NORTH BRANCH CHICAGO RIVER WATERSHED-BASED PLAN

05/22/08

FOR LAKE AND COOK COUNTIES, ILLINOIS

STORMWATER MANAGEMENT COMMISSION
333-B PETERSON ROAD
LIBERTYVILLE, ILLINOIS 60048

This publication was prepared using U.S. Environmental Protection Agency funding under Section 319 of the Clean Water Act distributed by the Illinois Environmental Protection Agency. The findings and recommendations contained herein are not necessary those of the funding agency.

E:\2006\06072\Reports\Natural Resources\Wetland\LCSMC Watershed Management Plan\06072 NB WMP 2008\2007 North Chicago River Watershed-Based Plan May.doc

TABLE OF CONTENTS

EXECUTIVE SUMMARY I

INTRODUCTION I

How the North Branch Chicago River Project Began ii
The North Branch Chicago River Watershed-Based Plan ii
USEPA Watershed-Based Plan Upgrades iii
Using this Document v
Watershed, River, Project & Plan v
Plan, Goals & Objectives v
Watershed Resource Inventory & Assessment v
Watershed Restoration and Management Techniques v
Action Plan v
From Plan to Performance vi

CHAPTER 1 : WATERSHED, RIVER, PROJECT & PLAN 1-1

1.1 North Branch Chicago……The Watershed 1-1
1.1.1 What is a Watershed? 1-1
1.1.2 North Branch Chicago River Watershed 1-2
1.2 North Branch Chicago……River or Ditch? 1-7
1.3 The North Branch Partnership 1-7
1.4 The North Branch Watershed Plan 1-8
1.4.1 Setting Goals & Objectives for the Plan 1-8
1.4.2 Assessing the Watershed Condition 1-9
1.4.3 Compiling a "toolbox" of watershed best management practices 1-9
1.4.4 Developing an Action Plan for the North Branch 1-9
1.5 Into the Future …..A Vision for the North Branch 1-10

CHAPTER 2 : PLAN GOALS & OBJECTIVES 2-1

2.1 Developing Plan Goals and Objectives 2-1
2.2 North Branch Chicago River Watershed Project Mission Statement 2-4
2.3 North Branch Chicago River Watershed Building Blocks Worksheet 2-4

CHAPTER 3 : WATERSHED RESOURCE INVENTORY & ASSESSMENT 3-1

3.1 Assessment Methodology 3-1
3.1.1 Data Collection Strategies 3-1
3.1.2 Geographic Information Systems 3-3
3.2 Watershed Setting 3-4
3.2.1 Geologic Setting 3-4
3.2.2 Pre-European Settlement Vegetation 3-4
3.2.3 Climate 3-7
3.2.4 Soils 3-7
3.2.4.1 Hydrologic Soil Groups 3-8
3.2.4.2 Hydric Soils 3-10
3.3 Historic Settlement and Resources 3-12
3.3.1 Human Settlement 3-12
3.3.2 Archeological Sites 3-13

3.3.3 Historic Structures 3-13
3.4 Jurisdictions in the North Branch Chicago River Watershed 3-15
3.5 Demographics 3-20
3.5.1 Lake County Demographic Forecast 3-20
3.5.1.1 Population & Households 3-21
3.5.1.2 Employment 3-22
3.5.2 Cook County Demographic Forecast 3-29
3.5.2.1 Population & Households 3-31
3.5.2.2 Employment 3-31
3.6 North Branch Chicago River Watershed Land Use 3-32
3.6.1 Land Use in Lake County 3-32
3.6.1.1 West Fork Land Use in Lake County 3-33
3.6.1.2 Middle Fork Land Use in Lake County 3-33
3.6.1.3 Skokie River Land Use in Lake County 3-33
3.6.2 Land Use in Cook County 3-34
3.6.3 Impacts of Land Use on Flooding, Water Quality and Streams 3-37
3.6.4 Open Land in the North Branch Chicago River Watershed 3-42
3.6.5 Transportation System 3-59
3.7 Conservation Land 3-61
3.7.1 Conservation Land in Lake County 3-61
3.7.2 Lands Identified for Conservation in Lake County 3-64
3.7.3 Conservation Land in Cook County 3-65
3.7.4 Greenways and Trails 3-67
3.8 Plants & Animals: Threatened & Endangered Species and Natural Areas 3-71
3.8.1 Threatened & Endangered Species 3-71
3.8.1.1 Sites of Threatened and Endangered Species 3-71
3.8.1.2 T&E Species Protection 3-71
3.8.2 Natural Areas & Nature Preserves 3-74
3.8.3 Development Impacts on T&E Species and Natural Areas 3-80
3.8.4 Planning Considerations for T&E Species and Natural Areas 3-80
3.9 Wetlands 3-80
3.9.1 Lake County Wetlands 3-81
3.9.1.1 High Quality (ADID) Wetlands 3-83
3.9.2 Cook County Wetlands 3-83
3.9.3 Future Wetland Impacts 3-84
3.10 Cultural Resources 3-85
3.11 Lakes 3-86
3.12 The River 3-88
3.12.1 General Description 3-88
3.12.1.1 West Fork 3-90
3.12.1.2 Middle Fork 3-90
3.12.1.3 Skokie River 3-90
3.12.2 River Assessment: A Stream Inventory, Lake County 3-91
3.12.2.1 Channel Conditions – Lake County 3-93
3.12.2.2 Discharge Points 3-102
3.12.2.3 Riparian Corridor/Floodplain 3-103
3.12.2.4 Aquatic Habitat 3-104

3.12.2.5 Aquatic and Terrestrial Organisms 3-106
3.13 Water Quality 3-107
3.13.1 North Branch Chicago River Urbanization and Water Quality 3-108
3.13.2 Assessment Data 3-109
3.13.2.1 IEPA Water Quality Reports 3-110
3.13.2.2 Biological Monitoring 3-113
3.13.2.3 Chemical Monitoring Data 3-115
3.13.2.4 Metal Contamination in North Branch Chicago River Sediments 3-120
3.13.3 Point Sources of Pollution 3-121
3.13.3.1 NPDES Permits 3-121
3.13.3.2 Sanitary and Stormsewer Infiltration and Inflows (I&I) 3-124
3.13.3.3 Other Potential Pollution Sources in the North Branch Chicago River 3-125
3.13.3.4 Conclusions 3-126
3.13.4 Nonpoint Source Pollutant Loading Analysis 3-129
3.13.4.1 North Branch Chicago River Watershed Pollutant Load Estimates 3-129
3.13.5 Water Quality Summary 3-133
3.13.6 An estimate of load reduction expected from management measures 3-134
3.14 Flooding 3-142
3.14.1 Hydrology and Hydraulics 3-142
3.14.1.1 North Branch: A Flashy Hydrology 3-142
3.14.1.2 Existing Studies/Floodplain Mapping 3-147
3.14.1.3 Drainage patterns: Defining stormsewersheds 3-150
3.14.1.4 Hydraulic Impoundments 3-152
3.14.1.5 Regulating Runoff/Preserving Floodplains, Lake County 3-153
3.14.1.6 Conclusions 3-156
3.14.2 Flood Damage 3-159
3.14.2.1 Studies/Reports 3-159
3.14.2.2 Flood Control Projects 3-161
3.14.2.3 Skokie Headwaters and North Chicago Flood Damage Reduction Feasibility Study (2006) 3-164
3.14.2.4 Lake County SMC Flood Problem Areas Inventory 3-167
3.14.2.5 Preliminary Identification of Structures at Flood Risk 3-170

CHAPTER 4 : WATERSHED RESTORATION AND MANAGEMENT TECHNIQUES 4-1
4.1 Water Quality Measures 4-1
4.1.1 Preventative Measures: Protecting Water Quality 4-1
4.1.1.1 Regulatory Requirements 4-2
4.1.1.2 Water Quality Best Management Practices 4-4
4.1.1.3 Riparian Buffers 4-7
4.1.1.4 Stream Maintenance 4-7
4.1.1.5 Nonpoint Source Pollution Prevention Program 4-8
4.1.2 Remedial Measures: Improving Water Quality 4-9
4.1.2.1 Detention Basin Retrofits 4-9
4.1.2.1.1 North Branch Detention Basin Inventory, Lake County 4-10
4.1.2.2 Outfall Retrofits Created Wetland Meanders 4-14
4.1.2.3 Streambank Stabilization 4-14
4.1.2.4 Correcting Sanitary and Stormsewer Infiltration and Illicit Discharges 4-15

4.2 Flood Damage Reduction Measures 4-16
4.2.1 Preventative Measures: Keep Flood Damage from Expanding 4-16
4.2.1.1 Floodplain Zoning 4-16
4.2.1.2 Floodplain Regulations 4-16
4.2.1.3 Floodplain Acquisition 4-17
4.2.1.4 Runoff Reduction 4-17
4.2.1.4.1 Infiltration Techniques 4-17
4.2.1.4.2 Alternative Site Designs 4-18
4.2.1.4.3 Stormwater Regulations 4-21
4.2.2 Remedial Measures: Fixing Flood Damage 4-22
4.2.2.1 Structural Flood Control 4-22
4.2.2.1.1 Reservoirs/Regional Detention 4-23
4.2.2.1.2 Detention Basins 4-23
4.2.2.1.3 Levees and Floodwalls 4-24
4.2.2.1.4 Barriers 4-24
4.2.2.1.5 Improved Channel Conveyance 4-24
4.2.2.1.6 Drainage Improvements 4-25
4.2.2.2 Non-Structural Flood Control 4-25
4.2.2.2.1 Building Relocation 4-25
4.2.2.2.2 Buyouts/Acquisition 4-26
4.2.2.2.3 Building Elevation 4-26
4.2.2.2.4 Floodproofing 4-26
4.2.2.2.5 Runoff Reduction 4-27
4.2.2.2.6 Insurance 4-27
4.3 Natural Resource Measures 4-28
4.3.1 Preventative Measures: Natural Resources Protection 4-28
4.3.1.1 Protecting Open Space and Natural Areas 4-28
4.3.1.1.1 Protected Ownership 4-28
4.3.1.1.2 Conservation Design Developments 4-31
4.3.1.2 Threatened and Endangered (T&E) Species 4-32
4.3.1.3 Greenways and Trails 4-32
4.3.1.4 Wetlands 4-33
4.3.1.4.1 No-Net-Loss/Wetland Mitigation 4-34
4.3.1.4.2 Management Plans for ADID Wetlands 4-34
4.3.1.4.3 Acquisition of High Priority Wetlands 4-35
4.3.1.4.4 Wetland/Stream Buffers 4-35
4.3.1.4.5 Wetland Incentives and Cost-Share Opportunities 4-35
4.3.2 Remedial Measures: Restoring Natural Resources 4-37
4.3.2.1 Stream Restoration 4-37
4.3.2.1.1 Pool/Riffle Complexes 4-37
4.3.2.1.2 Dam Removal 4-37
4.3.2.2 Wetland Enhancement and Restoration 4-38
4.4 Watershed Coordination Measures 4-38
4.4.1 Planning and Policy Coordination 4-38
4.4.1.1 Lake County North Branch Watershed Management Board 4-38
4.4.1.2 North Branch Planning Committee 4-38
4.4.1.3 MWRD Watershed Planning Council 4-39

4.4.2 Regulatory Coordination 4-39
4.4.2.1 The Watershed Development Ordinance 4-39
4.4.2.2 Wetlands Regulations 4-39
4.4.2.3 Municipal Advisory Committee 4-40

CHAPTER 5 : ACTION PLAN 5-1
5.1 Watershed Roles & Responsibilities 5-2
5.2 Programmatic Action Plan 5-11
5.2.1 Goal 1: Improve Water Quality in the North Branch Chicago River 5-11
5.2.2 Goal 2: Reduce Flood Damages in the North Branch Chicago River 5-13
5.2.3 Goal 3: Protect and Enhance Natural Resources and Provide Associated Recreational Opportunities 5-18
5.2.4 Goal 4: Develop a Public Information and Education Program within the Watershed Communities. 5-21
5.2.5 Goal 5: Improve Participation and Coordination in Watershed Improvement Activities 5-24
5.3 An Estimate of Load Reduction Expected From Management Measures 5-25
5.4 Site Specific Action Plan 5-28

CHAPTER 6 : FROM PLAN TO PERFORMANCE 6-1
6.1 Getting Projects Done 6-1
6.1.1 Coordination and Cooperation 6-1
6.1.2 Funding 6-2
6.2 Evaluating Plan Performance 6-2
6.3 Updating the Plan 6-2

LIST OF APPENDICES

APPENDIX LETTER	TITLE	PAGE NUMBER
A	Meeting Summaries	A1
B	Summary of North Branch Stream Reach Characteristics	B1 – B14
C	Discharge Points into the North Branch	C1 –C35
D	Hydraulic Structures in the North Branch	D1 – D9
E	Stream Inventory Photo Log	E1 – E46
F	Calculating Non-Point Source Pollutant Loading and Pollutant Loading Maps for North Branch Subwatersheds in Lake & Cook Counties	F1 – F39
G	Detention Basin Inventory Summary Table	G1 – G31
H	Potential Regionally Significant Storage Locations	H1 – H5
I	Existing Studies, Reports, Mapping and Data	I1 – I14
J	Funding Sources for Watershed Projects	J1 – J15
K	Maintenance, Management and Monitoring Plans for Recommended BMPs in the North Branch Watershed	K1 – K15
L	Glossary	L1 – L10
M	Acronyms and Abbreviations	M1 – M5
N	Education Plans	N1 – N13
O	Water Quality Monitoring Program for Metals	O1 – O3

LIST OF FIGURES

FIGURE NUMBER	TITLE	PAGE NUMBER
	CHAPTER 1	
1-1	Watershed Management Units	1-1
1-2	Regional Location of North Branch Watershed	1-3
1-3	North Branch Watershed Map	1-4
1-4	North Branch Chicago River Watershed in Lake and Cook Counties	1-5
	CHAPTER 3	
3-1	Glacial Moraines in Northeastern Illinois	3-5
3-2	Pre-Settlement Vegetation within Lake and Cook Counties	3-6
3-3	Hydrologic Soil Groups Lake and Cook Counties	3-9
3-4	Hydric Soils in Lake and Cook Counties	3-11
3-5	Drainage Districts - Lake County	3-17
3-6	Municipalities and Townships – Lake and Cook Counties	3-18
3-7	County Board Districts and Congressional Districts - Lake County	3-19
3-8	2000 To 2030 Population Change – Lake and Cook Counties	3-23
3-9	2000 To 2030 Employment Change – Lake and Cook Counties	3-24
3-10	2000 Population Density – Lake and Cook Counties	3-25
3-11	2030 Population Density – Lake and Cook Counties	3-26
3-12	2000 Employment Density – Lake and Cook Counties	3-27
3-13	2030 Employment Density – Lake and Cook Counties	3-28
3-14	2001 Land Use - Lake and Cook Counties	3-35
3-15	Parcels of Unknown Ownership	3-45
3-16	Open Space Inventory	3-47
3-17	Owner Type of Open Parcels	3-50
3-18	Public/Private Ownership	3-52

3-19	Protection Status	3-56
3-20	Recreational Use Type	3-58
3-21	2006-2011 Transportation Improvement Plan	3-60
3-22	Natural Areas, Illinois Nature Preserves and Threatened and Endangered Species	3-63
3-23	Forest Preserve District Land Holdings within the Cook County Study Area	3-66
3-24	Existing Greenways and Trails System with Protected Open Space-Lake County	3-69
3-25	Existing and Proposed Greenways and Trails	3-70
3-26	Natural Areas and Illinois Nature Preserves in Lake and Cook Counties	3-75
3-27	Biodiverse Areas – Lake and Cook Counties	3-77
3-28	Fieldwork Locations in Lake County Study Area	3-78
3-29	Remnant Landscapes	3-79
3-30	Wetland Inventory Map – Lake and Cook Counties	3-82
3-31	Surface Water Resources - Lake County	3-87
3-32	North Branch Chicago River Watershed	3-89
3-33	Stream Inventory Stream Reaches – Lake County	3-92
3-34	Pool/Riffle Development within Lake County	3-97
3-35	Streambank Erosion within Lake County	3-98
3-36	Sedimentation within Lake County	3-99
3-37	Instream Debris Loads within Lake County	3-100
3-38	Biotic Integrity Compared to Urbanization	3-109
3-39	Category 5 Impaired Waters	3-111
3-40	NPDES Permit Sites	3-123
3-41	Landfill and Compost Sites	3-127
3-42	US EPA Superfund Sites	3-128
3-43	Top Ranked Pollutant Loading Rates by Stormsewershed – Cook and Lake County	3-132
3-44	Rain and Stream Gages	3-144
3-45	Rainfall Hydrograph at Dundee Road (August 1990)	3-145
3-46	Comparative Hydrographs	3-146
3-47	Floodplains - Lake and Cook Counties	3-149
3-48	Stormsewersheds - Lake and Cook Counties	3-151
3-49	Gaged Discharges vs. Tributary Area	3-158
3-50	Flood Control Project Locations- Lake County	3-165
3-51	Potential Flood Problem Areas within the Skokie River Watershed- Lake County	3-166
3-52	Flood Problem Areas - Lake County	3-168
3-53	Flood of Record Boundaries - Lake County	3-175
	CHAPTER 5	
5-1	Open Space Within the Floodplain – Lake County	5-16
5-2	Potential Regional Storage – Lake County	5-17
5-3	Detention Basins Recommended for Water Quality Retrofits – Lake County	5-29
5-4	Priority Stream Inventory Reaches – Lake County	5-31
5-5	Potential Wetland Restoration Sites – Lake County	5-32
5-6	Priority Wetland Restoration Sites – Lake County	5-33
5-7	Potential Open Space Protection Sites – Lake County	5-34
5-8	Priority Open Space Protection Sites – Lake County	5-35

	APPENDIX F	
F-1	Pollutant Loading Biochemical Oxygen Demand	F-28
F-2	Pollutant Loading Chemical Oxygen Demand	F-29
F-3	Pollutant Loading Total Suspended Solids	F-30
F-4	Pollutant Loading Total Dissolved Solids	F-31
F-5	Pollutant Loading Total Nitrogen	F-32
F-6	Pollutant Loading Total Phosphorus	F-33
F-7	Pollutant Loading Total Copper	F-34
F-8	Pollutant Loading Total Lead	F-35
F-9	Pollutant Loading Total Zinc	F-36
F-10	Pollutant Loading Total Cadmium	F-37

LIST OF TABLES

TABLE NUMBER	TITLE	PAGE NUMBER
	CHAPTER 1	
1-1	A Quick View of the North Branch	1-2
1-2	Topics Covered in Watershed Assessment	1-9
	CHAPTER 2	
2-1	Key Problems and Opportunities in the North Branch Chicago River Watershed	2-11
	CHAPTER 3	
3-1	Watershed Assessment Data Sources	3-2
3-2	GIS Layers Used for the Watershed Assessment	3-3
3-3	Predominant Soil Types , North Branch Watershed, Lake and Cook Counties	3-8
3-4	Characteristics of Hydrologic Soil Groups	3-8
3-5	Acreage of Hydrologic Soil Groups in the Watershed, Lake and Cook Counties	3-10
3-6	Acreage of Hydric Soils in the Watershed, Lake and Cook Counties	3-10
3-7	Historic Bridges	3-14
3-8	Major Political Jurisdictions in the North Branch Chicago River Watershed	3-16
3-9	CMAP Forecast Data for the North Branch Chicago River Watershed, Lake County	3-20
3-10	CMAP Forecast Data for the North Branch Chicago River by Subwatershed, Lake County	3-21
3-11	CMAP Forecast Data for the North Branch Watershed, Cook County	3-29
3-12	CMAP Forecast Data for the North Branch by Subwatershed, Cook County	3-30
3-13	Land Use in the North Branch Watershed	3-36
3-14	Impervious Cover Estimates North Branch Chicago River Watershed	3-37
3-15	Watershed Development Trends, Lake County	3-38
3-16	Geometric Mean Concentrations of Pollutants in Stormwater Runoff from Selected Urban Source Areas	3-40
3-17	Highway Runoff Constituents and their Primary Sources	3-41
3-18	Acreage of Open Space in North Branch Watershed	3-43
3-19	Parcel Size and Estimated Value	3-44
3-20	Owner Type Summary for Open Parcels	3-48
3-21	Owner Type Summary for Partially Open Parcels	3-49
3-22	Public/Private Ownership	3-51
3-23	Protection Status by County and Watershed	3-54
3-24	Protection Status by Subwatershed	3-55
3-25	Forest Preserves in the North Branch Watershed - Lake County	3-61
3-26	Definitions: State and Federal T&E Species	3-71
3-27	T&E Plant and Animal Species in the North Branch Chicago River Watershed	3-73
3-28	Wetlands in the North Branch Watershed	3-81
3-29	Protection for ADID Wetlands	3-83
3-30	North Branch Lakes, Lake Co.	3-86

3-31	Lake County Stream Reaches	3-91
3-32	Channel Shape Characteristics, Lake County	3-94
3-33	Pool/Riffle Development in Lake County Reaches	3-94
3-34	Lake County Streambank Erosion Problems	3-95
3-35	Sediment Accumulation in Lake County	3-96
3-36	Instream and Overbank Debris Load in Lake County Reaches	3-101
3-37	Hydraulic Structures North Branch, Lake County	3-101
3-38	Discharge Points for North Branch Chicago River, Lake County	3-103
3-39	Land Use in Riparian Corridor, Lake County	3-103
3-40	Vegetation on Stream Banks, Lake County	3-104
3-41	Predominant Substrate Composition, Lake County	3-104
3-42	Number of Stream Reaches with Instream Fish Cover	3-106
3-43	Examples of Point and Nonpoint Source Pollution	3-107
3-44	Summary of Use Support Assessment Criteria and Biological Characteristics for Illinois Streams	3-110
3-45	IEPA Two-Year Schedule for TMDL Development	3-112
3-46	IDNR Lake Michigan Tributaries Fish Survey, July 27-31, 2006	3-114
3-47	MWRD Study of Benthic Macroinvertebrate Communities, 2006	3-115
3-48	IEPA Middle Fork Chemical Water Quality Data at Station HCCC-02	3-116
3-49	IEPA North Branch Chicago River Average Water Contamination Analysis From April 1999 through December 2003	3-117 – 3-120
3-50	IEPA North Branch Chicago River Sediment Contamination Analysis	3-121
3-51	NPDES Permitted Discharges to the North Branch Chicago River	3-122
3-52	Landfill Locations in the North Branch Chicago River Watershed	3-125
3-53	Pollutants Addressed in Loading Analysis	3-126
3-54	Average Pollutant Loading Rates by SSS for Priority Pollutants in the North Branch Chicago River Watershed (pounds/acre/year)	3-130
3-55	Estimated Annual Pollutant Loading Rates by Stormsewershed	3-131
3-56	Pollutant Load Reduction – Detention Basin Retrofits	3-136
3-57	Pollutant Load Reduction – Outfall Retrofits/Repairs	3-137
3-58	Pollutant Load Reduction – Stream Restoration and Maintenance	3-138
3-59	Pollutant Load Reduction – Potential Wetland Restoration Sites	3-138
3-60	Pollutant Load Reduction – Open Space Protection	3-139
3-61	Pollutant Load Reduction – Flood Mitigation Sites	3-140
3-62	Pollutant Load Reduction – Hydraulic Structures	3-141
3-63	Estimated Annual Pollutant Load Reduction for Streambank Stabilization by Stream Reach	3-142
3-64	Stream Gage Stations in the North Branch Watershed	3-144
3-65	Hydraulic Analysis and Floodplain Mapping Limits for Lake County	3-149
3-66	Stormsewersheds (SSS)	3-151
3-67	North Branch Flows per Tributary Area (FIS Study)	3-155 – 3-157
3-68	SCS Annual Projected Flood Damage in the North Branch by the Year 2000	3-160
3-69	Projected Residential Damage by Subwatershed for the North Branch, Lake & Cook Counties	3-161
3-70	USACE Annual Projected Flood Damage through 2020	3-162
3-71	Proposed/Constructed Flood Control Reservoirs North Branch Watershed	3-163
3-72	Flood Problem Sites North Branch Chicago River Watershed	3-170
3-73	Flood Damage Profile for the North Branch Watershed Flood Problem Areas Inventory, 1995	3-171

3-74	Preliminary Identification of Structures Located within the 100-Year Floodplain of the North Branch Chicago River, Lake & Cook Counties	3-173 – 3-174
	CHAPTER 4	
4-1	BMP Effectiveness Toward Meeting BMP Objective	4-5
4-2	Comparison of Median Pollutant Removal Efficiencies	4-6
4-3	Median Pollutant Removal Reported for Selected BMP Groups: Fecal Coliform, Hydrocarbons and Selected Trace Metals	4-6
4-4	Potential Pollutant Removal Capability of Urban Stream Buffers	4-7
4-5	Source Reduction Activities	4-9
4-6	North Branch Chicago River Watershed Detention Basins	4-11
4-7	North Branch Chicago River Watershed Detention Basin Types & Pollutant Removal Effectiveness	4-20
4-8	Relationship Between Impervious Cover and Stream Quality	4-20
4-9	Innovative Site Planning Techniques and Their Effect on Impervious Cover	4-22
4-10	WDO Runoff Volume Reduction Hierarchy	4-22
4-11	Benefits and Drawbacks to Structural Flood Control Measures	4-23
	CHAPTER 5	
5-1	North Branch Chicago River Watershed Partners, Lake County	5-2
-	Programmatic Action Plan	-
-	Site Specific Action Plan - Organized by Community	-

North Branch Chicago River Watershed-Based Plan

EXECUTIVE SUMMARY

In Lake County, the Lake County Stormwater Management Commission (SMC) is responsible for managing Lake County's water resources. The North Branch Chicago River Watershed-Based Plan was developed to provide direction and target resources for better management and restoration of the watershed. This plan serves as a blueprint for improving water quality, reducing flood damage, and protecting natural resources in the North Branch Chicago River Watershed. Watershed plans also provide an opportunity for multiple jurisdictions with varying priorities to coordinate their efforts and accept their responsibility for the impact their actions have both up and downstream. As Lake County continues to grow, there is a need to predict and manage how land use changes will affect the North Branch Chicago River and its' watershed.

INTRODUCTION

The North Branch Chicago River Watershed encompasses over 50.4 square miles in Lake County, and 44.4 square miles in Cook County. The total watershed area is 60,658 acres, with 32,240 acres in Lake County and 28,418 acres in Cook County. Twenty-five municipalities comprise most of the watershed's area. Natural open spaces have been converted to agricultural, commercial, and residential uses. Flood damage has occurred and water quality and habitat have been degraded. The Lake County Stormwater Management Commission (SMC) hired V3 Companies to update and expand the 2000 Final Draft of the North Branch Chicago River Watershed Assessment and Management Plan for Lake County. Applicable content from the 2005 North Branch Chicago River Open Space Plan (NBOSP) was incorporated into the updated watershed-based plan. The original 2000 plan and this updated plan were both funded in part by the Illinois Environmental Protection Agency (IEPA) through Section 319 of the Clean Water Act (CWA) and by the SMC.

This watershed assessment and plan was developed with the assistance and input of a variety of watershed stakeholders. The watershed plan is one component of a larger watershed project undertaken by a partnership of watershed stakeholders with substantial funding support from the IEPA. Watershed partners came together to provide leadership for watershed communities and residents in developing a new vision for the degraded North Branch Chicago River as described in the following mission statement.

NORTH BRANCH WATERSHED PROJECT MISSION STATEMENT

Identify opportunities for North Branch Chicago River watershed communities to integrate multi-objective watershed management in land use planning and development activities. The North Branch Chicago River Project strives to improve degraded conditions in the watershed by combining water quality improvement, water quantity control, flood damage reduction and natural resource protection and enhancement objectives in watershed-based best management practice projects and programs.

How the North Branch Chicago River Project Began

The North Branch Chicago River watershed partnership originated from an ad hoc group coordinated by the non-profit river advocacy organization Friends of Chicago River (Friends) in the early 1990s. This ad hoc group co-sponsored two watershed stakeholder workshops in 1991 and 1992 at the Chicago Botanic Gardens known as Voices from the Stream. The Voices workshops were dedicated to identifying issues important to North Branch Chicago River watershed residents and providing a vision for the future of the watershed.

Following Voices from the Stream, a congressional appropriation sponsored by Congressman Sidney Yates prompted the National Park Service to initiate the ChicagoRivers Demonstration Project in 1993. A number of government agencies participated in the project along with the Friends and other volunteers from the ad hoc partnership workgroup. As part of the project, the government agencies studied and assessed the condition of the entire 156 miles of the Chicago River waterway system - including natural resources such as wetlands, fish and macroinvertebrates, water pollution and sediment contamination, and resident attitudes towards the river. The ChicagoRivers project was intended to galvanize local interest in the conservation and use of the Chicago River and to promote local stewardship.

During the same time the ChicagoRivers study was being conducted, a core group of watershed partners continued to work on improving the North Branch Chicago River through restoration projects. The North Branch Chicago River Watershed Project was born out of the continued interest and commitment demonstrated by these partners as they worked on successive projects in the North Branch Chicago River.

The North Branch Chicago River Watershed-Based Plan

Based on their active involvement in watershed projects throughout this time period, Friends received an IEPA section 319 Grant in 1996 to develop a more formal watershed partnership, and a strategy for restoring and managing a 94 square mile area of the North Branch Chicago River watershed. The watershed strategy would be embodied in a watershed management plan that identified solutions for water pollution, flood reduction, and protection and restoration of natural resources. Friends contracted with Kirk Gregory, a professor at Northeastern Illinois University (NEIU), to complete a watershed assessment and plan for the Cook County portion of the North Branch Chicago River. NEIU students would conduct the watershed assessment under the guidance of Professor Gregory, and NEIU would become a watershed partner in future projects to study and monitor the condition of the river. At the same time, Friends entered into a cooperative agreement with SMC to assess the watershed condition and develop a management plan for the Lake County portion of the watershed. SMC had long been involved in restoration initiatives in the North Branch Chicago River. SMC was a member of the team that planned the Voices workshops in the early 90's, and participated with the Friends and other partners in a number of watershed projects and events in the following years.

SMC and NEIU worked together to select a methodology for the stream assessment, a nonpoint source pollutant loading model, and to identify sources of data for other components of the watershed assessment. A watershed assessment for the Cook County North Branch Chicago River was completed in 1998, but insufficient funding and the lack of a designated planning authority precluded the completion of a more detailed watershed assessment and full watershed management plan for Cook County. Although there is considerable difference in the level of detail, the North Branch Planning Committee decided to combine the Cook County and Lake County watershed assessments in this plan document (Chapter 3) to provide a more complete view of the entire watershed project area. As a result, while the watershed assessment in Chapter 3 reflects the most up-to-date information for the entire study area, there are some discontinuities between the Cook and Lake County portions of the watershed assessment due to differences in informational detail and mapping.

The ultimate goal of the North Branch Chicago River Watershed Project is to develop a watershed action plan for the entire North Branch Chicago River project area including both Lake and Cook Counties. While SMC was the logical partner to undertake the planning effort for Lake County, there was no comparable agency in

Cook County to develop the Cook County plan. (SMC has no planning authority or funding support to develop a management plan for the Cook County project area.) Therefore, the watershed management plan (Chapter 5 Action Plan) is for the northern half of the watershed in Lake County only. The Metropolitan Water Reclamation District of Greater Chicago (MWRD) is initiating a watershed management plan for the North Branch Chicago River in Cook County.

The first draft of the Lake County watershed assessment and plan was completed in February 1999. Following revisions based on comments from IEPA, SMC staff and Friends, a second draft of the plan was completed and mailed out for a 60-day public review in August 1999. A public hearing was held in September of 1999. Comments from the public, peer agency and municipal review received through mid-November 1999 were compiled for the North Branch Planning Committee. Over 300 individual comments were incorporated into a comment/response summary. The North Branch Planning Committee discussed comment responses that would result in substantive changes to the plan at meetings in December 1999 and January 2000. Technical guidance for responding to comments related to the water quality and hydrology and hydraulics sections of the plan was provided by the Water Quality Work Group and SMC technical staff respectively at meetings in December 1999. The resulting revisions were incorporated into the Final Draft which was adopted by the Lake County board in fall 2000.

In 2007, the update and expansion of the North Branch Chicago River Watershed Plan was completed. Updated information was gathered from municipalities, local, state, and regional agencies and other interested parties. This plan provides conclusions about current conditions and recommendations for improvements. This plan also incorporates the United States Environmental Protection Agency (USEPA) nine elements of a Watershed-Based Plan (WBP).

USEPA Watershed-Based Plan Upgrades

In October 2003, the USEPA released watershed protection guidance entitled "Nonpoint Source Program and Grant Guidelines for States and Territories". The document was created to ensure that Section 319 funded projects make progress towards restoring waters impaired by nonpoint source pollution. Under the guidance, nine elements are required in order for a plan to be considered a WBP. As described below, the updated and expanded North Branch Chicago River Watershed Plan addresses all nine elements of a WBP. The nine elements are as follows:

1. *Identification of the causes of impairment and pollutant sources that need to be controlled to achieve needed load reductions, and any other goals identified in the watershed plan.*

   A summary of the causes of water quality impairment and pollutant sources can be found in Chapter 3.13. A review of point and non-point pollutant sources, detention basin data, the location of landfills and Superfund sites, and a compilation of data from biological and chemical monitoring, river sediment sampling data, and previous water quality reports were reviewed.

2. *An estimate of the load reductions expected from management measures.*

   The projected load reductions through site specific project implementation have been provided in Chapter 3.13. The water quality best management section within Chapter 4 (4.1.1.2), contains information on the effectiveness of Best Management Practices (BMP) to reduce water quality impacts. See tables 4-1, 4-2, and 4-3. Appendix F gives a detailed explanation of pollutant loading and reduction methodology.

3. *A description of the nonpoint source management measures that will need to be implemented to achieve load reductions identified above, and a description of the critical areas in which those measures will needed to implement this plan.*

Nonpoint source pollution originating from within the stormsewersheds are ranked with respect to the frequency of being one of the most significant contributors of contaminant loading within the watershed. The most significant stormsewershed contributors are listed as potential significant areas and are shown on Figure 3-43. The discussion of management measures that can achieve load reductions are discussed in Chapter 3.13 and 4.1.

4. *Estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement this plan.*

   The action plan tables, found in Chapter 5, contain information related to technical and financial needs for each programmatic and site specific recommendation. Technical and financial assistance needs were determined based on the complexity of implementing the recommended actions. Lead and supporting agencies that should be consulted are also listed. Cost and funding sources for each recommendation vary but are based on the best available information.

5. *An information and education component used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the nonpoint source management measures that will be implemented.*

   Existing and proposed education programs were evaluated to determine how well these programs address the goals and objectives of the WBP. Based on this evaluation, additional programs and educational action items were recommended to address goals and objectives that existing programs fail to address. The Chapter 5 programmatic action plan and Chapter 6 milestones and measurable goals for Goal 4 (Develop a public information and education program within the watershed communities), include these recommendations with implementation schedules, lead agencies/owners responsible, technical/financial assistance information, and measurable goals.

6. *Schedule for implementing the nonpoint source management measures identified in this plan that is reasonably expeditious.*

   Each programmatic and site specific recommendation in the action plan tables (Chapter 5) was assigned an implementation schedule based primarily on priority, cost, and technical/financial needs. Implementation schedules were based on immediate needs (0-5 years), medium term needs (5-10 years), and long term needs (10-20) years. High priority areas are generally recommended for 0-5 year implementation unless costs or available technical assistance prevent this. Other recommendation items were recommended for medium and long term implementation when funding and assistance are available.

7. *A description of interim measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented.*

   Milestones determine if management measures are being implemented and how effective they are at achieving plan goals and objectives over time. Milestones are evaluated using measurable indicators related to watershed characteristics such as physical, chemical, biological, and social components. In the Chapter 6 tables, milestones and measurable goals were developed for each goal and objective. These measurable goals and milestones will be evaluated for plan performance, using the scorecards found in Chapter 6.

8. *A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards.*

The Chapter 2 Building Blocks Worksheet for goals and objectives identifies means for evaluation watershed improvements. Nonpoint source pollutant loads are identified in Chapter 3.13. The set of criteria that can be used to determine improvements in water quality through load reductions and the progress towards attaining water quality standards is also provided within this section. An overall assessment plan (scorecards) to determine achievement in loading reductions is outlined in Chapter 6.2 and Table 6.1.

9. *A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established above.*

   The set of criteria that can be used to determine the effectiveness of the implementation efforts over time is outlined in Chapter 6.2 and Table 6.1. Appendix K includes maintenance, management, and monitoring plans for the recommended BMPs in order to facilitate the continued water quality benefits of installed BMPs over time.

Using this Document

Watershed, River, Project & Plan

The information provided within this section includes an overview of the North Branch Chicago River watershed, the North Branch Partnership, the North Branch Chicago River Project, the North Branch Chicago River Watershed Plan, and the overall vision for the North Branch Chicago River. The North Branch Chicago River Project subsection summarizes public outreach and education programs, demonstration projects, and the watershed handbook. The North Branch Chicago River plan summarizes the establishment of goals and objectives, assessing the watershed condition, a "toolbox" for BMPs, and developing an action plan for the North Branch Chicago River.

Plan, Goals & Objectives

The Plan, Goals & Objectives section describes the overall goals and objectives (G&O's) as established at the stakeholders and partner forums. The G&O's for the North Branch Chicago River Watershed Management Plan follow the format from the December 2003 USEPA publication titled "Getting In Step, A Guide for Conducting Watershed Outreach Campaigns". During the North Branch Planning Committee meetings, participants discussed and completed the G&O from the Building Blocks Worksheets.

Watershed Resource Inventory & Assessment

The purpose of this section was to provide detailed information on existing conditions in the watershed. This information serves as baseline data for comparison with future watershed assessments. While the Cook County assessment is included in this chapter to describe the overall watershed picture, it is less detailed than the Lake county assessment and the action plan recommendations in Chapter 5 are directed to Lake County only.

Watershed Restoration and Management Techniques

The watershed restoration and management techniques described in Chapter 4, when applied to the North Branch Chicago River, can achieve the watershed goals and objectives identified in Chapter 2. The watershed techniques presented are broadly organized to reflect the plan goals of flood damage reduction, water quality improvement, natural resources protection and increased watershed coordination. Within each of the Goals Sections, the watershed measures are then categorized as being either Preventative or Remedial in nature.

Action Plan

The Action Plan chapter attempts to answer the questions, "who, what, where and when" regarding watershed improvements. This chapter is divided into three parts. The first section includes a description of the roles and responsibilities of the affiliated partners or "stakeholders" in North Branch Chicago River watershed management. The second and third sections of the Action Plan include the action recommendations.

From Plan to Performance

The Plan to Performance section provides guidance for the implementation of the watershed plan. It discusses both the coordination and cooperation efforts made by project leaders and watershed stakeholders. In addition, sources of funding, evaluating the performance plan, and updating the plan are also discussed.

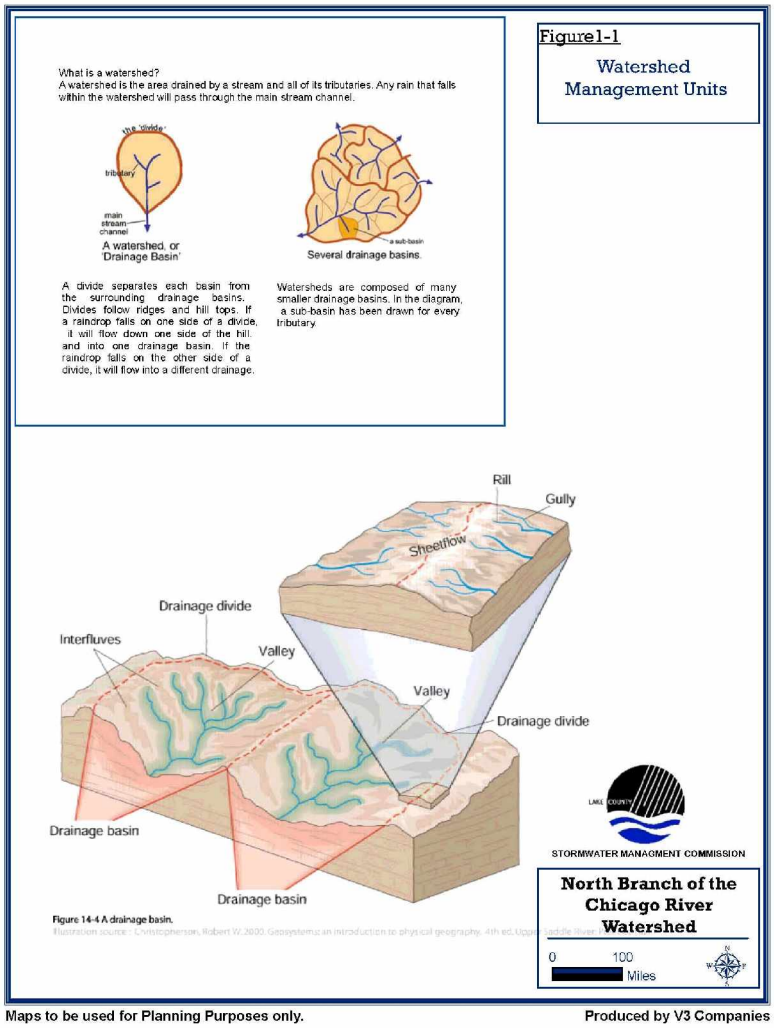
CHAPTER 1 : WATERSHED, RIVER, PROJECT & PLAN

1.1 North Branch Chicago River .....The Watershed

1.1.1 What is a Watershed?

Water from rainfall or snowmelt on a certain area that does not evaporate or infiltrate into the ground is called runoff. The runoff generated on a certain drainage area flows overland as a sheet flow or concentrated flow (on flow paths, ditches or stormsewers) to wetlands, lakes, streams or rivers. The geographic area of land that drains water to a particular stream, lake or wetland is referred to as its watershed. More specifically, the watershed is the area of land confined by topographic divides surrounding a stream, river, wetland, lake, or other waterbody that drains to that particular waterbody. The watershed includes not just the surface of the land, but also the area below the surface where precipitation that infiltrates into the soil flows toward the receiving stream or waterbody as underground flow.[1]

Watersheds vary in size and shape. The drainage area is the most important watershed characteristic that affects the amount of runoff generated on that watershed. The larger the contributing area, the larger will be the amount of runoff. The average slope, the soil type and the hydraulic roughness (land cover) are also important watershed characteristics that affect the volume of runoff. Larger rivers and streams have larger drainage areas that can be divided into several subwatersheds, which are subdrainage areas within that watershed. Each subwatershed has at least one flowline that represent the concentrated flow in that particular subwatershed. Each subwatershed can be considered as a watershed management unit. Figure 1-1 is a graphic depiction of how watershed management units fit together to form a river basin/watershed.



[1] *Underground flow is also known as groundwater. Shallow groundwater flows into streams, lakes and wetlands, and maintains water levels in the waterbody during periods of low rainfall such as in the dry summer months - this flow is referred to as the base flow of the river of stream.*

1.1.2 North Branch Chicago River Watershed

There are three main tributaries of the North Branch Chicago River, each of them having its own subwatershed: the West Fork of the North Branch subwatershed, the Middle Fork of the North Branch subwatershed, and the Skokie River subwatershed. The North Branch watershed is also a subwatershed of the larger Chicago River Watershed that is formed of the North and South Branches of the Chicago River. The Chicago River Watershed is a sub-basin of the larger Illinois River Watershed. Figure 1-2 shows the regional location of the North Branch Watershed study area within the context of the regional river system.

The study area for this watershed plan incorporates the portion of the North Branch watershed that includes the subwatersheds of the West Fork and Middle Fork tributaries and Skokie River, as well as a short reach of the mainstem. This includes the entire North Branch watershed in Lake County and that part of the watershed upstream of the North Shore Channel in Cook County. Figure 1-3 shows the location of the subwatersheds of the North Branch.

The project study area of the North Branch watershed in Lake and Cook Counties is approximately 94 square miles or 60,649 acres in size, with north and south boundaries roughly extending from Route 132 (Grand Avenue - Waukegan) in Lake County to Dempster Street (Morton Grove) in Cook County.[2] A little more than half of the project area (50.4 square miles), including the headwaters of the river, is located in the rapidly-developing suburban Lake County, while 44.4 square miles are located in the more highly developed and densely populated Cook County area (Table 1-1).

Table 1-1
A Quick View of the North Branch

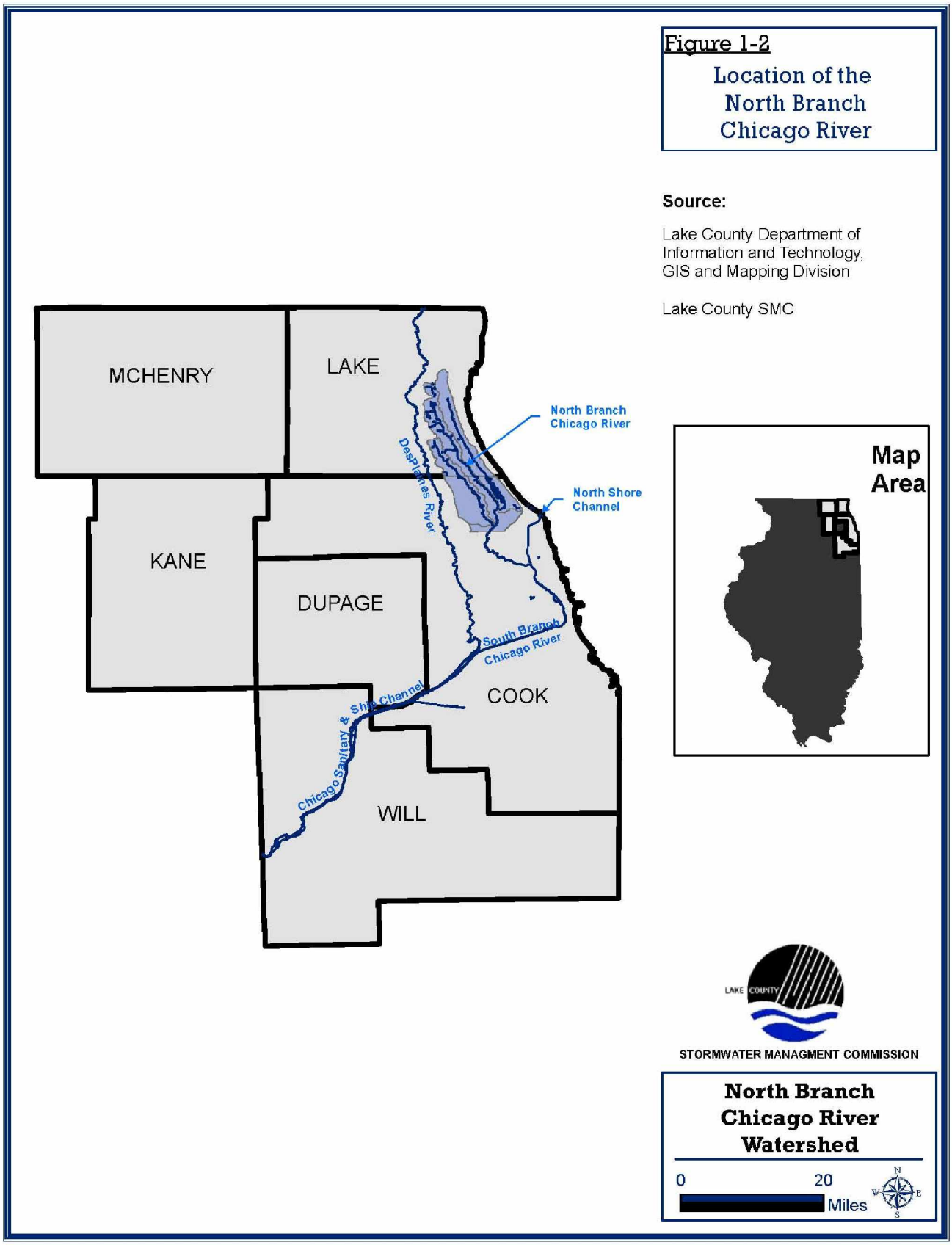
Jurisdiction:
25 municipalities (14 Lake Co; 11 Cook Co.)
- 11 townships (7 Lake Co.; 4 Cook Co.)
- 4 drainage districts

Estimated Demographic Change 2000-2030	**Lake (%)**	**Cook (%)**	
Population	11	3	
Households	10	6	
Employment	15	23	
Land Use (2001):	**Lake (%)**	**Cook (%)**	**Both (%)**
Residential	45	53	49
Commercial	7	8	8
Institutional	5	5	5
Industrial	5	4	4
Transportation	4	2	3
Agricultural	3	1	2
Conservation/ Recreation (open space)	17	21	19
Vacant*	12	2	7
Vacant under development	1	2	2
Water	1	2	1
Special Resources	**Lake (ac.)**	**Cook (ac.)**	
Forest Preserves	1,745	3,410	
Wetlands	4,473	1,157	

- Skokie Lagoons: a series of 7 lagoons (270 acres) created by a dam at Willow Road. An exceptional resource for fishing and recreational activities.
- Chicago Botanic Gardens: 385-acre site with 75 acres of lagoons.
- Plants & Animals
  - 40 threatened and endangered species.
  - 13 Illinois Natural Area Inventory sites and Nature Preserves.

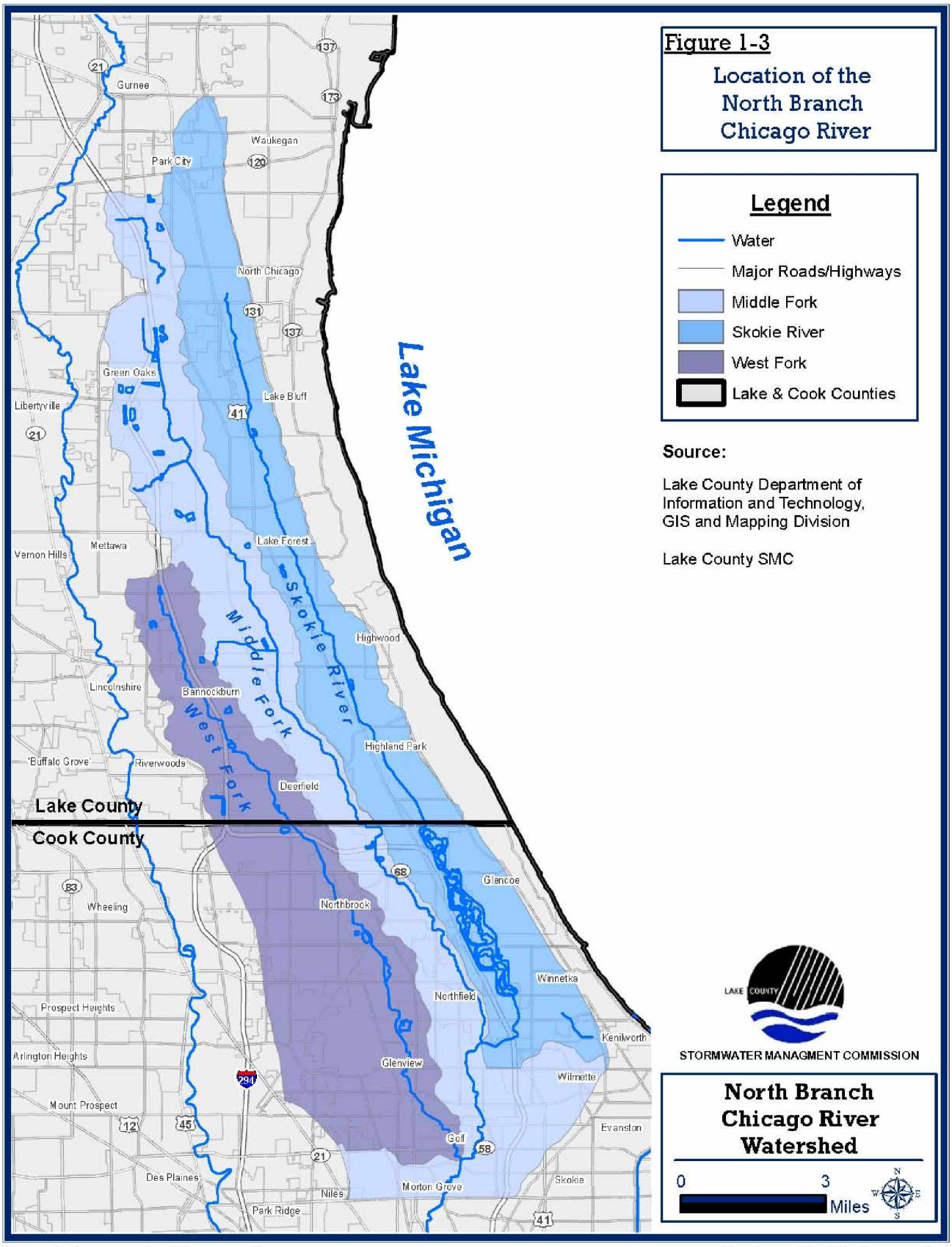
* Includes vacant forest and grassland, wetlands greater than 2.5 acres, and other vacant areas not under development.

[2] *Initially, the North Branch project study area extended to Touhy Avenue in Cook County covering an area of 102 square miles, however, the study area was changed to include only the portion of the watershed that has separate stormwater and sanitary sewer systems. The watershed area south of Dempster was not included in the project study area because it drains into the combined sewer system that serves most of the City of Chicago.*



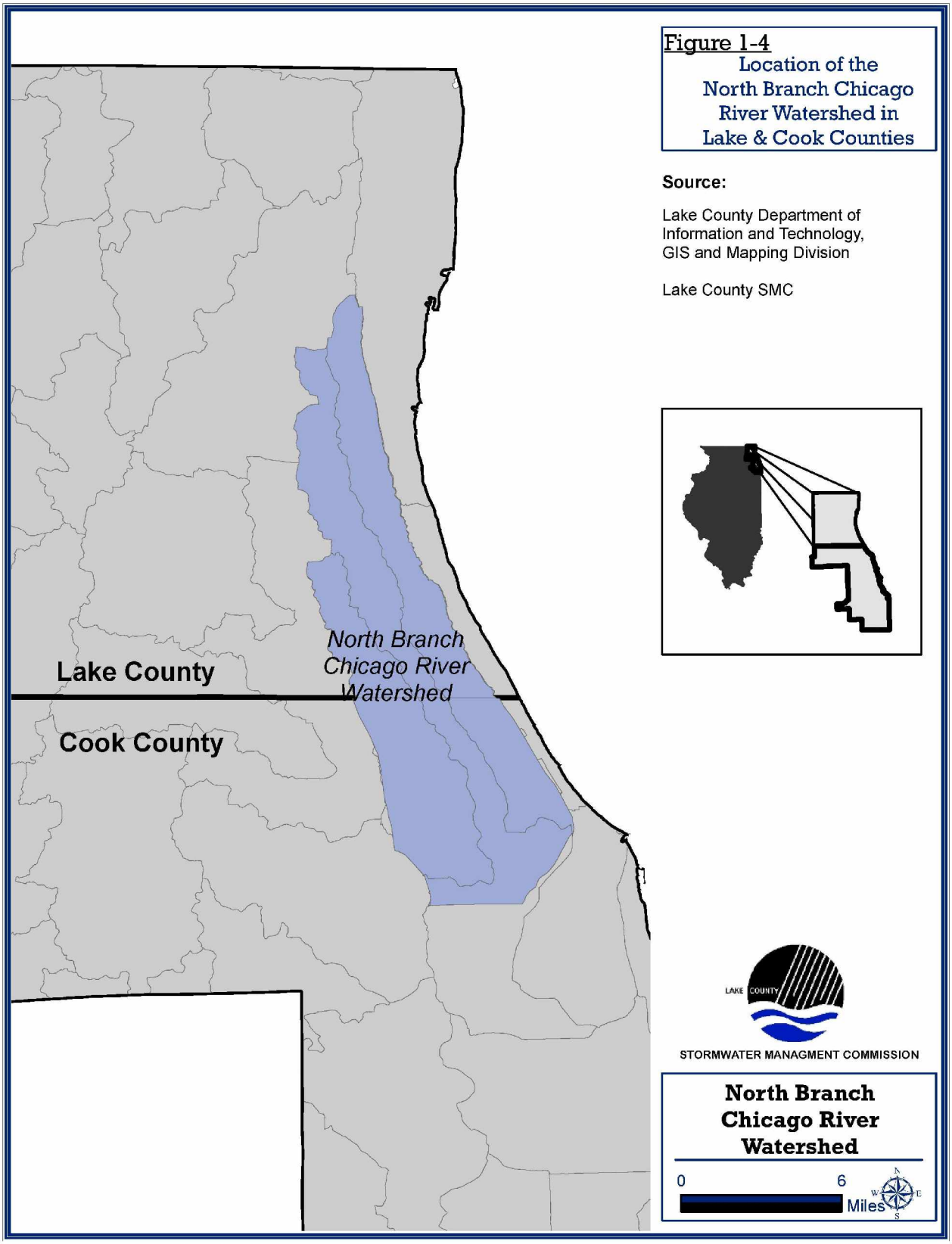
Maps to be used for Planning Purposes only.

Produced by V3 Companies



Maps to be used for Planning Purposes only.

Produced by V3 Companies



Maps to be used for Planning Purposes only.

Produced by V3 Companies

Figure 1-4 identifies the location of the three subwatersheds that comprise the North Branch Watershed in Lake and Cook Counties in relation to the County's remaining 23 subwatersheds. As can be seen from this map, the area of the North Branch Watershed represents a significant portion of the southeast quarter of Lake County.

European settlement dramatically changed the landscape of the North Branch watershed over a period of 150 years. As natural open land, the North Branch landscape was once composed of savanna, woodlands, prairie and wetlands. These natural features are only represented as remnants within the watershed today. Watershed land use changed from its natural condition to predominately farmland in the 1800's, began urbanizing in the early 1900's, and suburbanizing following World War II.

Today the North Branch is an urban watershed that includes downtown areas, city neighborhoods and suburban municipalities. The watershed also includes a limited amount of undeveloped area that is characterized by encroaching urban sprawl. Improved drainage systems have been a significant component of land use change in the watershed. The stormsewer and drainage systems, rooftops, driveways, roads, highways, and parking lots that characterize the landscape of the North Branch all impact the watershed by causing water to move off the land more quickly. As results, larger amounts of stormwater reach the streams in shorter periods of time. Despite the fact that in the last 15 - 20 years there were adopted several measures in order to improve the level of flood protection and stormwater management in North Branch Watershed, stream channels overflow in some areas flooding streets and buildings, and causing significant economic damage. These are mostly located in areas developed before adopting stormwater ordinances that regulate and control the new developments in the North Branch Watershed.

The health of the North Branch Chicago River is a direct reflection of land use activities throughout the watershed. How people develop the watershed, and how they live in the watershed following urban development, can have a dramatic effect on the condition of the river, wetlands and lakes in the watershed. In addition to increasing the volume and rate of runoff, urban development in the North Branch has deluged the river with pollutants carried in the stormwater. Pollutants such as oil and grease, salt, sediment, metals, bacteria and excess nutrients (nitrogen and phosphorus) that are washed from streets, buildings, parking lots, construction sites, lawns and golf courses when it rains are transported through stormsewers and end up in the river. This kind of pollution is called nonpoint source pollution. Sources of these pollutants include construction erosion, pet wastes, lawn fertilizer and pesticides, automobiles, road salt and others. A combination of pollutants, detention basins and alteration of the physical stream habitat can also increase water temperature or alter the pH and dissolved oxygen levels in the river making it unhealthy for aquatic life.

As described above, the condition of urban watersheds like the North Branch has many real consequences. In contrast, healthy watersheds offer many benefits including:

- a healthy river with better water quality;
- enhanced opportunities for recreation and environmental education;
- opportunities for environmentally sustainable economic development;
- better wildlife habitat;
- reduced flood damage; and
- a safe drinking water supply (for watershed residents or downstream communities).

Outreach efforts indicate that many North Branch watershed residents give little thought to the river except when it floods their property. For the most part, those residents who are aware of the river think of it as being a ditch for stormwater conveyance rather than as a valuable water resource. They have a difficult time seeing the potential for a restored river while looking at the ditch. But, in spite of its poor reputation, the North Branch is still home to high quality wetlands, nature preserves, and threatened and endangered plants, animals and natural communities. These natural features have stimulated a number of dedicated residents to

share a new view of the river and watershed. They see a river and watershed that offer great potential for restoration - and watershed resources that warrant protection as the watershed continues to be developed.

1.2 North Branch Chicago.....River or Ditch?

The North Branch Chicago River (North Branch) is, as its name implies, an urban river. It originates as three forks (tributary streams): the 14-mile West Fork, 24-mile Middle Fork (also known as the West Skokie), and the 17-mile Skokie River. From their origins in Lake County, these tributaries flow south into Cook County where they converge to form the mainstem of the North Branch (Figure 1-2). The North Branch flows south through Cook County to its confluence with the North Shore Channel and joins the South Branch of the river in downtown Chicago. The South Branch flows into the Chicago Sanitary and Ship Canal where it is diverted westward joining with the Des Plaines River as a tributary of the Illinois River. The Illinois River flows southwest across the state and is a major tributary of the Mississippi River.

Prior to 1898, the Chicago River flowed into Lake Michigan. However, due to pollution and health problems that arose from the city's sewage discharge from the river into the Lake (Chicago's drinking water supply), the flow of the Chicago River was reversed and diverted from Lake Michigan into the Mississippi River basin through the new Chicago Sanitary and Ship Canal that was opened on January 2, 1900.

As with the watershed, the river has undergone significant change since the time of European settlement in the early/mid 1800s. Two hundred years ago, the river would have been described as a marshy slough meandering slowly, falling imperceptibly as it flowed southward. The clear waters of the river channels supported marsh plants such as bulrushes and water lilies. Extending from the river were wet prairies and meadows interspersed and bordered by oak savannas that were situated on the higher ground in the watershed.

The North Branch underwent its first dramatic change when its tributaries were straightened and deepened for agricultural drainage in the late 1800s and early 1900s. No longer a meandering slough, the river more closely resembled a ditch. The land surrounding the river also changed as wetlands were tiled and drained and farming was expanded. Native oak savanna, wet prairie and meadows were converted to farm fields wherever feasible. More recently, as farm fields have been replaced by the homes and businesses of suburbia throughout the second half of the 1900s, former wetlands have been built on, and the nature of the river (or ditch) continues to change as it carries ever-increasing volumes of runoff. However, there are still some areas where the North Branch resembles a river, but in other areas it remains a ditch.

Today, the North Branch is maintained for urban stormwater management and is used to transport large volumes of runoff from streets, buildings and parking lots. As a result, the river channels have lost their stability and are deeper, wider and highly eroded from the altered hydrology. The marsh and deep-rooted prairie plants that originally dominated the channel corridor have been replaced with non-native trees and understory plants like buckthorn and garlic mustard that do not adequately stabilize the stream banks. The physical changes to the river channels combined with chemical pollution transported in runoff and poor streamside vegetation have resulted in a river that is impaired for aquatic life and human recreation and aesthetic enjoyment.

1.3 The North Branch Partnership

As described in the introduction to this document, following several years as an ad hoc interest group, the North Branch Watershed Project partnership was formally established by Friends in 1996. A watershed steering committee of 20-30 people was formed from the ad hoc partnership of stakeholders that planned the North Branch grant strategy. This steering committee expanded as the project progressed and more stakeholders were engaged in project activities.

As SMC and Northeastern Illinois University (NEIU) began work on watershed assessment and planning tasks, an Assessment and Strategy (A&S) work group was formed to provide technical and planning guidance and

support for project staff and the steering committee. This technical group was made up of federal, state and local government and agency representatives. When project assessment and planning needs declined after the first year of project activity, the A&S work group and steering committee were combined in October 1997 into a North Branch Planning Committee that continues to meet on a quarterly basis. Friends and SMC staff serve as project coordinators for the North Branch Watershed Project.

In order to implement the North Branch action plan, a Best Management Practices (BMP) Selection Team was established in 1999. The BMP Selection Team is composed of twenty-four members representing seventeen organizations and jurisdictions within the watershed. Eight of the representatives are non-voting members. The North Branch Planning Committee identified and approved the watershed stakeholder organizational slots that are represented on the Selection Team. The BMP Team solicits and reviews North Branch project proposals, and recommends watershed projects to IEPA for CWA Section 319 cost-share funding.

1.4 The North Branch Watershed Plan

The North Branch watershed plan serves as a blueprint for future watershed improvements. The plan includes a comprehensive assessment of the condition of the watershed and recommends both programmatic needs and site-specific projects to improve the health of the watershed and river. The following steps were used in developing the plan for Lake County.

- Outreach to stakeholders.
- Develop watershed management partnership with relevant stakeholders and staff a planning committee.
- Solicit public input on watershed problems and opportunities.
- Formulate project goals and objectives for watershed plan.
- Identify and collect existing studies and other watershed data.
- Synthesize and summarize existing watershed data.
- Collect new data where needed.
- Complete assessment of watershed conditions.
- Identify best management practices and policies appropriate for the watershed.
- Develop an action plan recommending watershed improvement projects and policies.
- Identify potential funding sources for watershed improvements.
- Obtain public official and general public input from review of draft watershed plan.
- Develop implementation schedule and complete final watershed management plan.
- Official county adoption of the management plan.
- Implement plan.
- Monitor and evaluate implementation progress.
- Update and revise plan on regular schedule or cycle.

1.4.1 Setting Goals & Objectives for the Plan

Key watershed issues and opportunities identified by the project partners and other stakeholders during the planning process were used to develop the goals & objectives for the North Branch watershed plan. Issues were categorized into the following topic areas, which are reflected by the plan goals covered in Chapter 2: poor water quality, flooding, erosion, natural resources protection, lack of stream access, poor inter-jurisdictional communication and coordination, and lack of watershed awareness by government agencies, developers, businesses and the general public.

To address the broad range of stakeholder concerns and needs, the plan focuses on a multi-objective management strategy (MOM). The use of MOM for identifying and prioritizing watershed improvement projects and policies is reflected in the plan mission statement that is also included in Chapter 2.

1.4.2 Assessing the Watershed Condition

Chapter 3 of this plan is an assessment of conditions in the North Branch watershed. Two strategies were used to assess the condition of the North Branch watershed. The first strategy was to identify and compile relevant information from all existing studies, reports, maps and data. See Table 1-2 for the list of topics/conditions assessed. Watershed information was collected from a variety of sources, and maps were produced for purposes of analysis and project reporting.

The second strategy was to physically survey North Branch streams and detention basins to collect data on their condition. The stream survey assessed the condition of the channel, streambanks and riparian corridor; inventoried all of the hydraulic structures and point discharges by stream reach; and identified areas along the channel in need of remediation. The detention basin inventory included the location, design, function and condition of the basins. Both stream and detention basin inventory results were entered into a database so that the data could be aggregated, manipulated and analyzed in a relational Geographical Information System (GIS).

Table 1-2
Topics Covered in Watershed Assessment

- Watershed Setting
- Pre-settlement Vegetation
- Climate
- Soils
- Historic Settlement & Resources
- Political Jurisdictions
- Demographic Forecast
- Perceptions & Uses of the River
- Land Use
- Plants & Animals
- Wetlands
- Cultural Resources
- Lakes
- River Condition – Stream Inventory
- Water Quality – Detention Basin Inventory
- Hydrology & Hydraulics
- Flood Damage

1.4.3 Compiling a "toolbox" of watershed best management practices

Chapter 4 of the watershed plan is a compilation and description of potential BMPs and policies appropriate for the North Branch watershed. The presented watershed management measures reflect a means to achieve plan goals, and are broadly categorized as being either preventative or remedial in nature.

Preventative measures are used to protect against worsening conditions in the watershed as it continues to develop. Remedial measures are designed to correct existing problems or improve current watershed conditions. Chapter 4 is the "toolbox" of potential management techniques that can be used in the watershed to improve the river. BMPs described in the toolbox include:

- Conservation design for new development.
- Installing swales instead of stormsewers.
- Building shorter and narrower streets.
- Reducing street setback requirements.
- Using permeable paving where possible.
- Reducing parking lot size.
- Maintaining natural vegetation buffers along streams and around wetlands and detention basins.
- Landscaping with deep-rooted native plants.
- Protecting open space, wetlands, floodplains and natural areas.
- Designating greenways and trails.
- Retrofitting detention basins & outfalls for water quality.
- Stabilizing eroding streambanks.
- Restoring wetlands.
- Mitigating flood damage.

1.4.4 Developing an Action Plan for the North Branch

The effectiveness of the North Branch watershed plan will be largely dependent on the quality of the action plan in Chapter 5. The action plan: 1) identifies and describes the watershed stakeholders (or partners); 2) includes programmatic and policy recommendations; and 3) identifies site-specific locations for best

management practices and drainage system retrofits. The action plan assigns a high, medium or low priority to each recommended action and matches project responsibilities with the appropriate stakeholders. Chapter 6 of the plan describes the system of cooperation and coordination for getting plan projects done, including sections on project funding and evaluating and updating the plan.

1.5 Into the Future .....A Vision for the North Branch

……..We All Live "Downstream"

Watershed stakeholders have expressed concerns about the condition of the North Branch for many years, but because of its large number of jurisdictions, coordination and cooperation opportunities for watershed restoration were limited. The North Branch partnership, expanded through this project, provides a base of coordination for development and implementation of this watershed management plan, and for collaborating local resources to fund and complete projects.

Demonstration projects and watershed management planning efforts around the country are showing that watersheds can be improved. Committed people supported by sound science and technical information are doing the same in the North Branch watershed. Watershed planning provides the guidance for these restoration and management efforts. The North Branch Watershed Plan supplies direction and targets resources for watershed improvement projects. The plan serves as a blueprint for improving water quality, reducing flood damage, and protecting natural resources - and for preventing existing watershed problems from worsening with future land development.

While the North Branch Chicago River and watershed are not without their problems, they also have extraordinary potential to become a great resource for Chicagoland residents. Environmentally friendly land development and management practices and protecting open space will prevent watershed degradation (maintaining stream quality, reducing runoff and protecting natural resources) as we move into the future. In addition to employing practices and programs that prevent future degradation, weaknesses and failings in the built drainage system can also be retrofitted to improve water quality and reduce flooding. While the North Branch will probably never be restored to what it once was, opportunities for restoring wetlands, naturalizing the riverbanks, reducing runoff and pollutant loads to the river and reestablishing a riparian corridor abound in the watershed. Recreational trails and greenways will connect people to the river, making it a focal point rather than being hidden in a "back alley". A healthy river will improve the quality of life for all watershed residents.

Success in restoring the watershed and improving the health of the river will depend on how well North Branch residents interact with the river and manage their activities that affect the watershed. The North Branch plan also includes a significant public outreach and education component to reach watershed residents and communities. Watershed awareness is the first step in changing behavioral patterns that degrade the river. In addition to bringing watershed awareness to residents, communities will also work together on a cooperative basis and combine their resources with county, state, federal and private cost-share funds to complete a number of the recommended watershed improvement projects and programs. The bottom line is residents and communities of the watershed will have to work together to successfully protect and restore the North Branch - sharing the costs and the benefits of watershed improvements.

CHAPTER 2 : PLAN GOALS & OBJECTIVES

2.1 Developing Plan Goals and Objectives

The Goals and Objectives (G&Os) for the North Branch Chicago River Watershed Plan were developed in several stakeholder and partner forums. A first draft of the G&O was developed for the 2000 North Branch Chicago River Watershed Assessment and Management Plan from a list of issues and opportunities identified by the Assessment and Strategy work group (Table 2-1). Some specific actions for attaining the G&O were also identified during this process. The draft G&O statement was distributed to all jurisdictional stakeholders for their input, and was shared with the general public for comment at the March 1997 project kick-off meeting and the River Rap in November 1997. River Rap participants identified and prioritized additional watershed problems and opportunities that are also reflected in the final goals and objectives statement.

Table 2-1

Key Problems and Opportunities in the North Branch Chicago River Watershed

- Poor water quality due to nonpoint and point source pollution.
- Substantial flood damage.
- Need for better natural resources protection and more open space.
- Need for improved watershed-based public information and education.
- Need for increased participation and coordination of government agencies, representative stakeholder organizations, schools and individual and business property owners in watershed improvement activities.

Five goals were established for the watershed plan to address the issues and opportunities raised in the planning process. The following G&O statements were developed with some potential action steps. Action steps were identified during planning meetings associated with the 2000 North Branch Chicago River Watershed Assessment and Management Plan, and identified in the North Branch Open Space Plan (NBOSP). The NBOSP was developed in 2005 as a follow-up to the Watershed Plan by Futurity Inc. in cooperation with Friends and the SMC. There were seven identified goals included in the NBOSP. The five goals from the 2000 plan and seven goals from the 2005 Plan were combined into eight goals and were distributed to the North Branch Planning Committee before and during the July 12, 2006 meeting for discussion and comment. Subsequent refinement and condensing reduced the eight goals into five. These five goals and corresponding objectives were incorporated into the Building Blocks Worksheet from the December 2003 USEPA's *Getting In Step, A Guide for Conducting Watershed Outreach Campaigns*. Goals one and two were discussed at the February 14, 2007 North Branch Planning Committee meeting. The North Branch Planning Committee received the G&O Building Blocks Worksheet via email on February 27, 2007, and suggestions were received for inclusion and discussion. The North Branch Planning Committee discussed and completed the G&O from the Building Blocks Worksheet on March 14, 2007.

G&O's from both previous plans have been integrated after evaluation, discussion and acceptance by the North Branch Planning Committee for inclusion within the North Branch Chicago River Watershed-Based Plan's G&Os. Appropriate excerpts directly from the NBOSP are included in the following chapters of this plan. Meeting notes from applicable North Branch Planning Committee meetings are included in Appendix A.

GOAL 1: IMPROVE WATER QUALITY IN THE NORTH BRANCH CHICAGO RIVER

Objective 1: Reduce nonpoint and point source pollutant loadings from runoff by some measurable standard.

Objective 2: Reduce streambank and streambed erosion.

Objective 3: Correct wastewater overflow conditions that have a significant impact on water quality.

Objective 4: Protect and restore riparian greenways and buffers along and around all water resources.

GOAL 2: REDUCE FLOOD DAMAGE IN THE NORTH BRANCH CHICAGO RIVER

Objective 1: Reduce flow rates and volumes from existing developed areas and prevent increases in flow rates and volumes from new development.

Objective 2: Protect and restore floodplain functions

Objective 3: Maintain and manage the river corridor and other drainageways to preserve conveyance of stormwater in an environmentally-friendly manner.

Objective 4: Mitigate flood damages using both remedial and preventive measures including property protection.

Objective 5: Determine potential locations and feasibility of regional stormwater detention sites.

GOAL 3: PROTECT AND ENHANCE NATURAL RESOURCES AND PROVIDE ASSOCIATED RECREATIONAL OPPORTUNITIES

Objective 1: Protect and restore wetlands and streams to improve water quality and aquatic habitat.

Objective 2: Protect and enhance plant communities and wildlife habitat and biodiversity.

Objective 3: Identify and develop potential areas for river-based recreational opportunities such as hiking, fishing, canoeing, running, biking, birding, peace of mind, tranquil setting for social benefit.

GOAL 4: DEVELOP A PUBLIC INFORMATION AND EDUCATION PROGRAM WITHIN THE WATERSHED COMMUNITIES

Objective 1: Develop and implement a schools-based river curriculum.

Objective 2: Provide public information and education program to community leaders, elected officials, businesses and homeowners.

Objective 3: Improve stewardship of the North Branch Chicago River and its aquatic resources by increasing public participation in the upkeep of the river.

Objective 4: Identify open space parcels adjacent to or near schools or existing public facilities that would be appropriate for outdoor education.

GOAL 5: IMPROVE PARTICIPATION AND COORDINATION IN WATERSHED IMPROVEMENT ACTIVITIES

Objective 1: Coordinate North Branch Chicago River Watershed Plan implementation activities.

Objective 2: Educate and encourage public and private land owners to increase their involvement in implementing best management practices.

Objective 3: Increase river and watershed monitoring efforts and coordinate data sharing.

2.2 North Branch Chicago River Watershed Project Mission Statement

The overall mission of the North Branch Chicago River Watershed Project is to:

> Identify opportunities for North Branch Chicago River watershed communities to integrate multi-objective watershed management in land use planning and development activities. The North Branch Chicago River Project strives to improve degraded conditions in the watershed by combining water quality improvement, water quantity control, flood damage reduction and natural resource protection and enhancement objectives in watershed-based best management practice projects and programs.

2.3 North Branch Chicago River Watershed Building Blocks Worksheet

The five goals and corresponding objectives for the North Branch Chicago River Watershed Management Plan follow the format from the December 2003 USEPA publication titled "*Getting In Step, A Guide for Conducting Watershed Outreach Campaigns*". The following worksheets integrate discussions from two North Branch Planning Committee meetings held on February 14 and March 14, 2007 as well as input solicited/received via email.

Building Blocks Worksheet

Driving Force: Poor water quality due to nonpoint and point source pollution.

Goal: Improve water quality in the North Branch Chicago River.

Objective:	Target Audience	Message	Format	Distribution	Evaluation
Reduce nonpoint and point source pollutant loadings from runoff by some measurable standard.	Landowners, Pet & Car Owners, Landscape Contractors, Public Works Dept, Waste Haulers, Developers	Native vegetation, reduce salt use, organic fertilizers, no/low/slow release P fertilizers, fertilize in fall only, proper waste mgmt.	Flyers and educational information, workshops, ordinance amendments, signage, provide more trash receptacles.	Municipal newsletters, cable access TV, signs at parks, stormsewer markers.	# flyers distributed, # signs posted, # stormsewers marked, # new trash recept., sampling/monitoring, contacts made.
Reduce streambank and streambed erosion.	Municipalities, Outfall PRP, HOA, Drainage Dist, Cook Co & Lake Co	Decrease sediment load, improve water quality, improve habitat	Educational information	Mailings, phone contact	# restoration projects, linear feet restored, $ spent on projects, decrease in turbidity, TSS, contacts made.
Correct wastewater overflow conditions that have a significant impact on water quality.	Deerfield WWTP, NSSD Clavey Rd Plant, Municipalities and Public Works Departments	Municipal IDDE, reduce illegal sump pump hookups, year-round disinfection requirements	Discussions with WWTP's, NPDES permit renewal process	Phone contact, meetings	Track plant data, # of overflow events, contacts made.
Protect and restore riparian greenways and buffers along and around all water resources.	Municipalities, Landowners, Drainage Districts, County Agencies, Land Conservation Organizations, CCFPD, LCFPD	Decrease sediment load, improve water quality/habitat/bio-diversity, native plant buffer, retrofits	Educational information, workshops	Mailings, phone contact	# of projects, $ spent on projects, linear feet restored, acres of additional buffers, contacts made.

Driving Force: Substantial flood damage.

Goal: Reduce flood damages in the North Branch Chicago River.

Objective:	Target Audience	Message	Format	Distribution	Evaluation
Reduce flow rates and volumes from existing developed areas and prevent increases in flow rates and volumes from new development.	Public and private landowners, HOA, Municipalities	Reduce overbank occurrences, stabilize bounce, increase infiltration, create rain gardens, use rain barrels, "keep your water on your own property," reduce impervious surfaces	Educational material, demonstration projects, rain barrel sales, change landscape and other ordinance requirements, incentive programs	Mailings, workshops, phone contact.	# rainbarrels sold, # rain garden projects, $ spent on rain gardens, landscape requirements changes, # brochures distributed, contacts made.
Protect and restore floodplain functions.	Municipalities, public and private landowners, Drainage Districts, County Agencies	Reduce overbank occur., prevent property damage, preserve open space, improve enforcement of ordinances, recreational aspects of wildlife habitat.	Educational material, policies, training for municipal staff & landowners	Mailings, workshops, phone contact.	# projects implemented, $ spent, acre/feet additional storage provided, change in the amount of open space, contacts made.
Maintain and manage the river corridor and other drainageways to preserve conveyance of stormwater in an environmentally-friendly manner.	Municipalities, Drainage Districts, MWRD, public and private landowners	Remove debris/trash, plantings along channel, incorporate streambank stabilization/restoration into conveyance projects	Meetings, policies, technical or support materials, i.e. NIPC plant guide, etc. workshops	Collaborative or individual agency effort.	# clean-up events, # people involved, photos of trash removed, Chicago River Day # of participants and # of sites, feet of streambank stabilized
Mitigate flood damages using both remedial and preventative measures including property protection.	Public and private landowners, Municipalities, Drainage Districts, MWRD	Prevent property damage from repetitive losses, participate in CRS program and/or improve CRS rating, notify people who are in floodplain, voluntary buyout of repetitive loss properties	Educational material, meetings, projects, workshops	Mailings, workshops, phone contact.	# of participants, CRS level improved, contacts made.
Determine potential locations and feasibility of regional stormwater detention sites.	SMC, Drainage Districts, MWRD	Reduce overbank occur., decrease $ in property damage	Meetings, projects/studies	Collaborative or individual agency effort.	# of projects completed, $ spent on projects, # of locations/studies completed, additional acre-ft of storage created, contacts made.

Building Blocks Worksheet

Driving Force: Need for better natural resources protection and more open space.

Goal: Protect and enhance natural resources and provide associated recreational opportunities.

Objective:	Target Audience	Message	Format	Distribution	Evaluation
Protect and restore wetlands and streams to improve water quality and aquatic habitat.	Public and private landowners, Drainage Districts, SMC, MWRD, FPDCC, LCFPD, Munic., Park Dist., schools, ecosystem partnerships, regional water trails, recreational groups	Better water quality means improved ecosystem resulting in improved fishery, improved recreational opportunities, economic benefit, clean water.	Restoration workshops, tours, educational info, policies, signage, grant assistance, improved ordinances and enforcement	Workshops, reference materials, inservice training for staff, interpretive signs, demo project tours, public events, website, meetings, phone contact.	Additional wetland acres protected &/or restored, additional linear stream reaches improved, acres of stream buffer restored, # of landowners taking some action, # of municipalities and MWRD enacting ordinances.
Protect and enhance plant communities wildlife habitat and biodiversity.	Public and private landowners, Drainage Districts, SMC, MWRD, ecosystem partnerships, LCFPD, FPDCC, Park Dist.	Improve watershed, improve quality of habitat, benefit wildlife communities, improved visual aesthetics, improve biodiversity, control invasive species	Educational info, policies, signage, workshops, tours, grant assistance, conservation easements, MIPN plants of concern, brochure	Workshops, reference and resource materials for target audience, phone contact.	$ spent, # of projects completed, # of events for volunteers, # of volunteers, monitoring - improved diversity, acres protected/enhanced/re-stored, plants of concern monitoring results, # baseline surveys/inventories completed.
Identify and develop potential areas for river-based recreational opportunities such as hiking, fishing, canoeing, running, biking, birding, peace of mind, tranquil setting for social benefit.	Public and private landowners, special interest groups, i.e. canoeists, LCFPD, CCFPD, Park Dist.	Increase river-based recreational uses, explain the benefits, economic benefits	Educational info, planning documents, policies, grant workshops, tours of existing facilities, implement recommendations in NBOS plan, canoe and bike trail maps	Workshops, implementation, one-on-one meeting with potential implementers	$ spent, # of communities participating, survey of users, trail miles added, river access points added

Building Blocks Worksheet

Driving Force: Need for improved watershed-based public information and education.

Goal: Develop a public information and education program within the watershed communities.

Objective:	Target Audience	Message	Format	Distribution	Evaluation
Develop and implement a schools-based river curriculum.	High schools, Jr. High schools, elementary schools, conservation/natural resource organization partners	Improvements within the watershed having direct and indirect results, river can be an integral part of science and other curricula.	Classes/workshops, field trips, presentations, instructional materials for staff, monitoring by classes	Workshops, website, resource materials, phone and meeting contact with teachers, school administrators and community groups	# of schools participating, # of students participating, # sites monitored by students.
Provide public information and education program to community leaders, elected officials, businesses and homeowners.	Public and private landowners, HOA, elected officials and staff, corporations	Benefits of collective efforts, economic benefits of improved watershed mgmt., shared responsibility for watershed resources	Phone calls, Tours, Newsletter, brochures, examples from other communities, presentations, DVDs/Autorun CDs	Workshops, resource materials, phone calls, public service announcement, cable TV, billboards, corporate newsletters, website.	# of phone calls, # of targets that received information, workshops held, behavioral changes.
Improve stewardship of the North Branch Chicago River and its aquatic resources by increasing public participation in the upkeep of the River.	Municipalities, Ecosystem Partnership, Youth Groups, Community Groups, Conservation Orgs., Park Districts, LCFPD, CCFPD, Drainage Dist., HOA, Anglers	Change perceptions of North Branch from ditch/liability to resource/river, instill sense of ownership in North Branch stakeholders, don't trash fishing locations	Clean-up days, tours, rallies, tie in with existing community events	Sample of organizational materials, brochures, incentives, recognition, contained within utility bill, Cable TV, radio, billboards, mailings, website.	# of events, # of participants, # of communities, # of returning participants, # of community groups, questionnaire comparisons before and after, FOCR data
Identify open space parcels adjacent to or near schools or existing public facilities that would be appropriate for outdoor education.	Appropriate Landowners, teachers, community groups, youth groups, civic governments parks, Forest Preserve Districts.	Ideal locations for educational opportunities and improvements, benefits to environmental education, create multiple benefit areas with habitat, runoff reduction and other benefits	Examples of successful partnerships; field tours; organization; or meetings to facilitate message	One on one meetings, phone contact, follow up letters.	# of contacts made, # of requests for more information, # of projects/parcels identified, # of field tour participants.

Building Blocks Worksheet

Building Blocks Worksheet

Driving Force: Need for increased participation and coordination of government agencies, representative stakeholder organizations, schools and individual and business property owners in watershed improvement activities.

Goal: Improve participation and coordination in watershed improvement activities.

Objective:	Target Audience	Message	Format	Distribution	Evaluation
Coordinate North Branch Chicago River Watershed Plan implementation activities.	Public and private landowners, organizations with a watershed interest, i.e. canoe, water trails, etc., ecosystem partnerships, watershed groups, drainage districts, municipalities, local legislators, SMC, MWRD, IDNR, IEPA	Benefits of regional effort, benefits of cost sharing, benefits of watershed management.	Implementation projects, information sessions, quality grant applications	Workshops, emails on grant opportunities; grant application assistance, website.	# of projects, $ spent, grant $ spent, local match $ spent, # of hits on website.
Educate and encourage public and private landowners to increase their involvement in implementing best management practices.	Public and private landowners, Drainage Districts, SMC, MWRD, elected officials, citizen committees, land managers, municipal staff.	BMP's improve water quality; link to quality of life issues, economic benefits	Workshops, presentations, brochures	Brochures, workshops, DVDs/Autorun CDs, Cable TV, radio, billboards, websites, press releases	# of active communities, # of projects, $ spent, # of press releases, # of hits on website.
Increase river and watershed monitoring efforts and coordinate data sharing.	IEPA, IDNR, Citizen Scientists, public and private Landowners, NSSD, MWRD, LCHD Lakes Mgmt., USGS, NOAH, Sierra Club, Coast Guard Auxillary, Illinois Lakes Management Assoc.	More data gathered = better understanding of problems, need for RiverWatch-type program in IL	Instructional sessions on water sampling, certified labs, etc. standard protocol for what is being tested for, etc., continue River Watch program or establish new hands on program.	Workshops, informational mailings, training sessions,	# of studies, funding applied for, $ received, $ spent, number of participating landowners, re-funding of RiverWatch, # of projects, sites monitored

CHAPTER 3 : WATERSHED RESOURCE INVENTORY & ASSESSMENT

The SMC and Northeastern Illinois University (NEIU) conducted a resource inventory and watershed assessment of the North Branch Chicago River in Lake and Cook County, respectively. The purpose of the assessment was to provide detailed information on existing conditions in the watershed. This information will also serve as baseline data for comparison with future watershed assessments. While the Cook County assessment is included in this chapter to describe the overall watershed picture, it is less detailed than the Lake county assessment and the action plan recommendations in Chapter 5 are directed to Lake County only. Lake County SMC only has authority to plan for the Lake County portion of the watershed. MWDR is initiating a comprehensive plan for the North Branch in the Cook County portion of the watershed.

This chapter is divided into five sections. The first section is a brief summary of the methodology used to develop the assessment. Each of the succeeding sections describes:

- the physical attributes of the watershed;
- people who live in the watershed;
- significant resources of the watershed; and
- the surface water resources of the North Branch Chicago River.

3.1 Assessment Methodology

The following is a brief summary of the data collection strategies and data resources used to assess watershed conditions. Numerous public agencies and private organizations contributed information to this study. In some cases the data was in a form that could be fairly easily summarized and reported, but in many instances the data had to be re-aggregated to reflect watershed boundaries rather than political boundaries. The Lake County GIS and Mapping Division, Chicago Metropolitan Agency for Planning (CMAP), and the Illinois Department of Natural Resources (IDNR) all contributed to this watershed-based effort. Of special note for contributions to the assessment is the information that was supplied by the municipalities within the watershed. Municipalities generously supplied the locations of detention basins and stormsewer maps for their jurisdictions, without which the recommendations for retrofit projects and determinations of top ranked pollutant loading sites would not have been possible. Municipalities also contributed significant local knowledge of flooding and drainage problems within the watershed.

3.1.1 Data Collection Strategies

Two strategies were used to acquire information for the North Branch Chicago River watershed assessment. The first strategy was to identify and collect all available existing studies, reports, data and mapping. This information was compiled and summarized and used for the watershed assessment. The list of existing resources for the North Branch Chicago River watershed is in Appendix I. In addition to these reports, Table 3-1 details the primary sources of data by topic.

Table 3-1
Watershed Assessment Data Sources

Data	Sources
Water Quality	NIPC Metropolitan Water Reclamation District of Greater Chicago IDNR IEPA US Geological Survey North Shore Sanitary District Lake County Health Department (LCHD) – Lakes Management Unit Lake County Forest Preserve District (LCFPD) Illinois Institute of Technology
Land Use	NIPC Lake County GIS & Mapping Division
Stormsewer & Zoning Maps	Municipalities
Landfill Locations	Lake County Health Department (LCHD)
Threatened and Endangered Species	IDNR
Current and Projected Demographics	NIPC Lake County Planning, Building and Development Department US Bureau of Census
Resident Attitudes	National Park Service
Historic & Cultural Resources	US Army Corps of Engineers (USACE)
Superfund Sites	USEPA
Soils	Lake Co. Map Services/Natural Resources Conservation Service
Wetlands	Lake County Planning, Building and Development Department US Fish & Wildlife Service
Open Space	Lake County Forest Preserve District Lake Forest Open Lands Association Libertyville Township SMC NIPC
Greenways & Trails	NIPC IDNR
Hydrology & Hydraulics	IDNR USACE Federal Emergency Management Agency (FEMA)
Flood Damage	SMC FEMA USACE Natural Resource Conservation Service Municipalities
NPDES Permitted Discharge Sites	IEPA

The second strategy involved collecting new data where existing data was insufficient. New data was collected and developed by SMC and NEIU. The stream and detention basin inventories are examples of new data collected for the North Branch Chicago River watershed study. The stream inventory was conducted

by SMC in Lake County and by NEIU in Cook County using the same methodology to collect the following information:

- channel conditions such as bank height, erosion problems, bank vegetation;
- hydraulic structures such as bridges and culverts in the river;
- point discharges into the river;
- land use and vegetative cover in the riparian corridor; and
- channel substrate and degree of sedimentation.

A detention basin inventory was completed in the Lake County portion of the watershed using location information provided by municipalities. Data was collected on the following:

- basin type (wet, dry, wetland);
- inlet and outlet size and structure;
- side slopes;
- vegetation; and
- maintenance or design problems (short circuiting, excess debris, drainage, erosion, scour, clogging).

The complete stream and detention basin inventory procedures and sample field data collection forms are available upon request from SMC. The findings of the stream and detention inventories are discussed in further detail in sections 3.12.2 and 4.1.2.1.1

3.1.2 Geographic Information Systems

The GIS mapping layers collected, created and/or used in the watershed assessment are detailed in Table 3-2. Most of the data for the Lake County assessment was provided by the county's GIS and Mapping Division. Both SMC and NEIU collected new data and created several new GIS maps.

Table 3-2
GIS Layers Used for the Watershed Assessment

• Digital Flood Insurance Rate Maps	• Soils (hydric soils/hydrologic soil groups)
• CMAP 2001 land use	• Stormsewershed delineation*
• Lake County Wetland Inventory	• CMAP Greenways
• Flood of record boundaries	• SMC flood hazard areas*
• CMAP 2030 households, population and employment	• Lake and Cook County Forest Preserve District holdings
• Watershed map (Lake and Cook Counties)	• Pre-settlement vegetation
• Base map with roads, water, political boundaries, watershed boundaries	• Open space (public and private)*
• Lake County & IDNR hydrography	• Stream reach characterization*
• North Branch detention basin inventory*	

* SMC, Futurity, or V3 created these GIS layers expressly for the North Branch watershed study.

3.2 Watershed Setting

3.2.1 Geologic Setting

The period of Wisconsin glaciation produced a series of moraines that formed concentric arcs around Lake Michigan in Northeastern Illinois. Moving from east to west away from the Lake, four of those moraines make up the low ridges that define the North Branch Chicago River drainage system. These moraines are named the Highland Park, Blodgett, Deerfield and Park Ridge (Figure 3-1). The valleys between these moraines are the current locations of the three forks of the North Branch Chicago River: the West and Middle Forks of the North Branch Chicago River and the Skokie River.[3]

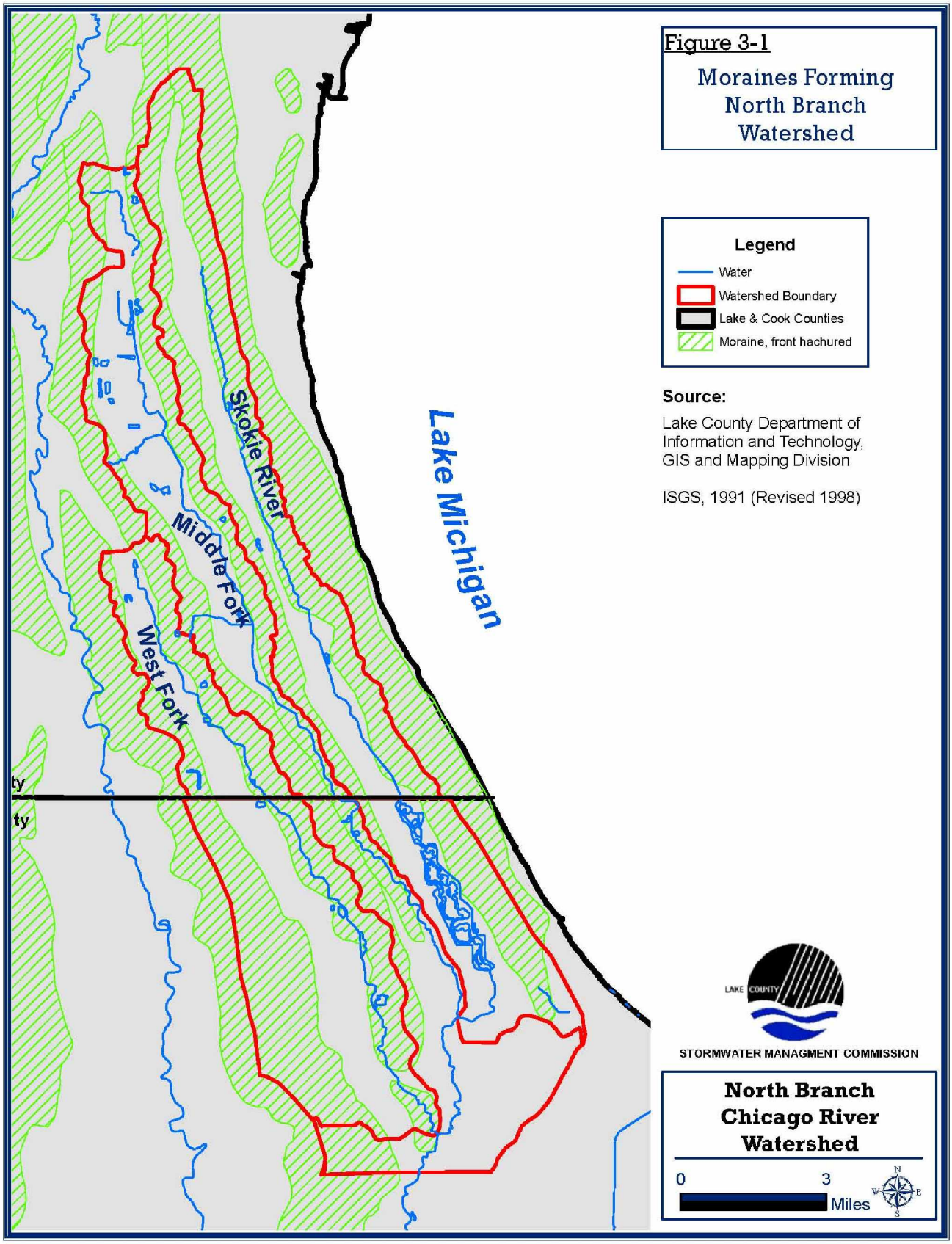
Following glaciation, the three forks of the river flowed through lands that developed into marshes, wet prairie and meadow, savanna and forest. The streams were relatively small, shallow and undefined, and meandered through a series of wetlands and small lakes on their path southward. In the late 19th and early 20th centuries, the landscape of the watershed was changed as the stream channels were converted to ditches to help drain the surrounding land for agriculture. The ditching of the three forks began the process of changing the way the land of the watershed was used, first for agriculture and more recently for suburban development.

3.2.2 Pre-European Settlement Vegetation

The pre-European settlement vegetation of the watershed was derived from the pre-European settlement natural vegetation communities map, available in GIS format, prepared by the Illinois Natural History Survey using Government Land Office maps and land surveyors' notes.

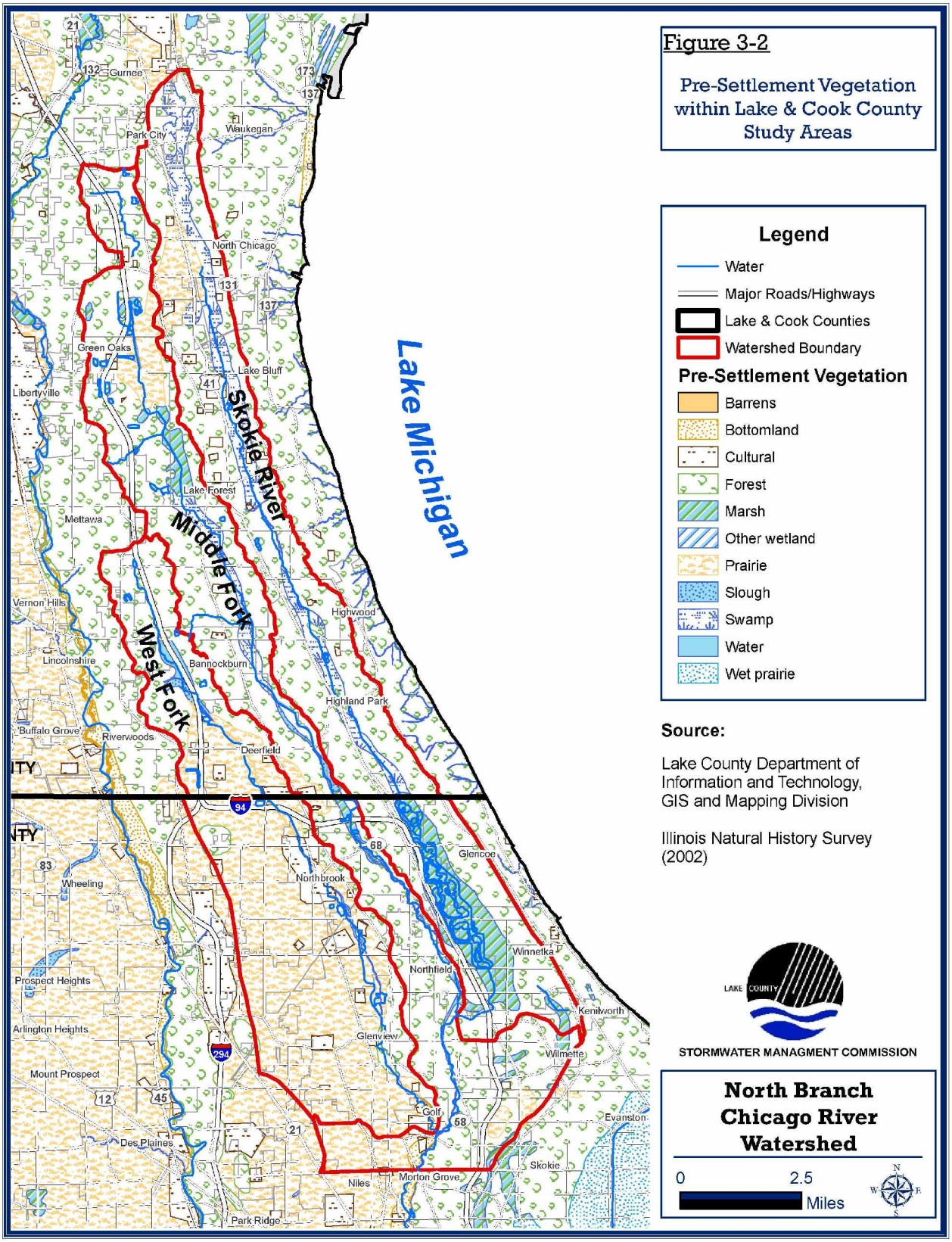
Prior to European settlement, most of the North Branch Chicago River watershed in Lake County was savanna interspersed with small pockets of dry mesic forest in the uplands. The exceptions to this landscape include two substantial prairies and the marsh and wet meadows that followed the floodplain of the North Branch Chicago River tributaries (Figure 3-2). One large tract of prairie was located in the upper portion of the watershed; the other was south of present-day Deerfield Road in the West Fork subwatershed. Remnants of native plant communities still exist at relatively small sites throughout the watershed including the Middlefork Savanna, Florsheim Park, McLaughlin Prairie, Shaw Prairie, Berkley Prairie and others.

[3] *For more information on the geology and geomorphology of the North Branch, see ChicagoRivers Demonstration Project: Nature and the River: A Natural Resources Report of the Chicago and Calumet Waterways, 1998 by the US Fish and Wildlife Service - Chicago, Illinois Field Office.*



Maps to be used for Planning Purposes only.

Produced by V3 Companies



Maps to be used for Planning Purposes only.

Produced by V3 Companies

Figure 3-2 also shows the reconstruction of pre-settlement vegetation for the glacial lake plain in Cook County. Prairie was the dominant vegetation in most of West Fork in Cook County. The reconstruction is based upon the original surveyors' field notes and the surveyors' interpretation of plant communities. From the information provided, the eastern banks of the streams were likely dominated by wet forest, while the western banks were prairies. In the southern portion of the study area and to the east of the wet forest occurred a large area of oak-hickory forest. Additionally, a pocket of oak savanna occurred on the very eastern edge of the study area straddling what is now Central Avenue. The area now occupied by the Skokie Lagoons and Skokie River system was mostly marshland, swamp and slough.

3.2.3 Climate

As climate characteristics are generally consistent over the area general climate data available for Lake County is included in this report. Lake County is characterized by a temperate climate with distinct seasonal fluctuations. The average summer temperature is 69.1° F with an average daily maximum temperature of 79.1° F (USDA, 2007). The average winter temperature is 23.9° F with an average daily minimum temperature of 15.9°F. The average annual total precipitation is 34.36 inches with 60% occurring between May and October. The total average seasonal snowfall is 37.4 inches. On average, 27 days per year have at least 1 inch of snow on the ground. Prevailing winds are generally from the south. This portion of Lake County averages 194 growing season days.

3.2.4 Soils[4]

The analysis of soils in the North Branch Chicago River watershed centered on identifying and mapping hydrologic soil groups and hydric soils. The degree to which certain soil types absorb and infiltrate precipitation determines which hydrologic soil group they fall in. Precipitation that is not absorbed or infiltrated becomes runoff. Therefore, hydrologic soil groupings within a watershed are one determinant of how much rainfall will run off as surface flow to streams. Soils are one of many determinants that contribute to stormwater runoff, others include impervious surfaces such as streets, parking lots, buildings, vegetative cover and substrate drainage to name a few.

Hydric soils are a wetland indicator. Soils that remain saturated or inundated with water for a sufficient length of time become hydric through a series of chemical, physical and biological processes. Once a soil takes on hydric characteristics, it retains those characteristics even after the soil is drained. Therefore hydric soils are the best indicator of what is or once was a wetland. Areas with hydric soils are potential sites for wetland restoration projects.

[4] *Soils information was excerpted from* ChicagoRivers Demonstration Project: Nature and the River: A Natural Resources Report of the Chicago and Calumet Waterways, 1998 *by the US Fish and Wildlife Service - Chicago, Illinois Field Office. Hydrologic soil groups and hydric soils came from the 1970 Lake County Soil Survey, February 1989 revisions to the Hydric Soils Legend, the 1986 Soil Conservation Service Technical Release 55 manual (*Urban Hydrology for Small Watersheds*) and mapping from Lake County Map Services.*

Lake County

Thirty-two soil series make up from 7 to 6,899 acres of the North Branch Chicago River watershed in Lake County. Of the 31 soil series, three types in Lake County account for over 41 percent of the soils found in the watershed (Table 3-3). The remaining 28 soil series each cover 1% (~ 324 acres) or less of the watershed area.

Table 3-3
Predominant Soil Types, North Branch Watershed, Lake and Cook Counties

Soil Type	Acres	Percentage
LAKE COUNTY		
Ozaukee silt loams	3,475	9
Nappanee silt loams	6,899	13
Frankfort silt loams	6,358	14
COOK COUNTY		
Urban Land – Drummer-Barrington	4,480	15
Urban Land – Markham-Ashkum	5,144	17
Urban Land – Milford	5,263	17

Cook County

Large areas in Cook County have been altered by urban development. Such development has significantly disturbed the natural soils and soil boundaries have become unrecognizable. As shown in Table 3-3, soil types covering 49 percent of the study area are classified as Urban Land – Drummer-Barrington, Urban Land - Markham-Ashkum and Urban Land - Milford. The designation of Urban refers to land that has been covered almost completely with buildings and pavement. Most areas are nearly level to gently sloping due to extensive grading and smoothing. Urban land is so modified by cuts and fills for works and structures, that more exact identification of the soil is not feasible.

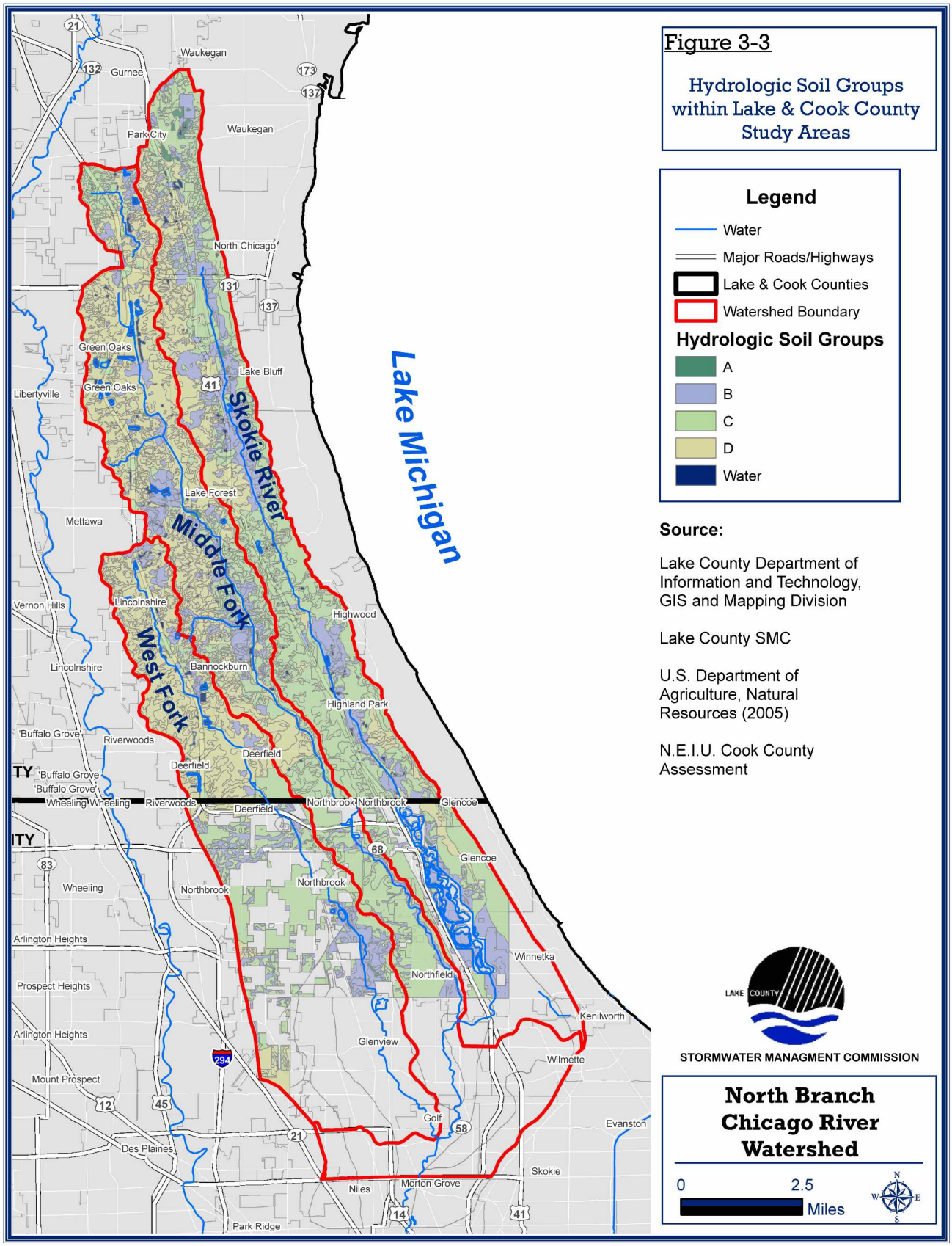
3.2.4.1 Hydrologic Soil Groups

Hydrologic soil groups are a factor in determining the runoff curve number. A curve number is a ratio of expected runoff volume for a given combination of land use or land cover and soil characteristics. Soils are classified into hydrologic soil groups based on their infiltration and transmission rates. The infiltration rate is the rate at which water soaks into the soil at the soil surface. The infiltration rate is controlled by conditions on the soil surface such as its roughness. Hydrologic soil groups are also an indicator of the transmission rate. The transmission rate is the rate at which water moves through and within the soil (i.e. after it has infiltrated or soaked into the soil). The soil profile or configuration of soil layers controls the transmission rate. A hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The runoff potential and infiltration and transmission rates of each of the hydrologic soil groups are found in Table 3-4.

Table 3-4
Characteristics of Hydrologic Soil Groups

HSG	Runoff Potential	Infiltration Rate	Transmission Rate
A	Low	High	High
B	Moderate	Moderate	Moderate
C	High	Low	Low
D	High	Very Low	Very Low

As can be seen in Table 3-4, hydrologic soil group A has the greatest infiltration and transmission and therefore the lowest runoff potential. At the other end of the spectrum, hydrologic soil group D is the opposite with low infiltration and transmission capacity and therefore the highest rate of runoff.



Maps to be used for Planning Purposes only.

Produced by V3 Companies

Figure 3-3 shows the soils in the watershed in Lake and Cook County mapped by hydrologic soil group. Table 3-5 lists the acreage and percentages for all of the hydrologic soil groups in the watershed in both Lake and Cook counties.

Table 3-5
Acreage of Hydrologic Soil Groups in the Watershed Lake and Cook Counties

Hydrologic Soil Group	Lake Co. Acres	Lake Co. Percent	Cook Co. Acres	Cook Co. Percent	Total Acres	Total Percent
A	156	0.49	14.5	0.05	170.5	0.2
B	5,033	16	2,840	10	7,873	13
C	11,252	35	6,409	21	17,661	28
D	15,264	47	725	2	15,989	25
Open Water	547	1.51	423	1	970	1.5
Urban Complex	-	-	20,221	66	20,221	32

3.2.4.2 Hydric Soils

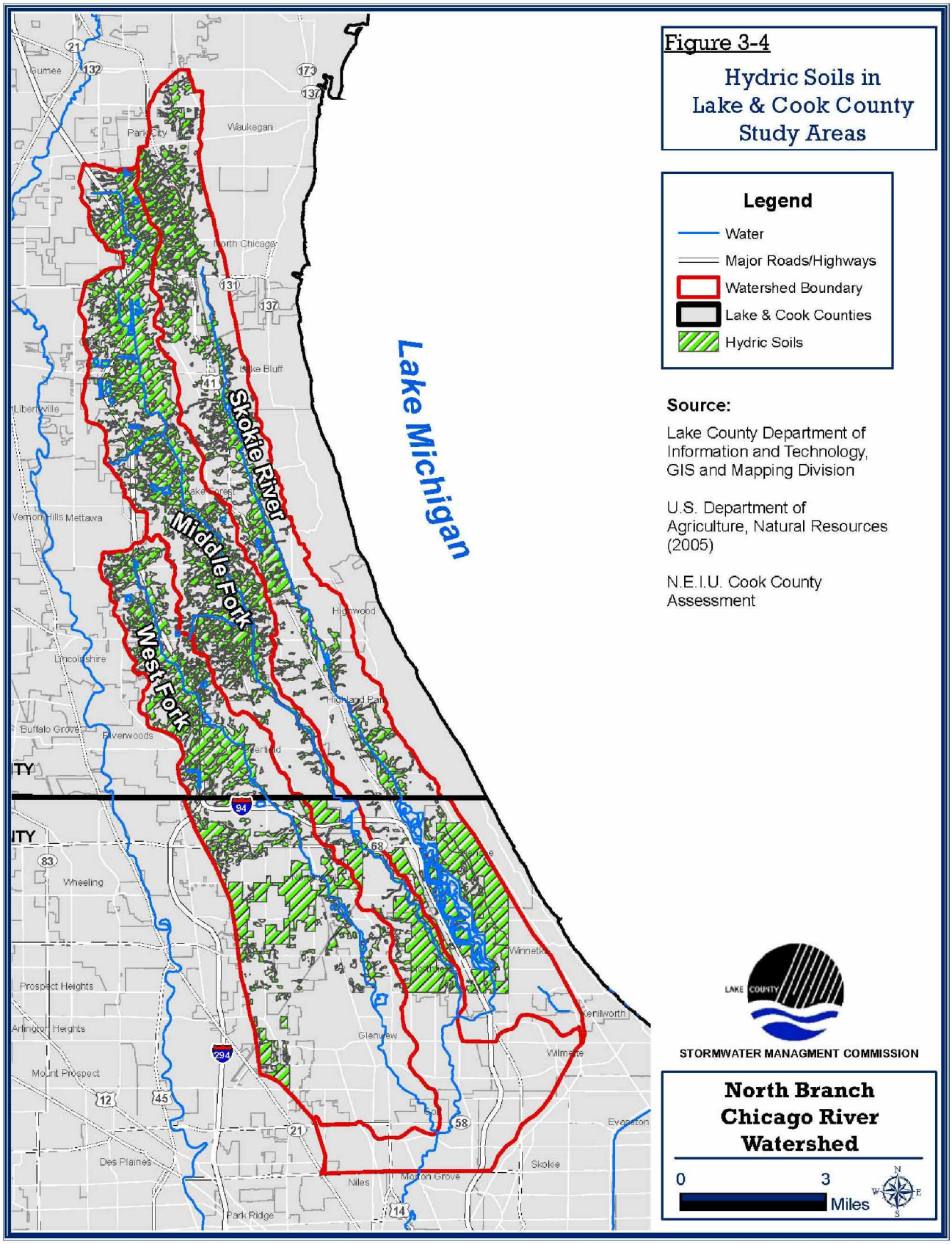
According to the 2006 Illinois Hydric Soils List, of the four predominant soil series in the North Branch Chicago River watershed in Lake County, one (Montgomery silty clay) is a hydric soil. Some soils classified as a non-hydric may contain hydric soil inclusions. Hydric inclusions are pockets of hydric soils that are found within areas of predominantly non-hydric soils. Hydric inclusions are most likely to occur in drainageways or depressional areas. Table 3-6 lists the acreages and percentages of the watershed that have hydric and non-hydric soils in both Lake and Cook Counties.

Table 3-6
Acreage of Hydric Soils in the Watershed, Lake and Cook Counties

Soil Type	Lake Co. Acres	Lake Co. Percent	Cook Co. Acres	Cook Co. Percent	Total Acres	Total Percent
Hydric	14,157	44	6,182	20	20,339	32
Non-Hydric	18,053	56	24,451	80	42,504	67

Figure 3-4 shows the spatial extent of hydric soils within the watershed study area in Lake and Cook Counties. Roughly 32 percent of the area (Table 3-6) is underlain with hydric soils. Of the 6,182 hydric soil acres in the Cook County watershed, 691 acres (11%) are located on Cook County forest preserve land.

For major developments in Lake County, the Lake County Watershed Development Ordinance prohibits the construction of buildings on hydric soils due to their instability, and because they are indicative of a high water table. Hydric soils must be either removed and replaced with appropriate non-hydric soils prior to construction, or avoided for buildings during site design. In addition, if the soil mapping for a major development indicates the presence of hydric soils, then a site specific soil mapping performed by a certified soil classifier is required for the development.



Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.3 Historic Settlement and Resources

Conditions in the North Branch Chicago River watershed are a reflection of the geologic and natural processes that have occurred in the watershed over many thousands of years, and are also a product of human settlement. As population in the watershed has increased, so have alterations to the land and the hydrologic and hydraulic flows of the watershed's natural drainage system. A straightened and deeply entrenched ditch has replaced a slow-moving, shallow, meandering wetland/stream system. Flooding and water pollution are common problems that are the result of how people settled and live in the watershed.

Land uses have changed over time. When first settled, the watershed primarily supported subsistence living with a small amount of farmland and grazing land. More intensive agriculture followed the turn of the 20th Century through mid-century when suburban development of the watershed increased. Today, suburban development including residences, industry and commercial businesses dominate the North Branch Chicago River watershed.

Pre-historic Native Americans were the first human settlers in the watershed. European settlers in the early-mid 1800s replaced the Native Americans. The pattern of historic European settlement has been the most significant determinant of current watershed conditions. Early settlement directed many of the land use patterns still evident in the watershed today.

Historic resources include what remains of the human settlement, such as historic structures and archeological remains. Historic structures are those that are eligible for listing on the National Register of Historic Places and are likely to be buildings or bridges.

Information on settlement, historic structures and archeological sites in the watershed has been excerpted from the following documents:

1. Draft Summary: History and Historic Properties of Friends Study Area prepared by Keith Ryder at the USACE (1997)
2. Inventory of Architecture before WW II in Lake County (except Highland Park and Lake Forest) by the Illinois Historic Sites Survey (1973)
3. Inventory of Historic Landmarks in Lake County by the Illinois Historic Sites Survey (1975)
4. Inventory of Historic Landmarks in Cook County by the Illinois Historic Sites Survey (1975).

3.3.1 Human Settlement

Native American tribes such as the Kickapoo, Potawatomies, Miamis and Chippewas were some of the earliest documented inhabitants in the North Branch Chicago River watershed. Prehistoric settlement probably dated back even further than these tribes. The eastern end of the Chicago River was used by the Native Americans to traverse between Lake Calumet, Lake Michigan and the Des Plaines Valley. From 1673 to 1700, this area was named the Chicago Portage and used by French explorers, missionaries and fur traders.

European settlement in the North Branch Chicago River watershed began during the 1830s and 1840s when Irish and German immigrants and New England farmers settled the watershed area. With the exception of Park City, Lincolnshire, Green Oaks and Mettawa (incorporated 1950-1960), the cities and villages in the watershed were founded in the mid-to late-1800s. Population increases followed transportation improvements in the watershed. Green Bay Road (then a log road) was in use by 1834. The stagecoach came to Deerfield by 1836 and reached Lake Bluff by 1845 via Waukegan Road.

The North Branch Chicago River watershed was physically and economically linked to Chicago via railroads between 1854-1872. For instance Morton Grove, Glenview, Northbrook and Deerfield were still farm communities in the 1890s with numerous truck farms, greenhouses and brickyards that produced goods for the city. The local economy depended on farming in the 1800s, and farmers worked within the constraints of the landscape, cutting hay in the marshes in the fall. In the early 1900s, the streams of the North Branch Chicago

River were straightened and deepened to drain and convert wetlands to productive cropland. The landscape of the watershed was permanently altered with this change in watershed hydrology.

During the period when farming dominated the watershed, many of the North Shore towns were comprised of summer homes and resorts for wealthy Chicago businessmen. Settlement in the watershed changed again in the early 20th century as rail connections improved and the towns grew. The North Shore electric interurban railroad connected most of the North Shore communities in the 1890s. From 1880 to 1910, Highland Park, Lake Forest and Lake Bluff were transformed from farm communities into commuter suburbs. Other suburbs followed, and much of the watershed was converted to suburban settlement by 1950. A period of significant development and population growth followed WWII. The Edens Expressway, completed in 1951, spurred additional growth of North Branch communities. As people began moving north out of the City of Chicago, residences were built on the land originally drained for farming and today the watershed supports older neighborhoods and newer subdivisions. Commercial and industrial businesses are primarily located in village centers and along highway corridors.

3.3.2 Archeological Sites[5]

Based on mapping completed by the Illinois State Museum, the North Branch Chicago River watershed in Lake and Cook Counties contains 6 known archeological sites in the West Fork subwatershed, two of which lie immediately adjacent to the stream. There are 28 known sites in the Middle Fork subwatershed, of which nine lie immediately adjacent to the stream, and five known sites in the Skokie River subwatershed, of which one lies adjacent to the stream. Known sites tend to occur in the relatively undeveloped reaches of the watershed. The degree to which the archeological sites are documented and protected varies; those that are well known and protected generally occur on public lands such as Forest Preserve properties, while many others were likely destroyed by urban development. Sites may also be present, but not identified due to the absence of detailed archeological surveys.

3.3.3 Historic Structures

Although much of the North Branch Chicago River watershed was not developed until after 1945, the 1975 Inventory of Historic Landmarks in Lake County identified four significant historic and landmark structures in each of the three subwatersheds in Lake County. The historic structures include the Historic Resources of Highland Park, a National-Register-listed historic district near downtown Highland Park and the Vine-Oakwood-Green Bay Road Historic District in Lake Forest. Highland Park, at the southern end of the Skokie subwatershed, also contains parks and estates designed by renowned landscape architect Jens Jensen. A historically significant man-made lake designed by Jens Jensen at the turn of the 20th Century has been identified near the Lake Bluff Forest Preserve.

As with the archeological information, there was only limited information available on the historic structures in the watershed. Information on historic buildings in the Cook County portion of the watershed was not available. However, in both counties, there are three bridges of possible historic significance over the West Fork, three crossing the Middle Fork and five on the Skokie River. Table 3-7 lists these bridges and their year of construction. The Illinois Department of Transportation (IDOT) number refers to the assigned to each bridge that would provide information on a specific bridge.

[5] *Draft Summary: History and Historic Properties of Friends Study Area prepared by Keith Ryder at the US Army Corps of Engineers (1997)*

Table 3-7 Historic Bridges			
Subwatershed	**Location**	**IDOT Number**	**Construction Date**
West Fork – Lake County	Deerfield Road	0490070	1927
	Central Avenue	0496154	1930
West Fork – Cook County	Golf Road	0160355	1928
Middle Fork – Lake County	Half Day Road	0490010	1937
Middle Fork – Cook County	Middle Fork Road	1066097	1940
	Old Willow Road	0166098	1908
Skokie River – Lake County	Old Elm Road	0496863	1925
Skokie River – Cook County	Dundee Road	0160940	1935
	Tower Road	0160816	1937
	Willow Road	0160818	1935
	Winnetka Road	0161162	1935

3.4 Jurisdictions in the North Branch Chicago River Watershed

The North Branch Chicago River Watershed Project area consists of a large number of political jurisdictions, most notably two counties, 25 municipalities and 11 townships (see Table 3-8). Watershed acreage by jurisdiction is presented in Table 3-8 for municipalities and unincorporated county (the smallest units of local government). A combination of three of the fourteen municipalities and unincorporated county (Deerfield, Highland Park, Lake Forest, and unincorporated areas) contain over 70 percent of the watershed area in Lake County. Likewise, six of the watershed's 27 municipal and unincorporated jurisdictions account for almost 65 percent of the entire study area in both counties (Glenview, Highland Park, Lake Forest, Northbrook, and unincorporated Lake and Cook Counties).

Drainage District boundaries reflect more of a watershed perspective. Four drainage districts have authority and stream and maintenance responsibility for different sections of the three tributaries of the North Branch Chicago River. Figure 3-5 depicts areas of drainage district authority in Lake County. Other parties with jurisdiction in the watershed include:

- the Department of the Navy (Great Lakes Naval Training Center)
- County Forest Preserve Districts
- Park Districts - In Lake County 6 municipalities have park districts (Deerfield, Highland Park, Lake Bluff, Waukegan, Gurnee and Foss in North Chicago).
- Lake and North Cook County Soil and Water Conservation Districts
- US Congressional Districts
- State Senatorial and Representative Districts.

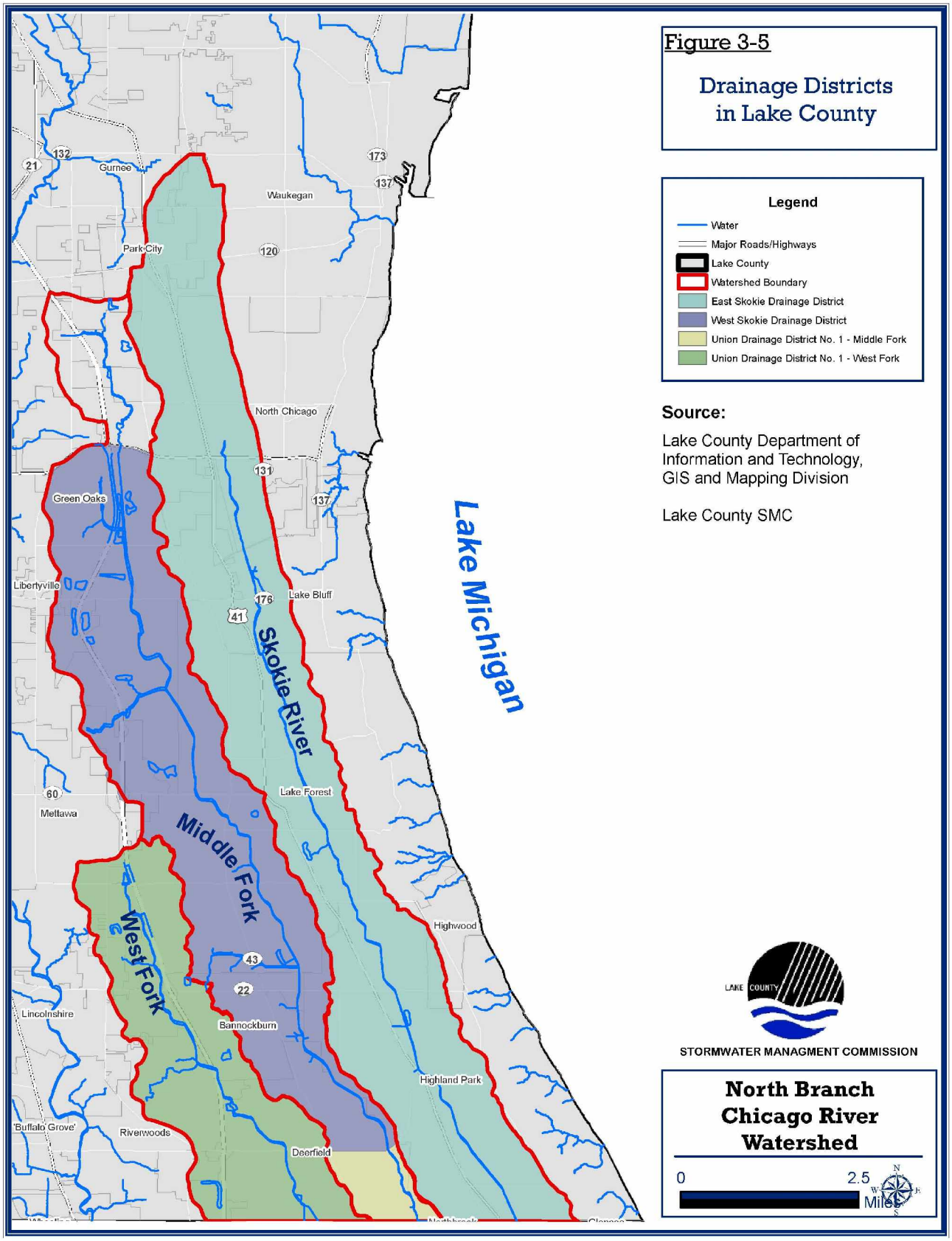
The 50 square mile North Branch Chicago River watershed in Lake County includes 14 municipalities, 7 townships and 8 county board districts. There are 2 federal and 7 state congressional districts represented in this portion of the watershed. Figures 3-6 and 3-7 are maps of Lake and Cook County Municipalities and Townships, and County Board and Congressional Districts respectively. In addition to these jurisdictions, the SMC has authority for administering development permits under the Watershed Development Ordinance throughout the county. The 45 square mile Cook County portion of the watershed is divided into 11 municipalities and covers 3 townships.

Community participation in the watershed has improved as the North Branch Chicago River watershed plan was being developed and reviewed, and as communities have been able to access cost-share funds for BMP projects in the watershed. Stakeholder representation has expanded on the North Branch Planning Committee and the BMP Selection Team as the project has progressed. These groups are serving as the coordinating bodies for inter-jurisdictional implementation of the North Branch Plan and Project in both Lake and Cook Counties.

Table 3-8

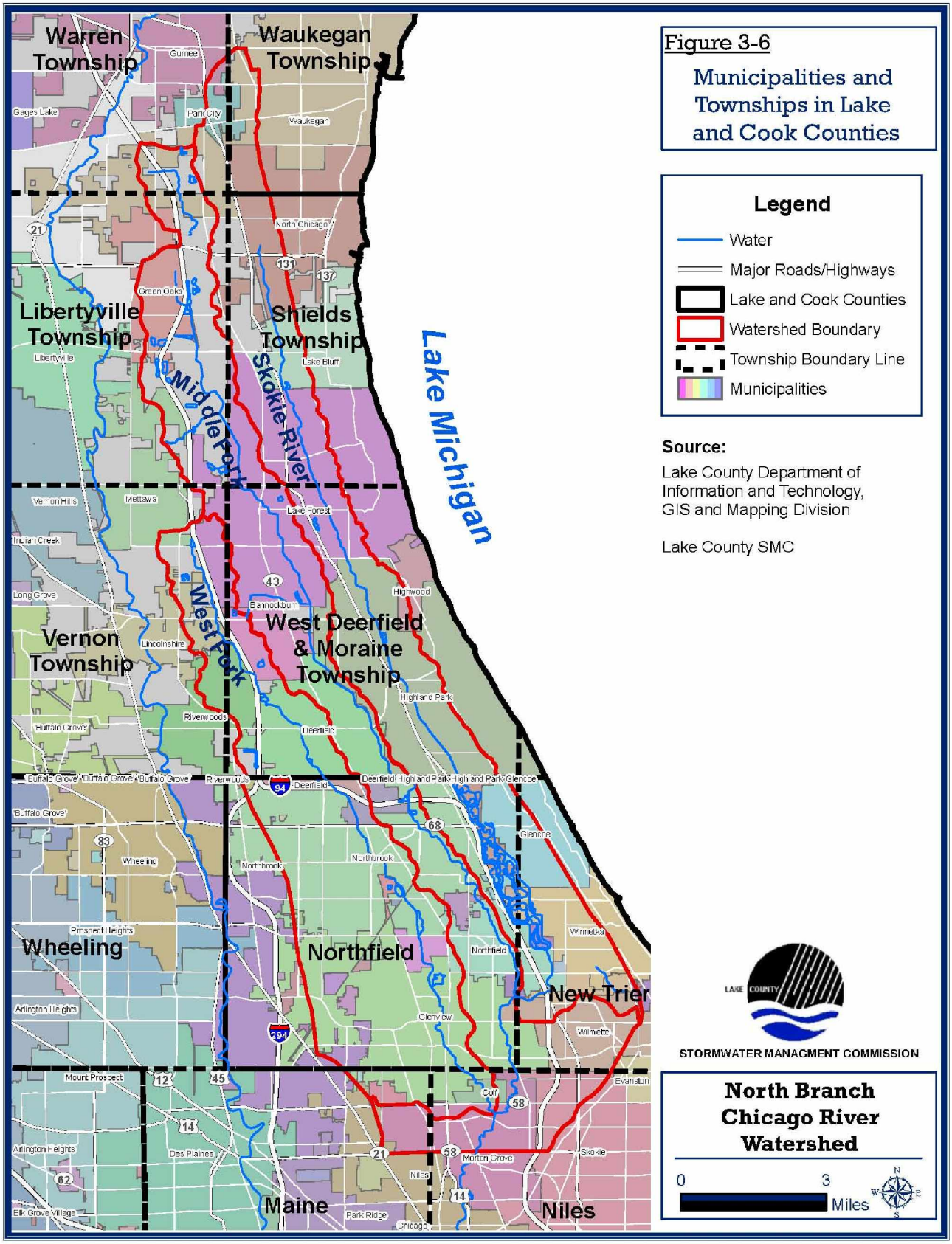
Major Political Jurisdictions in the North Branch Chicago River Watershed

Municipalities Lake Co.	Watershed Acres	Percent of Watershed Lake/ Tot.		Municipalities Cook Co.	Watershed Acres	Percent of Watershed Cook/ Tot.		Townships Lake Co.	County Bd. Districts Lake Co.	Congressional Districts Lake Co.	Drainage Districts
Bannockburn	1,305	3.8	2.1	Glencoe	1,498	5.3	2.4	Warren	7th	**U.S.**	East Skokie
Deerfield	3,201	9.4	5.1	Glenview	6,752	23.8	10.8	Waukegan	11th	8th	West Skokie
Green Oaks	1,358	4.0	2.2	Golf	285	1.0	0.5	Libertyville	12th	10th	Union 1 (MF)
Gumee	114	0.3	0.2	Kenilworth	41	0.1	0.1	Shields	13th		Union 1 (WF)
Highland Park	5,300	15.5	8.5	Morton Grove	1,982	7.0	3.2	Vernon	14th	**State**	
Highwood	145	0.4	0.2	Niles	104	0.4	0.2	West Deerfield & Moraine	21st	Senate:	
Lake Bluff	909	2.7	1.4	Northbrook	7,201	25.4	11.5	West Deerfield & Moraine	22nd	29th	
Lake Forest	7,843	23.0	12.5	Northfield	1,806	6.4	2.9	Shields	23rd	30th	
Lincolnshire	572	1.6	0.9	Skokie	961	3.4	1.5	**Townships**			
Mettawa	409	1.2	0.7	Wilmette	1,960	6.9	3.2	**Cook Co.**		**House**	
North Chicago	1,839	5.4	3.0	Winnetka	1,758	6.2	2.8	New Trier		57th	
Park City	491	1.4	0.8					Northfield		58th	
Riverwoods	947	2.7	1.5					Niles		59th	
Waukegan	1,822	5.3	2.9					Maine		60th	
Unincorporated Lake County	5,978	18.5	9.8	Unincorporated Cook County	3,923	13.8	6.5				



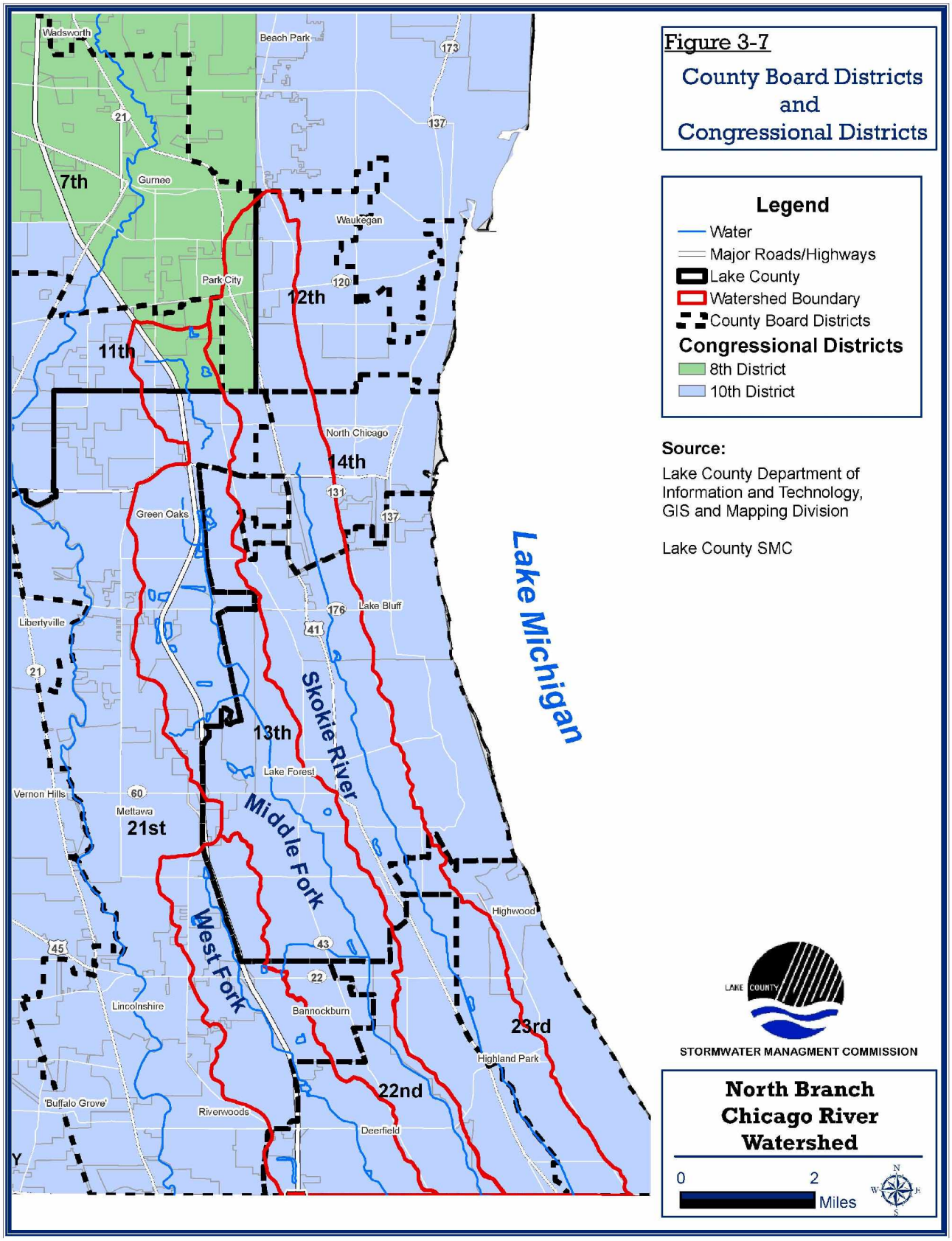
Maps to be used for Planning Purposes only.

Produced by V3 Companies



Maps to be used for Planning Purposes only.

Produced by V3 Companies



Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.5 Demographics

The best available information on future development trends in Lake and Cook County comes from local comprehensive plans, local zoning maps and demographic forecasts made by the CMAP[6]. CMAP population, household and employment data for the year 2000 and forecasts for the year 2030 were collected and analyzed. The results of this analysis are discussed in the following sections. The CMAP forecasts include input from local municipalities as well as regional trend data and provide the best overall information for predicting demographic changes in the watershed.

3.5.1 Lake County Demographic Forecast

Although the North Branch Chicago River watershed in Lake County is considered a suburban/urban watershed that is fairly well built-out, it is still projected to have significant growth through 2030. Overall, a 10.9 percent increase in population, a 10.3 percent increase in households, and a 15.0 percent employment increase in municipalities in the Lake County portion of the North Branch Chicago River watershed (Table 3-9) are expected by the year 2030.

See Figures 3-8 and 3-9 for maps showing predicted changes in population and employment for the North Branch Chicago River watershed.

Table 3-9

CMAP Forecast Data for the North Branch Chicago River Watershed, Lake County

	2000	2030	Change	%
Population	133,912	148,456	14,544	10.9
Households	47,370	52,244	4,874	10.3
Employment	158,043	181,758	23,715	15.0
Persons/Household	2.83	2.84	0.01	0.5
Density (per acre)*				
Population	4.15	4.60	0.45	10.9
Households	1.47	1.62	0.15	10.3
Employment	4.90	5.64	0.74	15.0

* Density figures have been rounded to two decimal places for presentation in this table.

With the projected increases in households and employment, there will be a corresponding decrease in the remaining vacant and agricultural land in the watershed. The projected change in land use will add a significant amount of new impervious surface that will further degrade water quality and increase stormwater runoff if traditional development patterns (low density, wide streets, large parking lots, wide setbacks and curb and gutter) continue to be used in the watershed.

[6] *In 2006, the Northern Illinois Planning Commission (NIPC) merged with the Chicago Area Transportation Study (CATS) to form the CMAP.*

Table 3-10 provides a comparison of 2000 data on population, households and employment and predicted changes by 2030 for the three subwatersheds in Lake County. Population and households are grouped together in the following discussion since they generally mirror each other. Household projections were not mapped in the figures for this section since they are reflected as changes in the same areas where population is growing.

Table 3-10
CMAP Forecast Data for the North Branch by Subwatershed, Lake Co.

West Fork	**2000**	**2030**	**Change**	**%**
Population	24,770	28,805	4,035	16.3
Households	8,234	9,253	1,019	12.4
Employment	43,498	48,526	5,028	11.6
Persons/household	3.01	3.11	0.10	3.5
Density (per acre)				
Population	4.48	5.21	0.73	16.3
Households	1.49	1.67	0.18	12.4
Employment	7.87	8.78	0.91	11.6
Middle Fork	**2000**	**2030**	**Change**	**%**
Population	35,965	42,008	6,043	16.8
Households	12,676	15,299	2,623	20.7
Employment	62,923	73,221	10,298	16.4
Persons/household	2.84	2.75	-0.09	-3.2
Density (per acre)				
Population	2.84	3.32	0.48	16.8
Households	1.00	1.21	0.21	20.7
Employment	4.97	5.78	0.81	16.4
Skokie River	**2000**	**2030**	**Change**	**%**
Population	73,177	77,643	4,466	6.1
Households	26,460	27,692	1,232	4.7
Employment	51,622	60,011	8,389	16.3
Persons/household	2.77	2.80	0.04	1.4
Density (per acre)				
Population	5.21	5.53	0.32	6.1
Households	1.88	1.97	0.09	4.7
Employment	3.67	4.27	0.60	16.3

3.5.1.1 Population & Households

Number: Of the three subwatersheds, Skokie had the largest population and total number of households in 2000, and is projected to have the greatest number of people and households in 2030. The West and Middle Fork subwatersheds are expecting similar increases in population, however the Middle Fork is expecting significantly greater increases in households by 2030.

Change: The greatest change in population numbers and households is projected for the Middle Fork, with a percent increase of 16.8 and 20.7 respectively. The large increases in population and households reflect the substantial amount of undeveloped land available in the Middle Fork compared with the other North Branch subwatersheds.

Density: Skokie had the highest population density in 2000 (5.21 people/acre) and also had the highest household density (1.88 households/acre). Skokie is projected to have both the highest household and population density in 2030 (5.53 households and 1.97 people/acre). Projections for 2030 indicate slightly fewer people per household in the Middle Fork, and a slight increase in people per household for the Skokie and West Fork. See Figures 3-10 and 3-11 to compare North Branch Chicago River watershed population density in 2000 with population density in 2030.

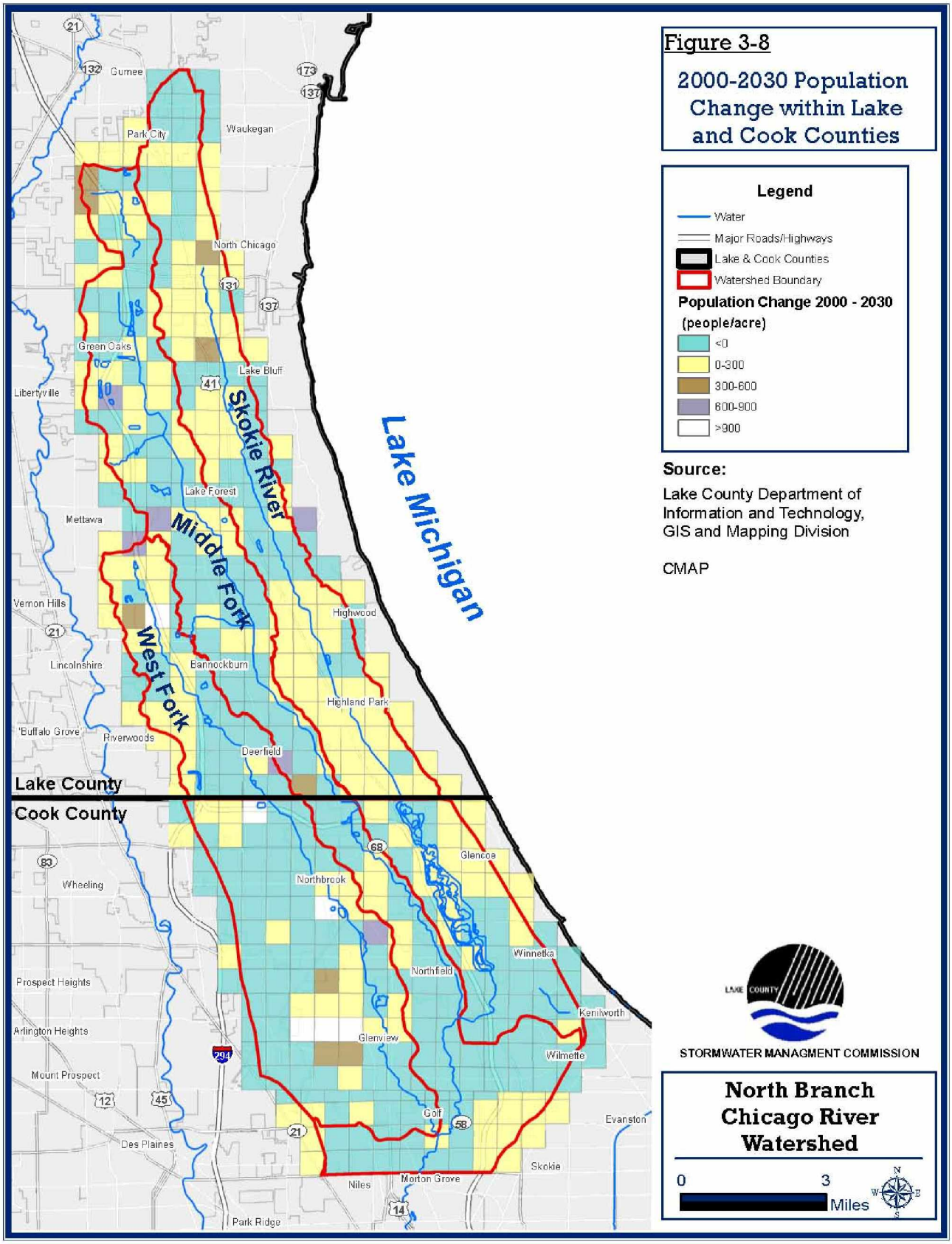
Most of the increase in population and households will occur in the northern portion of the Skokie subwatershed in the area roughly bounded by 22nd Street on the north and Route 176 to the south (see Figure 3-10). Within Middle Fork, the area with the greatest anticipated population increase is located between Rockland Road and Everett Road. In the West Fork, a significant increase in population and households is projected for the watershed area north of Half Day Road. Significant increases are also projected for Highland Park.

3.5.1.2 Employment

Number: The Middle Fork subwatershed had the highest employment in 2000, and is also projected to have the greatest number of jobs in 2030. Skokie has the second highest employment followed by the West Fork.

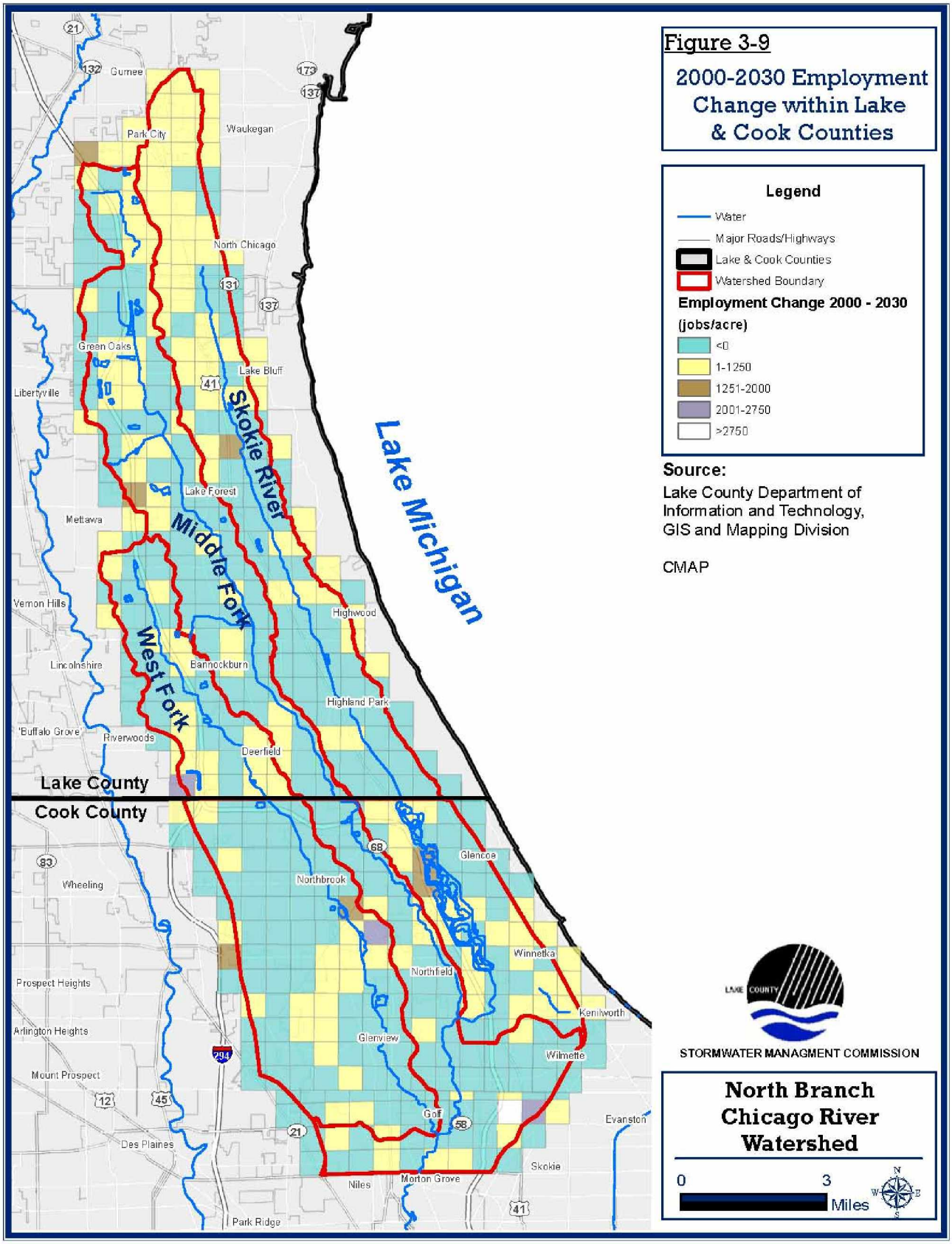
Change: The greatest percent increase in employment is projected for the Middle Fork (16.4%-10,298 jobs), while the least number of new jobs will occur in the West Fork (5,028).

Density: West Fork had the greatest employment density in 2000 (7.87 jobs/acre), and is projected to have the highest employment density in 2030 (8.78 jobs/acre). Employment density in the Middle Fork is higher than the Skokie, although the Middle Fork is less developed. See Figures 3-12 and 3-13 to compare North Branch Chicago River watershed employment density in 2000 with projected employment density in 2030. Most of the increase in employment growth will occur in the northern portion of the Skokie River subwatershed. A significant pattern for projected employment growth can be seen from the north to south in the Route 41 corridor between Belvidere Road and Deerpath Road.



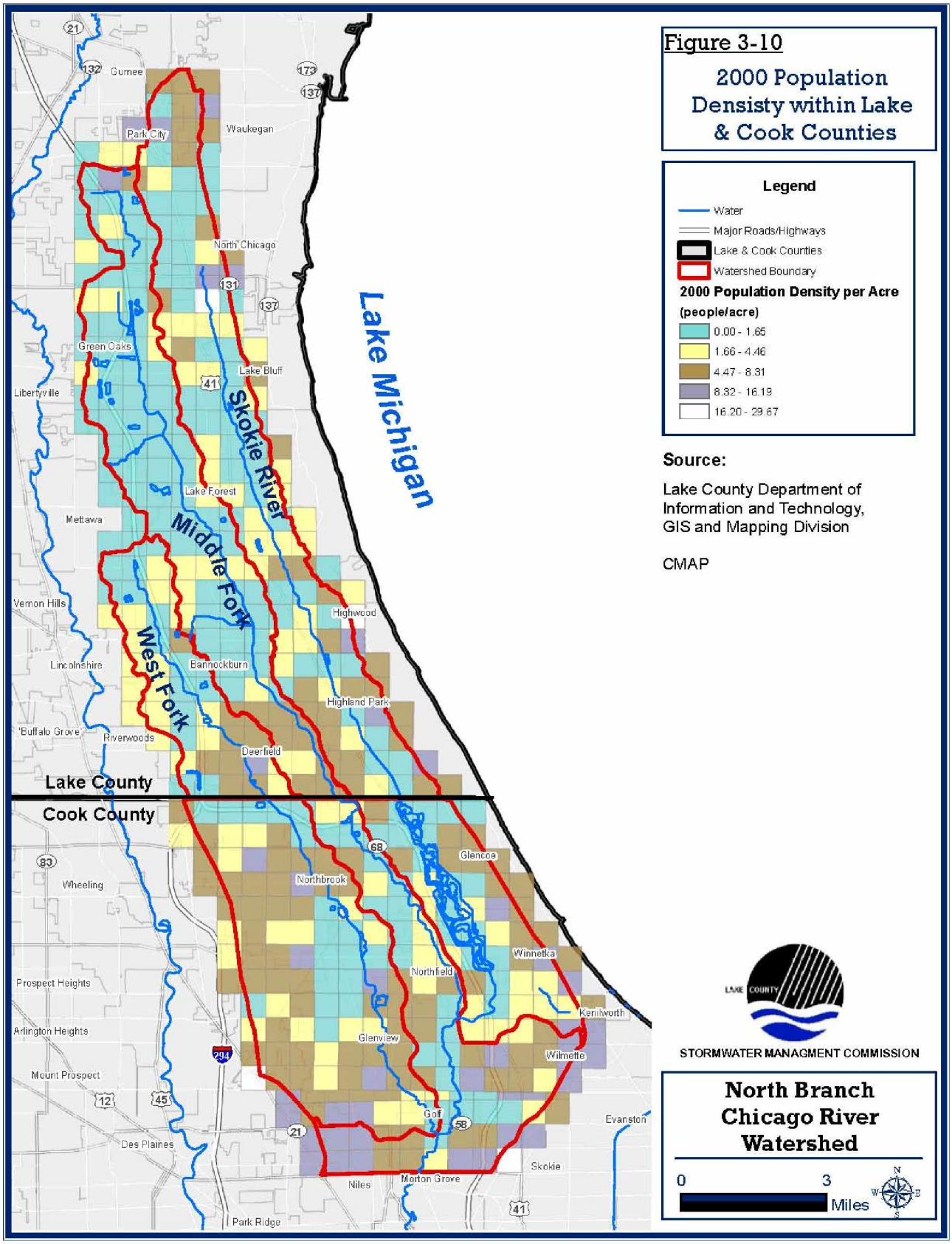
Maps to be used for Planning Purposes only.

Produced by V3 Companies



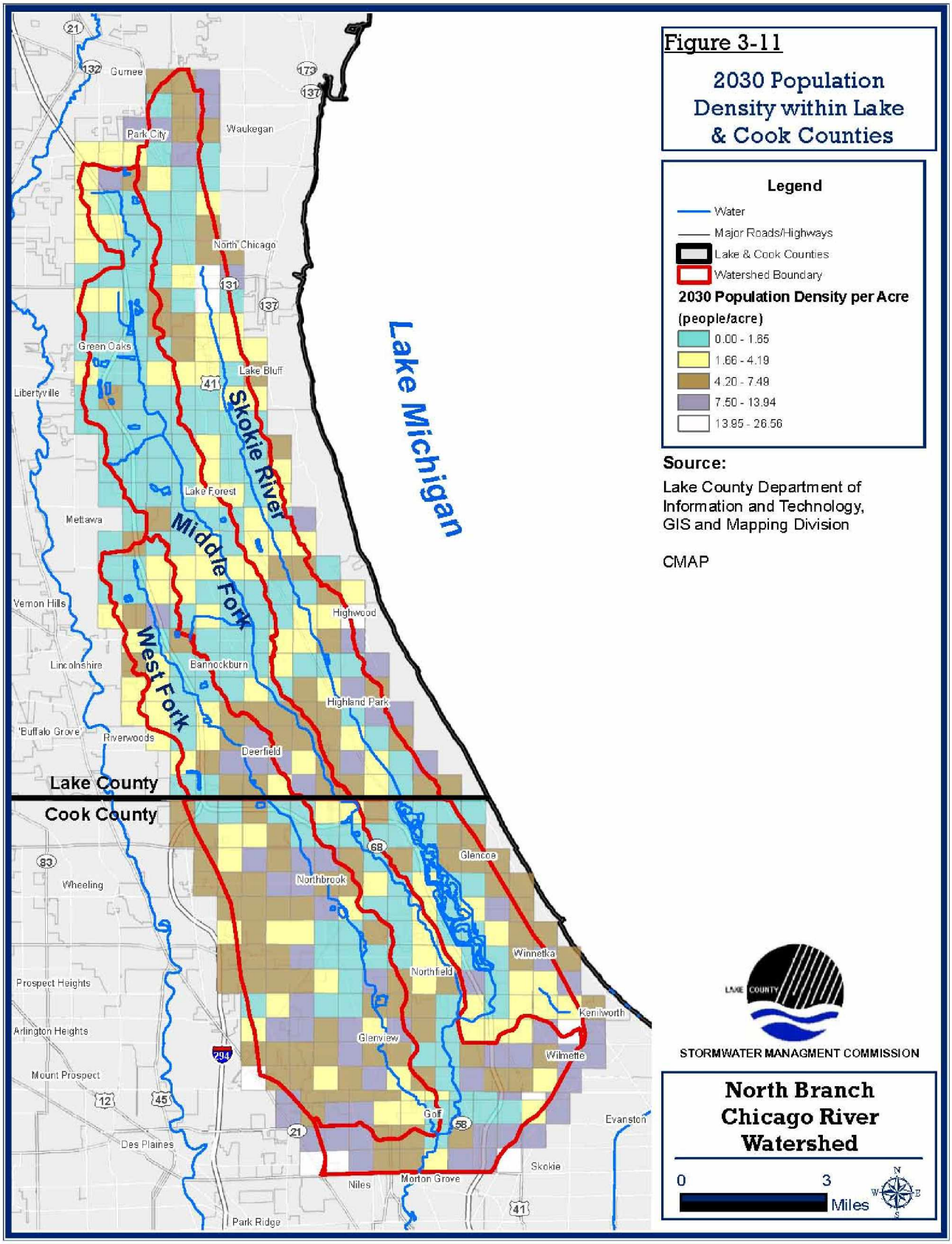
Maps to be used for Planning Purposes only.

Produced by V3 Companies



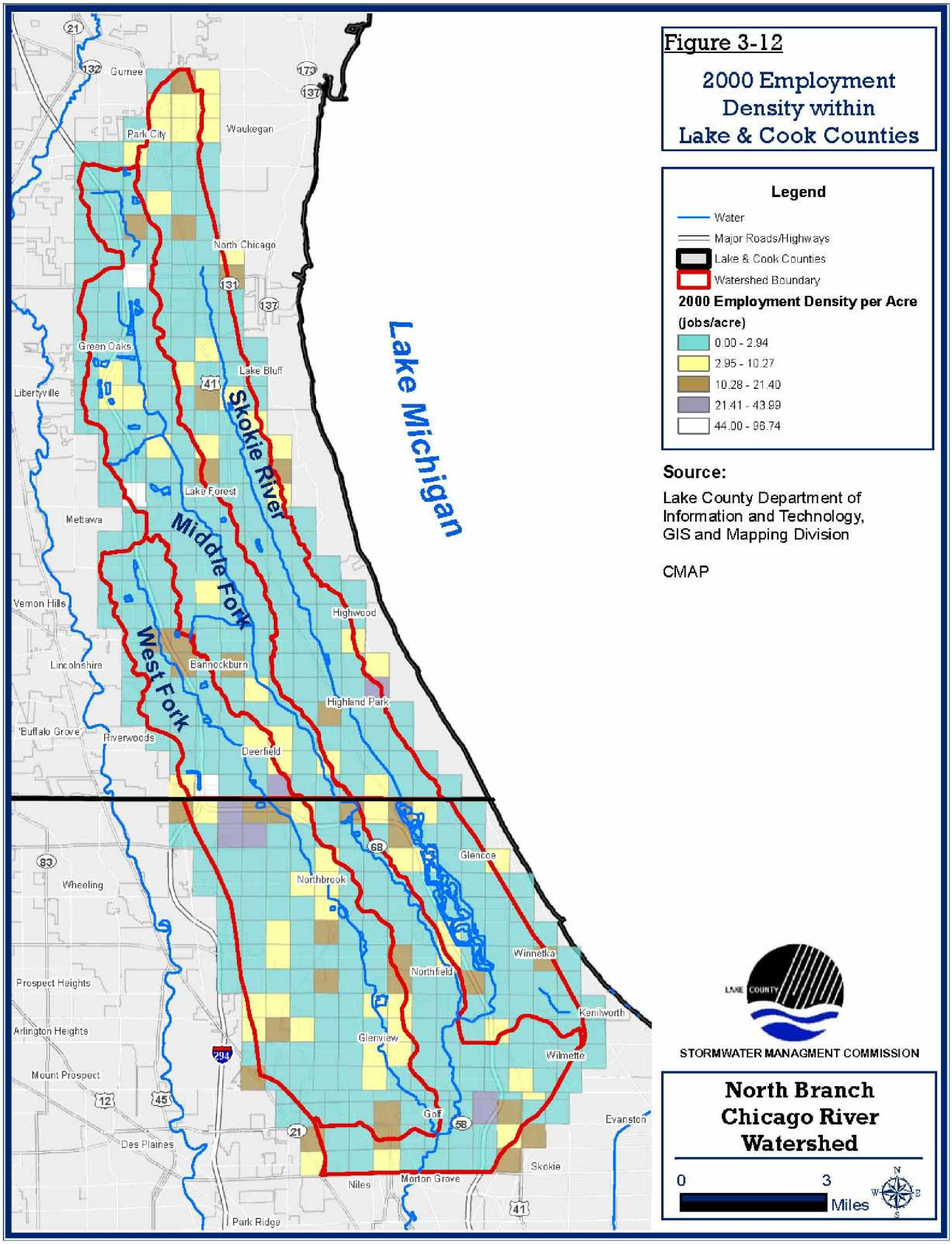
Maps to be used for Planning Purposes only.

Produced by V3 Companies



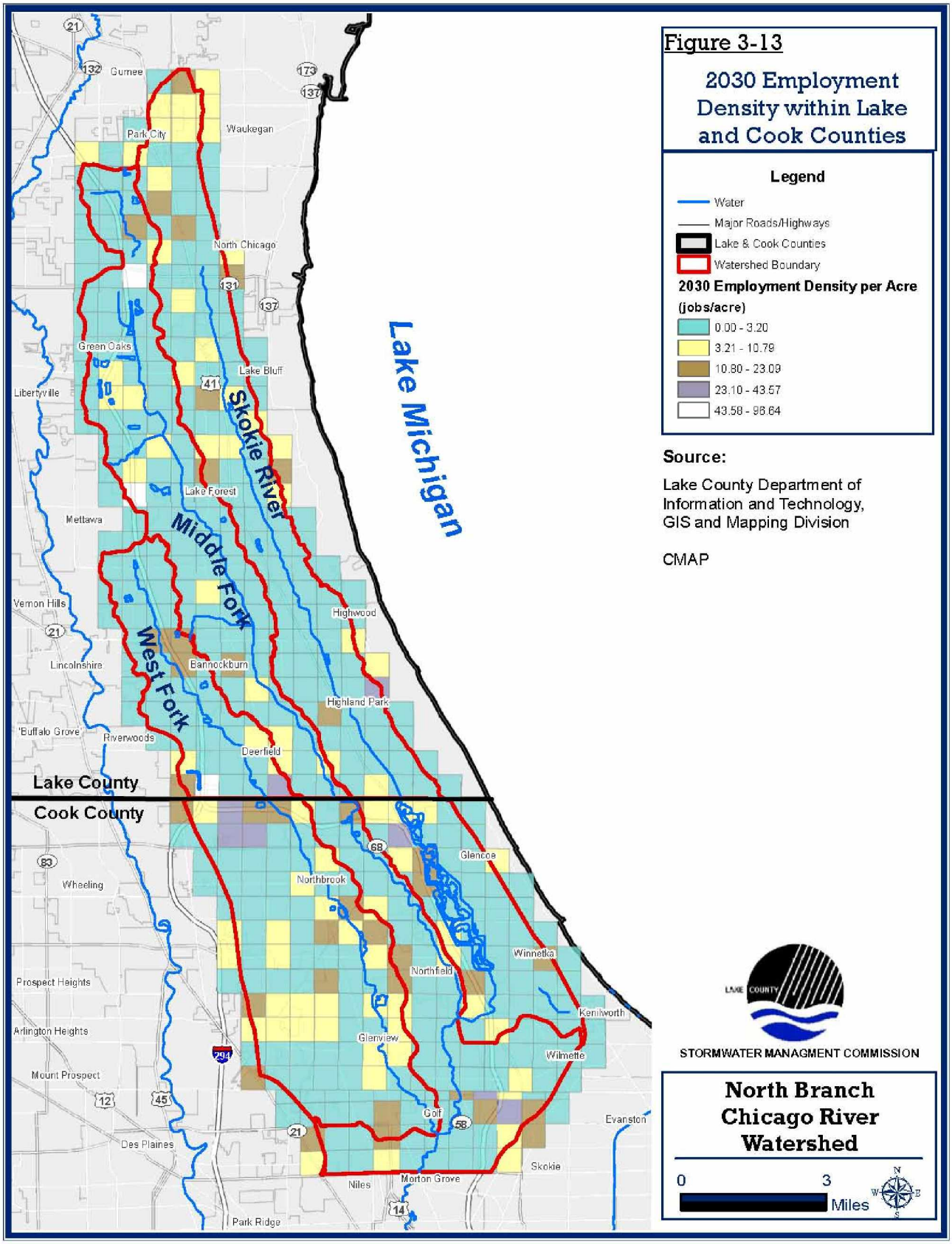
Maps to be used for Planning Purposes only.

Produced by V3 Companies



Maps to be used for Planning Purposes only.

Produced by V3 Companies



Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.5.2 Cook County Demographic Forecast

In the Cook County portion of the North Branch Chicago River watershed, the 2000 population was estimated to be 215,430. Population density varies within the study area. As shown in Figure 3-10, the greatest densities occur in the southern portion of the study area and lower densities are found in the northern portions. Overall, a 3.2 percent increase in population, a 5.6 percent increase in households, and a 23.3 percent employment increase in municipalities in the Cook County portion of the North Branch Chicago River watershed (Table 3-11) are expected by the year 2030.

With the projected increases in households and employment, there will be a corresponding decrease in the remaining vacant and agricultural land in the watershed. The projected change in land use will add a significant amount of new impervious surface that will further degrade water quality and increase stormwater runoff if traditional development patterns (low density, wide streets, large parking lots, wide setbacks and curb and gutter) continue to be used in the watershed.

Table 3-11
CMAP Forecast Data for the North Branch Watershed, Cook County

	2000	2030	Change	%
Population	215,430	222,285	6,855	3.2
Households	78,242	82,627	4,385	5.6
Employment	171,206	211,120	39,914	23.3
People/Household	2.75	2.69	-0.06	-2.3
Density (per acre)*				
Population	7.58	7.82	0.24	3.2
Households	2.75	2.91	0.15	5.6
Employment	6.02	7.43	1.40	23.3

* Density figures have been rounded to two decimal places for presentation in this table.

Table 3-12 provides a comparison of 2000 data on population, households and employment and predicted changes by 2030 for the three subwatersheds in Cook County. Population and households are grouped together in the following discussion since they generally mirror each other. Household projections were not mapped in the figures for this section since they are reflected as changes in the same areas where population is growing. A discussion on employment changes follows.

Table 3-12

CMAP Forecast Data for the North Branch by Subwatershed, Cook Co.

West Fork	**2000**	**2030**	**Change**	**%**
Population	89,726	96,972	7,246	8.1
Households	32,493	36,174	3,681	11.3
Employment	95,869	111,796	15,927	16.6
Persons/household	2.76	2.68	-0.08	-2.9
Density (per acre)				
Population	6.98	7.54	0.56	8.1
Households	2.53	2.81	0.29	11.3
Employment	7.46	8.70	1.24	16.6
Middle Fork	**2000**	**2030**	**Change**	**%**
Population	83,407	83,768	361	0.4
Households	30,840	31,358	518	1.7
Employment	50,153	60,027	9,874	19.7
Persons/household	2.70	2.67	-0.03	-1.2
Density (per acre)				
Population	9.16	9.20	0.04	0.4
Households	3.39	3.45	0.06	1.7
Employment	5.51	6.59	1.08	19.7
Skokie River	**2000**	**2030**	**Change**	**%**
Population	42,297	41,545	-752	-1.8
Households	14,909	15,095	186	1.2
Employment	25,184	39,297	14,113	56.0
Persons/household	2.84	2.75	-0.08	-3.0
Density (per acre)				
Population	6.55	6.43	-0.12	-1.8
Households	2.31	2.34	0.03	1.2
Employment	3.90	6.08	2.18	56.0

3.5.2.1 Population & Households

Number: Of the three subwatersheds, the West Fork had the largest population and total number of households in 2000, and is projected to have the greatest number of people and households in 2030. The Middle Fork and Skokie River subwatersheds are expected to remain substantially the same from 2000 to 2030 in population and households with percent changes in each of these categories under 2 percent.

Change: The greatest change in population and household numbers is projected for the West Fork (8.1% and 11.3%, respectively), The Skokie will have a net loss (-1.8%) in population but an increase in households (1.2%).

Density: The Middle Fork had the highest population density in 2000 (9.16 people/acre) and also had the highest household density (3.39 households/acre). The Middle Fork is projected to have both the highest household and population density in 2030 (3.45 households and 9.20 people/acre). It is interesting to note that the 2000 population densities for the West Fork and Skokie were similar, while the employment density of the West Fork is approximately twice that of the Skokie's. This reflects the fact that West Fork is the most developed of the three subwatersheds. Projections for 2030 indicate slightly fewer people per household in each of the three watersheds. See Figures 3-10 and 3-11 to compare North Branch Chicago River watershed population density in 2000 with population density in 2030.

Most of the increase in population and households will occur in the northern half of the Skokie River subwatershed in the area roughly bounded by Tower Road to the South and Lake-Cook Road to the north (see Figure 3-10). An additonal significant population and household increase can be found in Glenview and is related to the commercial and residential development of The Glen (the former Glenview Naval Air Station). Within Middle Fork, the area with the greatest anticipated population increase is bounded by Old Orchard Road on the north and Illinois 43 on the east. In the West Fork, a significant increase in population and households is projected the Village of Glenview between Willow Road and Glenview Road. Slight decreases in population are expected in the southern boundaries of all three watersheds.

3.5.2.2 Employment

Number: The West Fork subwatershed had the highest employment in 2000, and is also projected to have the greatest number of jobs in 2030 (Figure 3-13). The Middle Fork has the second highest employment followed by the Skokie.

Change: The greatest percent increase in employment is projected for the Skokie (56.0%-14,113 jobs), while the greatest number of new jobs will occur in the West Fork (15,927).

Density: West Fork had the greatest employment density in 2000 (7.46 jobs/acre), and is projected to have the highest employment density in 2030 (8.70 jobs/acre). Employment density in the Middle Fork is higher than the Skokie, although the Middle Fork is less developed. See Figures 3-12 and 3-13 to compare North Branch Chicago River watershed employment density in 2000 with projected employment density in 2030.

A pattern for projected employment growth can be seen along the Illinois 43 and Illinois 41 corridors in Cook County. Another concentration of significant employment increases is related to commercial and residential development of The Glen (the former Glenview Naval Air Station) in Glenview.

3.6 North Branch Chicago River Watershed Land Use

Based on 2001 NIPC land use mapping, the four predominant land uses in the North Branch Chicago River watershed are residential (49%), open space recreational (11%), open space conservation (8%), and commercial/services (8%). See Table 3-13 for a breakdown of land use classes for the watershed in both Lake and Cook Counties and by subwatershed in Lake County.

The North Branch Chicago River watershed in Lake and Cook Counties was approximately 81% developed. Seventy-seven percent of Lake County portion of the watershed is developed and 86% of the Cook County portion of the watershed is developed. The major differences in land use composition between Lake and Cook Counties occur in the residential, commercial, agriculture, vacant and open space-conservation categories. Lake County is 45% residential versus 53% in Cook County. Four percent of Lake County is for transportation/ communication/utilities use, whereas only 2% of the watershed in Cook County is transportation/ communication/utilities use. There is significantly more agricultural and vacant land in Lake County (3%-Lake versus 1%-Cook of agricultural; and 12%-Lake versus 2%-Cook of vacant land). On the other hand, Cook County has considerably more land in conservation open space: 2,704 acres making up 10% of Cook County versus 2,370 acres making up 7% of Lake County. Recreational open space is the largest use of undeveloped land in Cook County, whereas vacant land is the largest land use classification for undeveloped land in Lake County.

3.6.1 Land Use in Lake County

In Lake County, the largest land uses include: residential (45%), vacant (12%), recreational open space (10%), and conservation open space (7%). As mentioned previously, approximately 77% of the Lake County watershed was developed by 2001. Within that watershed the West Fork subwatershed was 87% developed, the Middle Fork subwatershed was 66% developed, and the Skokie River subwatershed was 83% developed. The southern portion of the watershed is mostly built out in older municipalities while some of the communities in the northern portion of the watershed, especially in the Middle Fork, are still developing. The undeveloped portion of the watershed including agriculture, vacant, open space-conservation, and water resources represents 23% of the land use. However, agriculture land use in Lake County decreased from 8% in the 1990 land use plan to only representing 3% of the total acreage for Lake County watershed in 2001. In addition, vacant land decreased by 1% over the eleven year period. Open space – conservation increased from 5% in 1990 to 7% in 2001 whereas open space – recreational land use consistently represented 10% of the total acreage over the eleven years for the study area. More than 50% of the vacant and agricultural land (still available for development or conservation) in 2001 is located in the Middle Fork subwatershed.

Industrial and institutional land uses make up a larger portion of the northern half of the watershed. The Great Lakes Naval Training Center (GLNTC), located between Lake Bluff and North Chicago, is the largest institutional land use in the watershed. Industrial and institutional land uses are scattered in the southern half of the watershed, but primarily occur along major transportation routes where commercial property tends to be located. Throughout the watershed, most commercial development follows the north-south corridors of the Tri-State Tollway (I-94) and Highways 41 and 43.

3.6.1.1 West Fork Land Use in Lake County

Land use in the Lake County portion of the West Fork subwatershed is primarily residential, but includes several areas of significant commercial and industrial use (Figure 3-14). Over 56% of the West Fork is residential compared with approximately 40% in the other two subwatersheds. Commercial development has occurred along Route 43 in Deerfield on the southeastern boundary of the subwatershed. In addition, a combination of commercial and industrial land use is found along I-94 between Deerfield and Lake-Cook Roads and at the Route 22 (Half Day Road) interchange. In total, nearly 87 percent of the West Fork subwatershed has been developed into residential, commercial, industrial, institutional, transportation and recreational open space land uses.

Established communities such as Deerfield, Bannockburn and Lincolnshire are in the lower reaches of the West Fork subwatershed. The northern portion of the watershed is less developed and incorporates more acres of open space, agricultural, and vacant land. Recreational open space includes Ravinia and Deerfield Country Clubs and Conway Farms Golf Club. Recreational open space in the West Fork subwatershed increased from 5% in 1990 to 11% in 2001. Conservation open space also increased by 2% over the eleven year period. Total open space, including both recreational and conservation open space, vacant, agricultural and water resource classifications, represents approximately 1,222 acres or about 22 percent of the West Fork subwatershed.

3.6.1.2 Middle Fork Land Use in Lake County

Residential development makes up 43% of the Middle Fork subwatershed land use, and is the predominant land use classification south of Route 60 (Figure 3-14). North of Route 60, residential development is concentrated primarily in the area between Rockland Road (Illinois Route 176) and Buckley Road (Illinois Route 137) and to the west of the Tri-State Tollway (I-94). A large percentage of undeveloped land is located north of Route 60. In addition, a significant amount of land use diversity occurs north of Route 60 due to larger amounts of agricultural, commercial, and industrial land. Approximately 66% of the Middle Fork subwatershed has been developed.

Of the three forks, the Middle Fork has the greatest amount of vacant and agricultural land with over 2,628 acres making up 21 percent of the subwatershed. Although most of the remaining vacant and agricultural land occurs north of Illinois Route 60, suburban development is increasing in the northern portion of the Middle Fork. Many areas north of Lake Forest are experiencing rapid growth and large parcels are being annexed by municipalities for development. An example is the 223-acre Conway Farms in Lake Forest that was recently developed north and east of Illinois Route 60 and Interstate 94.

Limited amounts of protected open space exist within the watershed. However, protected open space increased from 8% in 1990 to 18% in 2000. Old School, Middlefork Savanna and Prairie Wolf Forest Preserves, totaling approximately 1,387 acres, are the three largest tracts of protected open space and make up approximately 11 percent of the subwatershed. Total open space, including both recreational and conservation open space, vacant, agricultural and water resource classifications, makes up approximately 4,821 acres or about 38 percent of the Middle Fork subwatershed. Although agriculture decreased from 16% in 1990 to 5% in 2001, the Middle Fork still contains the largest amount of unprotected and undeveloped land in the watershed.

3.6.1.3 Skokie River Land Use in Lake County

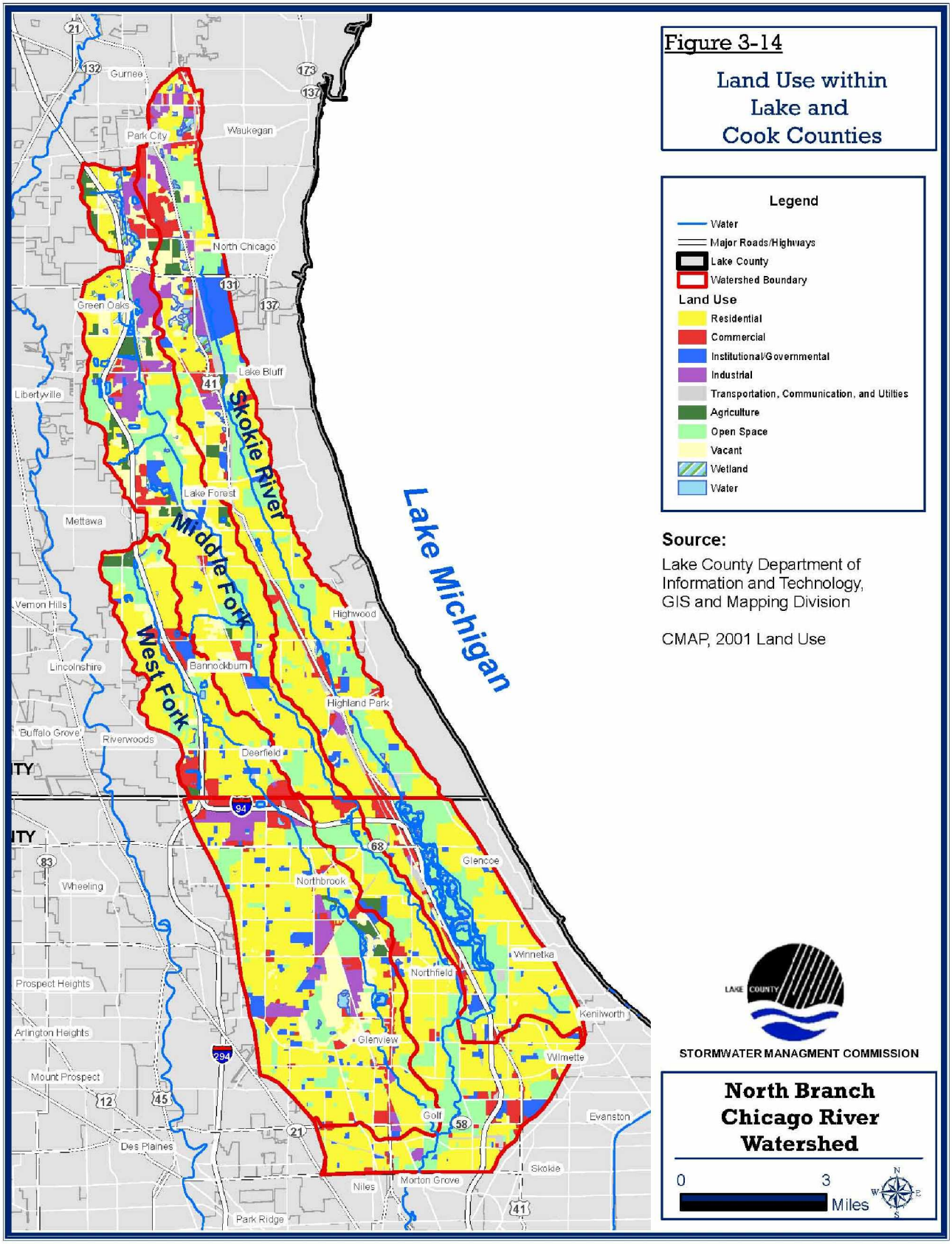
The Skokie subwatershed south of Lake Bluff is almost entirely residential and recreational open space, with some commercial development occurring along US Highway 41 (Figure 3-14). Residential land use covers approximately the same percentage of land in the Skokie River subwatershed (41%) as in the Middle Fork. North of Route 60 the Skokie River subwatershed supports a variety of land uses including commercial, residential, industrial, agriculture, and vacant land. A large area of institutional use is located north of Route 60 due to the GLNTC in North Chicago. The Skokie River subwatershed is highly developed compared to the

other two forks. Nearly 12,307 acres or 83 percent of the Skokie subwatershed is considered developed in residential, commercial, industrial, institutional, transportation or recreational open space land uses.

The northern portion of the Skokie subwatershed has a significant amount of combined open space and vacant land. As in the Middle Fork, most of the vacant and agricultural land occurs north of Illinois Route 60. There are 1,928 acres of vacant and agricultural land that make up 12 percent of the subwatershed. Limited amounts of protected conservation open space exist within the Skokie River subwatershed. The largest parcel is the approximate 238 acres of the Greenbelt Forest Preserve that is located in the watershed. Only 23 percent of the total open space (or 655 acres) is set aside as conservation land. Total open space, including both recreational and conservation open space, vacant, agricultural and water resource classifications, make up approximately 4,551 acres or about 32 percent of the Skokie subwatershed. Skokie River has the largest amount of recreational open space of the three forks. A substantial portion of this open space consists of golf courses or parks that border the river and include floodplain. Although golf courses are classified as open spaces they are generally not protected and could be developed in the future.

3.6.2 Land Use in Cook County

Land use within the Cook County portion of the North Branch Chicago River watershed is primarily residential as shown in Figure 3-14 and listed in Table 3-13. The predominant land use in 1990 was also residential. Fifty-three percent of the land use in the study area is residential (primarily single family) followed by open space recreation, open space conservation, commercial, and institutional land uses. Open space occupies 7,262 acres scattered throughout the Cook County portion of the watershed in land and water resources, which accounts for 26% of the study area. Commercial use tends to be concentrated along major roads such as U.S. Route 41 and Waukegan Road (I-43). In the 1990 land use plan, the former Glenview Naval Air Station accounts for a large proportion of institutional land use (approximately 46%). In 1995 the Glenview Naval Air Station closed and the 1,121 acres was converted into The Glen, a mixed-use district, consisting of new homes, offices, and retail space. In addition, public amenities such as the Park Center, Evelyn Pease Tyner Interpretive Nature Center, Gallery Park, Lake Glenview, Air Station Prairie, two golf courses, and a Metra station were created within the redevelopment. According to The Village of Glenview, 95% of the land is now sold, leased or under contract and redevelopment will continue for the next several years.



Maps to be used for Planning Purposes only.

Produced by V3 Companies

Table 3-13

Land Use in the North Branch Chicago River Watershed

North Branch Watershed	North Branch Total		Lake County Total		Cook County Total		West Fork – Lake Co.		Middle Fork – Lake Co.		Skokie River – Lake Co.	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Residential	29,499	49	14,371	45	15,128	53	3,088	56	5,508	43	5,775	41
Commercial and Services	4,503	8	2,368	7	2,135	8	564	10	562	4	1,242	9
Institutional	2,995	5	1,536	5	1,459	5	231	4	448	4	857	6
Industrial/Warehousing/ Wholesale	2,606	4	1,564	5	1,042	4	5	0	774	6	785	5
Transportation/ Communication/Utilities	2,091	3	1,378	4	713	2	243	4	334	3	801	5
Agriculture	1,148	2	960	3	188	1	151	3	598	5	211	2
Open Space - Recreational	6,518	11	3,298	10	3,220	11	606	11	500	4	2,192	16
Open Space - Conservation	5,074	8	2,370	7	2,704	10	226	4	1,489	12	655	5
Vacant (Wetland/Forest/ Grassland)	4,367	7	3,680	12	687	2	241	4	2,030	16	1,409	10
Under Development	1,020	2	342	1	678	2	87	2	213	2	42	0
Lakes/Reservoirs/Lagoons	835	1	372	1	463	2	84	2	204	1	84	1
Total Acreages	60,658		32,240		28,418		5,526		12,660		14,053	
Undeveloped	11,424	19	7,382	23	4,042	14	702	13	4,321	34	2,359	17
Developed	49,234	81	24,858	77	24,376	86	4,824	87	8,339	66	11,694	83

*NIPC 2001 land use data

3.6.3 Impacts of Land Use on Flooding, Water Quality and Streams

As land use changes with urbanization there is less open space and more impervious cover in a watershed. Undeveloped open land is able to infiltrate rainfall into the ground, and ponded runoff is stored in numerous natural depressions in the landscape. Vegetation also reduces the amount of surface runoff by intercepting rainfall and through evapotranspiration. Development reduces the capacity of the land to hold water by removing natural vegetation, compacting soils when grading for construction and adding impervious cover such as rooftops, driveways, streets and parking lots. Impervious cover directly influences urban streams by dramatically increasing surface runoff. Depending on the degree of impervious cover, the annual volume of runoff from a watershed can increase by two to 16 times its predevelopment rate along with proportional reductions in ground water recharge. According to the Importance of Imperviousness, T. Schueler, *Watershed Protection Techniques,* 1995, the result has been that traditional development significantly increases the volume and accelerates the rate of rainfall runoff. Table 3-14 presents estimates of impervious cover in the North Branch Chicago River watershed. As can be seen by these estimates, the West Fork is the subwatershed most developed with impervious cover in both counties, followed by the Skokie and Middle Fork subwatersheds. The Cook County portion of the watershed as a whole has 30 percent impervious cover; while Lake County has 29 percent, with an overall watershed impervious area estimated at 30 percent.

Table 3-14
Impervious Cover Estimates
North Branch Chicago River Watershed

Watershed/ Subwatershed	Acres	Impervious Cover (acres)*	Percent Impervious
Lake County	32,239	9,407	29
West	5,526	1,723	31
Middle	12,660	3,339	26
Skokie	14,053	4,345	31
Cook County	28,417	8,534	30
West	12,856	4,058	32
Middle	9,102	2,524	28
Skokie	6,459	1,952	30
Total N. Branch	60,656	17,941	30

* Estimate methodology derived from: Impervious Cover and Land Use in the Chesapeake Bay Watershed, Center for Watershed Protection, 2001.

Once development occurs, the increased runoff from these areas is often channeled into an improved drainage system that concentrates sheet flow runoff into ditches and stormsewers. Water that was once infiltrated, taken up by plants or stored in natural depressions in the landscape now flows off the property quickly. This new drainage system collects stormwater and sends an increased volume offsite to adjacent and downstream waterways at a faster rate through stormsewers and ditches, thereby increasing the potential for streambank and shoreline erosion and damaging floods.

Data presented in Table 3-15 reflects changes in population and employment density in the watershed since 1970 that have resulted in more impervious land cover and increased runoff to the North Branch Chicago River. Although there has been some protection of open space by the Forest Preserve District, local park districts and conservation nonprofits, the entire area of land in conservation open space makes up only 7 percent of the watershed in Lake County and 8 percent of the watershed as a whole. (See Section 3.6.4 for more detailed information on open space.) Both a visual inspection of the watershed and the low percentage of the land use conserved in open space are indicators that the watershed has been developed using traditional development practices rather than more watershed-healthy conservation development practices.

Flood Damage *(See Section 3.14 for a more detailed evaluation of flood damage in the watershed.)* Land use has a direct effect on flood damage in the watershed. The most obvious way land development results in flood damage, is the location of buildings and infrastructure in the floodplain. Less obvious, but of equal significance, is the impact an increased volume of runoff generated from upland development has on expanding the floodplain and causing localized flooding problems.

Without adequate stormwater infiltration and runoff detention, peak flows in the North Branch Chicago River increased, and overbank and localized flooding worsened as the watershed developed. As a result of the flood damage, several flood reduction studies were conducted in the watershed beginning in the 1970s. These studies resulted in the construction of seven flood control reservoirs in the watershed at a total cost of over $40 million.

Table 3-15
Watershed Development Trends, Lake County

	Population Density (per square mile)				Employment Density (per square mile)			
	1970	**2000**	**2030**	**2000 to 2030**	**1970**	**2000**	**2030**	**2000 to 2030**
West Fork	1,110	2,868	**3,335**	**16%**	305	5,037	5,620	12%
Middle Fork	655	1,818	2,125	17%	214	3,181	3,700	16%
Skokie	1,532	3,335	3,540	6%	533	2,349	2,733	16%
North Branch	1,116	2,656	2,944	11%	369	3,136	3,610	15%

Although there is insufficient data to determine historical changes in flood heights along the river in Lake County, a visual comparison of the boundaries of the Flood of Record[7] with the current 100-year floodplain boundaries reflects some differences. The current 100-year floodplain is wider than the Flood of Record in a number of areas along all three forks of the river. Of special note:

West Fork

The 1957 Flood of Record (50-year event) for the West Fork indicated that most of the floodwater was maintained within the channel itself. The 2006 100-year floodplain mapping depicts an expanded floodplain upstream of Lake Eleanor and the Duffy Lane flood reservoir, and a defined floodplain north of Half Day Road.

Middle Fork

The 2006 100-year floodplain boundary expands beyond the 1938 Flood of Record boundary (50-year event) along much of the Middle Fork. Two areas of most notable expansion are located between Atkinson Road and Route 176 and immediately south of Route 60.

Skokie River

Areas of most notable difference between the 1938 Flood of Record boundary (15-20-year event) and the 2006 100-year floodplain boundary along the Skokie River include an enlarged floodplain:

- north of Route 120 in Park City;
- north and south of 22nd Street in North Chicago;
- on the GLNTC property south of Route 137;
- immediately north of Deerpath Road; and
- north and south of Clavey Road.

Inappropriate use of floodplain land has resulted in flood damage in the watershed. Based on a preliminary assessment of the Lake County watershed, 892 buildings were identified within the mapped 100-year

[7] *The Flood of Record for the Skokie and Middle Fork occurred in 1938, while the Flood of Record for the West Fork occurred in 1957. The November 16, 2006 Flood Insurance Study for Lake County indicates that on July 21-22 of 1982 a flood event that most likely exceeded the 100-year frequency occurred on the West Fork from its source to Lake-Cook Road when over 7.5 inches of rain fell in approximately 14 hours. Unfortunately, the Hydrologic Atlas that maps the Flood of Record was developed prior to this flood event and has not been updated.*

floodplain boundary of the North Branch Chicago River. There are seventeen known sites where overbank flooding damages multiple buildings or roadways. An analysis of land use within the Flood of Record boundaries (based on the floods of 1938 for the Skokie and Middle Fork, and 1957 for the West Fork) indicates that construction in the floodplain is not uncommon. Thirty-five percent of the 1938 and 1957 Flood of Record floodplains are now in developed land use categories such as residential, commercial, industrial, institutional or transportation/communication/utilities (2001 CMAP land use data).

In March 2004, Illinois State Water Survey (ISWS) started a complex study regarding Quantifying the Impact of Land Cover Change and of Climate Change on Floods in Northeastern Illinois[8], which was finalized in February 2007. This study includes 12 small urbanized watersheds in Northeastern Illinois. Precipitation frequency analysis for different time periods was calculated based on L-moments, hydrologic parameters for different land-use categories were determined using GIS, and hydrologic analysis was performed using the HEC-HMS model. This study quantified:

- the increase in flood peaks between 1954 and 1996;
- quantified the increase in calculated design precipitation;
- identified the land-use changes in the watershed areas;
- identified the relative contributions of land cover change and climate change on increasing flood discharges;
- compared the published regulatory discharges with flood discharges computed for current conditions; and
- provided tools to analyze future land use and climate scenarios.

The most notable differences between this study and the previous United States Geological Survey (USGS) studies (Curtis 1987, Soong et al. 2004) as well as FEMA certified discharges in 2004 (FEMA 1980, FEMA 1986, FEMA 2000a, FEMA 2000b, FEMA 2002, FEMA 2005) are the difference in the median and the difference in the lower quartile. On the average the flood peaks in this study are 13.5% higher than those of FEMA, and 12.9% larger than those published by the USGS in 2004 (Soong et al. 2004). It was also found that the precipitation values calculated in this study are slightly higher than those of Bulletin 71 (Huff and Angel, 1902), within one percent of those given by NOAA-14, and on the average 15.5% larger than the corresponding precipitation values given in TP-40 (Hershfield 1961).

Although buildings and infrastructure located in the floodplain are at the greatest risk from overbank flooding, overbank flooding is not the only cause of flood damage in the watershed. Approximately one-half of the known flood problem areas in the Lake County watershed have other primary flooding causes such as poor local drainage, depressional flooding or sewer backup. Examples of flooding and runoff-related types of problems in the North Branch Chicago River include:

- There are constrictions in some places along the river due to sediment/debris blockages, undersized culverts, inadequate bridge openings or natural topographic features. Backwater flooding has resulted in building and/or transportation damage in several locations along the river including upstream of the constructed flood control reservoirs.

- Localized flood damage occurs in areas where the drainage system was not designed to accommodate new upstream or adjacent development runoff. In these cases stormwater runoff tends to pond at the low points (depressions) in the landscape until the drainage system can handle it.

- Stormwater that isn't accommodated by the drainage system may infiltrate into the sanitary system resulting in sanitary sewer backups that flood basements causing damage.

---

[8] *Quantifying the Impact of Land Cover Change and of Climate Change on Floods in Northeastern Illinois, ISWS Study No R/CM 05-04, 2004-2007*

- The cumulative increase in the volume of runoff combined with channel modifications and the timing of flows has caused significant erosion along some river segments or reaches. Erosion has resulted in property loss, poor water quality, and has generated sediment accumulation and debris blockages.

Water Quality *(See Section 3.13 for a detailed water quality assessment for the North Branch.)*
Water quality in the North Branch Chicago River is primarily impacted by nonpoint pollutants transported to the river from urban runoff, industrial and municipal wastewater discharges, and by in-stream erosion and habitat degradation. Studies have shown that land use has a direct effect on water quality. Generally, the higher the percent of connected impervious cover of a land use, the greater the pollution load it generates. Pollutants from a variety of diverse and diffuse sources collect on impervious surfaces and are flushed into rivers and streams when it rains. Urban lawns, driveways, rooftops, parking lots and streets are the source areas of these pollutants, while the causes include: vehicles; road surface applications; direct atmospheric deposition; fertilizer; pesticides/herbicides; general litter (including pet litter); vegetative decay; and soil erosion from construction sites. Urban runoff also carries pollutants such as oil and grease, metals and pathogens such as fecal coliform. Runoff from impervious surfaces can be 10-12 degrees warmer than runoff from land in a natural state, which combined with reduced summer flows results in higher in-stream water temperatures. Table 3-16 is a comparison of pollutant loads from a number of nonpoint sources representing different land uses based on extensive monitoring for a Wisconsin study.

Table 3-16
Geometric Mean Concentrations of Pollutants in Stormwater Runoff From Selected Urban Source Areas (Adapted from Bannerman et. al., 1993)*

Source Area	Total Phosphorus (mg/l)	Solids (mg/l)	E. coli (c/100ml)	Zinc (μ/l)	Cadmium (μ/l)	Copper (μ/l)
Residential feeder street	1.31	662	92,000	220	0.8	46
Residential collector street	1.07	326	56,000	339	1.4	56
Commercial arterial street	0.47	232	9,600	508	1.8	46
Industrial collector street	1.50	763	8,380	479	3.3	76
Industrial arterial street	0.94	690	4,600	575	2.5	74
Residential roofs	0.15	27	290	149	ND	15
Commercial roofs	0.20	15	1,117	330	ND	9
Industrial roofs	0.11	41	144	1,155	ND	6
Residential lawns	2.67	397	42,000	59	ND	13
Driveways	1.16	173	34,000	107	0.5	17
Commercial parking	0.19	58	1,758	178	0.6	15
Industrial parking	0.39	312	2,705	304	1.0	41

* Table reproduced from Watershed Techniques Vol 1, No. 1

When considering nonpoint source pollution, streets were found to be the single most important source area in residential, commercial and industrial areas based on a Wisconsin study of stormwater pollutant sources. Not only did streets produce some of the highest concentrations of phosphorus, suspended solids, bacteria and several metals, but they also generated a disproportionate amount of the total runoff volume. Consequently, streets typically contributed four to eight times the pollutant load than would have been expected if all source areas contributed equally.[9]

[9] Sources of Urban Stormwater Pollutants Defined in Wisconsin, *Watershed Protection Techniques, Vol.1, No. 1, February 1994.*

A number of factors contribute to high pollutant loading from streets. Streets are directly connected to the drainage system, resulting in a high runoff coefficient, and the curb and gutter system tends to trap and retain fine particles that blow into them and are then flushed off in stormwater during a rain event. Streets also tend to be the collection point for pollutants delivered from sidewalks, driveways, lawns and rooftops, as well as from vehicular traffic emissions and leaks. Table 3-17 includes a list of the types of constituents in highway runoff that are sources of pollution.

Table 3-17
Highway Runoff Constituents and Their Primary Sources

Constituents	Primary Sources
Particulates	Pavement wear, vehicles, atmosphere, maintenance
Nitrogen, Phosphorus	Atmosphere, roadside fertilizer application
Lead	Leaded gasoline (auto exhaust), tire wear (lead oxide filler material, lubricating oil and grease, bearing wear)
Zinc	Tire wear (filler material), motor oil (stabilizing additive), grease
Iron	Auto body rust, steel highway structures (guard rails etc), moving engine parts
Copper	Metal plating, bearing and bushing wear, moving engine parts, brake lining wear, fungicides and insecticides
Cadmium	Tire wear (filler material), insecticide application
Chromium	Metal plating, moving engine parts, brake lining wear
Nickel	Diesel fuel and gasoline (exhaust), lubricating oil, metal plating, bushing wear, brake lining wear, asphalt paving
Manganese	Moving engine parts
Cyanide	Anticake compound (ferric ferrocyanide, sodium ferrocyanide, yellow prussiate of soda) used to keep deicing salt granular
Sodium, Calcium, Chloride	Deicing salts
Sulphate	Roadway beds, fuel, deicing salts
Petroleum	Spills, leaks or blow-by of motor lubricants, antifreeze and hydraulic fluids, asphalt surface leachate
PCB	Spraying of highway rights-of-way, background atmospheric deposition, PCB catalyst in

The Wisconsin study also documented that the highest overall phosphorus concentrations came from lawns, which may be due to excessive lawn fertilization. Lawns were also found to be an important source of fecal coliform as were residential streets. Parking lots had moderately high concentrations of all pollutants. Of all the sources monitored, rooftop runoff had the lowest concentrations of pollutants except for zinc, which was found at higher concentrations in runoff from rooftops than from any other source areas.
Phosphorus and nitrogen are nutrients that become pollutants when in excess. Nutrients have caused excessive algal blooms in the Skokie River and Lagoons, and deplete the river of dissolved oxygen in all three forks. Phosphorus is frequently transported with sediment particles, as are many metals that can be toxic. Urban runoff carries these nutrients from impervious surfaces, lawns and construction sites. Municipal wastewater discharges are also a source of excess nutrients, which are not currently regulated by IEPA permits.

Stream Conditions Developed land uses contribute significantly greater runoff volume to the North Branch Chicago River. This increase in water quantity combined with greater pollutant loads and channel modifications have contributed to poor stream quality. Development immediately adjacent to the stream channel without adequate setbacks and buffers has also caused stream degradation. If the watershed had been developed with more attention placed on setting aside riparian lands as public open space, stream conditions would be much less impacted today.

Physical modifications that have been made to the river (straightening and deepening of the channel and removal of native riparian vegetation) have resulted in moderate to severe erosion of the stream channels. This erosion increases the sediment load in the river. Sediment transported in the river from channel erosion, combined with soil erosion from construction sites, results in high levels of suspended solids in the water that settle out of the water as sediment, which collects on the bottom of the channel.
Sediment covers the stream substrate, eliminating habitat for aquatic organisms. Sediment also clogs storm drains, and fills lakes, wetlands, and reservoirs, which not only degrades habitat, but also reduces the conveyance capacity of the channel and increases the potential for downstream flooding. The channel modification and erosion in combination with poor management of vegetation along the riverbanks has resulted in degraded habitat for both aquatic and terrestrial plants and animals.

Degraded streams and other aquatic systems cannot support a diverse community of aquatic life. Studies on fish and macroinvertebrate composition and diversity have demonstrated a direct relationship between the percent imperviousness of a watershed and stream quality. Imperviousness is the sum of the area of roads, parking lots, sidewalks, rooftops and other impermeable surfaces in a watershed. Stream degradation begins to occur at relatively low levels of imperviousness (10-20%), and streams are significantly degraded in watersheds that have greater than 25 percent impervious surface.[10] An estimated 29 percent of the watershed in Lake County, and 30 percent of the watershed as a whole are impervious surfaces. This urbanized landscape has resulted in impairments to the river, of medium priority as rated by the IEPA.

3.6.4 Open Land in the North Branch Chicago River Watershed

As described in the previous section, there is a direct relationship between the amount of open land in a watershed and the hydrology of the watershed and stream quality. As an outgrowth of the original 2000 North Branch Chicago River Watershed Assessment and Management Plan (Watershed Plan), a North Branch Open Space Plan (NBOSP) was developed in 2005 by Futurity Inc. in cooperation with Friends and the SMC. The NBOSP inventory, presented below, identifies both open and partially open land parcels to take into account all available open space to provide a basis for planning and management recommendations. Open and partially open lands were defined in the NBOSP as follows:

- An open land parcel does not have built structures or impervious cover.
- A partially open land parcel has a structure (building, parking) on a relatively small part of a parcel thus still offering some potential for stormwater management, a buffer next to existing open space, or possible greenway and trail connections. Such parcels are typically partly-developed industrial sites, or institutions (churches, schools, etc.) with extensive grounds. In some cases these were also parklands largely covered with recreation centers, parking lots, and the like.

NBOSP Inventory Findings — Number, Size and Estimated Value of Parcels Research found that there are approximately 71,732 parcels of land in the North Branch watershed in Lake and Cook counties. Some 25,924 parcels are in Lake County and 45,778 parcels are in Cook County. Of these parcels, 4,338 are open and 946 partially open.

[10] *The Importance of Imperviousness, Watershed Protection Techniques, Vol.1, No. 3, Fall 1994. Schueler & Claytor, Impervious Cover as a Urban Stream Indicator and a Watershed Management Tool, Practical Watershed Planning For Growing Watersheds, Center For Watershed Protection, 1998.*

Table 3-18
Acreage of Open Space in North Branch Watershed

Portion of Study Area		Total area (acres)	Open Parcels Area (acres)	Open Parcels Percent of study area	Partially Open Parcels Area (acres)	Partially Open Parcels Percent of study area
County	**Lake**	32,241	10,274	32%	3,105	10%
	Cook	28,417	6,688	24%	2,994	11%
Subwatershed	**West Fork**	18,383	3,545	19%	1,941	11%
	Middle Fork	21,762	6,860	32%	1,609	7%
	Skokie River	20,513	6,557	32%	2,549	12%
Watershed		60,658	16,962	28%	6,099	10%

As indicated in Table 3-18, the open space inventory identified 16,962 acres of open space (28% of the watershed area). This amount is very close to one of the primary objectives of the open space management plan, which is to protect 15,162 acres in the watershed as open space (25% of the watershed).

It is interesting to note that the acreage of partially open parcels in each county is nearly equal: 3,105 acres in Lake County and 2,994 acres Cook County. Subwatershed boundaries provide a different perspective for assessing open space. These findings, also included in Table 3-18, indicate that the Skokie and Middle Fork subwatersheds are similar in total area and contain the same percentage of open space (32%). The West Fork is slightly smaller in total area than the other two watersheds, but contains much less open space (19%). All three subwatersheds contain a sizeable number of partially open parcels.

While the average size of open parcels in Lake County is only 15% larger than Cook County, the average size of partially-open parcels in Lake County is more than twice as large, even though the acreage of partially open parcels is virtually the same for both counties (Table 3-19). This is due in part to the presence of large corporate campuses in Lake County.

Table 3-19

Parcel Size and Estimated Value

Open Parcels

Portion of Study Area	Parcel Count	Total Area (acres)	Parcel Size (acres)			Estimated Value ($s)			
			Minimum	Maximum	Average	Minimum	Maximum	Average	Total
Lake	2,453	10,274	0.00	149.36	4.19	0	1,427,571	86,665	130,777,434
Cook	1,885	6,688	0.00	184.68	3.55	0	3,152,003	68,904	83,649,129
Watershed	4,338	16,962	0.00	184.68	3.87	0	3,152,003	78,718	214,426,563

Partially Open Parcels

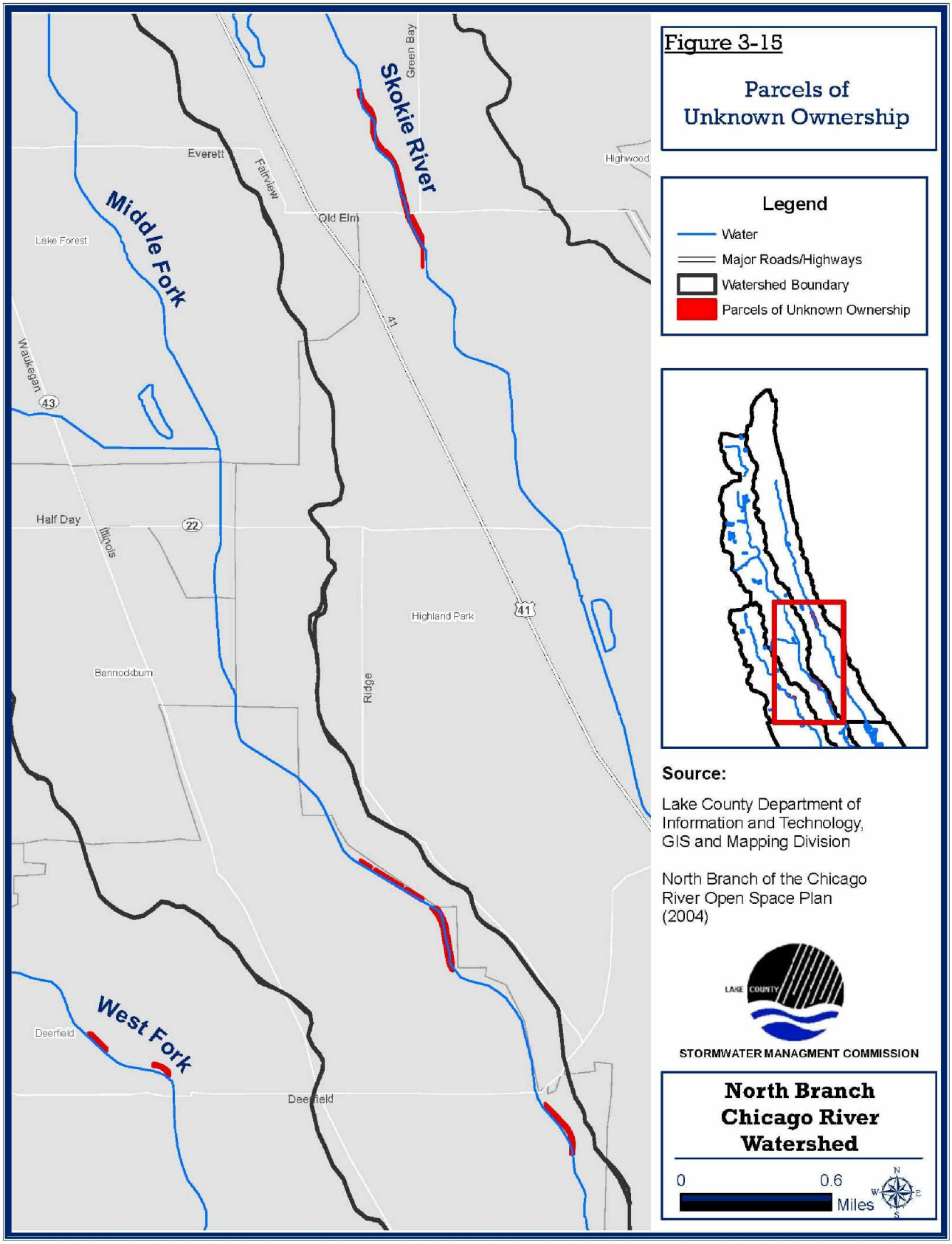
Portion of Study Area	Parcel Count	Total Area (acres)	Parcel Size (acres)			Estimated Value ($s)			
			Minimum	Maximum	Average	Minimum	Maximum	Average	Total
Lake	297	3,015	0.00	295.38	10.46	0	8,470,412	550,707	47,360,771
Cook	649	2,994	0.00	128.20	4.60	0	9,639,955	294,604	119,314,538
Watershed	946	6,099	0.00	295.38	7.53	0	9,639,955	339,461	166,675,309

** Land values are estimated by multiplying the assessed value of a parcel by 3.0 to approximate the market value.*

Average parcel size statistics can be misleading and should be interpreted with care. Several large parcels can skew this value. For example, in Cook County there are many small open parcels but the large open parcels comprising forest preserve district lands and golf courses increase the value of the average size.

Perhaps more important than parcel size is the concentration of open space. Where open space is concentrated, there is greater opportunity to protect water quality and aggregate parcels into viable conservation habitat. The northern third of the watershed contains a significant concentration of open space parcels and provides such an opportunity. The estimated land values included in Table 3-19 provide an order of magnitude and do not represent actual cost. Property values depend on a number of factors and must be assessed on a parcel-by-parcel basis.

Unknown Parcels/Uses The ownership of ten parcels remains unknown (Figure 3-15). All are in Lake County, and all are along the forks of the North Branch and include the streams themselves. Their combined area is 11.45 acres. These parcels are actually part of the streams themselves. None have a property identification number (PIN) and therefore show no ownership. They rather appear to be rights-of-way for the river itself, similar to dedicated street rights-of-way. All are parts of subdivisions at least 50 years old. These parcels may be useful as trail connections.



Maps to be used for Planning Purposes only.

Produced by V3 Companies

Inventory Findings — Location

In descriptive terms, the North Branch watershed can be divided into three sections according to identified open space (Figure 3-16). The findings in all three sections can be directly correlated to development pressures emanating from the Chicago region.

Southern Section

Dempster Street — Lake-Cook Road: Open space in the watershed from Dempster Street to Lake-Cook Road (the Cook County portion of the watershed) is characterized by large parcels having permanent long-term protection (forest preserves, park districts), and other parcels that are often taken for granted as permanent open space but are actually unprotected, such as private golf clubs. Most of these lands were set aside in the early 1900s, and mostly along the Skokie River, the only suburbanized part of the watershed at that time.

The Glenview Naval Air Station was an opportunity for large-scale open space protection when it was decommissioned. Although no agency chose to acquire the entire base for open space, the mix-use redevelopment by the Village of Glenview maintained 21% of the site (236 acres) as open space, which includes golf courses and public open space including a native prairie and o naturalized lake. In addition, Loyola Academy converted the Glenview landfill to recreational open space and ballfields.

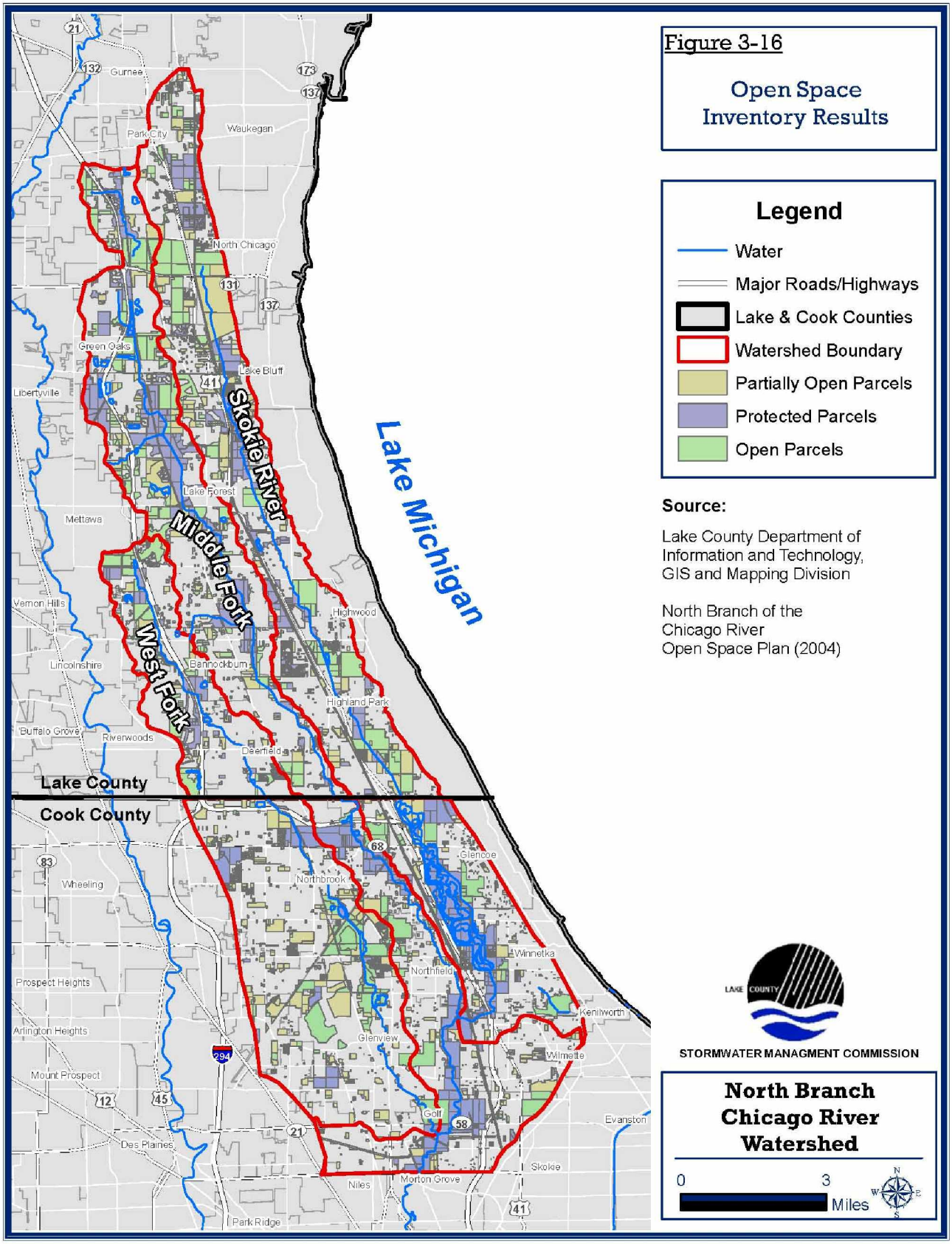
Central Section

Lake-Cook Road — Illinois Route 60: The central section, between Lake-Cook Road and Illinois Route 60, also contains substantial large tracts of open space, again unprotected private golf courses dating from the early 1900s and more recent (1970-2000) forest preserve and park purchases. However numerous additional open space protection opportunities remain, including several parcels of substantial size.

Northern Section

Illinois Route 60 — North Branch Headwaters: The northern third of the watershed, from Route 60 to the headwaters, also contains forest preserves, golf courses, and other public lands, mostly preserved in the last 50 years. In addition, several local land trusts own open space parcels. It is in this area, however, that the opportunity for substantial additional open space preservation also exists, including several tracts of over 100 acres.

It should also be noted that the farther north one goes in the watershed the better the quality of the remaining unprotected open space. The biodiversity study and extensive fieldwork, described shortly, confirm this.



Maps to be used for Planning Purposes only.

Produced by V3 Companies

Inventory Findings — Owner Type

An ownership classification scheme was developed as part of the inventory process (Tables 3-20 and 3-21 and Figure 3-17). Parcels were assigned to these categories by reviewing ownership and tax records. Some interesting general observations appear from the statistics and map:

- The owner types with the highest percentage of open space (open parcels) in the watershed are forest preserve districts (29%, or 4,931 acres) and private owners (24%, or 4,095 acres).
- Private ownership accounts for 976 acres of open space (open parcels) in Cook County and 3,119 acres in Lake County.
- Forest preserve districts own 46% of the open space (open parcels) in Cook County and only 18% of the open space in Lake County (3,089 acres vs. 1,842 acres).
- Private club holdings are about the same in both counties.
- Park district holdings are also the same, although Cook County is more densely populated.
- Some owner types own more partially open parcels than open parcels. For example, utility holdings in the watershed are 21 acres (open parcels) and 432 acres (partially open parcels). School district holdings in the watershed are 205 acres (open parcels) and 822 acres (partially open parcels).
- Large privately owned parcels tend to be in the western and northern sections of the watershed.

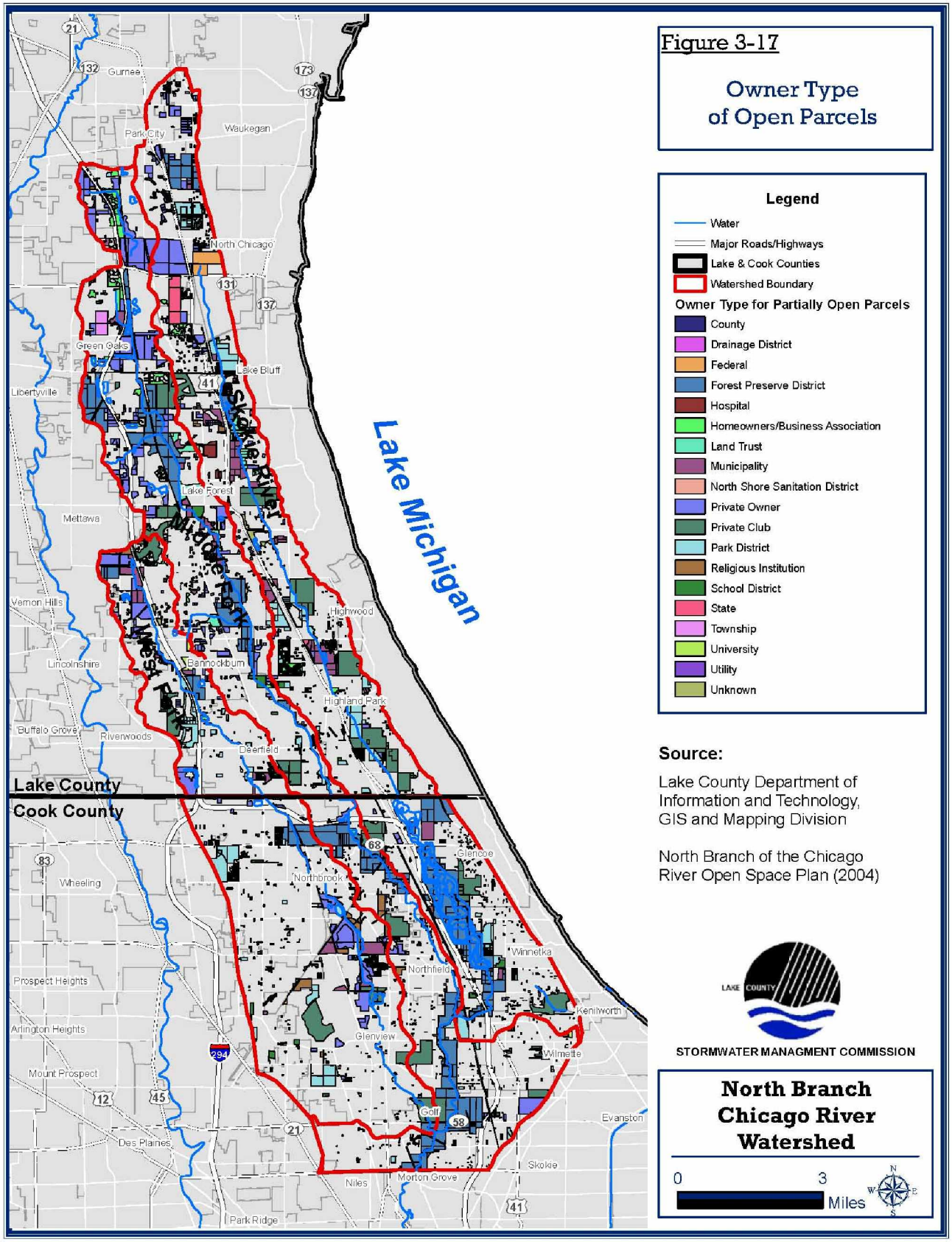
Table 3-20

Owner Type Summary for Open Parcels

Owner Type	Percent of open space parcels owned in:			Acres of open space owned in:		
	Lake	Cook	Watershed	Lake	Cook	Watershed
Unknown	1.12	0.00	0.68	114.92	0.09	115.01
Forest Preserve	17.93	46.18	29.07	1,841.73	3,088.89	4,930.62
Hospital	0.68	0.03	0.43	70.14	2.15	72.29
Homeowner/Business Assoc.	6.07	1.08	4.10	623.72	72.51	696.23
Cook County	0.00	0.04	0.06	0	9.78	9.78
Conservation Organization	2.70	0.15	1.65	277.36	2.44	279.80
Lake County	0.09	0.00	0.05	9.04	0	9.04
Lake County Drainage District	0.01	0.00	0.00	0.60	0	0.60
Municipality	9.35	4.69	7.51	960.25	313.63	1,273.88
North Shore Sanitary District	0.01	0.00	0.01	1	0	1.00
Private	30.36	14.59	24.15	3,119.39	976.05	4,095.44
Private Club	15.41	17.50	16.23	1,583.39	1,170.24	2,753.63
Park District	9.91	10.81	10.26	1,017.85	722.79	1,740.64
Religious Institution	0.55	3.09	1.55	56.29	206.79	263.08
School District	1.08	1.51	1.26	111.85	101.23	213.08
State	2.00	0.00	1.21	205.34	0.00	205.34
Township	0.79	0.01	0.48	81.43	0.44	81.87
University	0.45	0.09	0.31	46.59	6.04	52.63
Federal	1.40	0.05	0.87	143.78	3.18	146.96
Utility	0.09	0.18	0.12	9.06	11.78	20.84
	100	100	100	10,273.73	6,688.13	16,961.8

Table 3-21
Owner Type Summary for Partially Open Parcels

Owner Type	Percent of open space parcels owned in:			Acres of open space owned in:		
	Lake	Cook	Watershed	Lake	Cook	Watershed
Unknown	0.45	0.00	0.23	13.86	0	13.86
Forest Preserve	0.00	10.41	5.11	0	311.51	311.51
Hospital	4.12	2.91	3.53	128.09	87.07	215.16
Homeowner/Business Assoc.	0.00	0.80	0.39	0	23.80	23.80
Cook County	0.00	0.47	0.23	0	14.03	14.03
Conservation Organization	0.00	0.00	0.00	0	0	0.00
Lake County	0.48	0.00	0.24	14.80	0	14.80
Lake County Drainage District	0.00	0.00	0.00	0	0	0.00
Municipality	1.53	11.05	6.20	47.62	330.69	378.31
North Shore Sanitary District	1.69	0.00	0.86	52.51	0	52.51
Private	42.41	25.95	34.33	1,317.03	776.82	2,093.85
Private Club	4.16	3.23	3.71	129.26	96.72	225.98
Park District	3.32	12.26	7.71	103.20	366.99	470.19
Religious Institution	1.76	10.95	6.27	54.72	327.66	382.38
School District	13.04	13.93	13.48	404.98	416.94	821.92
State	0.16	0.12	0.14	4.94	3.58	8.52
Township	0.00	0.00	0.00	0	0.13	0.13
University	0.63	0.36	0.50	19.44	10.83	30.27
Federal	17.08	2.62	9.98	530.38	78.47	608.85
Utility	9.16	4.95	7.10	284.4	148.31	432.71
	100	100	100	3,105.24	2,993.54	6,098.78



Maps to be used for Planning Purposes only.

Produced by V3 Companies

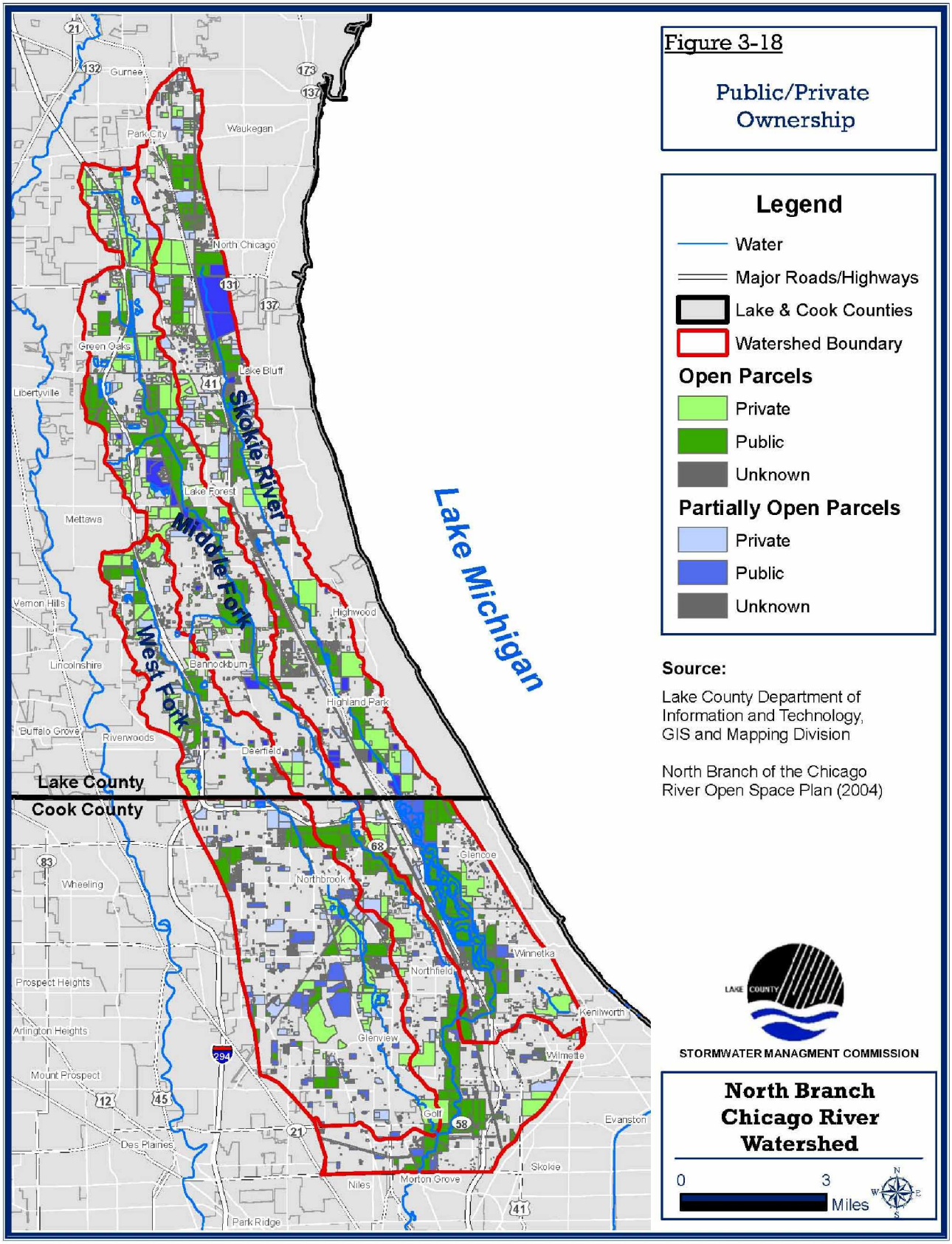
Inventory Findings — Public/Private Ownership
Public/private ownership was distilled from owner type information (Table 3-22 and Figure 3-18).

Some general observations are:

- In Lake County, most of the open space (56%) is in private ownership; in Cook County the opposite is true, most of the open space (63%) is in public ownership.
- Highly urbanized Cook County still contains a surprisingly high amount of open space in private ownership (2,448 acres).

Table 3-22
Public/ Private Ownership

Ownership of Open Parcels	Lake County		Cook County		Watershed	
	Percent	Area (acres)	Percent	Area (acres)	Percent	Area (acres)
Private	56%	5,786	37%	2,448	49%	8,234
Public	43%	4,373	63%	4,2340	50%	8,613
Unknown	1%	115	0%	0.2	1%	115
	100%	10,274	100%	6,688.13	100%	16,962
Ownership of Partially Open Parcels	**Lake County**		**Cook County**		**Watershed**	
	Percent	**Area (acres)**	**Percent**	**Area (acres)**	**Percent**	**Area (acres)**
Private	60%	1,857	49%	1,470	55%	3,326
Public	40%	1,235	51%	1,522	45%	2,757
Unknown	0%	14	0%	1	0%	15
	100%	3,106	100%	2,993	100%	6,098



Maps to be used for Planning Purposes only.

Produced by V3 Companies

Inventory Findings — Protection Status/Threats to Protection

The conversion of open space to other uses is perhaps the single biggest threat to the North Branch Chicago River watershed. This conversion results in increased runoff, water quality degradation, and loss of wildlife habitat within the watershed.

The central purpose of the inventory was to identify all open space vulnerable to development: parcels still open or partially open, but not protected as open space and therefore subject to conversion to other uses (Table 3-23).

Parcels owned by park districts, forest preserve districts, the Libertyville Township Open Space District, and land trusts have the highest level of open space protection, since these organizations have the protection of open space as their central mission. For instance, forest preserve districts can only sell land with the consent of the state legislature. Also these bodies have dedicated some of their lands to the Illinois Nature Preserves Commission, under whose supervision land can be sold only with the consent of the governor.

Other parcels have conservation easements on them, which again afford a high level of protection. The Lake Forest Open Lands Association holds conservation easements on nearly 50 acres in the watershed. Finally, miscellaneous parcels protected by deed restrictions were found, such as common open space belonging to homeowners associations and business parks.

Conservation easements and deed restrictions were only mapped if this information could be discerned by owner contact and field work.

The remaining open and partially open parcels not identified in one of the categories above currently have no protective measures in place to maintain them as open lands. These areas may be developed at any time based on their underlying zoning; most of these parcels are privately owned (Figure 3-19).

Unfortunately, protection of a good deal of the existing open space is taken for granted. In actual fact certain public and quasi-public bodies — private golf courses, school districts, churches, hospitals, and other institutions, including the GLNTC — owning extensive open space can, and do, dispose of these lands for other purposes as they see fit. Thorngate Country Club, for instance, was located just to the west of the North Branch watershed at Riverwoods and Deerfield Roads. It had been in business for decades and generally taken for granted as permanent open space — until 1991, when it was developed with over 200 houses. In the watershed, part of the Highland Park Country Club was also sold for condominium development.

Table 3-23
Protection Status by County and Watershed

Protection Status of Open Parcels	Lake County		Cook County		Watershed	
	Percent	Area (acres)	Percent	Area (acres)	Percent	Area (acres)
Protected	45%	4,636.77	58%	3,891.06	50%	8,527.83
Unprotected	55%	5,624.27	42%	2,796.99	50%	8,421.26
Unknown	0%	12.68	0%	0.09	0%	12.77
	100%	10,273.72	100%	6,688.14	100%	16,961.86
Protection Status of Partially Open Parcels	**Lake County**		**Cook County**		**Watershed**	
	Percent	**Area (acres)**	**Percent**	**Area (acres)**	**Percent**	**Area (acres)**
Protected	4%	115.80	23%	702.43	23%	818.23
Unprotected	96%	2989.44	77%	2,291.11	77%	5,280.55
	100%	3,105.24	100%	2,993.54	100%	6,098.78

Protected lands include Forest Preserve Districts, State Nature Preserves, Township Open Space, Park Districts, Homeowners/Business Associations, and Land Trusts.

The open space inventory identified 16,961.86 acres of open space (open parcels). Of this, 50% or 8,527.83 acres (14% of the watershed) are protected (Table 3-23). There are 818.23 acres of protected partially open parcels.

As mentioned earlier in this chapter, subwatershed boundaries provide a different perspective for assessing open space and defining management needs. Table 3-24 shows protection status of open and partially open parcels by subwatershed. General observations are as follows:

West Fork
Of the three subwatersheds, the West Fork contains the least amount of open space (3,546 acres or 19% of the subwatershed) and only 35% (1,226.75 acres) of this is protected (open parcels). 247.53 acres of partially open parcels are protected.

Middle Fork
The Middle Fork contains a significant amount of open space (6,859 acres), and 57% (3,920.17 acres) of this is protected. There are 180.18 acres of protected partially open parcels.

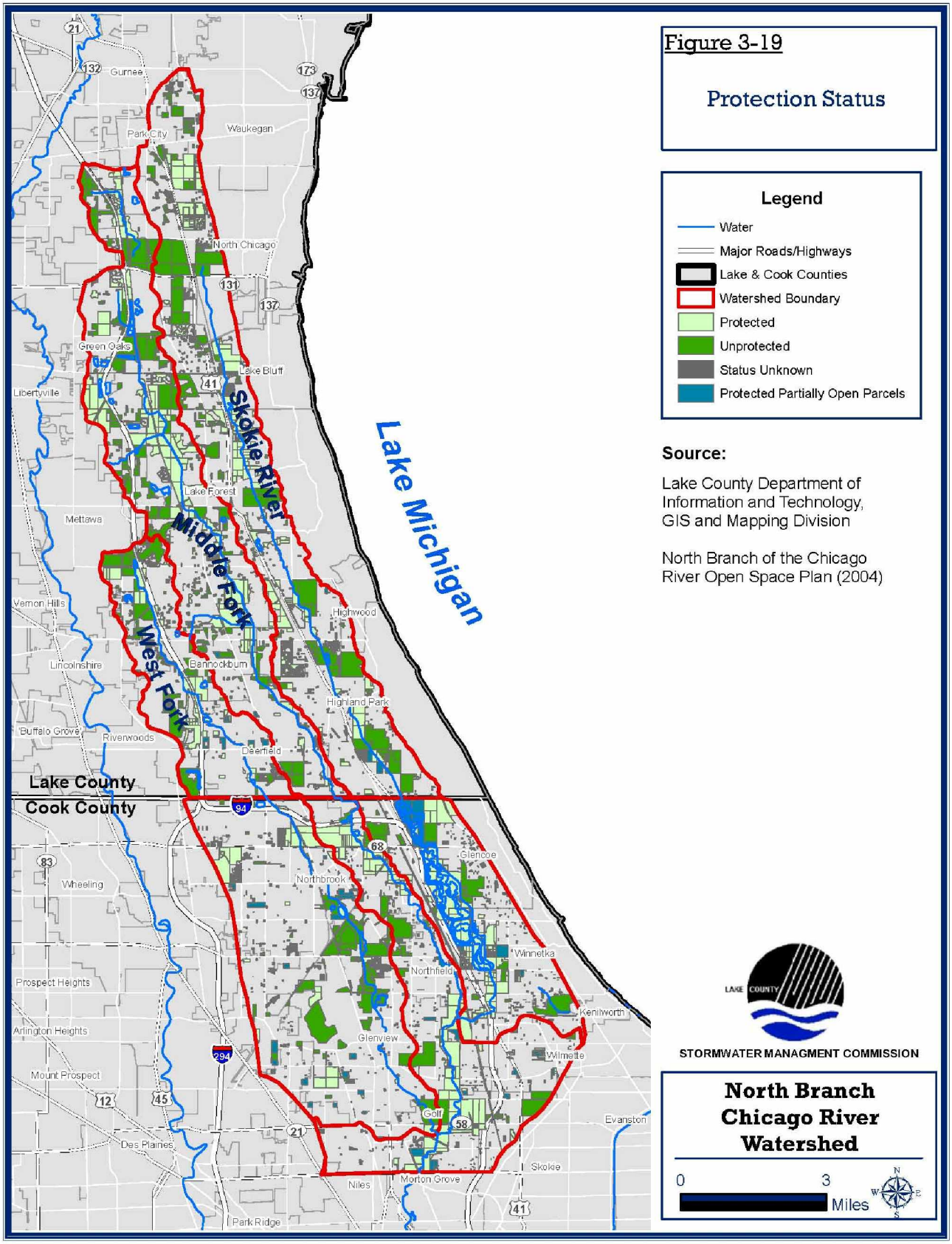
Skokie River
Like the Middle Fork, the Skokie River contains a significant amount of open space (6,557 acres); 52% (3,380.93 acres) of this is protected. There are 390.53 acres of protected partially open parcels.

Table 3-24

Protection Status by Subwatershed

Protection Status of Open Parcels	West Fork		Middle Fork		Skokie	
	Percent	Area (acres)	Percent	Area (acres)	Percent	Area (acres)
Protected	35%	1,226.75	57%	3,920.17	52%	3,380.93
Unprotected	65%	2,316.04	43%	2,936.62	48%	3,168.60
Unknown	0%	2.34	0%	3.09	0%	7.34
	100%	3,545.13	100%	6,859.88	100%	6,556.87
Protection Status of Partially Open Parcels	**West Fork**		**Middle Fork**		**Skokie**	
	Percent	Area (acres)	Percent	Area (acres)	Percent	Area (acres)
Protected	13%	247.53	11%	180.18	15%	390.53
Unprotected	87%	1,693.65	89%	1,428.82	85%	2,158.08
	100%	1,941.18	100%	1,609	100%	2,548.61

Protected lands include Forest Preserve Districts, State Nature Preserves, Libertyville Township Open Space, Park Districts, Homeowners/Business Associations, and Land Trusts.



Maps to be used for Planning Purposes only.

Produced by V3 Companies

Inventory Findings — Recreational Use Type

Many of the identified public open space parcels (and some private open space parcels) support a wide range of active and passive recreation activities (Figure 3-20). These uses are generally defined as:

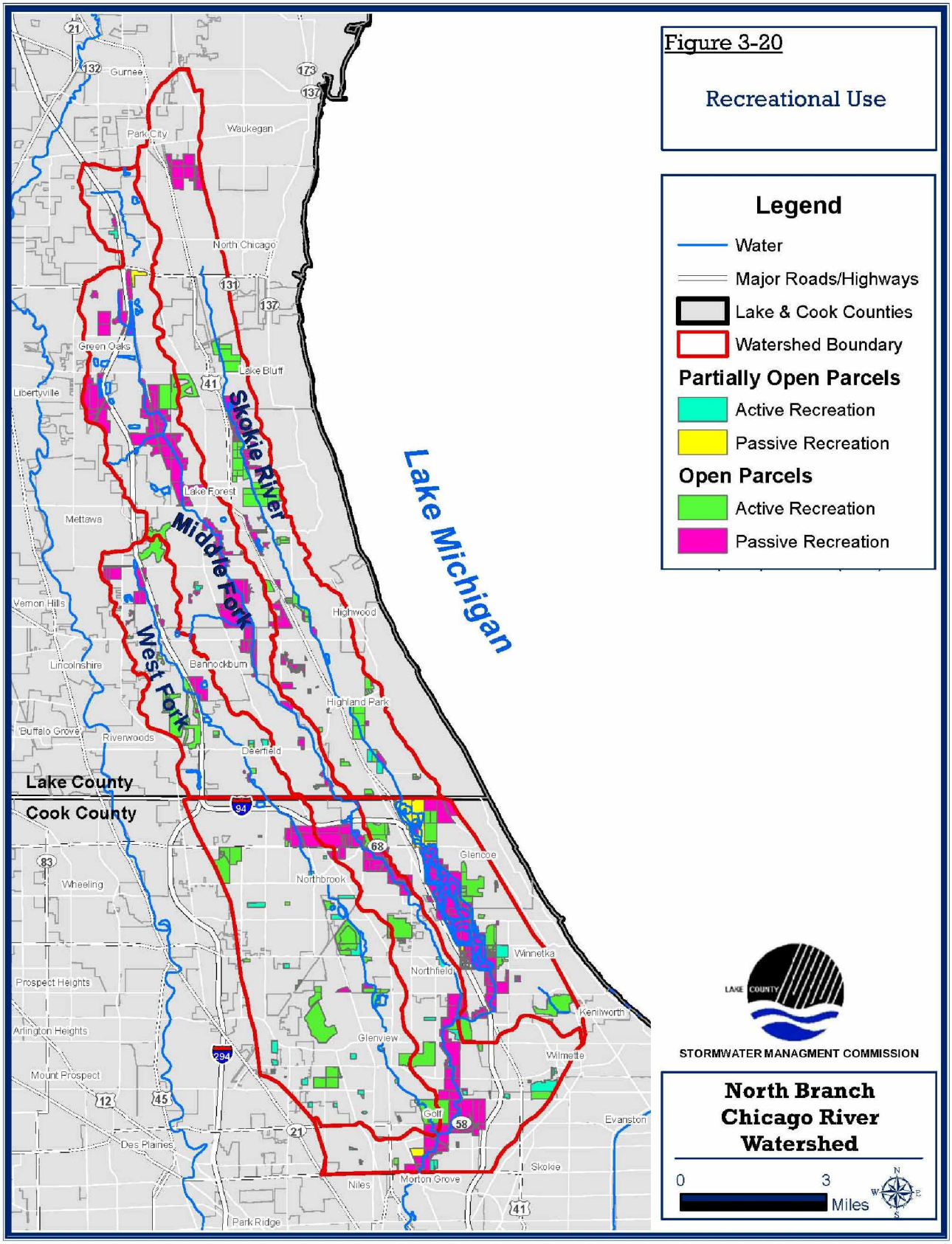
Active (Primarily Recreation): High-activity recreational uses traditionally associated with local park districts and requiring extensive maintenance and care. Examples include playfields, tennis courts, swimming pools, playgrounds, and golf courses.

Passive (Primarily Conservation): Diffuse, low-impact recreational uses traditionally associated with forest preserves, land trust holdings, and nature centers, and that may include hiking/cycling trails, picnic groves, fishing lakes, and the like.

Some key general observations:

- The bulk of the public open space parcels arrange themselves in north-south formations, generally following the streams in the subwatersheds.
- There are virtually no public open space connections running east-west in the watershed.
- Public open space corridors are more prevalent in Cook County, while Lake County public open spaces tend to be isolated and not connected.
- There is little public open space in the northern quarter of the watershed.
- Most public open space appears to lie within the Skokie River and Middle Fork subwatersheds, with little present in the West Fork subwatershed.

Greenways and trails were also evaluated under the Open Space Plan inventory and are described in this Watershed Plan under Special Resources, Section 3.7, Conservation Land.



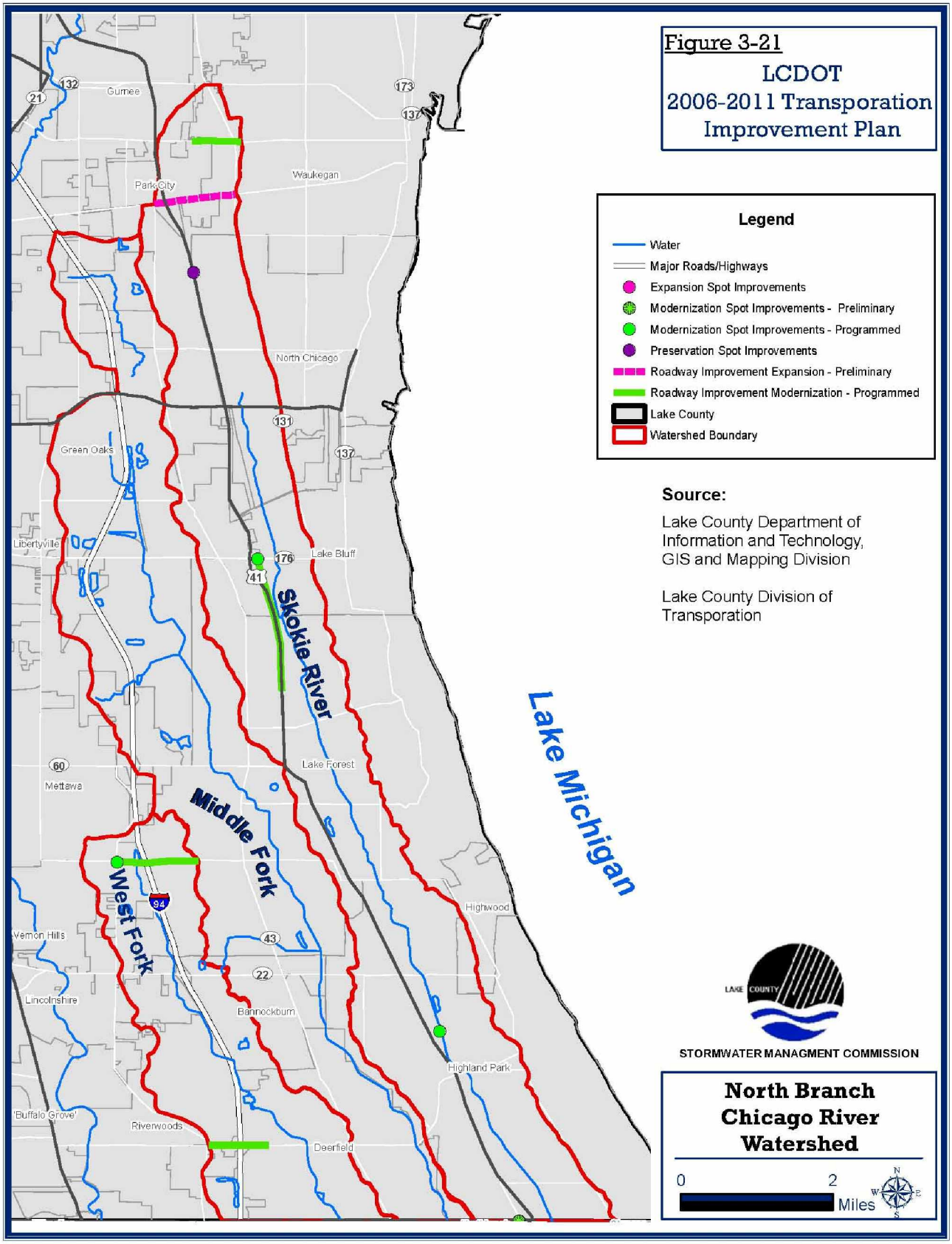
Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.6.5 Transportation System

Several highways and two major north-south rail lines, the Union Pacific and the Canadian Pacific Railroads, serve the North Branch Chicago River watershed. In addition, the Canadian Pacific Line is used for commuter rail service by Amtrak. The 2006-2011 Highway Improvement Plan provided by the Lake County Division of Transportation (LCDOT) depicts nine (9) modernizations, expansion, and preservation projects scheduled for the watershed. Expansion of the east-west traversing highway 120 is currently underway. Additionally, programmed/preliminary roadway improvements and programmed spot improvements. Figure 3-21 depicts the major transportation features and future LCDOT improvement projects planned throughout the watershed.

Two roadway improvements and two spot improvements are intended south of Route 60 in the West Fork and Skokie subwatersheds. One roadway expansion, one spot improvement, and two roadway improvements are anticipated north of Route 60 in the Skokie subwatershed. A review of the 5-year plan does not depict any road or spot improvements for the Middle Fork subwatershed.



Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.7 Conservation Land

The North Branch Chicago River watershed contains a number of significant natural resources that are worthy of protection. To a large extent, sustaining biodiversity in the watershed will depend on how well future decisions related to land use. Habitats such as wetlands, and remnant savanna, prairies and forest will have to be maintained in order ensure the survival of threatened and endangered species and the natural communities. This section highlights the special natural resources of the North Branch Chicago River watershed, as well as a few cultural features of special significance in the watershed.

3.7.1 Conservation Land in Lake County

Forest Preserves

Approximately five percent (1,745 acres) of the North Branch Chicago River watershed in Lake County is in forest preserves owned by the Lake County Forest Preserve District (LCFPD)[11]. Forest Preserves cover a total of 63 acres in the West Fork subwatershed, 1,403 acres in the Middle Fork and 238 acres in the Skokie River subwatershed. See Table 3-25 for a listing of Forest Preserve properties and Figure 3-22 for a map of conservation land that includes Forest Preserve properties.

According to the Chicago Wilderness Society, Middlefork Savanna in Lake Forest is one of the most important sites for biodiversity in northeastern Illinois. This site is a globally endangered black soil savanna that is considered as one of the two best remaining examples of this type of tall grass savanna in the world.

Table 3-25
Forest Preserves in North Branch Watershed, Lake County

Name	Subwatershed	Approximate Acres in North Branch	Total Acres
FOREST PRESERVES:			
Wright Woods	West Fork	63	506
Old School	Middle Fork	380	380
Middle Fork Savar	Middle Fork	576	576
Berkeley Prairie	Middle Fork	16	16
Prairie Wolf	Middle Fork	431	431
Greenbelt	Skokie River	238	560
Total Acres		*1745*	*2469*
FLOOD DETENTION SITES:			
Bannockburn*	West Fork	77	77
Prairie Wolf (IDNR inholding)	Middle Fork	158	158
Site 15*	Middle Fork	77	77
Lake Bluff	Skokie River	84	84
Flood Sites Total		*396*	*396*

*Flood control reservoirs have already been constructed at these sites.

Lake Forest Open Lands

In addition to the LCFPD, Lake Forest Open Lands Association (LFOLA), a private, non-profit corporation, owns or holds conservation easements on 21 properties totaling 389 acres in the Middle Fork and Skokie River subwatersheds. Including the Skokie River and the West Skokie River Nature Preserves, the Derwen Mawr Nature Preserve, and the Everett, Mellody and Middlefork Farms Nature Preserves. LFOLA also oversees the care and maintenance of 168-acres of Lake Forest has property and nearly 225 acres are under conservation easement.

[11] *As shown in Table 3-25, the LCFPD also owns four flood detention sites in the watershed totaling approximately 396 acres (19% of the total 2,100 acres of LCFPD holdings in the North Branch). Flood control reservoirs have been constructed at the Bannockburn site on the West Fork (near Duffy Lane and I-94) and Site 15 on the Middle Fork (at Atkinson Road and I-94). Two other sites that are being held for potential future flood control reservoirs are the 84-acre Lake Bluff Forest Preserve and a 158-acre in-holding at Prairie Wolf.*

Lake Bluff Open Lands

Lake Bluff Open Lands Association (LBOLA), also a private non-profit organization, was formed in 1981 to save a six acre wetland. LBOLA manages 13 properties totaling 225 acres of conservation land in the Lake Michigan and Skokie watersheds (including the LCFPD's 84 acre Lake Bluff reservoir holding). The Skokie River Preserve and Prairie Preserve properties are located in the Skokie watershed.

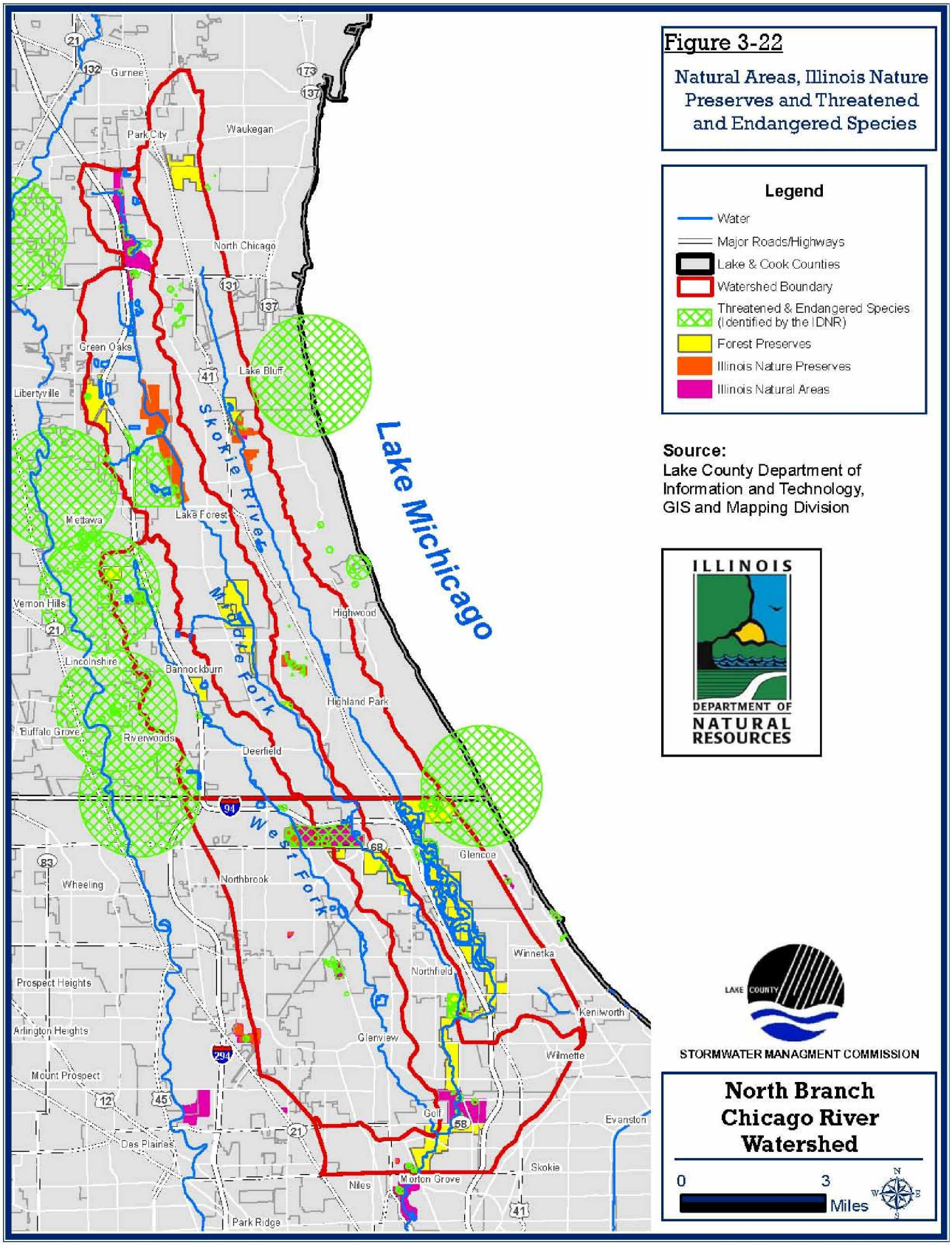
Nature Preserves/Parks

There are five dedicated nature preserves in the North Branch Chicago River watershed in Lake County.

1. *Skokie River Nature Preserve*: approximately 120 acres located along the Skokie River on the north side of Lake Forest, and it includes Shaw and McLaughlin Prairies.
2. *Highmoor Nature Preserve*: approximately 16 acres located in Highland Park south of Route 22. The nature preserve is owned by the Park District of Highland Park and is contiguous with Hybernia Nature Preserve.
3. *Hybernia Nature Preserve:* approximately 27 acres located in Highland Park south of Route 22. The nature preserve is part of a 132 acre residential development.
4. *Florsheim Park Nature Preserve:* a 40 acre tract of land owned by the Village of Lincolnshire in the West Fork subwatershed.
5. *Middle Fork Savanna:* approximately 576 acres located near Lake Forest in the Middle Fork subwatershed.

In addition to these dedicated nature preserves, there are a number of parcels in the watershed that are owned by local park districts and specified for conservation use.

One of these parcels includes the Heller Nature Center, which is owned by the Park District of Highland Park. This nature center is approximately 98 acres and is located on Ridge Road, north of Route 22.



Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.7.2 Lands Identified for Conservation in Lake County

There are a number of high quality (ADID) wetlands in the North Branch Chicago River watershed and several Illinois Natural Area Inventory[12] (INAI) sites that should be considered for conservation protection. Several of the ADID wetlands are parts of larger wetland complexes along the river tributaries. In addition to these specific sites, conservation efforts should also generally target floodplains and wetlands for easements or acquisition. The following is a brief description of five areas in the watershed that have been identified as high priority for conservation protection. There are numerous other individual sites scattered throughout the watershed that also warrant further investigation. (Figure 3-30 is a map of the ADID wetlands in the watershed.)

Headwaters West Fork

There are five ADID wetlands located in the West Fork. Three of these ADID wetlands (ADID #'s 163, 164, and 165) are bordered by Riverwoods and I-94 (west-east) and Everett and Half Day Road (north-south). ADID #162 is bordered by Everett to the north and Riverwoods to the east and ADID #181 is bordered by I-94 to the east and Half Day Road to the north.

The headwaters area of the West Fork contains the only significant remaining open space within that subwatershed in Lake County. This area includes opportunities for both restoring wetlands and protecting existing wetlands and forest. Strong consideration should be given to expanding Elm Road Forest Preserve to include agricultural land located north of Everett Road, and forest, agricultural land and wetland south of Everett to Old Mill Road. This area includes ADID wetland # 163 north of Florsheim Park and portions of # 164 that are unprotected. Florsheim Park could also be expanded to include some of this area. The Village of Lincolnshire purchased 63 acres of this area in 1999. Twenty-five acres has been developed for active recreation, while 38 acres including the floodplain and wetlands adjacent to the West Fork is being managed as conservation open space.

Middle Fork Headwaters

This headwater reach of the Middle Fork is the only reach that was not channelized. There are several ADID wetlands located in the Middle Fork headwaters that are currently unprotected. Three of these ADID wetlands (ADID #'s 97, 98, and 99) are bordered by Routes 120 and 137 (north-south) and I-94 and Route 43 (west-east). One ADID wetlands (ADID # 109) is bordered by Route 137 and Atkinson (north-south) and I-94 and Route 43 (west-east). Two sites that are specifically identified in this area include the Wrigley Tract owned by Abbott Laboratories and the Baxter Parcel owned by Town & Country Homes. The Wrigley Tract, located north of Illinois Route 137 and west of Illinois Route 43, is composed of native wet and wet-mesic prairie, sedge meadow, marsh, and oak woodland along with former agricultural land and successional woodlands. The federally threatened eastern prairie fringed orchid is found at this site, which is part of the extensive wetland complex in the headwaters of the Middle Fork.

The Baxter parcel is located just north and upstream of the Wrigley tract and includes ADID wetland #91. This parcel contains a moderately sized marsh and sedge meadow complex with high floristic diversity and a population of the eastern prairie fringed orchid. According to the US Fish and Wildlife Service[13] (USFWS), the Wrigley tract was the most significant open land not in public ownership in the Middle Fork subwatershed. The combined Baxter/Wrigley/Abbott tract was recently included as an INAI site known as the Oak Grove Botanical Area.

---

[12] *Illinois Natural Areas Inventory (INAI): Completed in 1978 and updated in 1995, the INAI is an Illinois Department of Natural Resources listing of all known lands and waters in the state that have significant natural values, support endangered species, or are still sufficiently undisturbed to demonstrate what Illinois was like in pre-settlement times.*

13 1996 Draft Chicago Rivers Demonstration Project - Natural Resources Technical Report

IDOT Excess Parcel – Skokie Watershed

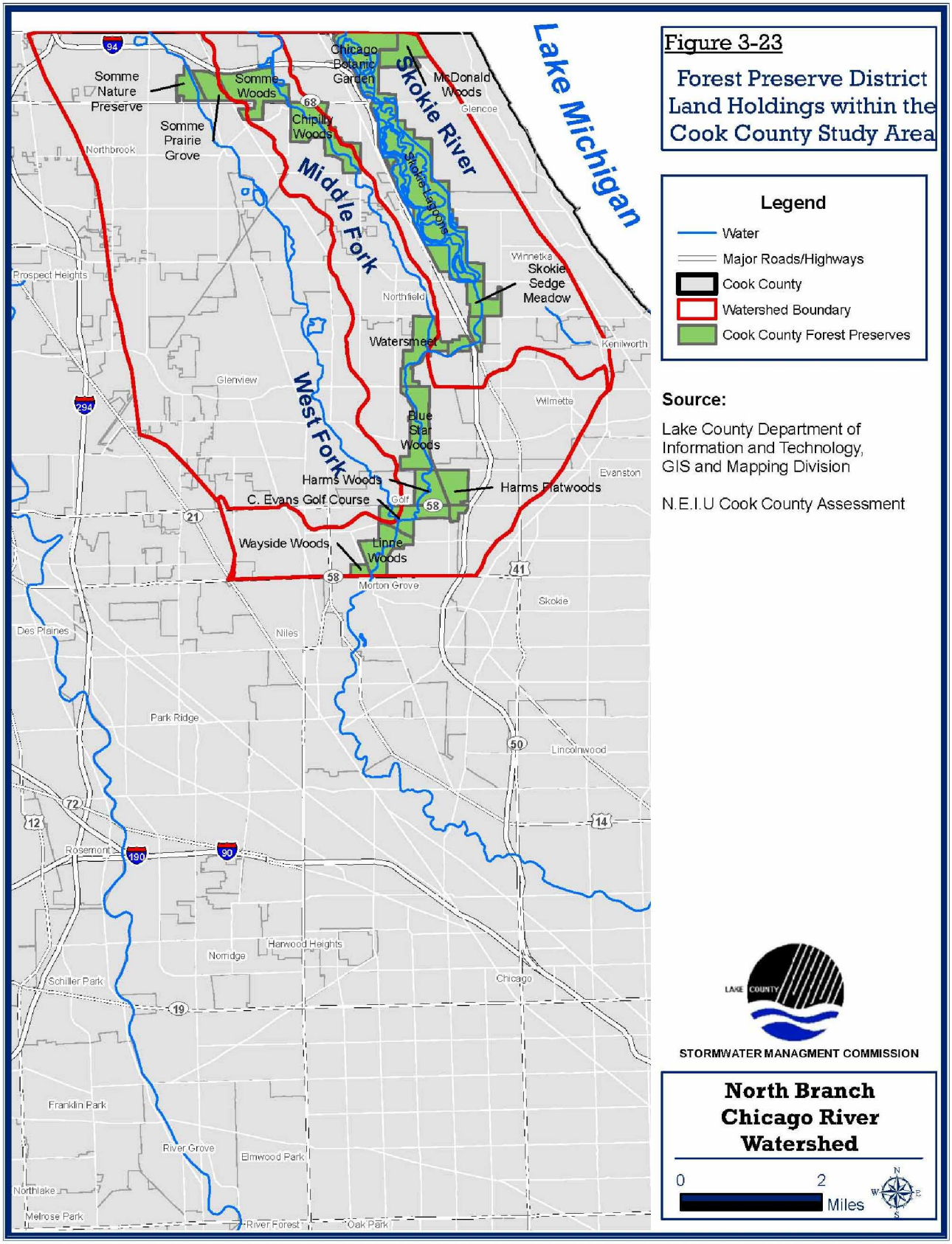
The IDOT owns a 160 acre parcel southwest of the intersection of Routes 137 and 41 in the Skokie subwatershed. This parcel is being considered for development as a wetland mitigation bank by the Tollway. The site includes ADID wetlands and three plant species that are listed as threatened or endangered species in Illinois. The northern portion of the parcel is degraded, but the southern portion and areas of some adjacent properties are considered relatively pristine. Remnant natural communities include prairie, sedge meadow, and marsh. ADID wetland #110 is bordered by Routes 137 and 176 (north and south) and Route 43 and US Highway 41 (west-east). Consideration should be given to expanding this parcel to include the entire area of ADID wetland, the wetland and agricultural land bounded by Route 137 and Atkinson Road (north-south) and Routes 43 and 41(west-east), protecting this site in permanent conservation use and restoring the degraded portions of the site.

Lake Bluff Site – Skokie Watershed

This 80-acre site is a Forest Preserve property that is being considered as a location for a flood control reservoir. An ecological assessment done by Dr. Wayne Schennum concluded that the Lake Bluff site is a critical ecological link between the Skokie River Preserve and the Lake Forest Nature Preserve. Approximately 15-acres of the site have already been restored by a group of Lake Bluff Open Lands volunteers. Continued restoration will transform the site into an integral part of a 225-acre prairie/savanna/wetland natural area characteristic of the Skokie River valley at the time of Euro-American settlement. The site harbors some of the oldest burr oaks in the area. The site also includes a man-made lake of historical significance, which is home to 28 species of birds.

3.7.3 Conservation Land in Cook County

Approximately 3,091 acres of conservation open space in the North Branch Chicago River watershed in Cook County is under the management of the Cook County Forest Preserve District (CCFPD). The CCFPD acreage represents 5% of total land use. Most of the CCFPD land holdings are found along the floodplains of the Middle Fork and Skokie River as shown in Figure 3-23. A significant preserve, Linne Woods, is found on the mainstem of the North Branch Chicago River near the southern margin of the study area.



Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.7.4 Greenways and Trails

As outlined in the 2005 NBOSP, greenways and trails are an important component to the overall health of a watersheds biodiversity. Within the North Branch Chicago River watershed there are several existing trails and greenways (see Figure 3-24), in which a number have been proposed in a regional greenways and trails plan (see Figure 3-25). The CMAP and Openlands Project, with support from the IDNR, prepared a draft greenways plan covering the Chicago metropolitan region for the Illinois Prairie Trail Authority. The plan incorporates both existing and proposed greenways and trails for the North Branch Chicago River watershed.

In addition some of the proposed greenway trails, shown on Figure 3-25, already exist within the village of Glenview.

Greenways

By their linear nature, the forks of the North Branch Chicago River and their adjacent open lands form corridors that are the remnants of the natural wetlands and drainage system that once existed in the watershed. Past preservation efforts have largely saved much of these corridors as greenways. In fact, the entire length of all three forks may be considered existing greenways, since the drainage districts hold flowage easements prohibiting any development the entire length of these forks. Vegetation of varying quality grows on these easements, although in places it is only mowed grass.

Greenways serve many functions. For purposes of this report, they provide:

- a linear passageway for plants, animals, people, and water, including the sediments and chemicals therein.
- a linear habitat for plant and animal communities, and a corridor for animals and seeds to move from one part of the watershed to another.
- a riparian zone to cleanse waters flowing into the streams by trapping sediments and toxins, as well as keeping streambanks stabilized.

Because of their linear nature, greenways provide important edge habitat, a transitional area between two types of landscapes, which are typically rich in biological diversity. Greenways also help reverse the phenomenon of fragmentation by providing connections between existing open space/natural area holdings. Fragmentation occurs slowly as a landscape is developed, reducing over time what was once a continuous natural landscape to isolated pieces of remnant natural areas. Many plants and animals essentially become trapped in these fragments and are unable to migrate to other open spaces. Greenways are also well suited for outdoor recreation, particularly for multi-use trails and water-based sports such as canoeing.

Large sections of greenways already exist throughout the watershed. The longest one is found on the Skokie River in Cook County, assembled by the forest preserve district in the early part of the last century. Another greenway of nearly equal length has been assembled over the last 30 years along the Middle Fork through Lake Forest, Bannockburn, and Highland Park. A shorter segment runs along the Skokie River through Lake Forest and Lake Bluff. Most greenway land is found along the Skokie River and Middle Fork subwatersheds, following the streams themselves in a north-south pattern.

Trails

Trails have existed in the North Branch Chicago River watershed for thousands of years. Today's major north-south highways such as Waukegan Road and Green Bay Road follow these ancient Native American trading routes.

Today, trails are used largely for recreational purposes such as walking, jogging, nature studies, bicycling and skiing. These activities are reflected in the various types of trails found in the watershed. The forest preserve districts in both counties, for instance, operate miles of wide, multi-use trails constructed of gravel or asphalt. These trails provide the experience of uninterrupted travel difficult to find in an urban environment.

On the other hand, local open space advocates such as homeowner associations and land trusts may maintain narrow dirt trails covered at times with wood chips. Some of these trails may be less than a mile in length.

Trails are an important element of greenways because they allow linear connectivity between existing open space areas. However, the current trail system in the watershed is disconnected. The longest continuous segment is the multi-use trail along the Skokie River in Cook County, extending from Dempster Street to the county line. A second, smaller section of multi-use trail exists in the Middlefork Savanna in western Lake Forest. Finally, a section of trail using the long-abandoned North Shore Railroad right-of-way parallels Route 41 from Lake-Cook Road to northern Lake Forest, and extends west on Route 176 to the Des Plaines River Trail. There is also a designated water trail for canoeists on the Skokie River in Cook County. Numerous local trail systems exist, such as the one around Prairie Wolf and the extensive system connecting the Lake Bluff and Lake Forest Open Lands.

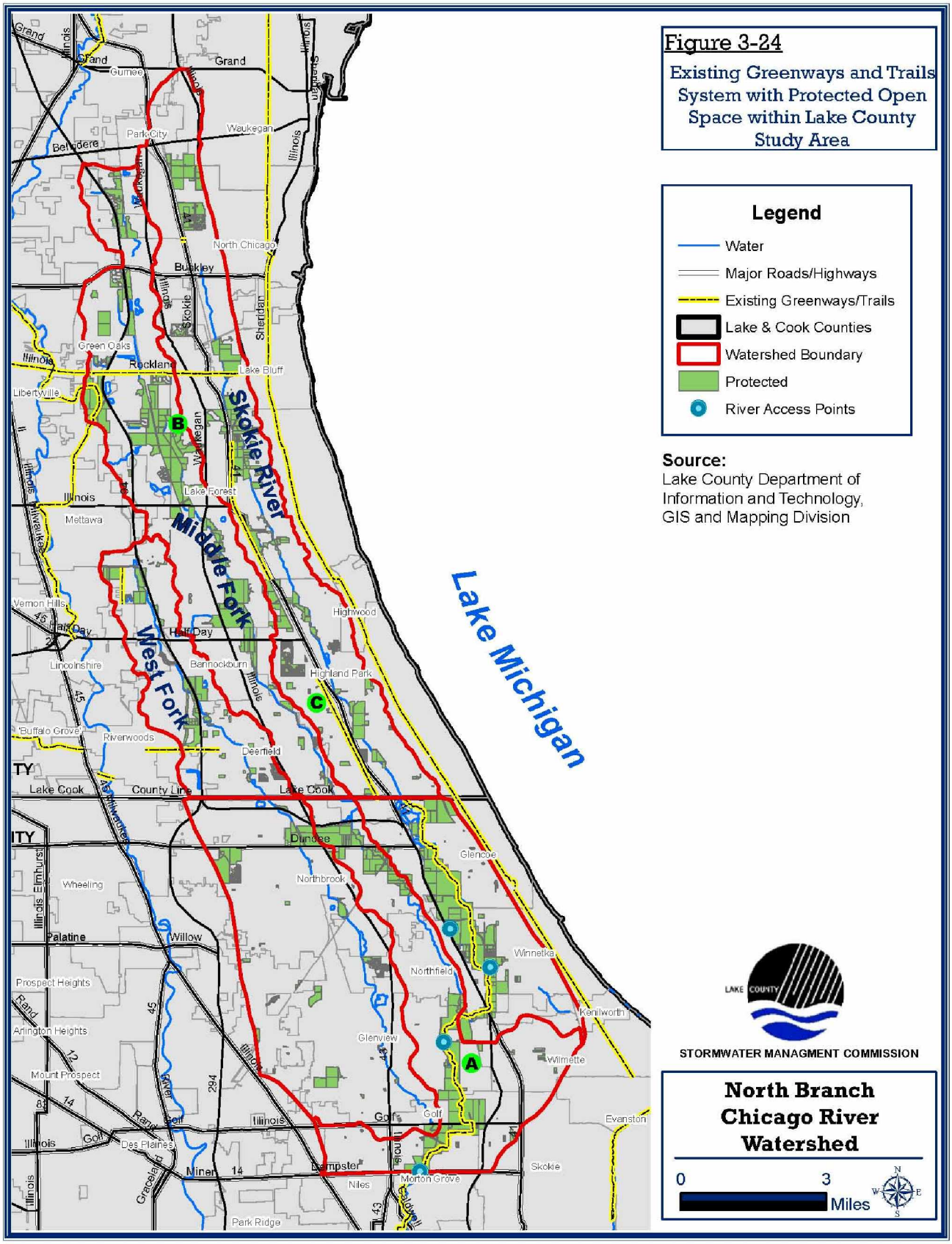
Lake County

A number of shorter trails currently exist in the Lake County portion of the watershed, but there is not a north-south connection throughout the length of the watershed as in Cook County. Existing trails are located on Lake Forest and LBOLA properties, and there is an east-west segment of the North Shore Trail along Route 176. Several trails have been proposed in Lake County. The LCFPD has completed a trail for the Middlefork Savanna Forest Preserve along the Middle Fork between Routes 176 and 60. In addition, a Middle Fork trail segment now connects Deerfield High School to Prairie Wolf.

The regional greenways and trails plan includes a stream-based greenway designation for all three forks of the river in Lake County. The plan also proposes a new regional greenway and trail connections for a north-south trail along Route 41 (Skokie Highway). This trail will then connect with the east-west segment of the North Shore Trail that runs along Route 176. A second proposed regional greenway and trail would connect the Skokie Highway trail to the Des Plaines River trail in Mettawa. This trail will run in a north and west direction and includes a north-south length along the Middle Fork through the Prairie Wolf Forest Preserve where it then turns west and north to Wright Woods Forest Preserve along the Des Plaines.

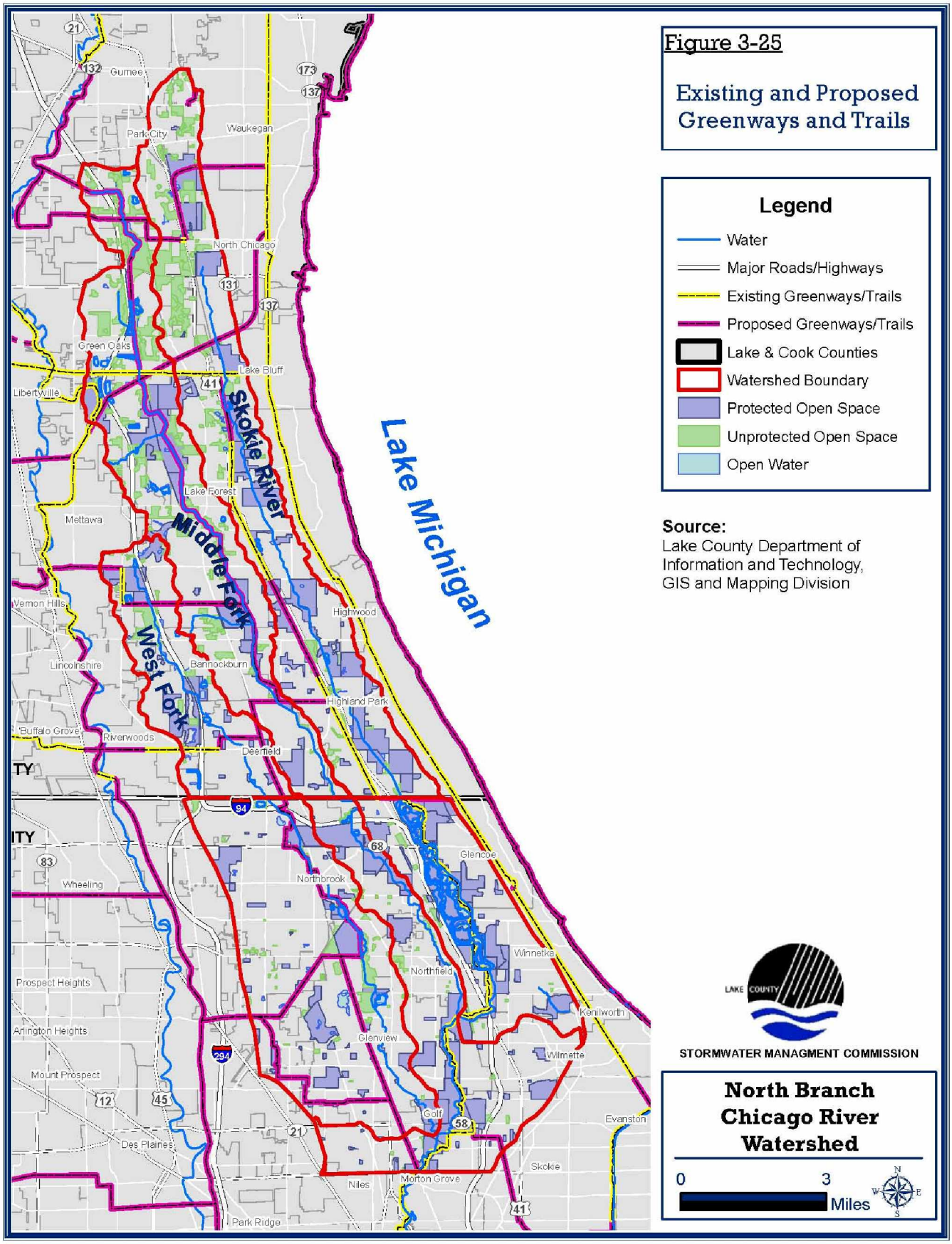
Cook County

In Cook County, the entire length of the Skokie River and the mainstem of the North Branch Chicago River currently includes a greenway of Forest Preserve lands. A trail runs through this greenway from Lake-Cook Road south through the entire project area along the Skokie and then the mainstem of the North Branch Chicago River. The Middle Fork of the river includes a stream-based greenway, and both a regional greenway and trail have been proposed along the West Fork of the river. In addition to land trails, a new effort was initiated to identify and coordinate a 480 mile Water Trail Plan for Northeastern Illinois. This plan was adopted by CMAP and released to the public in 1999. One water trail currently exists along the Skokie River and the mainstem of the North Branch Chicago River in Cook County. Four launch sites are also located along this reach of the river for canoe access.



Maps to be used for Planning Purposes only.

Produced by V3 Companies



Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.8 Plants & Animals: Threatened & Endangered Species and Natural Areas

3.8.1 Threatened & Endangered Species

It is well-documented that Lake and Cook Counties are still home to some of the most diverse landscapes in Illinois. Living in these landscapes is a wide array of threatened and endangered (T&E) plants and animals. Most of these have been extensively documented by the Illinois Natural History Survey and the INAI, aided by a small group of dedicated volunteers continually on the lookout for rare and endangered species.

In an urban/suburban area like the North Branch Chicago River watershed, the primary cause of species loss is the conversion of land from native plant and animal communities to other uses. There are a total of eight T&E animal species and thirty-two T&E plant species in the Chicago River watershed (See Table 3-26 for definitions of T&E species and Table 3-27 for the list of T&E species in the watershed). The Lake County North Branch Chicago River watershed contains six T&E animal occurrences and over 20 threatened and endangered plant occurrences.

Table 3-26

Definitions: State and Federal T&E Species
federally endangered species – any species that is in danger of extinction throughout all or a significant portion of its range.
federally threatened species – any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
state endangered species – any species that is in danger of extinction as a breeding species in Illinois.
state threatened species – any breeding species that is likely to become a state endangered species within the foreseeable future in Illinois.

The North Branch Chicago River watershed in Cook County contains 9 T&E plant and animal species.

3.8.1.1 Sites of Threatened and Endangered Species

Nearly all the known locations of T&E species in the watershed are already protected on deed restricted open space: parcels owned by forest preserve districts, land trusts, park districts, and homeowner associations. The project team reviewed and updated all T&E species maps with local biodiversity experts, and found only three unprotected sites:

- The IDOT parcel south of Route 137: this land is owned by a public agency but is not necessarily guaranteed protection.
- The Wrigley Tract, located north of 137 between Waukegan Road (I-43)and the Union Pacific Railroad (UPRR): a large corporate holding that could be developed.
- A detention basin area north of the Tri-State spur and west of the UPRR in Deerfield. Most of this site has been developed for Home Depot and a Metra station; T&E species were found living in the basin area.

A larger question regarding the future health of these T&E sites is whether they are receiving proper land management. The LCFPD, for instance, has been very aggressive in its management of T&E sites in the Middlefork Savanna, and Abbott Laboratories last year did extensive brush management work on a T&E site at the northwest corner of its property. Copies of land management plans, like that of the Middlefork Savanna's, can be requested through the LCFPD.

3.8.1.2 T&E Species Protection

Nearly all the known locations of T&E species in the North Branch Chicago River watershed are already protected on deed restricted open space: parcels owned by forest preserve districts, land trusts, park districts, and homeowner associations.

State Level

Local units of government are required by law to consult with the IDNR prior to performing or authorizing any public or private action that would adversely affect T&E species or Natural Areas. There are two levels of required consultation. In the initial consultation, notification and a project description must be provided. If T&E species are likely to be present, the second level, an open consultation must be completed. In the open consultation, more detailed information is reviewed and the IDNR issues a biological opinion on the extent to which the resource is likely to be impacted or jeopardized. The IDNR then works with the developer and local government(s) to make recommendations to minimize or mitigate potential impacts. Ultimately, the local government is responsible for making the final decision on the proposed project, as the IDNR's role is only advisory.

Federal Level

Federal law prohibits direct harm to a federally-listed animal, or destruction of its habitat. There is little protection at the federal level for listed plants except in circumstances where they are being destroyed by someone other than the owner of the property, or if the action is federally authorized or funded, in which case consultation with USFWS is required. State protection requirements do apply to federally-listed plants.

Table 3-27
T&E Plant and Animal Species in the North Branch Chicago River Watershed

Animals: ***(Common Name)***	*(Scientific Name)*	**State Listing**	**Federal Listing**
Iowa Darter	*Etheostoma exile*	threatened	
Eastern Massasauga	*Sistrurus catenatus catenatus*	endangered	
Black-crowned Night Heron	*Nycticorax nycticorax*	endangered	
Peregrine Falcon	*Falco peregrinus*	threatened	endangered
Blanding's Turtle	*Emydoidea blandingii*	threatened	
Common Moorhen	*Gallinula chloropus*	threatened	endangered
Kirtland's Snake	*Clonophis kirtlandi*	threatened	
Upland Sandpiper	*Bartramia longicauda*	endangered	
Plants: ***(Common Name)***	*(Scientific Name)*	**State Listing**	**Federal Listing**
Small Sundrops	*Oenothera perennis*	threatened	
Seaside Crowfoot	*Ranunculus cymbalaria*	endangered	
Eastern Prairie White-Fringed Orchid	*Platanthera leucophaea*	endangered	threatened
Pale Vetchling	*Lathyrus ochroleucus*	threatened	
Golden Sedge	*Carex aurea*	threatened	endangered
Tuckerman's Sedge	*Carex tuckermanii*	endangered	
Swollen Sedge	*Carex intumescens*	threatened	
Pretty Sedge	*Carex woodii*	threatened	
Crawford's Sedge	*Carex Crawfordii*	endangered	
Seaside Spurge	*Chamaesyce polygonifolia*	endangered	
Dog Violet	*Viola conspersa*	threatened	
American Sloughgrass	*Beckmannia syzigachne*	endangered	
Oval Milkweed	*Asclepias ovalifolia*	endangered	
Forked Aster	*Aster furcatus*	threatened	
Shadbush	*Amelanchier sanguinea*	threatened	
Sea Rocket	*Cakile edentula*	threatened	
White Lady's Slipper	*Cypripedium candidum*	threatened	
Leafy Prairie Clover	*Dalea foliosa*	endangered	endangered
Bearded Wheat Grass	*Elymus trachycaulus*	threatened	
Queen-of-the-prairie	*Filipendula rubra*	endangered	
Northern Cranesbill	*Geranium bicknellii*	endangered	
Ground Juniper	*Juniperus commun*	threatened	
Tubercled Orchid	*Platanthera flava var. herbiola*	threatened	
Purple Fringed Orchid	*Platanthera leucophaea*	endangered	
Balsam Poplar	*Populus balsamifer*	endangered	
Downy Solomon's Seal	*Polygonatum pubescens*	endangered	
Purple-flowering Raspberry	*Rubus odoratus*	endangered	
Dwarf Raspberry	*Rubus pubescens*	threatened	
Royal Catchfly	*Silene regia*	endangered	
Mountain Blue-eyed Grass	*Sisyrinchium montanum*	endangered	
Marsh Speedwell	*Veronica scutellata*	threatened	

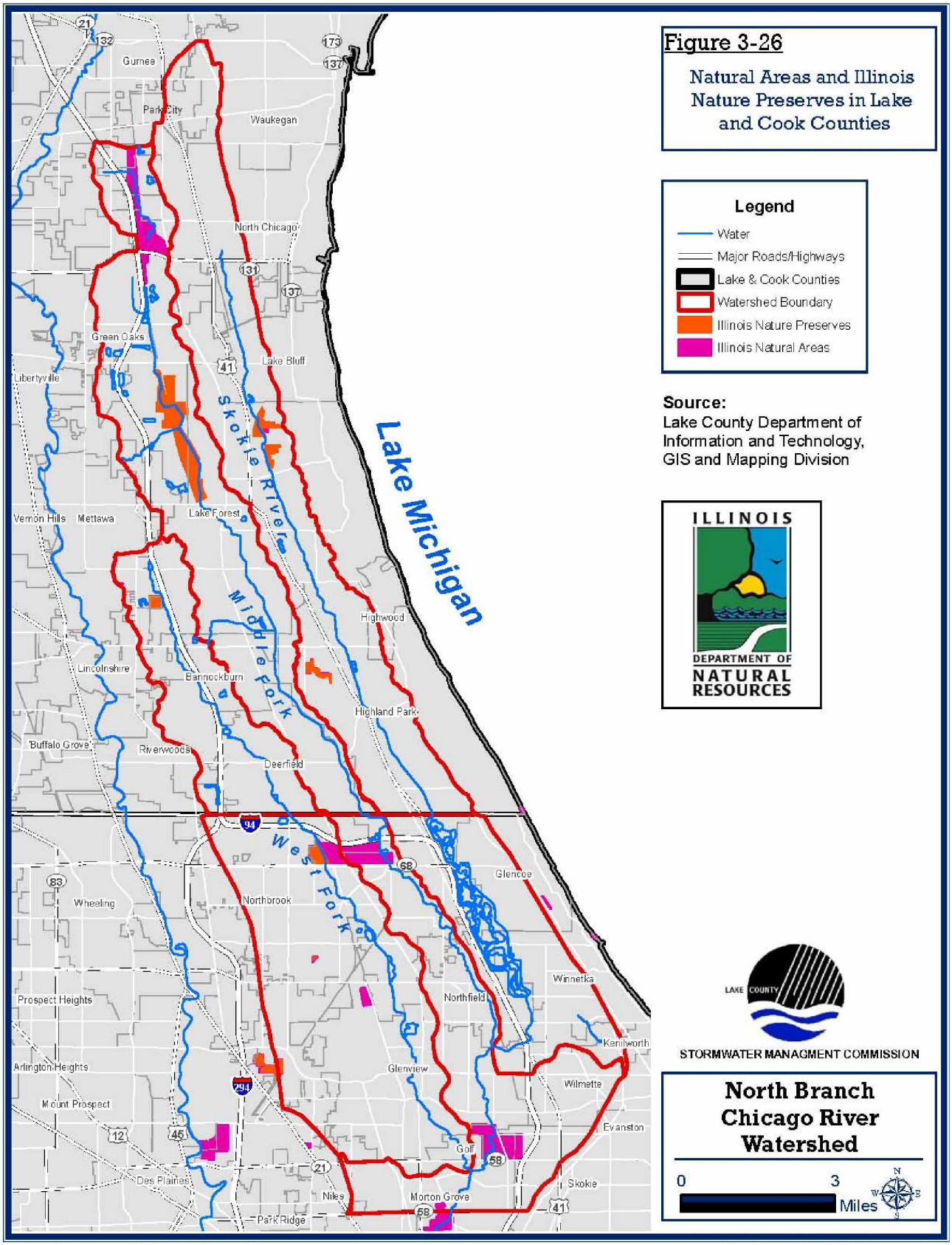
3.8.2 Natural Areas & Nature Preserves

In addition to the T&E occurrences, there are six INAI sites and four Nature Preserves in the Lake County portion of the North Branch Chicago River watershed. Scientific surveys are conducted at INAI sites because they are considered important for ecological or other reasons. INAI sites are only protected to the extent that a local unit of government is required by law to consult with the IDNR (as described in the previous section) prior to authorizing any activity (public or private) that will alter existing environmental conditions or potentially adversely impact the designated area. INAI sites typically do not have management plans unless they are designated as Nature Preserves, or are owned by a resource agency.

Nature Preserves, on the other hand, are provided the highest level of legal protection. The Illinois Nature Preserve Commission (INPC) must approve all actions that take place on, or impact, the nature preserve under threat of legal penalties. Florsheim Park in Lincolnshire, Hybernia-Highmoor Prairie in Highland Park, Skokie River Nature Preserve (including McLaughlin and Shaw Prairies) in Lake Forest, and Middle Fork Savanna near Lake Forest are the four Nature Preserves in the Lake County watershed. All four have management plans approved by the INPC. There are also three Nature Preserves in the Cook County portion of the study area: Somme Prairie in Northbrook, Glenbrook North High School Prairie in Northbrook and Morton Grove Prairie in Morton Grove. The largest of the preserves in Cook County is Somme Prairie.
High-quality natural landscapes owe their current preservation to three factors:

- Long-term protection by land conservation groups such as forest preserve districts and land trusts (Skokie River Nature Preserve, LFOLA).
- Lack of intense past use (agriculture in particular) because of marginal or poorly drained soils (Florsheim Woods, Village of Lincolnshire).
- Long-term ownership by private individuals or institutions with no immediate plans to develop them (Wrigley Tract, Abbott Laboratories).

It is not unusual for a site to be designated as a INAI site or Nature Preserve because it has a high quality plant community, is known to have T&E species, or could provide high quality habitat for T&E species. In Lake County, several of the INAI sites or Nature Preserves are adjacent to each other, forming a contiguous block of land. As a result, there are 9 distinct sites within the North Branch Chicago River watershed that are INAI sites or Nature Preserves. Figure 3-26 shows the general locations of these sites. Of the nine total sites in the North Branch Chicago River watershed in Lake County, only four are completely in public ownership. Two sites are in combined public and conservation organization ownership. The three remaining sites are in private ownership; one is a Nature Preserve, while two sites currently have no protection.



Maps to be used for Planning Purposes only.

Produced by V3 Companies

Other Important Natural Areas

The North Branch Open Space Plan (NBOSP) project team took several steps to ensure that all important natural areas were identified. Biodiversity mapping reflects T&E species, INAI sites, and INPC information compiled from and verified by local natural resource specialists (Figure 3-27).

SMC originally used 1995 aerial photographs and other sources to originally identify 33 parcels as potential sites for open space protection (refer to the *Watershed Plan*). Many of these have since been developed. Subsequent detailed study by the NBOSP project team using more recent aerial photographs, combined with locally-supplied information, still increased this number to 35, about half being original identifications, and half new. These sites were then field-checked in Lake County (Figure 3-28).

Of the aforementioned field sites, 17 of 35 are already protected by public and private open-space groups and will most likely remain dedicated to conservation use. This would probably be true even for such parcels as the ones owned by the IDOT, Deerfield High School and LFOLA, all of which could theoretically sell their land.

- IDOT owns a large parcel purchased decades ago to realign Route 41 in Lake Bluff and North Chicago (Figure 3-28, site number 11). Scattered wetlands throughout greatly diminish the buildability of this land or its usefulness for highway purposes. A site visit found wetland delineation work on this site. This area may be used for wetland mitigation work by the Tollway rather than being developed.

- In the case of Deerfield High School, the land is dedicated to playfields and the school has recently completed a large IEPA 319 grant restoring and stabilizing the Middle Fork, which bisects the property (Figure 3-28, site number 19). Almost all this land is also in the floodplain.

- The LFOLA owns 35 acres, all out of the floodplain and technically buildable, but this land is restricted to permanent open space uses in both the assessor and municipal records (Figure 3-28, site number 26).

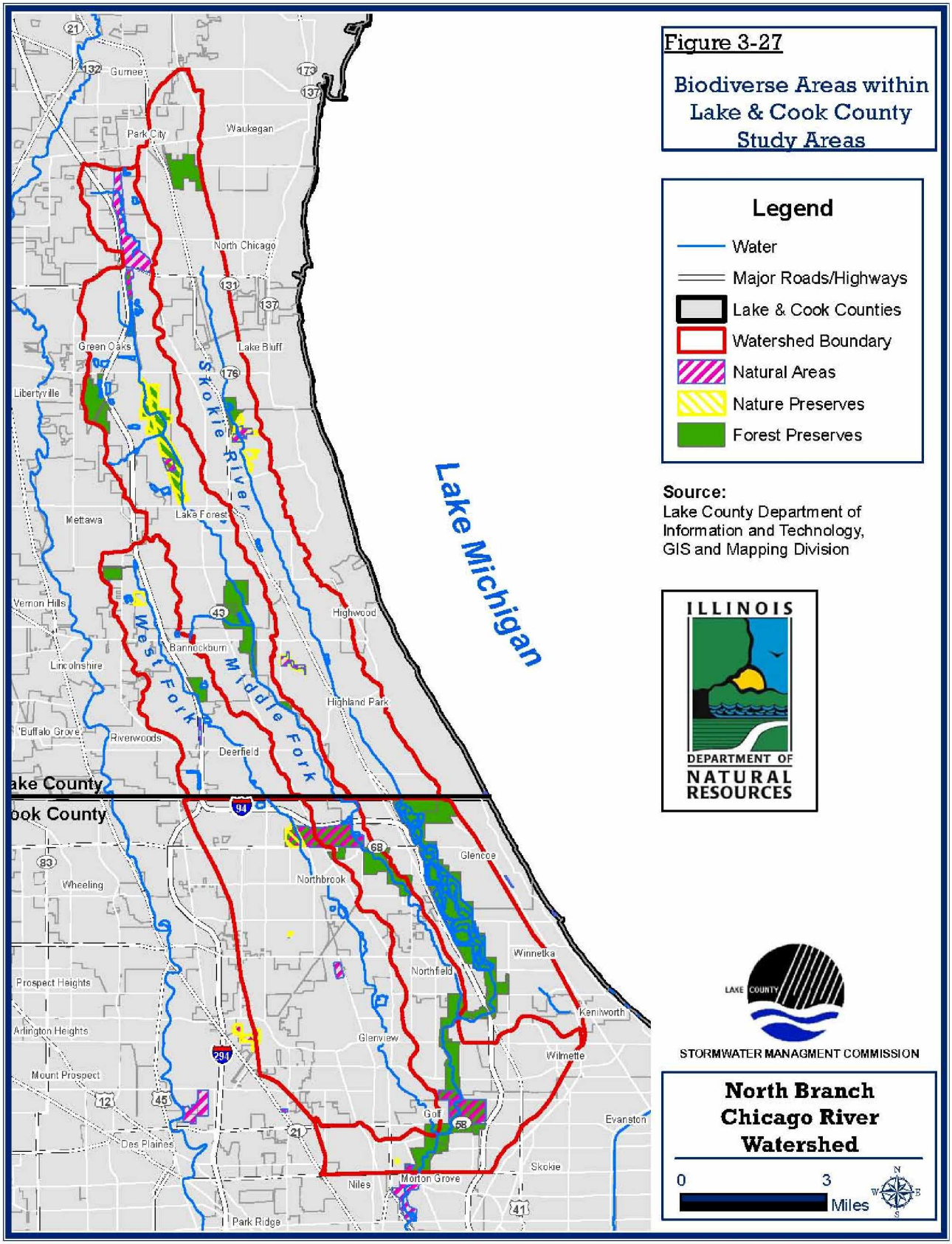
- The remaining 18 privately owned sites have various commercial, industrial and residential zonings. With nearly 50% of the parcels identified in the 1999 watershed study having been developed, it is reasonable to expect the remainder to vanish in the next decade.

Remnant Landscapes

Part of the NBOSP involved assessing the restoration potential of any sites visited. During field review of properties in Lake and Cook Counties, it became apparent there was a need to identify what this report calls remnant landscapes as well (Figure 3-29). Since most of the North Branch Chicago River watershed has been extensively altered throughout the decades by filling, dredging, and ditching, the presence of original unaltered topography is worth noting.

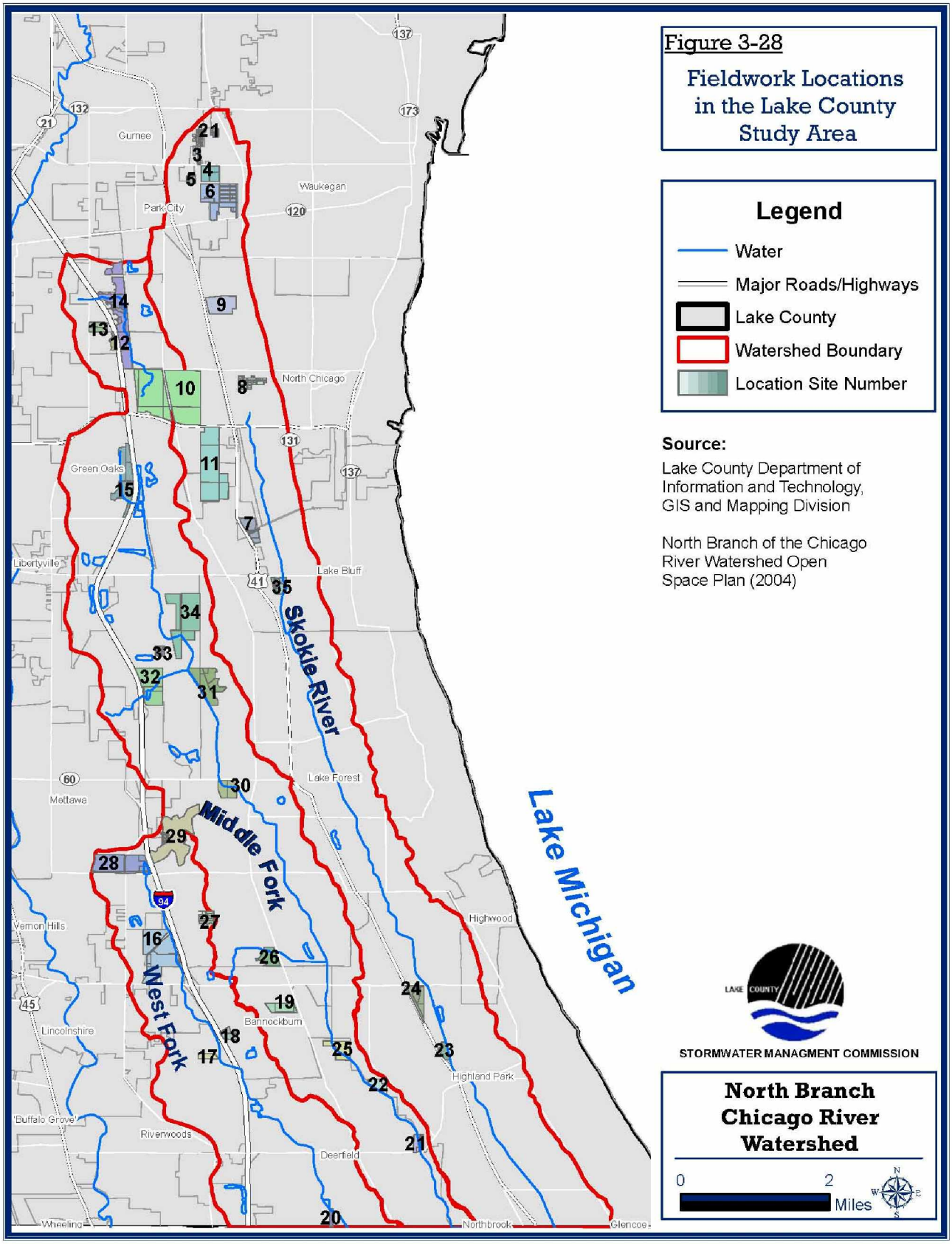
Eighteen examples of remnant landscapes were located. These consisted of exceptional and well-known sites where both the topography and plant communities are largely intact — similar to the forest preserve holdings at Berkeley Prairie and Middlefork Savanna, for instance — to areas that, though having degraded habitat, still retained original landforms.

Of the 18 sites, eight are unprotected. These would include less-intact examples such as a wetland complex located in Gurnee, only 100 yards from the watershed border, as well as the large and well-known prairie/wetland/savanna landscape on the Wrigley Tract bounded by Interstate 94 and Illinois Routes 43 and 137. This property also harbors the only remaining, non-ditched section of river channel in the entire North Branch Chicago River watershed.



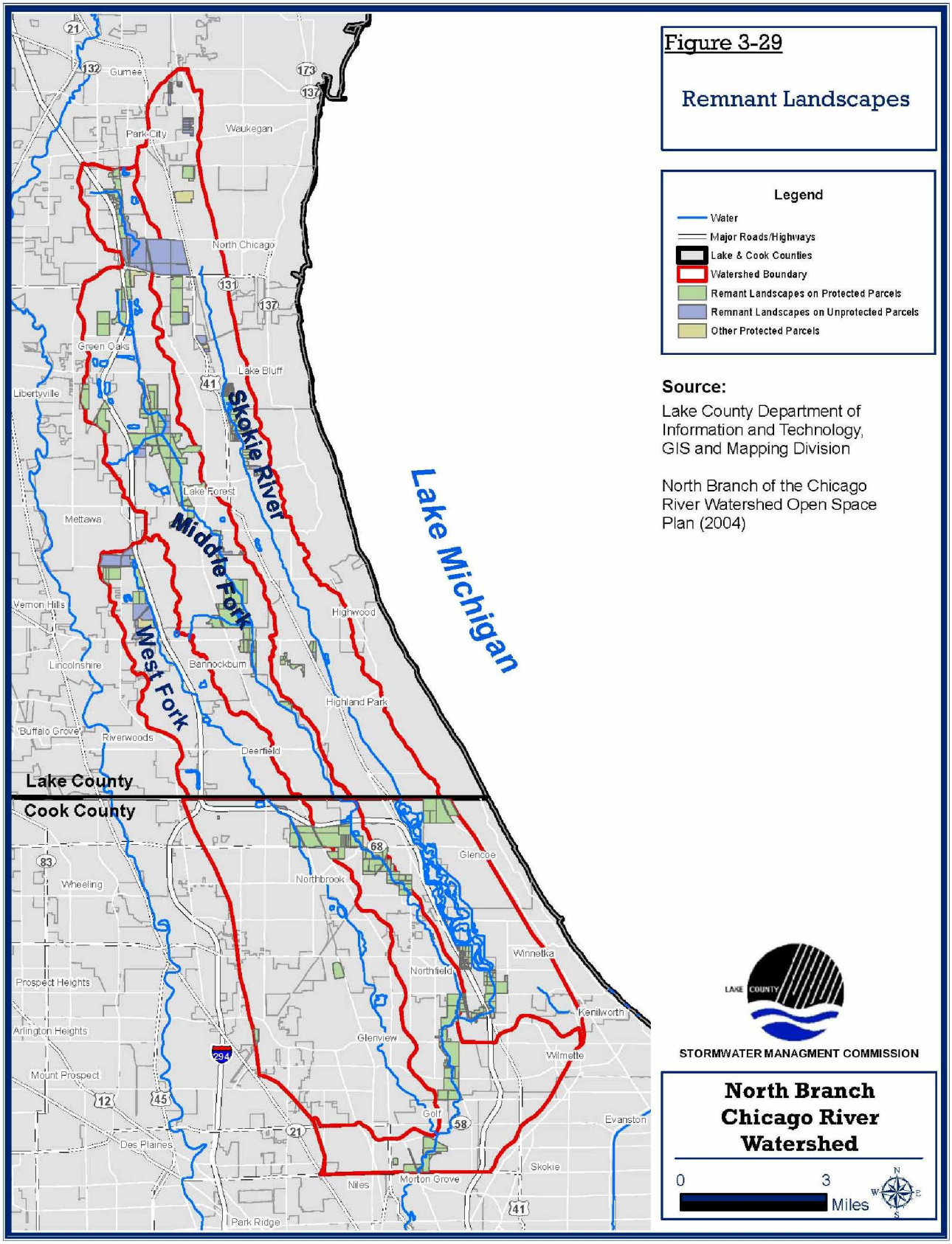
Maps to be used for Planning Purposes only.

Produced by V3 Companies



Maps to be used for Planning Purposes only.

Produced by V3 Companies



Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.8.3 Development Impacts on T&E Species and Natural Areas

All of the T&E, INAI sites, and Nature Preserve sites are directly or indirectly subject to threats from development. In addition to direct development of the privately-owned, unprotected sites, off-site and adjacent development can also significantly degrade the quality of habitat available at neighboring sites. For example, wetland sites (9 of 10 total sites in Lake County, and 13 of 19 in Cook County) are particularly susceptible to hydrologic modifications from surrounding developed areas. Habitat for T&E plants & animals may inadvertently be lost at these sites if they become too wet or too dry as a result of adjacent off-site development.

A second impact is related to the total size necessary to provide habitat. In many cases the protected sites alone may not be large enough to provide sufficient habitat for animals that require large territories for feeding and successful reproduction. Undeveloped adjacent sites may be serving as buffers and providing these needs. Development of these adjacent sites can therefore result in habitat loss for the protected species.

A final example of an impact that can result from development, is the spread of invasive species from nearby developed areas to the high quality site. Invasive species can potentially displace native plants and animals, degrade nesting and foraging habitat, disrupt ecological processes and reduce overall biodiversity. Disturbing the ground for development often opens the door for these species to get established.

3.8.4 Planning Considerations for T&E Species and Natural Areas

Threatened and endangered species and high quality natural areas need to be considered when planning for open space protection, watershed improvements and locating future development in the North Branch Chicago River watershed. INAI sites and T&E sites in private ownership that are currently unprotected are highest priority for public acquisition or some other form of permanent conservation protection. Local community planning departments, plan commissions or boards need to be aware of the state requirements for IDNR consultation, the locations of Nature Preserves and INAI sites and the general potential locations of T&E species. Unsurveyed sites may have T&E species that have not been previously documented, therefore if there is any question, the site should be sent to the IDNR for a minimum quick review. Municipal and County governments also need to include these sites in land use plans for special consideration when determining local zoning and development requirements.

Planning for watershed level projects should also incorporate considerations for T&E species, INAI sites and Nature Preserves when considering proposals for flood detention, drainage improvements and wetland restoration projects. In the North Branch Chicago River watershed, agencies most responsible for this planning include the four drainage districts, USACE, SMC, affected municipalities, the counties and Forest Preserve Districts.

3.9 Wetlands

Prior to channelization of the North Branch Chicago River tributaries and large-scale drainage of the watershed in the early 1900s, wetlands made up approximately 30 percent of the landscape in the Lake County watershed and 22 percent of the Cook County study area. The draining of wetlands in the watershed opened up vast acres of land for agriculture, and more recently for mixed-suburban use.

Based on the presence of hydric soils (soils formed under wet conditions), there were approximately 9,749 acres of wetlands in the watershed in Lake County and 6,182 acres in Cook County prior to European settlement.[14] Since that time, 55 percent of the wetlands in Lake County and 81 percent in Cook County have been converted to other uses.

[14] *This acreage is a minimum value since most of the original soil characteristics in the southern half of the Cook County study area have been lost due to urban and suburban development.*

3.9.1 Lake County Wetlands

Today, according to the Lake County Wetland Inventory (LCWI), 4,474 acres of wetlands remain in the three subwatersheds of the North Branch Chicago River in Lake County. These wetlands cover approximately 14 percent of the total land area (Table 3-28). Of these 4,474 acres, approximately 29 percent (1,307 acres) are currently protected through public ownership. Approximately 2 percent (104 acres) are currently protected under conservation organization ownership and 30% (1,337 acres) are in private ownership.

West Fork: In the West Fork, there are 503 acres of wetlands that make up approximately 3% of the subwatershed (Table 3-28). As shown in Figure 3-30, wetlands are primarily located in the floodplain in the upper one-third of the West Fork subwatershed especially north of Half Day Road (Illinois Route 22).

Middle Fork: Around 20 percent of the Middle Fork subwatershed or 2,517 acres are wetlands. As indicated in Figure 3-30, the wetlands in the Middle Fork are primarily located in the headwaters (north of Buckley Road/Illinois Route 137) and in the floodplain of the river especially between Rockland Road (Illinois Route 176) and Illinois Route 60.[15]

Skokie River: The Skokie River subwatershed contains 1,454 acres of wetlands covering approximately 7 percent of the subwatershed. Wetlands in the Skokie River are primarily located in the headwaters especially north of 14th Street in North Chicago and in the floodplain between Buckley Road and Atkinson Road (Figure 3-30).

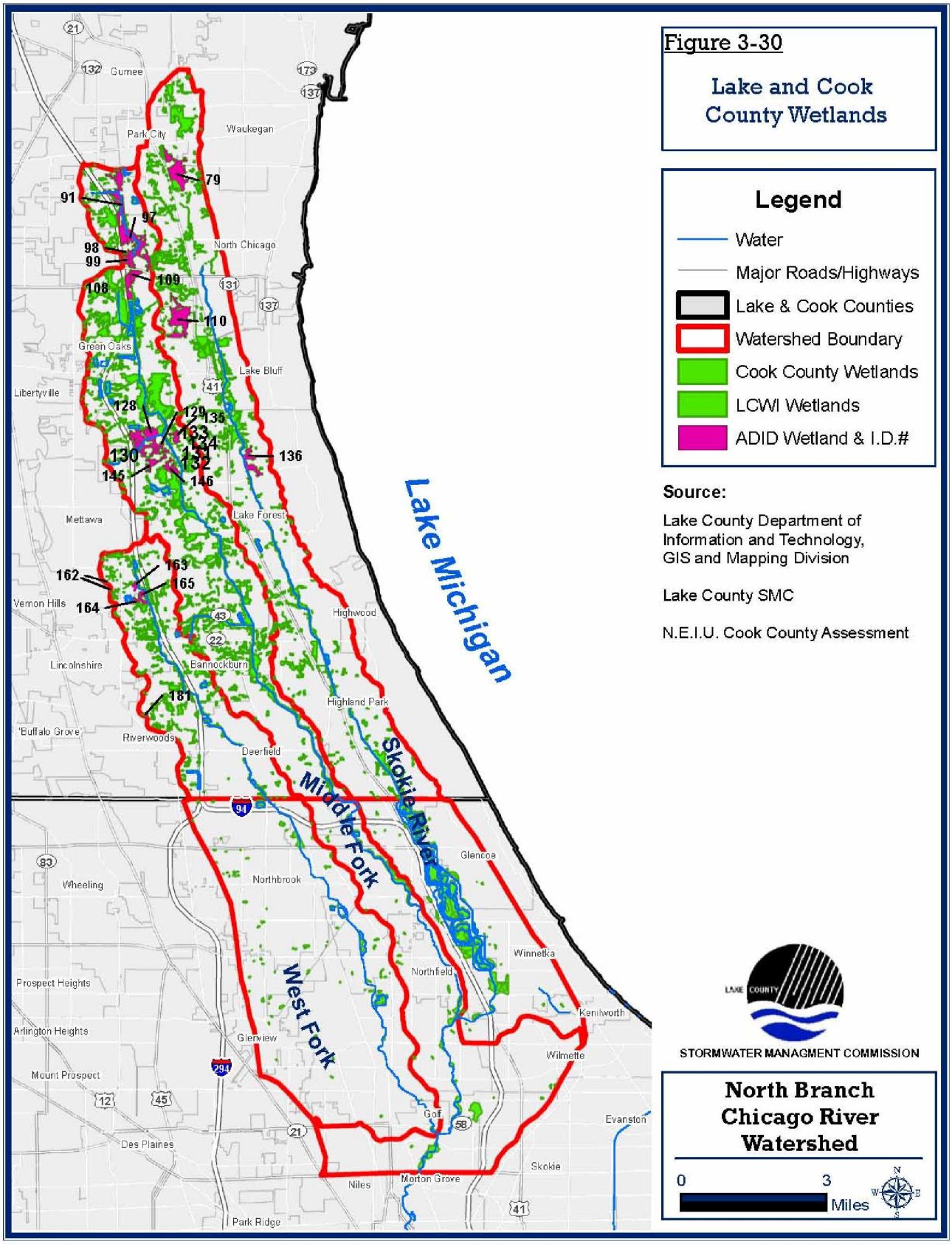
Table 3-28

Wetlands in the North Branch Watershed

Subwatershed	Wetland Acres in Subwatershed	Percent of Subwatershed	Protected Acres*	Percent Protected	ADID Wetlands in Subwatershed
West Fork	503	3	34.8	7	5
Middle Fork	2517	12	842.5	33	16
Skokie River	1,454	7	267.2	18	3
Lake Co. Total	4,474	14	1144.5	26	24
Cook Co. Total	1,157	4	989	85	N/A
North Branch Total	5,631	9	2133.5	38	N/A

*Protected acres include those in public ownership of the Lake or Cook County Forest Preserve Districts and local park districts. The protected total also includes privately-owned land held by non-profit conservation organizations such as the Lake Forest Open Lands Association and properties designated as State of Illinois Nature Preserves.

[15] *The Middlefork Savanna makes up most of the west side of the river between IL 176 (Rockland) and IL 60.*



Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.9.1.1 High Quality (ADID) Wetlands

Twenty-four wetlands in the North Branch Chicago River watershed in Lake County have been identified as high quality wetlands through the ADID process (Figure 3-30). Completed in 1992, the ADID process sought to identify wetlands that should be protected because of their high functional value. The three primary functions evaluated were: 1. ecological value based on wildlife habitat quality and plant species diversity; 2. hydrologic functions such as stormwater storage value and/or shoreline/bank stabilization value; and 3. water quality values such as sediment/toxicant retention and nutrient removal/transformation function. Of the twenty-four ADID sites, 5 are in the West Fork subwatershed, 16 are in the Middle Fork and 3 are in the Skokie River.

As shown in Tables 3-28 and 3-29, ten of the ADID wetlands are protected in public ownership (such as the LCFPD) or in the ownership of conservation organizations (such as the LFOLA). Portions of eleven of the remaining sites have some level of protection because they are owned in part by a public resource agency or conservation organization. The remaining three ADID wetland sites are completely in private ownership. Some of these remaining sites are located in or near parcels that are likely to be developed in the future. Although they do not have the added protection of being in conservation ownership, these three ADID wetlands are afforded some level of protection through floodplain development and wetland provisions in the Lake County WDO and the USACE Section 404 Clean Water Act permit program.

Table 3-29
Protection for ADID Wetlands

Level of Protection	West	Middle	Skokie
Complete	1	9	0
Partial	2	6	3
Regulatory only	2	1	0
TOTALS:	5	16	3

3.9.2 Cook County Wetlands

Based on the National Wetland Inventory there are an estimated 1,157 acres of wetlands within the watershed study area in Cook County. As seen in Figure 3-30, these wetlands are found primarily in the floodplains immediately adjacent to the streams. Of the total wetland area, 973 acres (approximately 84%) lie within the land holdings of the CCFPD, and most of the forest preserve district wetlands are located within the Skokie Lagoons. The remaining 184 acres are located on public lands such as municipal parks, or on privately owned lands.

3.9.3 Future Wetland Impacts

Wetlands conservation will be one of the biggest watershed management challenges for the North Branch Chicago River watershed in future years. As demand for developable property in the watershed continues to grow, the incentive to build in wetland areas will also grow. The greatest impacts on wetlands from development will likely be from:

- wetland losses mitigated outside of the watershed;
- unsuccessful mitigation within the watershed;
- nonpoint source pollution carried in runoff from adjacent land uses;
- water level fluctuations caused by increased runoff from impervious surfaces; and
- invasion of non-native plant species.

The effects of these wetland impacts will likely be increased flooding in the watershed, degraded water quality and aquatic habitat in the North Branch Chicago River, and a decrease in watershed biodiversity. From a hydrologic perspective, a study of 30 watersheds in Illinois concluded that peakflow and floodflow volumes decrease, and low flow in the channel increases, with increasing wetland acreage in the watershed. (Demissie and Khan, 1993)[16]. If wetland losses from future development result in decreased stormwater storage then increased flood damage is anticipated. Likewise, restoration of wetlands in the watershed will provide more stormwater storage, and depending on the location of the restored wetlands should reduce flood damage.

Although direct filling of wetlands is greatly restricted under Section 404 of the Clean Water Act (CWA) and the wetland provisions of SMC's Watershed Development Ordinance, small areas of fill are still permitted where avoidance isn't feasible. Wetland fill permits under these circumstances require that mitigation be performed to restore or create new wetlands to replace the lost acres. If the wetland mitigation occurs outside of the watershed, then the replaced values do not benefit watershed residents. Even in circumstances where mitigation is in the same watershed, the acres, types and quality of wetlands that are mitigated, their location in the watershed and the success of the mitigation are all variables that determine whether wetland functions are being adequately replaced through mitigation. Unfortunately, the types of wetlands that are recreated are frequently not the types of wetlands that are lost. Generally, in Northeastern Illinois shallow marshes, wet prairies and sedge meadows have been filled and replaced elsewhere with open water wetlands. This method of replacement leads to a shift in the values that wetlands provide as habitat, and to a lack of diversity of wetland types, which results in decreased biodiversity throughout the watershed.

In addition to inadequate mitigation by wetland type, the question of whether wetland mitigation is successful over the long term remains to be answered. Currently the Lake County Watershed Development Ordinance (WDO) and the federal CWA permit program administered by the USACE both require provisions for follow-up monitoring and maintenance of mitigated wetlands. The WDO requires a maintenance plan and deed restriction on all wetlands within development permit boundaries including mitigated wetlands. The USACE requires five years of monitoring for mitigated wetlands to determine if the mitigation is successful, and the USACE is beginning to add long-term maintenance plans for existing and mitigated wetlands to their permit conditions. Unfortunately, neither the CWA or WDO permit programs have a clear-cut follow-up system for monitoring and enforcement of the deed restrictions nor maintenance plans over the long term. Although long-term management plans generally identify an entity responsible for the long term management, long-term funding and enforcement of management protection and maintenance activities are usually not worked out in detail. Therefore, inspection and enforcement only tends to occur if a complaint is filed for a specific site. In addition, it is not possible to evaluate the effectiveness of wetland protection or mitigation, for individual wetlands or for the watershed as a whole, without a long-term inspection/monitoring system.

[16] Influence of Wetlands on Streamflow in Illinois, *M. Demissie and A. Khan, Illinois State Water Survey Contract Report 561, Champaign, Illinois, 1993.*

3.10 Cultural Resources

While there are a number of cultural resources in the North Branch Chicago River watershed in Lake and northern Cook County, several of special note include Lamb's Farm, Trinity International University and the Chicago Botanic Garden.

Lamb's Farm

Lamb's Farm, located on 70 acres in the upper Middle Fork subwatershed in Green Oaks, is a residential and vocational facility for mentally disabled adults. Lamb's Farm began in 1961 when 12 adults with mental disabilities were employed in a small pet shop in Chicago. Today, more than 250 adults with mental disabilities are served each year. Lamb's Farm has ten businesses on-site that raise money to support programs and provide employment experience for residents. Lambs Farm businesses include a restaurant, bakery, ice cream parlor, country store, pet shop, gift shop, thrift shop, petting zoo and several children's attractions. In addition to daily services, annual festivals and special events bring more than 350,000 visitors to Lamb's Farm each year.

Trinity International University

Trinity International University has a 108-acre campus in Deerfield in the central portion of the West Fork subwatershed. The University at the Deerfield site is composed of Trinity College: a small Christian college, and Trinity Evangelical Divinity School: a seminary. The heritage of these institutions dates back to 1897 with the establishment of the First Swedish Evangelical Free Church of Chicago. The seminary was established at the Deerfield site in 1961, the college followed in 1965.

Chicago Botanic Garden

Just south of the Lake county line in northeastern Cook County is the Chicago Botanic Garden, a world-class botanic garden serving over 700,000 visitors and 34,000 members each year. The Garden is owned by the CCFPD and managed by the Chicago Horticultural Society. The Garden's site was authorized in 1963. Planting began in 1972, the first year it was open to the public. The Botanic Garden includes 23 gardens totaling over 385 acres with 75 acres of lagoons containing 9 islands, and has over 6 miles of shoreline. The Skokie River runs through the Garden, and the Skokie Lagoons are located immediately south of the property.

The Botanic Garden is directly impacted by upstream drainage from the Lake County watershed. Much of the shoreline surrounding the Garden's islands and lagoons is eroding due to high fluctuations of water level in the river and lagoons from upstream stormwater runoff. Water quality in the lagoons is also degraded by an overabundance of nutrient pollutants, and as a result the lagoons experience excessive algae growth. A river restoration and enhancement project that includes streambank stabilization using bioengineering techniques, riparian wetland restoration and native prairie buffer is being completed on the portion of the Skokie that flows through the Garden. The Botanic Garden is currently working on an aquatic initiative to stabilize the eroding shoreline and improve water quality in the lagoons, as well as to use the lagoons to establish a world-class aquatic plant collection at the Garden.

3.11 Lakes

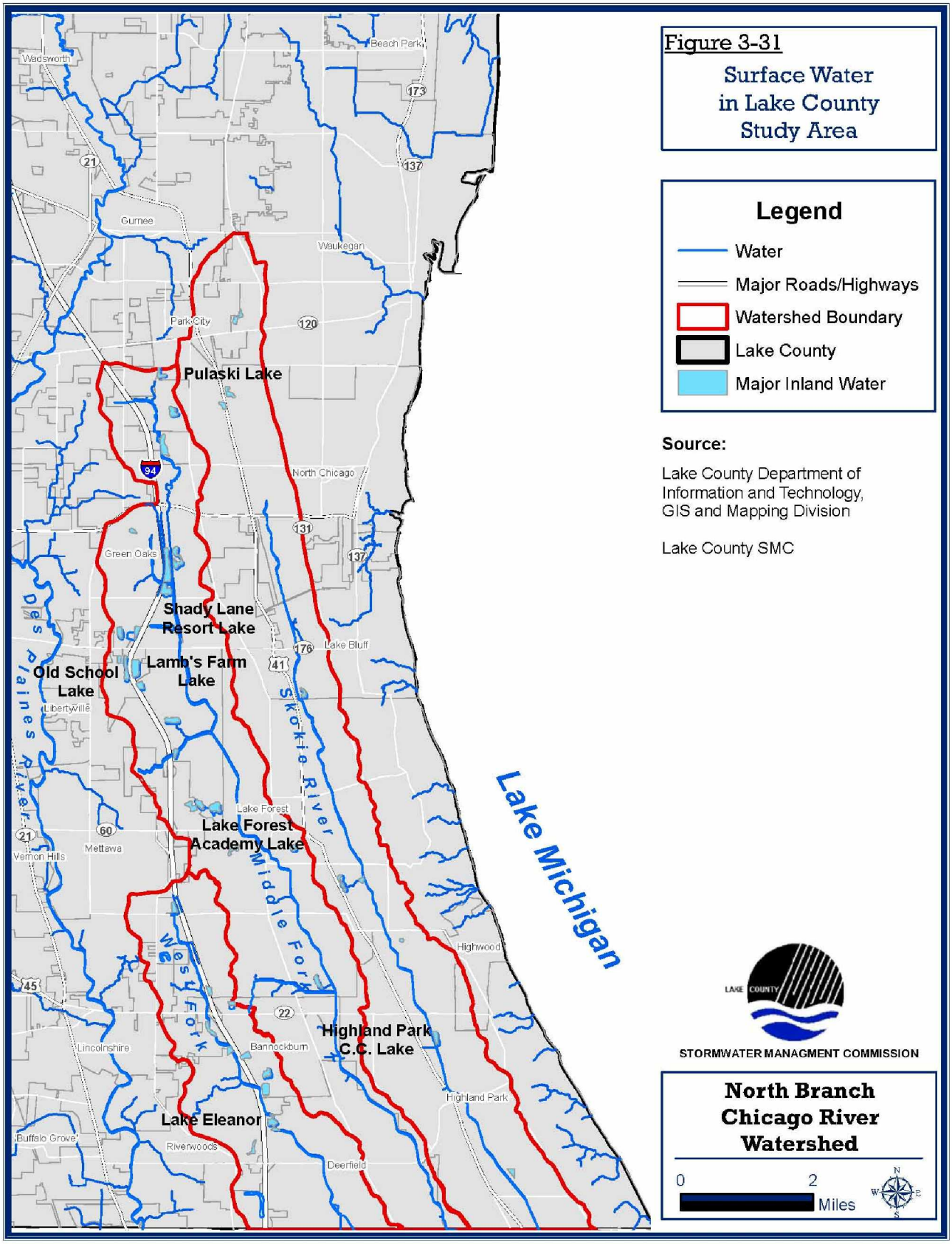
Although the North Branch Chicago River watershed does not have a large number of lakes, some of them are significant. The Skokie Lagoons, a series of seven man-made lagoons located just south of the Chicago Botanic Gardens (CBG) on the Skokie River, makes up the largest concentration of lakes in the watershed. The Skokie Lagoons are located in the area of the former Skokie Marsh on 2,000 acres purchased by the Cook County Forest Preserve District (CCFPD) in 1920. By that time, the historic marsh had been severely degraded.

Plans to modify the marshlands into a series of ponds or lagoons for flood control were developed in 1929. In 1942, the Civilian Conservation Corps built a seven-lagoon system with water levels controlled by dams and other structures. In subsequent years, water quality in the lagoons became increasingly degraded by effluent from an upstream sewage treatment plant (STP) and surrounding land uses. Significant effort has been made in recent years to manage the lagoons for fishing, boating and other recreational activities. Water quality has improved following construction of a diversion channel for the sewage effluent and the lagoon fishery has been restored.

In addition to the Skokie Lagoons in Cook County, the North Branch Chicago River watershed in Lake County has ten named lakes (Table 3-30). Of the ten named lakes, Old School Lake, Pulaski Lake, and Lake Eleanor have been studied by the Lake County Health Department (LCHD) Lakes Management Unit. See Figure 3-31 for lake locations within the watershed.

Table 3-30
North Branch Lakes, Lake Co.

Lake Name	Acres	Access
WEST FORK		
• Lake Eleanor	15	Unknown
MIDDLE FORK		
• Schmidt Lake	9	Unknown
• Lamb's Farm Lake	18	Unknown
• Shady Lane Resort Lake	10	Unknown
• Old School Lake	11.8	Public
• Lake Forest Academy Lake	23	Unknown
• 20th Century Lake	10	Unknown
SKOKIE RIVER		
• Pulaski Lake (Greenbelt FP)	5.5	Public
• Highland Park C.C. Lake	.3	Unknown
• Foley's Pond	4	Public



Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.12 The River

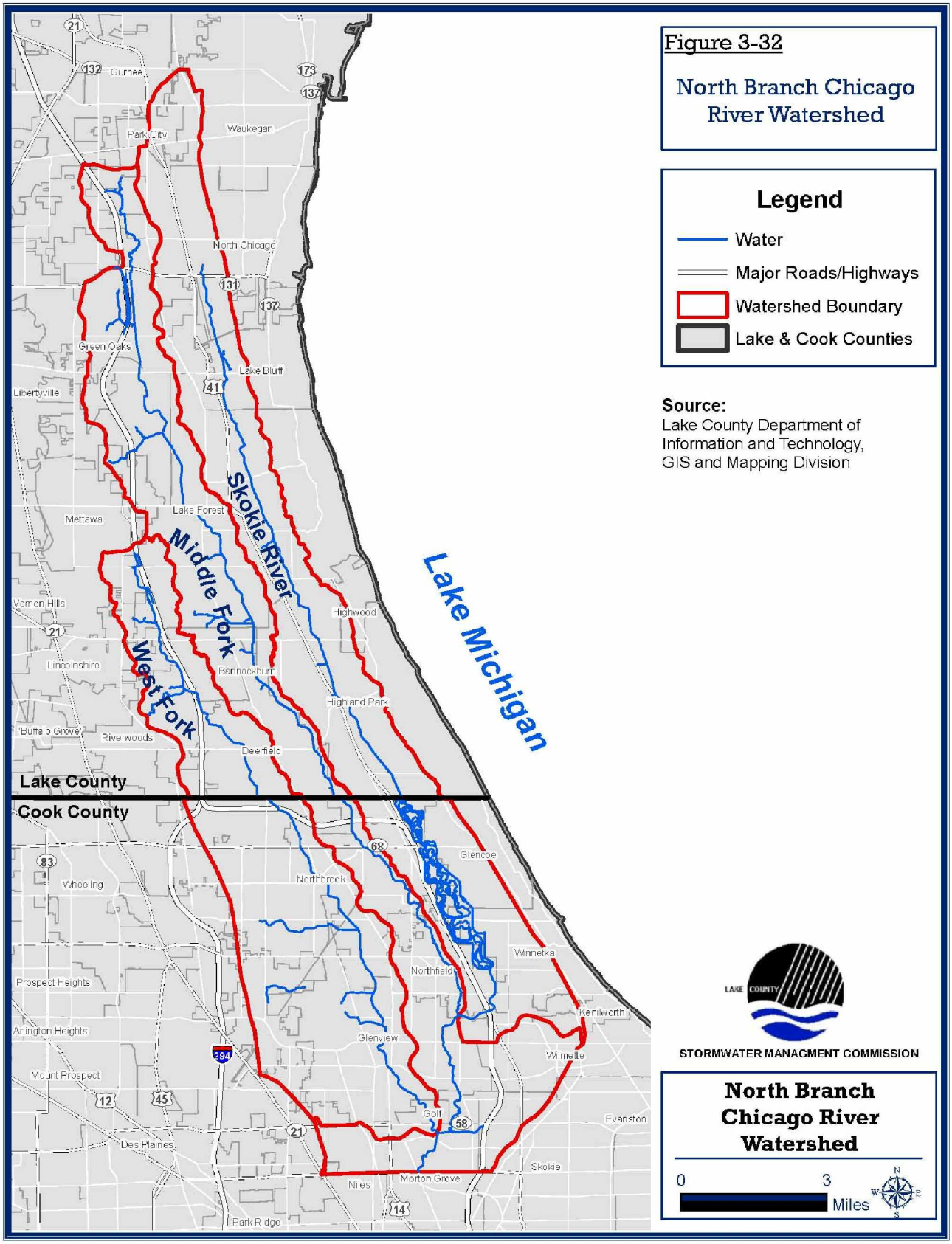
Water quality, aquatic life, physical habitat and instream flows were assessed to determine the condition of the North Branch Chicago River. The results of chemical monitoring and biotic data collected by other agencies were aggregated and summarized to provide information on water quality and aquatic life in the river. Instream flow and the physical characteristics and habitat of the stream were assessed based on new data collected during the stream inventory. The following sections include both the summaries of existing data and report the new data collected in the stream inventory. (Detailed summaries of the stream inventory data can be found in Appendices B and F.)

3.12.1 General Description

The North Branch Chicago River is made up of three tributaries: West Fork, Middle Fork, and Skokie River, which flow approximately 55 stream miles in Lake and Cook Counties. In Lake County, the West Fork is approximately six stream miles, the Middle Fork 13 miles, and the Skokie 15 miles (excluding the stream length in underground culverts). In both Lake and Cook Counties, the West Fork is approximately 14 miles long, the Middle Fork is 24 miles, and the Skokie River is 17 miles long. All three forks in Lake County flow roughly parallel with long narrow watersheds. The West Fork and Middle Fork lie between 1.12 and 1.75 miles apart. The Middle Fork and Skokie River are between 0.5 and 1.5 miles apart (Figure 3-32).

The three North Branch Chicago River tributaries currently serve as stormwater conveyance systems and have been extensively channelized by the drainage districts. Channelization refers to channel modifications that include straightening, widening or deepening a stream or river channel in order to increase the volume and/or velocity of water flow. The North Branch Chicago River tributaries were channelized in the first half of this century to improve drainage from surrounding lands.

Channelization alters the natural flow of streams and rivers that have a tendency to meander. The natural meander geometry of a stream will dissipate the energy of water as it flows through bends in the channel, and also creates pools and riffles in the streambed that provide habitat for aquatic plants and animals. Channelization tends to eliminate pools, riffles and meanders as it directs a larger volume of water into a straight, confined channel, which increases the energy of the flow causing erosion of the streambed and/or steambanks. As the streambed erodes over time the channel deepens becoming more entrenched. This process is referred to as downcutting. If the streambed is composed of materials that are resistant to erosion such as gravel or stone, then the flow will tend to widen the channel by eroding the streambanks, rather than deepening it. Erosion of the streambed or streambanks results in heavier loads of sediment being transported and settling out in the channel, which degrades the aquatic ecosystem.



Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.12.1.1 West Fork

The West Fork begins near Everett Road in Lake County and flows southward until it joins with the North Branch Chicago River near Morton Grove in Cook County. The West Fork in Lake County has a drainage area of 8.6 square miles or approximately 5,500 acres and is approximately six miles in length. The watershed has an average slope of 3.9 feet per mile. Channel modification and filling of the natural floodplain are extensive throughout this tributary due to adjacent residential development and I-94. While there are several small lakes and ponds, including Lake Eleanor located directly on the West Fork channel, there are no major lakes in the basin. Unlike the Middle Fork and Skokie Rivers, the West Fork has very little of its corridor in golf course and park use.

The West Fork originates in a wetland headwaters area that drains to a borrow pit located at the northwest corner of Everett Road and I-94. Flow is intermittent in the upper reaches of the stream, but is perennial south of Old Mill Road. A flood control reservoir (#27) is located alongside the river where it crosses from west to east under I-94 at Duffy Lane in Bannockburn. I-94 follows the West Fork along most of its length in Lake County. The river parts with the highway just south of Lake Eleanor taking a more southeasterly course through residential development in Deerfield. The Deerfield wastewater treatment plant discharges treated effluent to the river just north of the county line near Keller Park in Deerfield.

3.12.1.2 Middle Fork

The Middle Fork, also known as the West Skokie, originates in the Waukegan area flowing south into Cook County where it becomes the mainstem of the North Branch Chicago River. The Middle Fork has a drainage area of 19.8 square miles or 12,660 acres in Lake County and is approximately 13 miles in length. The upper watershed has a slope of 5.8 feet per mile, while the slope flattens out toward the middle of its length to 1.8 feet per mile. North of Buckley Road, the channel is often indistinguishable in an area of marshland. It has intermittent flow from its source to a point one mile downstream of Rockland Road. From this point to its confluence with the main stem in Cook County, the Middle Fork is a perennial stream. While there are a number of small lakes and ponds, no major lakes are found in the basin.

Virtually all reaches of the Middle Fork south of Buckley Road have been modified to transport more water. Between Buckley and Atkinson Roads, the river is essentially a ditch along the Chicago, Milwaukee, St. Paul and Pacific Railroad tracks. At Rockland Road, it passes through an abandoned railroad right-of-way in a concrete culvert. The floodplain is very wide in this area and includes the Middlefork Savanna and Knollwood Country Club. North of Route 60, the channel passes through Meadowood Park and a residential area along Lexington Drive in Lake Forest that experiences overbank flooding. South of Westleigh Road the Middle Fork is highly channelized as it passes through golf courses and homes with large lots. The basin is fairly flat in this area with a great deal of floodplain storage. The Middle Fork then flows through Prairie Wolf Forest Preserve where a potential future flood control reservoir site is located north of Half Day Road. South of Prairie Wolf the Middle Fork is surrounded by residential development for the rest of its length in Lake County.

3.12.1.3 Skokie River

The Skokie River is the eastern fork of the North Branch Chicago River. The Skokie watershed begins at Grand Avenue in Waukegan and extends south to the confluence with the Middle Fork near Glenview in Cook County. South of the Lake County line, the Skokie has been dammed at Willow Road to form the Skokie Lagoons. The Skokie flows from north to south in a watershed that is approximately 21 miles long and 1.5 miles wide with a slope of approximately 4 feet per mile in its headwaters and 1 foot per mile in its lower watershed down to the Skokie Lagoons. The Lake County portion of the watershed encompasses 21.9 square miles or approximately 14,000 acres and is approximately 15 miles in length. While there are a number of small lakes and ponds, no major lakes are in the Lake County part of the Skokie basin.

The Skokie River parallels US 41 (Skokie Highway) for much of its length. During high flows, wide sheet flow occurs between Washington Street and Belvidere Road (Illinois Route 120). The river flows south from Belvidere through Greenbelt Forest Preserve, Foss Park Golf Course and the (GLNTC) Golf Course. North of

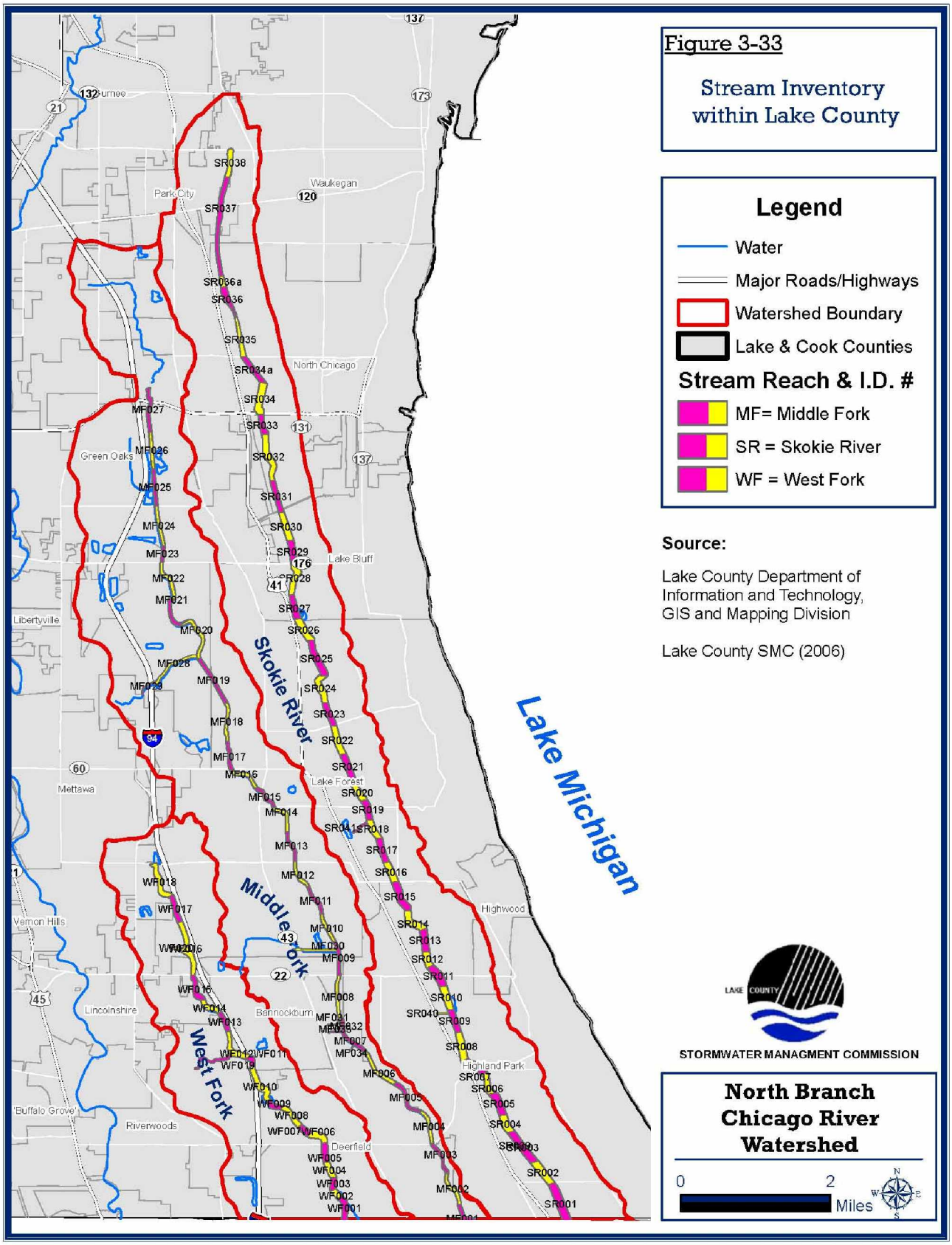
the Naval Golf Course the river is an open channel in some reaches and enclosed in various forms of subsurface conduit in others. There are several chronic flood damage areas located in this upper part of the watershed due to inadequately sized drainage systems and buildings located in topographic depressions. From Rockland Road to its confluence with the Middle Fork, the Skokie is a perennial stream. Parks and golf courses surround the river as it flows through Lake Forest. When it reaches Highland Park more residential development occurs in the river corridor in addition to parks and golf courses. There is chronic flood damage in several of the residential areas along this reach of the river. The Clavey Road STP is located on the river just north of the county line.

3.12.2 River Assessment: A Stream Inventory, Lake County

An extensive stream inventory was conducted on the North Branch Chicago River in both Lake and Cook Counties during 1997 and again in Lake County during 2005. Twelve tributary streams were inventoried in 2006-2007. This inventory documents the observations made during the stream inventories. The inventory required dividing the river into stream reaches for recording purposes. A stream reach is defined as a stream segment having fairly homogenous hydraulic, geomorphic, riparian cover and land use characteristics. In Lake County, the three forks were broken down into a total of 95 stream reaches (See Table 3-31, Figure 3-33). The inventory methodology required walking the entire stream length, taking measurements and noting in-stream, streambank and riparian corridor characteristics on a standardized inventory form. Approximately 1,600 photos were taken of the Lake County reaches as part of the inventory to document existing conditions along the river (See Appendix E for photo log). This data set is contained and updated as part of the SMC's Stream Inventory Browser. To request a copy, please contact SMC.

Table 3-31
Lake County Stream Reaches

Tributary	No. of Reaches	Average Length (ft.)
West Fork	20	1799
Middle Fork	34	2626
Skokie	41	1859
Total	95	2121



Maps to be used for Planning Purposes only.

Produced by V3 Companies

The major stream characteristics included in the inventory are as follows:

- Channel conditions (physical size, degree of bank erosion, sediment accumulation, debris load, pool/riffle development)
- Discharge points (open channel and stormsewer outfall sizes and locations)
- Hydraulic structures
- Riparian corridor (land use and vegetated buffer)
- Aquatic habitat (substrate composition, turbidity, algae, instream fish cover)

Appendix B summarizes key reach characteristics for the 95 stream reaches.

Although some quantitative data were collected with the channel, outfall and hydraulic structure measurements, the condition of the river was largely assessed using a qualitative method that involved visually inspecting and rating each stream reach as low, moderate or high for the characteristic being evaluated. A copy of the stream inventory methodology is available in the stream inventory browser. The following terminology is used in the discussion of the stream inventory results.

- *Low, moderate and high*: low refers to levels affecting less than 33% of the reach; moderate means 34 to 66% was affected; and high indicates 67 to 100% of the reach was affected.
- *Point discharges:* refers to open channels and pipes that drain into the river. Open channels may include gullies, ditches or stream tributaries of the river.
- *Turbidity:* refers to clarity of the water, which is a function of how much material including sediment is suspended in the water. High degrees of turbidity make the river less hospitable to aquatic life.
- *Hydraulic structures:* refers to low head dams, weirs, bridges, levees and any other structures along the course of the river.

3.12.2.1 Channel Conditions – Lake County

A number of factors were inventoried to better describe the condition of the North Branch Chicago River channels. The degree of recovery from channelization, sinuosity, pool/riffle development, bank erosion, sediment accumulation and debris loads are all measures of river equilibrium. Physical measurements such as the bank height, channel width, bank slope and the water depth reflect the shape of the channel and the amount of water that is transported by the river under both high and low flow conditions. Streambank vegetation, canopy coverage and hydraulic structures affect the hydraulic capacity of the channel and floodway and are therefore also included in the stream condition inventory.

The stream condition inventory points out the great variability in the channels of the North Branch Chicago River as the river travels from the northern headwater reaches southward. Table 3-32 includes a summary of channel shape characteristics for all three forks of the river in Lake County. There are significant differences in size and stability of the channels when considering the less developed northern areas of the Middle Fork and West Fork versus the highly developed middle to southern sections of these subwatersheds in Lake County. In addition there is a significant difference between the Skokie River and the other forks in terms of the Skokie having more pool/riffle development, less sediment accumulation, and low debris loads. Unlike the Middle and West Forks, there are also large segments of the Skokie headwater reaches that are piped underground.

A brief summary of the factors inventoried to determine the condition of the North Branch Chicago River is included in the following sections.

Table 3-32
Channel Shape Characteristics, Lake County

WEST FORK	Bank Height Range (ft.)	Bank Slope Range – Run over Rise (ft./ft.)	Top Channel Width Range (ft.)	Bottom Channel Width Range (ft.)
North of Half Day Rd	1 to 9	0.3/1 to 0.7/1	5 to 43	3 to 16
South of Half Day Rd.	2 to 13	0.1/1 to 4/1	9 to 81	3.5 to 33.5
MIDDLE FORK				
North of Rockland Rd.	1 to 8	0.3/1 to 1.3/1	14 to 45	4.5 to 11
South of Rockland Rd.	0.5 to 13	0.1/1 to 4/1	7.5 to 46	4 to 26.5
SKOKIE RIVER				
North of Half Day Rd.	3 to 12	0.3/1 to 5/1	18 to 73	4 to 27
South of Half Day Rd.	2.5 to 12	0.3/1 to 3/1	27 to 59.5	5.5 to 48

Pool/Riffle Development

Pool/riffle development is generally associated with the natural meandering of stream channels. Deeper pools develop in the bends of the channels while riffles are the shallow rapids that are located in the crossover between meanders. Channelization activities, including straightening and ditching, of the North Branch Chicago River tributaries have resulted in poor pool/riffle development.

Thirty-two percent of the reaches in Lake County had no pools and riffles (Table 3-33). High to moderate pool/riffle development was not observed in any of the reaches of the North Branch Chicago River (Figure 3-34).

Table 3-33
Pool Riffle Development in Lake County Reaches

Degree of Pool/Riffle Development	West Fork Reaches		Middle Fork Reaches		Skokie River Reaches		N. Branch Total Reaches	
	#	%	#	%	#	%	#	%
None	7	35	13	38	10	24.4	30	32
Low	13	65	21	62	31	75.6	65	68
Moderate	0	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0	0

Streambank Erosion

Streambank erosion is one of the most significant and visible problems for the North Branch Chicago River channels. In addition to erosion along the main channels, severe erosion was also noted in gullies and tributaries entering the North Branch Chicago River during the stream inventory. There are likely several causes for the significant erosion. The most important factor is the sheer volume and velocity of the runoff transported by the river following rain events. Other contributing factors include the steep slopes of the streambanks, a lack of deep-rooted native vegetation along the streambanks to stabilize the soil, and erosion associated with outfall structures and other point discharges into the river.

Table 3-34

Lake County Streambank Erosion Problems

Extent of Erosion♦	West Fork Reaches		Middle Fork Reaches		Skokie River Reaches		N. Branch Total Reaches	
	#	%	#	%	#	%	#	%
None	3	15	0	0	2	5	5	5
Low	7	35	13	38	15	36	35	37
Moderate	9	45	18	53	22	54	49	52
High	1	5	3	9	2	5	6	6

♦ None = 0%; Low = 1-33%; Moderate = 34-66%; High = 67-100% of the reach had eroded streambanks.

As shown in Table 3-34, of the 95 channel reaches in Lake County, 55 reaches (or 58%) had moderate or high bank erosion. The Middle Fork had the most eroded stream length (approximately 9 miles out of approximately 13 miles of moderate to high erosion) followed by the Skokie River (with 8 miles out of 15 miles of moderate to high erosion) and the West Fork (with 2 miles out of 6 miles of moderate to high erosion). Of the three forks, the Skokie and West Fork each has one reach with high levels of erosion. The worst streambank erosion occurred between Lake-Cook Road and Everett on the Middle Fork, from Deerpath Avenue to Lake-Cook Road along the Skokie, and between Deerfield Road and Lake Eleanor and also south of Duffy Lane on the West Fork (See Table 3-34, Figure 3-35).

Sediment Accumulation

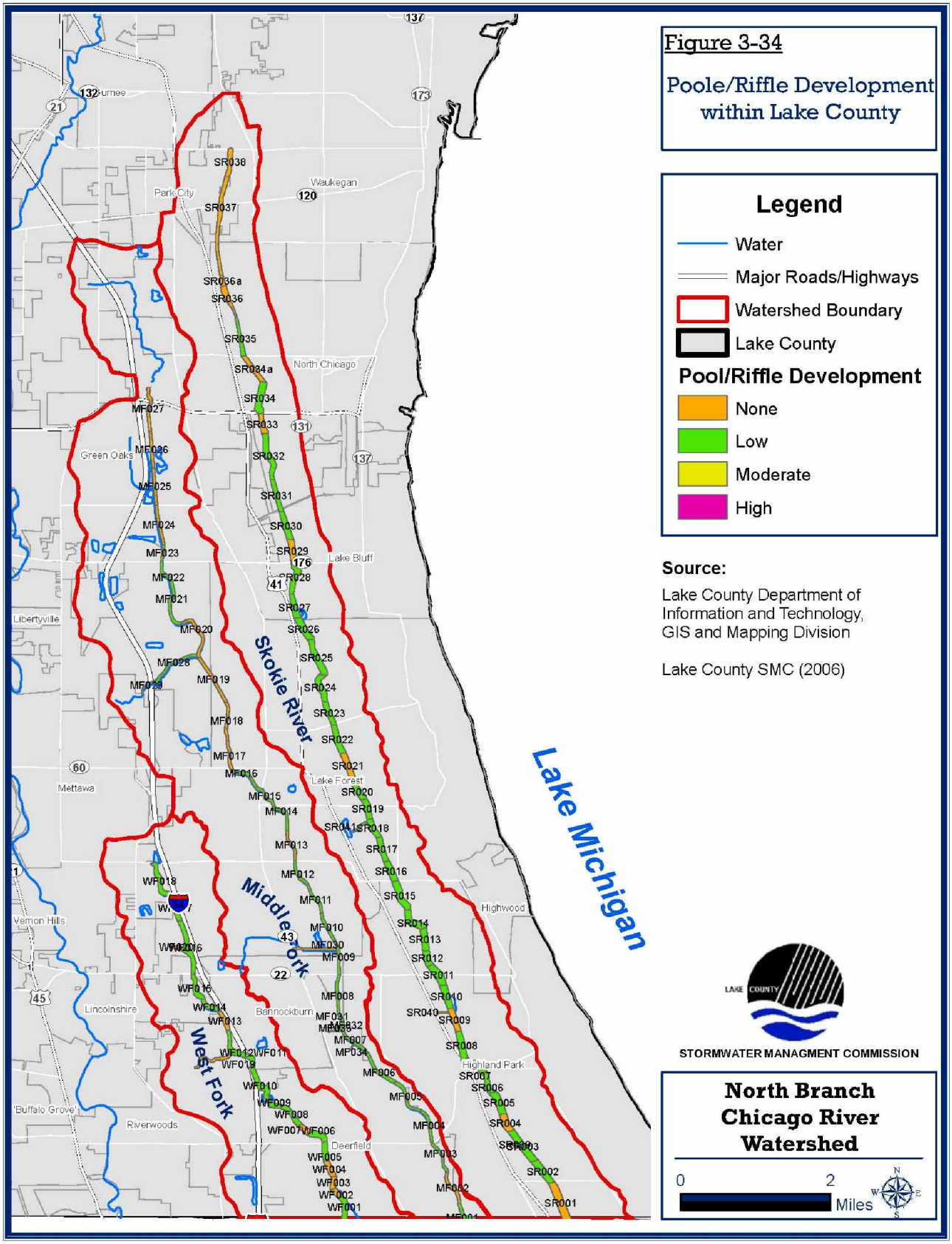
A high degree of streambank erosion has contributed to the accumulation of significant deposits of sediment in the streambed. Typically the river generates and transports sediment through its steeper gradient reaches. The sediment in the water then settles out and accumulates in areas where the water slows down. Areas of lower channel gradient and where the river backs up from constrictions are common areas where sediment accumulates. Overall, approximately 68% of all reaches in Lake County had moderate or high sediment accumulation problems.

More than 5 miles (out of the total 6 miles) of the West Fork and 14 miles of the Middle Fork had moderate to high sediment accumulations in the streambed; the Skokie had approximately 9 miles of streambed with moderate or high sediment accumulation. The Middle Fork had the greatest percent of reaches with moderate or high sediment accumulation followed by the West Fork. The Skokie River had the lowest percent of reaches with significant sediment accumulation (See Table 3-35, Figure 3-36).

Table 3-35
Sediment Accumulation in Lake County

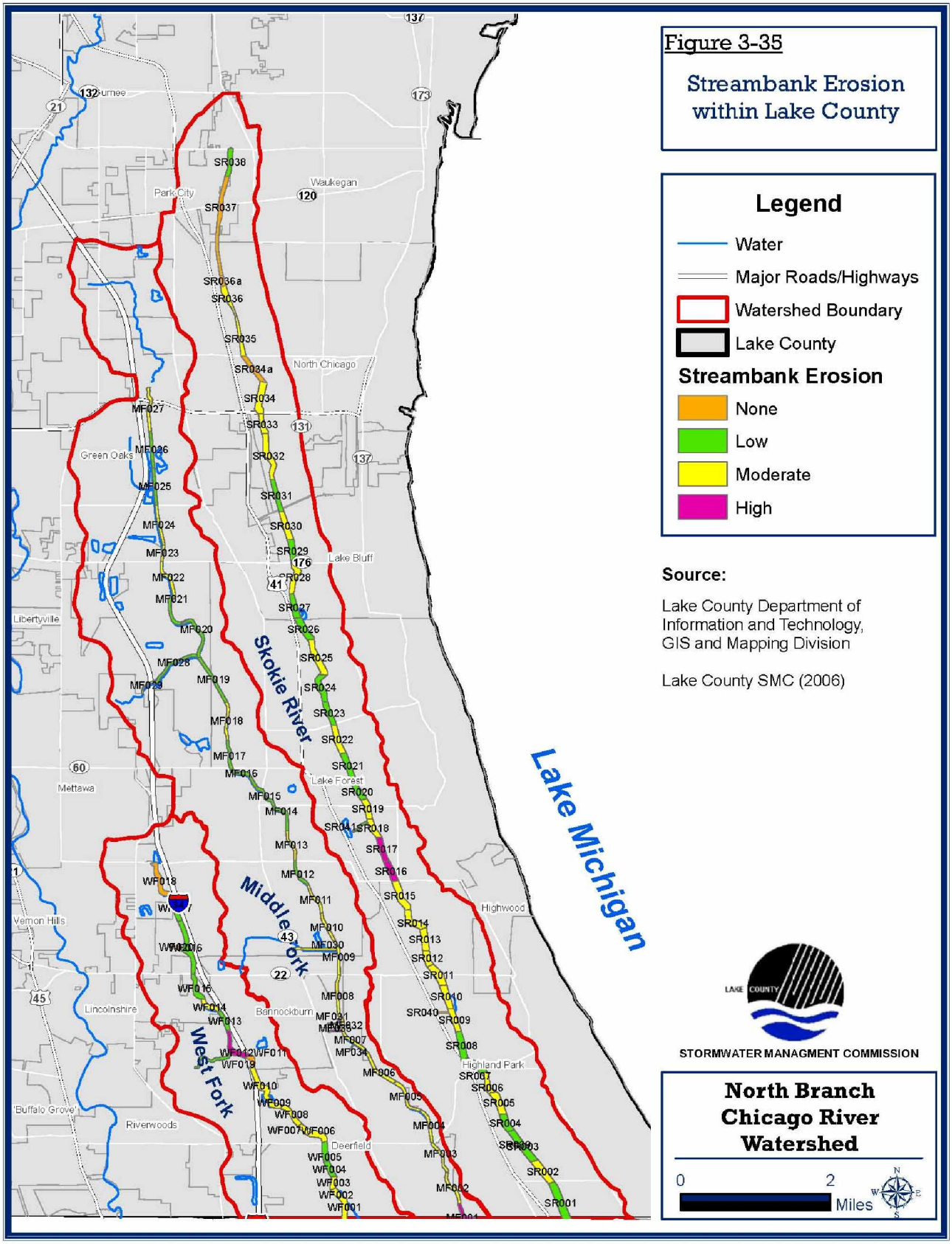
Degree of Sediment Accumulation♦	West Fork Reaches		Middle Fork Reaches		Skokie River Reaches		N. Branch Total Reaches	
	#	%	#	%	#	%	#	%
None	0	0	1	3	0	0	1	1
Low	6	30	6	18	17	41	29	31
Moderate	8	40	19	55	19	46	46	48
High	6	30	8	24	5	13	19	20

♦ None = 0%; Low = 1-33%; Moderate = 34-66%; High = 67-100% of the reach had sediment accumulations.



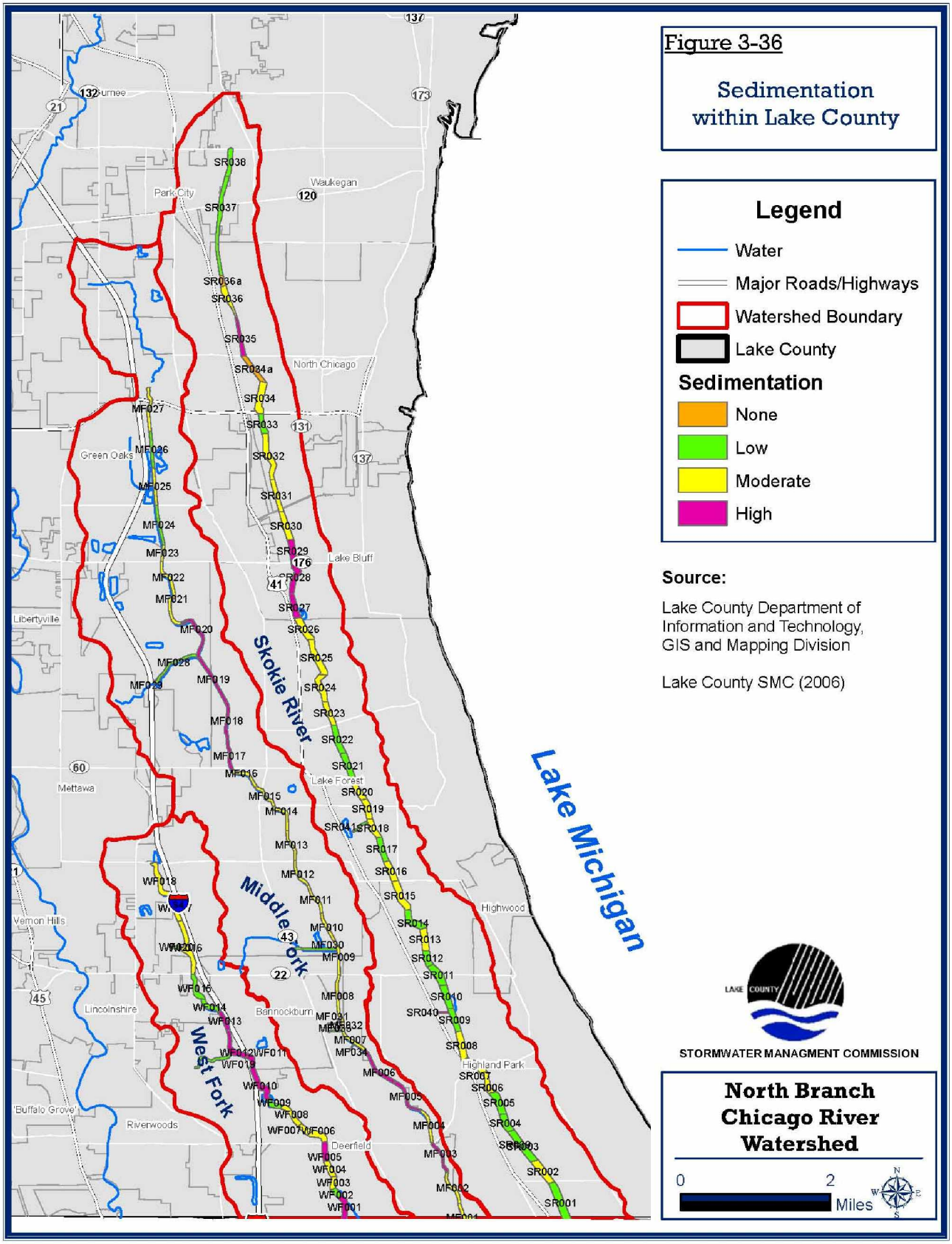
Maps to be used for Planning Purposes only.

Produced by V3 Companies



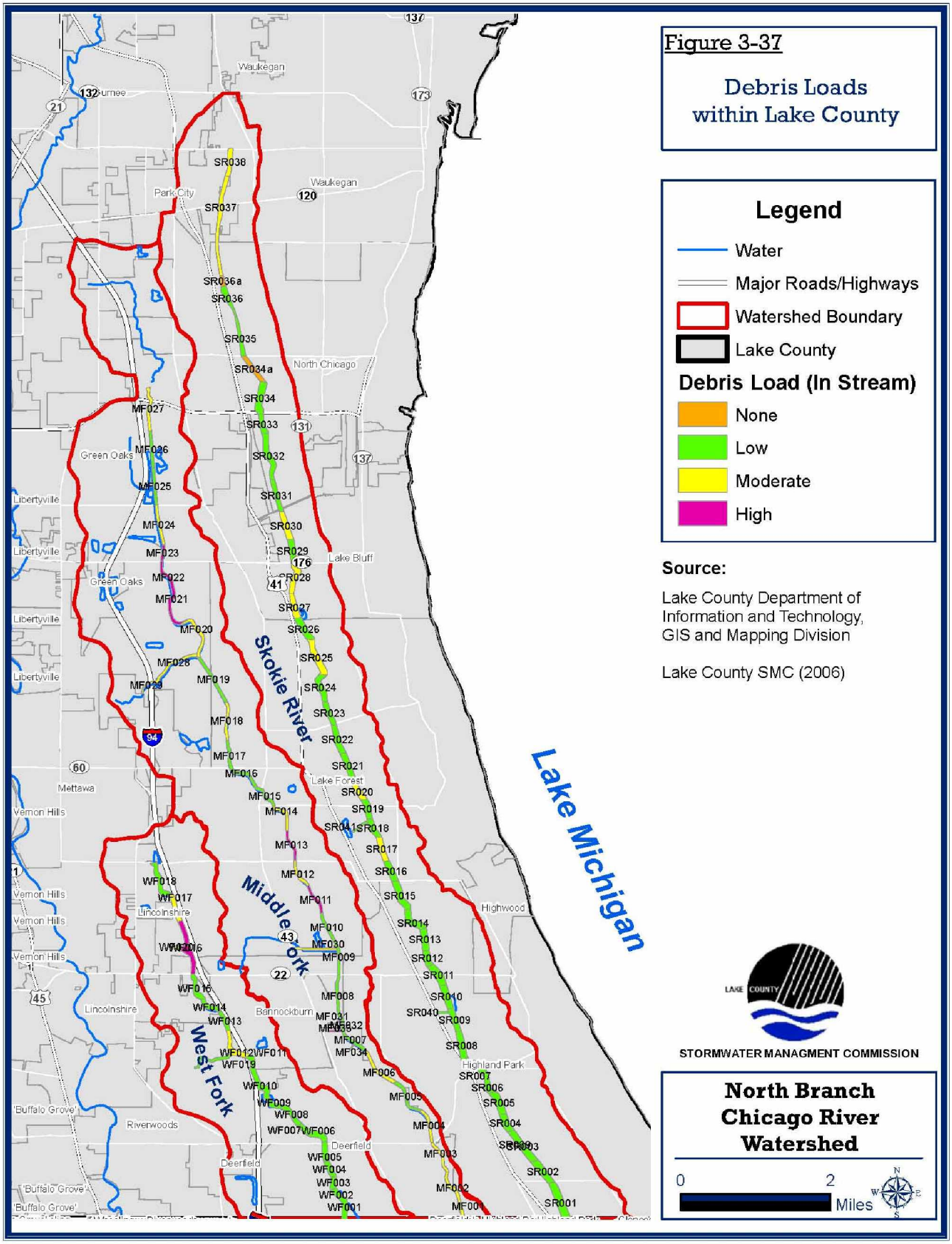
Maps to be used for Planning Purposes only.

Produced by V3 Companies



Maps to be used for Planning Purposes only.

Produced by V3 Companies



Maps to be used for Planning Purposes only.

Produced by V3 Companies

Debris Loads

In stream and overbank debris loads refer to both natural and man-made debris including leaves, sticks, logs, lumber, trash and sediment. The instream and overbank debris load tests assessed the extent to which debris was causing problems or had the potential to cause problems in the channel or on the banks such as obstructing flow, or deflecting stream flow into the bank causing erosion.

Reaches that failed the test were characterized by large accumulations of lodged and partially compacted debris across the stream channel. Throughout the North Branch Chicago River, 34 out of the 95 total reaches failed the instream debris load test, 24 failed the overbank debris load test and 17 failed both tests (Table 3-36). Most of the reaches of the Middle and West Forks that failed the debris load tests are located north of Half Day Road (See Figure 3-37). The southern reaches where the channels are considerably larger do not have a significant problem with debris collecting. Debris loads are also not a problem in the Skokie, where only 9 of the 41 reaches failed the instream debris load test. There are problems with conveyance in the northern underground reaches of the Skokie, and the East Skokie Drainage District (ESDD) repairs these problems when they become apparent.

Table 3-36
Instream and Overbank Debris Loads in Lake County Reaches

Failed Test*	West Fork Reaches		Middle Fork Reaches		Skokie River Reaches		N. Branch Total Reaches	
	#	%	#	%	#	%	#	%
Instream	4	20	21	62	9	22	34	36
Overbank	4	20	13	38	7	17	24	25
Both	3	15	11	32	3	7	17	18

*Reaches that "failed" the test for debris accumulation are classified as moderate or high.

Hydraulic Structures

Hydraulic structures are culverts, dams, levees, weirs or bridges within the stream. Hydraulic structures were included in the inventory because they can be constriction points in the flow of the river and may result in backwater flooding problems. Dams also can serve as barriers to the natural movement and dispersal of fish and other aquatic organisms, thereby limiting the number and species diversity of aquatic animals that the river would otherwise support. Hydraulic structures also require periodic maintenance and replacement. Appendix D contains a summary of the types, sizes, locations, and specific notes on the 193 hydraulic structures inventoried in the Lake County reaches of the North Branch Chicago River.

The Skokie River has the greatest number of hydraulic structures of the three forks in Lake County (100). In fact, there are more hydraulic structures along Skokie River than there are in the other two forks combined. The Skokie River flows under 63 bridges and through 31 culverts. A still in operation dam on the West Fork, which creates Lake Eleanor, needs to be investigated to determine the feasibility of removing the dam (See Table 3-37.)

Table 3-37
Hydraulic Structures North Branch, Lake County

Hydraulic Structures	West Fork	Middle Fork	Skokie River	N. Branch Total
Bridges	24	26	63	113
Culverts	14	23	31	68
Dams	1	0	0	1
Reservoirs	0	1	0	0
Weirs	0	0	0	0
Other	3	2	6	11
Total	42	51	100	193

Two flood control reservoirs are situated along the river in Lake County. One reservoir is located on the West Fork near Duffy Lane, and the other on the Middle Fork at Atkinson Road. These reservoirs, and a third reservoir at Lake-Cook Road on the West Fork, had design and construction problems that resulted in backwater flooding upstream in Riverwoods, Green Oaks and Deerfield respectively. The USACE has made alterations to the two reservoirs on the West Fork and corrected most of the design problems identified. (See Section 3.14 for additional information.)

Reservoirs aren't the only hydraulic structures in the watershed that are causing backwater flooding problems. Some culverts and bridges also contribute to this problem. For example, the bridge at Half Day Road over the West Fork has insufficient capacity for high flows, and floods an area upstream that is currently undeveloped. In addition, an inadequately sized drainage system in the upstream reaches of the Skokie backs water up north of IL Rt. 137 (Buckley Road) in North Chicago and Rt. 120 (Belvidere Road.) in Park City.

3.12.2.2 Discharge Points

The stream inventory identified 925 discharge points that drain into the North Branch Chicago River in Lake County (172 into the West Fork, 324 into the Middle Fork and 429 into the Skokie River). Discharge points include open channels and pipe outfalls, ranging from two-inch sump pump pipes to 40-foot open channels and 6-foot diameter pipes. Table 3-38 is a summary of the number of discharge points and their relative percentages for each of the forks of the North Branch Chicago River. The Skokie River has the highest number of pipes and other outfalls, in addition to the highest density of outfalls per stream mile at 25, followed by the West Fork with a density of 20. The Middle Fork has considerably more tributaries and swales/gullies discharging into the river than the other two forks, with a total of 67.

Many of these discharge points contribute to the degradation of water quality in the North Branch Chicago River from the urban runoff they transport. In addition to transporting pollutants, a considerable number of pipe and swale/gully outfalls are contributing significant amounts of sediment to the North Branch Chicago River by causing streambank erosion. The conditions of the outfalls, including associated erosion, were recorded in the stream inventory. There were 29 discharge points in the West Fork, 27 in the Middle Fork, and 34 in the Skokie River with erosion related or other problems.

Although outfall pipes range in size from 2 inches to 6 feet, 60% of them are 12 inches or less in diameter, and 40% are between 13 and 72 inches in diameter. Swales and tributaries flowing into the river range from 1 foot to 41 feet, but over 10% are 1 to 4 feet in size. Appendix C summarizes the types, sizes and locations of all discharge points into the North Branch Chicago River in Lake County, and includes general notes on each by stream reach.

Table 3-38
Discharge Points for North Branch Chicago River, Lake County

Discharge Points	West (7 mi.)	%*	Middle (15 mi.)	%*	Skokie (16 mi.)	%*	N. Branch Total (38 miles)	%*
Tributaries	3	1.7	7	2	4	1	14	1.5
Swales/Gullies	30	17.5	60	19	41	9.5	131	14.5
Total	33	19.2	67	21	45	10.5	145	16
Swales/gullies and tributaries/stream mile	5		4		3		4	
Pipes	139	80.8	256	79	383	89.5	778	84
Other outfalls	0	0	1	<1	1	<1	2	<1
Total	139	80.8	237	79	384	89.5	780	84
Pipes and other outfalls/stream mile	20		18		24		21	
Combined Total Discharge Points	172	100	294	100	429	100	925	100
Problem Discharge Points	29	16.9	27	9.6	34	7.9	94	10

* Percent based on combined total number of discharge points.

3.12.2.3 Riparian Corridor/Floodplain

The stream inventory included recording land use within 100 feet on either side of the river. Land use within this 200-foot riparian corridor was noted in the stream inventory under six categories: agricultural, recreational, residential, vacant/open space (includes recreational open space and forest, grassland, wetland), commercial/industrial, and other. The percent of land in each land use category was estimated for each stream reach while walking the stream. See Table 3-39 for a summary by fork and for the entire river.

Table 3-39
Land Use in Riparian Corridor, Lake County

Land use	West Fork %	Middle Fork %	Skokie River %	*N. Branch %*
Residential	34	16	13	18
Commercial/industrial	14	4	5	7
Recreational	13	5	35	20
Agricultural	0	3	0.5	1
Vacant/open space	39	67	43	51
Other	0	5	3.5	3

The percent of each of six categories of vegetation on the streambanks within 100 feet of each side of the river was also noted in the stream inventory. A summary of the predominant vegetation in the stream buffer is included in Table 3-40.

Table 3-40
Vegetation on Streambanks*, Lake County

Predominant Vegetation	West Fork %	Middle Fork %	Skokie River %	N. Branch Total %
Unmowed Grass	0	0	8	3
Lawn	6	0	4	3
Wetland	1	1	4	2
Trees	20	14	8	13
Shrub	25	29	23	26
Native Herbaceous	35	39	44	41
Rowcrop	0	0	1	0
None	10	16	7	11
Other	4	0	.3	1

* Percent of vegetative type within 100 feet of each side of river based on visual estimates.

3.12.2.4 Aquatic Habitat

Stream substrate, water quality, and instream fish cover are three criteria assessed in the stream inventory that reflect the quality of aquatic habitat in the North Branch Chicago River.

Substrate Composition

The composition of the stream substrate was recorded as an estimate of the percent of the stream bottom that was made up of gravel, sand, cobble, silt, organic matter, boulder, claypan or concrete. The substrate of the streambed is a significant determinant in the number and species richness of aquatic invertebrates in the stream. Since macroinvertebrates are the main food source for a variety of other animals (fish, amphibians, birds and small mammals), a healthy stream ecosystem is heavily dependent on the stream substrate.

The substrate composition in the Lake County reaches of the North Branch Chicago River is very similar in the West Fork and Middle Fork. However, there is a substantial difference between the substrate in those two forks and the Skokie River. While most of substrate in the West and Middle Forks is made up of silt and organic matter, many of the Skokie River reaches are predominately sand and gravel. (See Table 3-41). When compared to silt, gravel provides greater habitat variety for benthic (bottom-dwelling) macroinvertebrates. In addition to differences in habitat, a sand and gravel substrate is more resistant to downcutting and the channel is more prone to widen in response to increases in runoff volume to the river.

Table 3-41
Predominant Substrate Composition, Lake County

Fork	Substrate Composition	Percent of Substrate	# Reaches	%
West Fork	Silt and Organic Matter	50 to 75% > 75%	8 9	40 45
Middle Fork	Silt and Organic Matter	50 to 75% > 75%	20 12	59 35
Skokie River	Sand and Gravel	50 to 75% > 75%	23 0	56 0

Water Quality

A visual inspection of several water quality indicators was made during the stream inventory. A more detailed assessment of biological and chemical monitoring for water quality can be found in Section 3.13. Turbidity, water color and the presence of grease and oil or algae in the water column were the water quality factors evaluated during the stream inventory.

Turbidity: Only 15 reaches throughout the North Branch Chicago River in Lake County were considered highly turbid under baseflow conditions. However, turbidity was a significant problem during storm events when the soft bottom sediments were stirred up and the streambanks eroded by high flow volumes. Turbidity was considered a moderate problem in the Middle Fork and Skokie River where 15 (44%) and 18 (44%) of the reaches, respectively, were moderately or highly turbid. Turbidity is relatively less of a problem in the West Fork; 6 of its 20 reaches (30%) showed moderate or high levels.

Algae: Algae are a general indicator of high nutrient levels. While not a serious problem in Lake County, algae were found in moderate levels in all three forks. There was only 1 reach in the Lake County watershed that exhibited high algae problems. None of the reaches in the West Fork had moderate or high amounts of algae, and 12 of its 20 reaches (60%) had low levels. Similarly, none of the Middle Fork reaches had high levels of attached algae, 1 reach (3%) had moderate levels, and 17 reaches (50%) had low levels. The Skokie River had 2 reaches (5%) that were considered to have moderate to high levels.

Filamentous algae have been identified as a significant problem at the CBG. Mats of algae cause substantial diurnal swings in dissolved oxygen (dissolved oxygen levels get very low during the night) limiting fish and other aquatic animals. In addition to the chemical and biological impacts excessive algae can have, it is also aesthetically displeasing. Since the Clavey Road wastewater treatment plant effluent has been routed around the lagoons at the Botanic Garden, it is not likely the contributor of the excess nutrients causing this problem.

Grease & Oil: Eleven reaches of the West Fork (55%) had grease and oil in the sediment or water column based on visual inspection. Grease and Oil are also a problem for the Middle Fork where 13 reaches (38%) were subject to grease and oil in the water column based on visual inspection. Twenty-eight reaches in the Skokie (68%) were observed to have grease and oil in the water column based on visual inspections.

Instream Fish Cover

Instream fish cover was evaluated based on the presence of the following features in each stream reach: undercut banks; pools over 28 inches deep; macrophytes; logs; overhanging vegetation; rootwads; boulders; and backwaters. Several of these features provide "living spaces" for fish (affecting water depth and hiding places), the others provide sources of food.

Table 3-42 is a summary of the number of stream reaches for each tributary that have fish cover by type of cover. Overhanging vegetation is most common type of instream cover found in the North Branch Chicago River, boulders is the least common. The Middle Fork has the greatest amount of instream fish cover with an average of 3.62 types of cover per reach. The West Fork and Skokie River have slightly less fish habitat with averages of 3.15 and 3.59 cover types per reach, respectively.

Table 3-42
Number of Stream Reaches with Instream Fish Cover

Cover type	West Fork		Middle Fork		Skokie River		North Branch	
	# reaches	%	# reaches	%	# reaches	%	# reaches	%
Undercut banks	10	50	17	50	20	49	47	49
Pools	3	15	8	24	15	37	26	27
Macrophytes	18	90	30	88	33	80	81	85
Logs	6	30	21	62	13	32	40	42
Overhanging vegetation	15	75	15	44	26	63	56	59
Rootwads	5	25	24	71	22	54	51	54
Boulders	5	25	8	24	16	39	29	31
Backwaters	1	5	0	0	4	10	5	5

3.12.2.5 Aquatic and Terrestrial Organisms

Although organisms were not specifically sampled during the inventory, the following animals were observed in the stream or riparian corridor during the inventory:

- *West Fork:* Bluegill, unidentified sunfish, fathead minnows, carp, juvenile snapping turtle, unidentified turtle, frogs, toads, tadpoles, crayfish, mussels, snails, dragonfly/damselfly nymphs, ducks, geese, herons, and a muskrat.

- *Middle Fork*: Bluegill, fathead minnows, carp, goldfish, frogs, toads, tadpoles, crayfish, mussels, snails, dragonfly/damselfly nymphs, ducks, herons, egrets, sandpipers/plovers, and muskrats.

- *Skokie River:* Snapping turtle, snails, mussels, muskrat, deer, woodchuck, carp, bluegill, fathead minnow, unidentified fish, black bullheads, crayfish, frogs and tadpoles, herons, geese, ducks, sandpipers/plovers and green herons.

3.13 Water Quality

Water quality impairment can be caused by pollutants from a number of sources (Table 3-43). Water pollution degrades aquatic ecosystems including fisheries, and in some circumstances may be harmful to human health. Pollutants are typically classified as being from point or nonpoint sources. Point sources refer to discharges from a single source such as an outfall pipe conveying wastewater from an industrial plant or wastewater treatment facility. Nonpoint sources generally refer to pollutants that accumulate in the water system from a variety of sources including runoff from the land and impervious surfaces and deposition of air pollutants. In addition to pollutants entering the water system from the watershed, physical changes such as channelization, dredging, removal of riparian vegetation and loss of wetlands can also impair water quality and aquatic habitat in rivers, streams, lakes, and wetlands - and are considered a nonpoint source of pollution.

Table 3-43

Examples: Point and Nonpoint Sources of Pollution

Point Sources

- Wastewater treatment plant
- Combined sewer overflows
- Industrial plants
- Domestic wastewater lagoons

Nonpoint Sources

- Hydrologic modification including stream channelization, dredging, wetland conversions
- Landfills
- Atmospheric deposition
- Illegal septic dumping
- Mining operations
- Illicit connections to stormsewers
- Soil erosion from farm fields
- Impervious surface runoff including oil, grease, gasoline, metals from brake wear, tire wear, de-icing salts, etc.
- Highway maintenance
- Soil erosion from construction sites
- Contaminated sediments
- Yard waste dumping
- Lawn chemicals

The water quality summary for the North Branch Chicago River includes information from a combination of sources. Information sources include:

- *Assessment data:* Compiled data from both chemical and biological monitoring, river sediment samples, and previous water quality reports.
- *Point source discharge permits:* Point discharges into the North Branch Chicago River are required to have a National Pollutant Discharge Elimination System (NPDES) permit from the IEPA before discharging to the river. The list of all permitted discharges from point sources is included.
- *Nonpoint pollutant loading:* A simple nonpoint source pollution-loading model was used to estimate nonpoint pollutant loads to the river based on existing watershed land use. Pollutant loading critical areas, or priority pollutant loading areas, were identified based on this analysis.
- *Other Sources:* Locations of landfills and Superfund sites are also identified as potential point sources for pollution.
- *Detention basin inventory:* The results of a detention basin inventory that was conducted in order to identify opportunity sites for water quality retrofits are also included in this section.

3.13.1 North Branch Chicago River Urbanization and Water Quality

The causes and sources of water quality problems in the North Branch Chicago River watershed are primarily urban in nature. These problems have resulted from reconstruction and ditching of the stream channels, increased runoff due to development and from nonpoint source pollution runoff from streets, driveways, parking lots, rooftops (impervious surfaces), lawns and construction sites.

The first water quality impairments to the North Branch Chicago River are likely to have occurred in the early 1900s when the three forks were channelized and wetlands were drained for farming. Soil erosion and sedimentation resulting from agricultural operations were the primary pollutants during this time period. Since 1950, most of the North Branch Chicago River watershed in Lake County has urbanized and suburbanized. Industrial, commercial and residential wastewaters were discharged to the North Branch Chicago River as land use changed. The worst pollutants during this period were attributed to these point source discharges. Following the passage of the Clean Water Act in 1972, point source dischargers were required to get a permit and monitor their wastewater discharges as a part of the NPDES program. As a result of CWA requirements, point source pollution in the North Branch Chicago River has decreased dramatically. Today, nonpoint source pollution is a significant cause of water quality problems in the river. Fertilizers, herbicides and pesticides applied to lawns and business grounds, soil erosion from construction sites, road salt used for deicing and oil, grease and metals deposited on parking lots, driveways and roads by cars are some of the nonpoint pollutants of concern. During storms, these pollutants are washed off the ground and impervious surfaces into stormsewers - and ultimately into the North Branch Chicago River.

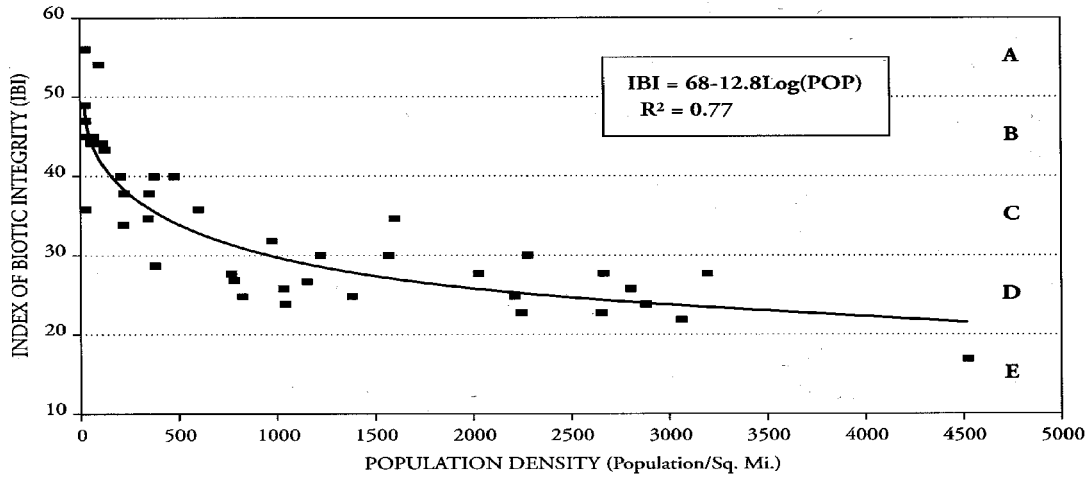
The increased impervious cover that comes with urbanization has also led to an increase in the volume and velocity of runoff in the watershed. The increased quantity of runoff has caused and exacerbated problems such as excessive stream bank erosion and the downcutting or deepening of the stream channel. Silt from channel erosion is also considered a source of nonpoint pollution. In addition to increasing surface runoff, impervious surfaces reduce the amount of precipitation that is infiltrated into the ground to recharge groundwater aquifers; a lower groundwater water table translates to lower groundwater-fed low flows during the dry season.

Population Density and Stream Quality

There is clear evidence from studies done around the country that watershed urbanization results in adverse impacts to waterbodies. One such study by the Northeastern Illinois Planning Commission (NIPC), now CMAP, compared urbanization (as measured by population density within a watershed) to stream quality using the Index of Biotic Integrity (IBI). [17] The IBI is an indicator used to rate streams in five categories (A-E) that indicate the quality of the aquatic resource based on fish surveys. (See Sections 3.13 for a detailed description of the IBI and the stream rating system.) In the 1996 study, NIPC found there was a negative relationship between stream quality and high population density based on an assessment of more than 40 northeastern Illinois rivers and streams. Nearly all of the streams in urban/suburban watersheds with population densities greater than approximately 300 people per square mile were in the C, D or E categories with biological conditions described as being fair to poor. These streams are considered significantly degraded. On the other hand, nearly all of the streams in rural areas with population densities roughly less than 300 people per square mile are A or B streams with biological conditions described as good (Figure 3-38).

[17] *"Watershed Urbanization Effects on Stream Quality" by Dennis Dreher, 1996. For more information, see* 1995-6 Northeastern Illinois Planning Commission Annual Water Quality Report

Figure 3-38
Biotic Integrity Compared to Urbanization



The population density of the North Branch Chicago River watershed in Lake County was over 2,624 people per square mile in 2000. As discussed in the population and demographics summary, this number is projected to rise to 2,944 people per square mile by the year 2030. The Middle and West Forks of the North Branch Chicago River have been classified in the IEPA's 2004 Illinois Water Quality Report as poor and the water quality within the Skokie River has been classified as fair. If watershed population increases as projected, the North Branch Chicago River is expected to experience further degradation in water quality unless extraordinary measures are implemented for development and redevelopment. A goal to improve stream quality can only be achieved by using water quality and quantity BMP projects discussed in Chapters 4 and 5.

3.13.2 Assessment Data

Water quality information was collected from several different sources for this report. The oldest water quality assessment information comes from the 1978 *Areawide Water Quality Plan* completed NIPC, now known as CMAP. More recent reports include *Illinois Water Quality Reports* to USEPA for the years 1992-1993 and 1994-1995, 1998, 2002, 2004, and 2006. These reports, required by the Clean Water Act on a biennial basis, are frequently referred to as 305b reports. In addition to these formal reports, water quality data was aggregated from several additional studies and sources. Biological monitoring has been performed by The Metropolitan Water Reclamation District of Greater Chicago (MWRD), ChicagoRivers, LCFPD, and RiverWatch. Chemical water quality monitoring has been performed by IEPA, MWRD, Illinois State Toll Highway Authority (ISTHA), ChicagoRivers and Lake Forest High School.

The Northeastern Illinois Planning Commission did the first water quality study for the North Branch Chicago River in 1978 (NIPC, Areawide Water Quality Management Plan). At that time, poor water quality in the river was attributed to two factors: 1) low stream flows during dry periods; and 2) high pollutant loadings from point source discharges, combined sewer overflows in Cook County, and stormwater runoff. Low flow conditions resulted in high temperatures and low dissolved oxygen conditions in the river making it inhospitable for fish and other aquatic animals. Oxygen-demanding pollutants that entered the river in both wet and dry weather worsened the low dissolved oxygen problems. Overall, the most significant water quality standard violations were attributed to point source discharges from the Deerfield WWTP on the West Fork, and natural conditions in the Middle Fork (where the low stream gradient does not allow for re-oxygenation of the water during dry season low flow conditions).

3.13.2.1 IEPA Water Quality Reports

The IEPA provides biennial Illinois Water Quality Reports, also know as 305b reports, to USEPA. Within these reports, two systems of water quality classifications are presented: 1) a use support classification; and 2) Biological Stream Characterization (BSC). See Table 3-44 for a summary of the assessment criteria.

The use support classification is a rating of how the waterbody (stream or lake) is supporting its designated uses. Examples of designated uses include:

- aquatic life (supports aquatic life including fish and bottom dwelling organisms);
- fishing (fish are safe for human consumption);
- secondary contact (boating);
- primary contact (swimming); and
- drinking water supply.

Table 3-44

Summary of Use Support Assessment Criteria and Biological Characterization for Illinois Streams

US EPA Use Support	Fully Supporting Aquatic Life Use		Not Supporting Aquatic Life Use		Not Supporting Aquatic Life Use
General Description	Good	Good	Fair	Fair	Poor
MBI	< 5.0	5.0-5.9	6.0-7.5	7.6-8.9	> 8.9
PIBI	51-60	41-50	31-40	< 31	
IBI/AIBI	51-60	41-50	31-40	21-30	< 20
Rating	A	B	C	D	E
Stream Characterization	Unique Aquatic Resource	Highly Valued Aquatic Resource	Moderate Aquatic Resource	Limited Aquatic Resource	Restricted Aquatic Resource

North Branch Chicago River Watershed-Based Plan

The North Branch Chicago River is designated for General Use, which includes protection of aquatic life, primary and secondary contact recreation, and agricultural and industrial uses. The majority of streams, rivers and lakes in Illinois are designated for General Use.

IEPA is now using the USEPA's new Assessment Database (ADB version 2.x) to store and transmit assessments. This database is specifically designed to support the Integrated Report. Use Attainment is now reported as Fully Supporting, Not Supporting, Not Assessed or Insufficient Information. Partial Support is no longer being used. All previously assessments of Partial Support were transferred to the new database as Not Supporting. Based on this classification system, the most recent IEPA assessment (Illinois Integrated Water Quality Report and Section 303(d) List - 2006) classifies all forks of the North Branch Chicago River as Not Supporting. Previously, the 2004 Illinois Water Quality Report had listed the West Fork and Middle Fork as providing poor aquatic life use support and the Skokie River as providing fair aquatic life use support.

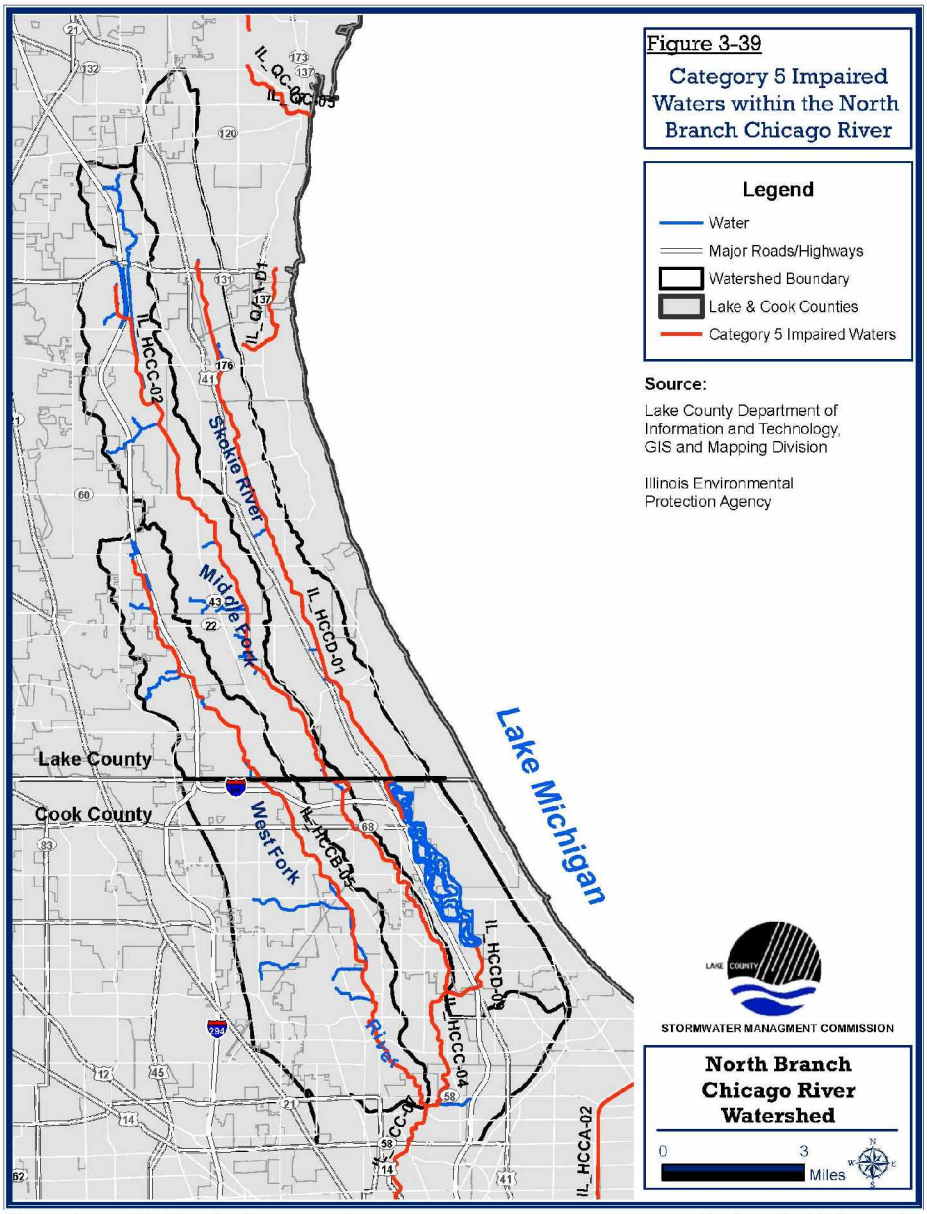


Table 3-45 shows stream segments for the North Branch Chicago River listed on the Section 303(d) List as impaired waterways (Illinois Integrated Water Quality Report and Section 303(d) List - 2006). Locations of these segments are displayed in Figure 3-39. The two segments listed within the North Branch Chicago River (IL HCC-07 and IL HCC-08) are downstream of the watershed study area. The remaining five segments are within the North Branch Chicago River watershed study area.

Table 3-45

IEPA Two-Year Schedule for TMDL Development

10-Digit HUC	Water Name	Assessment Unit ID	Impaired Designated Use	Potential Causes	Potential Sources
0712000301	North Branch Chicago River	IL HCC-07	Primary Contact Recreation, Aquatic Life	Fecal Coliform, Total Dissolved Solids, Silver, Dissolved Oxygen, Chloride	High concentration of fecal material and suspended solids, industrial waste, increase in salt input
0712000301	North Branch Chicago River	IL HCC-08	Indigenous Aquatic Life	Dissolved Oxygen, Iron, Oil and Grease	Industrial waste, runoff
0712000301	West Fork	IL HCCB-05	Aquatic Life, Primary Contact Recreation	Zinc, Total Dissolved Solids, Fecal Coliform, Chloride	Industrial waste ,high concentration in suspended solids and fecal material, increase in salt input
0712000301	Middle Fork	IL HCCC-02	Aquatic Life, Primary Contact Recreation	Chloride, Dissolved Oxygen, Silver, Total Dissolved Solids, Fecal Coliform	Increase in salt input, industrial waste, high concentration of suspended solids and fecal material
0712000301	Middle Fork	IL HCCC-04	Aquatic Life, Primary Contact Recreation,	Total Dissolved Solids, Fecal Coliform, Dissolved Oxygen, Silver, Chloride	High concentration of suspended solids and fecal material, increase in salt input
0712000301	Skokie River	IL HCCD-01	Aquatic Life, Primary Contact Recreation	Dissolved Oxygen, Silver, Fecal Coliform	Industrial waste, high concentration of fecal material
071200301	Skokie River	IL HCCD-09	Aquatic Life, Primary Contact Recreation	Silver, Total Dissolved Solids, Fecal Coliform	Industrial waste, high concentration of suspended solids and fecal material

3.13.2.2 Biological Monitoring

The quality of the fish and macroinvertebrate communities have been assessed using the IBI and the Macroinvertebate Biotic Index (MBI). The IBI and MBI are used to rank the quality of the stream based on a five-tiered stream classification system developed by the BSC study.

The five categories of rankings are:

Class A: Excellent stream quality for fish. IBI from 51-60, a *unique aquatic resource*, comparable to the best situations without human disturbance. A MBI of <5.0 is also an indicator of a Class A stream.

Class B: Good stream quality for fish. IBI from 41-50, a *highly valued aquatic resource*, a good sport fishery. A MBI from 5.0-5.9 is also an indicator of a Class B stream.

Class C: Fair stream quality for fish. IBI from 31-40, a *moderate aquatic resource*, bullhead, sunfish and carp. A MBI from 6.0-7.5 is also an indicator of a Class C stream.

Class D: Poor stream quality for fish. IBI from 21-30, a *limited aquatic resource*, carp or other less desirable species. A MBI from 7.6-8.9 is also an indicator of a Class D stream.

Class E: Very poor stream quality for fish. IBI less than or equal to 20, a *restricted use aquatic resource*, no sport fishery, few fish of any species present. A MBI >8.9 is also an indicator of a Class E stream.

Periodic fish and macroinvertebrate sampling has been conducted in the watershed since the 1970s. In general, fish communities have been severely impacted in the North Branch Chicago River by channelization (physical habitat modification), sediment contamination and point and nonpoint discharges into the river. However, sampling efforts indicate that the fish community has improved over the past 20 years, which is considered a key trend since fish communities in most reaches are still considered to be moderately to severely degraded. Fish collections are still dominated by species considered to be pollution-tolerant. Fish community composition is limited by structural habitat diversity, water quality and sediment contamination.

Overall, the upper three reaches of the North Branch Chicago River may not have been subject to the severity of pollution as the middle and lower reaches of the river, although habitat degradation appears to have been more severe in the upper reaches due to channelization. The only unchannelized portion of the three upper reaches of the North Branch Chicago River is the Middle Fork north of Route 137. However, it is difficult to determine what species richness in the river was like prior to large-scale habitat alteration, since it is not known how thoroughly these reaches were sampled before the river was channelized. Table 3-46 shows the results of the IDNR Lake Michigan tributaries fish survey in July 2006. Collection of an Iowa darter, a state-listed threatened species in an upstream reach of the West Fork is significant. Other noteworthy species include a young-of-the-year northern pike and a native madtom collected from the Middle Fork. The young northern pike is indicative that reproduction is occurring by a relatively intolerant species, and the madtom is the only collection record for this genus in the entire Chicago Waterway System. The presence of these species may indicate that water quality, although poor, may not be the limiting factor for fish, therefore it is possible that in-stream and streamside habitat enhancement including wetland creation may benefit fish diversity.

Table 3-46

IDNR Lake Michigan Tributaries Fish Survey, July 27-31, 2006

	Code:	HCCB-13	HCCC-04	HCCC-06	HCCD-09
	Location:	West Fork: Schermer Rd.	Middle Fork: Golf Rd at Evans Golf Course	Middle Fork: Deerfield High School	Skokie River: Winnetka Rd
Common Name	**Scientific Name**				
Gizzard shad	*Dorosoma cepedianum*	0	1	0	9
Central mudminnow	*Umbra limi*	0	0	3	0
Goldfish	*Carrassius auratus*	29	19	0	14
Common Carp	*Cyprinus carpio*	6	27	4	4
Golden shiner	*Notemigonus crysoleucas*	0	8	2	0
Fathead minnow	*Pimephales promelas*	1	1	2	1
Bluntnose minnow	*Pimephales notatus*	0	1	0	1
White sucker	*Catostomus commersoni*	27	58	11	48
Yellow bullhead	*Ameiurus natalis*	0	2	0	0
Black bullhead	*Ameiurus melas*	0	1	0	0
Blackstripe topminnow	*Fundulus notatus*	0	3	38	42
Black crappie	*Pomoxis nigromaculatus*	0	0	1	0
Largemouth bass	*Micropterus salmoides*	0	4	0	43
Green sunfish	*Lepomis cyanellus*	7	26	12	8
Bluegill x Green sunfish	*Lepomis macrochirus x L.*	1	1	0	1
Bluegill	*Lepomis macrochirus*	21	12	13	67
Pumpkinseed	*Lepomis gibbosus*	0	0	0	1
Orangespotted sunfish	*Lepomis humilis*	0	0	0	1
Total Fish		92	164	86	240
Total Species		6	13	9	12
Native fish species		4	11	8	10
Native minnow species		1	3	2	2
Native sucker species		1	1	1	1
Native sunfish species		2	3	3	5
Benthic invertivore species		0	0	0	0
Intolerant species		0	0	0	0
Specialist benthic invertivores		0	0	0	0
Generalist feeders		0.99	0.95	0.51	0.63
Mineral-substrate spawners		0	0	0	0
Tolerant species		1	0.64	0.62	0.5
Extrapolated IBI		9	13	19	20

Similar to fish communities, benthic macroinvertebrate communities have also improved, but are still limited to taxa that are moderately to highly tolerant to pollution and habitat degradation. Therefore, benthic communities overall also remain degraded. Benthic invertebrate populations are also more diverse in the upper rather than lower reaches of the river. This is probably due to the same pollution and habitat degradation influences as the fish communities. MBI scores for reaches in the study area are all within the moderately pollution-tolerant range, although communities in the upper reaches are significantly more diverse than downstream. None of the benthic invertebrates collected are considered to be intolerant of pollution (indicators of high water quality).

The MWRD has designated sampling stations along all three forks of the North Branch Chicago River. However, during their 2003 and 2004 study effort on benthic macroinvertebrate communities these three stations were not sampled. Two designated stations further downstream along the mainstem of the North Branch Chicago River were studied. Both Hester-Dendy samplers and Peteite Ponar dredge were used to collect organisms from the station downstream of the confluence with the North Shore Channel. The sampling station (Number 96) located at Albany Avenue was only evaluated using Hester-Dendy samplers. The results are summarized in Table 3-47.

Table 3-47
MWRD Study of Benthic Macroinvertebrate Communities, 2006

Taxa	lbs/m2	%	Taxa	lbs/m2	%
Hydra	14.4	0.35	*Nanocladius distinctus*	10.8	0.26
Turbellaria	236.8	5.74	*Nanocladius crassicornus*	7.2	0.17
Oligochaeta	172.2	4.17	*Chironomus*	3.6	0.09
Helobdella punctata	70.0	1.69	*Dicrotendipes*	12.6	0.30
Mooredobdella microstoma	3.6	0.09	*Dicrotendipes simpsoni*	1.8	0.04
Caecidotea	3,150.3	76.31	*Glyptotendipes*	1.8	0.04
Baetis intercalaris	5.4	0.13	*Phaenopsectra punctipes*	1.8	0.04
Stenacron	10.8	0.26	*Polypedilum illinoense*	37.7	0.91
Argia	1.8	0.04	*Polypedilum scalaenum*	17.9	0.43
Cheumatopsyche	12.6	0.30	*Paratanytarsus*	7.2	0.17
Hydropsyche betteni	9.0	0.22	*Tanytarsus*	5.4	0.13
Ceraclea	1.8	0.04	*Xenochironomus xenolabis*	55.6	1.35
Chironomidae	1.8	0.04	*Physa*	12.6	0.30
Thienemannimyia grp.	14.4	0.35	*Helisoma*	7.2	0.17
Corynoneura	14.4	0.35	*Ferrissia*	213.5	5.17
Cricotopus bicinctus	10.8	0.26	*Musculium*	1.8	0.04
Total Benthos	**4,128.1**				
Total Taxa Richness	**31**				
EPT Taxa Richness	**5**				

3.13.2.3 Chemical Monitoring Data

Chemical water quality monitoring data has been collected for the North Branch Chicago River on a regular basis by the IEPA, MWRD and the Lake County Health Department (LCHD). The IEPA and MWRD have had monitoring programs in place for a number of years, while LCHD has been sampling a number of sites on the West Fork since 1997. Sediment samples were collected and analyzed by the MWRD and US Bureau of Mines for the *ChicagoRivers* project in 1992. There have been no continuous monitoring studies performed on stormwater runoff within the watershed.

The MWRD and IEPA data may be useful in detecting large violations and long-term trends in water chemistry, but is insufficient for more detailed purposes. A periodic grab sampling regime cannot capture variations with a lifetime of less than a month (e.g. diurnal DO fluctuations), and is therefore unable to reflect the potentially limiting conditions of the stream, many of which may be short-lived (e.g. chemical spills, three-day DO less than 5.0 mg/l, etc.). Overall, the dearth of information useful for on-the-ground decision making indicates the need for water chemistry data collection that can help correlate pollution sources with in-stream conditions.

The results from MWRD and IEPA sampling can provide warning signals for chronic problems within the stream. Repeated water quality violations in the whole North Branch Chicago River for dissolved oxygen, total dissolved solids, fecal coliforms, iron and copper can assist in decision making for site selections. Priorities would be locations where watershed improvement implementation projects would provide the most significant benefit. Table 3-48 has the most recent IEPA water chemistry data from within the watershed, collected during 2005 along the Middle Fork. Table 3-49 contains IEPA water chemistry data represented from all three forks of the North Branch Chicago River.

Table 3-48

IEPA Middle Fork Chemical Water Quality Data at Station HCCC-02

Parameter	Units	09/07/05	10/20/05
Cyanide	mg/L	Non-detect	Non-detect
Nitrogen, Ammonia	mg/L	Non-detect	Non-detect
Nitrogen, Kjeldahl	mg/L	1.34	2.37
Nitrogen, Nitrite & Nitrate	mg/L	0.48	0.28
Phosphorus, Dissolved	mg/L	0.19	0.077
Phosphorus, Total	mg/L	0.234	0.223
Solids, Total Suspended	mg/L	24	26.5
Solids, Volatile	mg/L	Non-detect	8.5
Sulfur, Total Sulfate	mg/L	51	22
Total Organic Carbon	mg/L	-	11.9
Total Chloride	mg/L	380	290
Total Fluorides	mg/L	-	0.681
Total Phenol	mg/L	-	Non-detect

Table 3-49

IEPA North Branch Chicago River Average Water Contamination Analysis from April 1999 through December 2003

		West Fork	Middle Fork	Middle Fork	Skokie River
Parameter	**Units**	**HCCB-05**	**HCCC-02**	**HCCC-04**	**HCCD-09**
2,4-D	ug/L		1		
ACETOCHLOR	ug/L		0..1		
ACIFLUORFEN, SODIUM	ug/L		0.5		
ALACHLOR	ug/L		0.02		
ALDRIN	ug/L		0.01		
ALKALINITY, Total	mg/L	125		200.5	79.55
ALUMINUM, Dissolved	ug/L	100	132.703	100	100
ALUMINUM, Total	ug/L	530	448.158	310	346.67
ARSENIC, Total		1.3		2.1	2.05
ATRAZINE		0.1			
BARIUM, Dissolved	ug/L	43.5	38.12	26.67	22.33
BARIUM, Total	ug/L	56.5	43.66	30.33	27.33
BENZENE			1		
BERYLLIUM, Dissolved	ug/L	1	1	1	1
BERYLLIUM, Total	ug/L	1	1	1	1
BHC-ALPHA			0.01		
BHC-GAMMA (LINDANE)			0.01		
BORON, Dissolved	ug/L	270	111.65	186.67	209
BORON, Total	ug/L	290	115.55	186.66	210
BROMOFORM			1		
BUTYLATE			0.2		
CADMIUM, Dissolved	ug/L	3	3	3	3
CADMIUM, Total	ug/L	3	3	3	3
CALCIUM, Dissolved	mg/L	57.5	65.43	55.66	52.33
CALCIUM, Total	mg/L	62.5	67.55	57.66	54
CAPTAN			0.05		
CARBON TETRACHLORIDE			1		
CARBON, TOTAL ORGANIC	mg/L	9.6		6.25	6
CHLORDANE			0.1		
CHLORDANE, CIS			0.01		
CHLORDANE, GAMMA			0.01		
CHLORIDE, Total	mg/L	155	214.36	112.6	99
CHLOROBENZENE			1		
CHLORODIBROMOMETHANE			1		
CHLOROFORM			1		
CHLOROPHYLL (A+B+C),		380	442.63	400	433.33
CHLOROPHYLL A, CORRECTED	ug/L	7.74	9.17	7.14	6.68
CHLOROPHYLL A, UNCORRECTED		8.72	9.60	9.02	8.72

Table 3-49

IEPA North Branch Chicago River Average Water Contamination Analysis from April 1999 through December 2003

		West Fork	Middle Fork	Middle Fork	Skokie River
Parameter	**Units**	**HCCB-05**	**HCCC-02**	**HCCC-04**	**HCCD-09**
CHLOROPHYLL-B		0.5	1.56	1.16	1.98
CHLOROPHYLL-C		0.73	1.28	1.37	3.20
CHLOROPYRIFOS			0.1		
CHROMIUM, Dissolved	ug/L	5	5	5	5
CHROMIUM, Total	ug/L	5	5.10	5	5
COBALT, Dissolved	ug/L	10	10.08	10	10
COBALT, Total	ug/L	10	10	10	10
COLIFORM, TOTAL FECAL	#/100ml		15900		
CONDUCTANCE, SPECIFIC	umho/cm	1149.5	1044.17	880.33	798
COPPER, Dissolved	ug/L	12	10	10	10
COPPER, Total	ug/L	12.5	10.26	10	10
CYANAZINE			0.1		
CYANIDE		0.01	0.01	0.01	0.01
DDD			0.01		
DDE			0.01		
DDT			0.01		
DDT			0.1		
DIAZINON			0.25		
DICAMBA			0.25		
DICHLOROBENZENE ISOMERS			1		
DICHLOROBROMOMETHANE			1		
DICHLOROETHANE, 1,1-			1		
DICHLOROETHANE, 1,2-			1		
DICHLOROETHENE, TRANS-1,2-			1		
DICHLOROETHYLENE, CIS-1,2-			1		
DICHLOROMETHANE			1		
DICHLOROPROPIONIC ACID, 2,2-			20		
DIELDRIN			0.01		
DISSOLVED OXYGEN (DO)	mg/L	9.31	6.95	6.39	6.82
DNBP, 4,6-DINITRO-2-SEC-					
DYFONATE			0.1		
ENDRIN			0.01		
EPTC, DIPROPYLTHIOCARBAMIC			0.5		
ETHYL BENZENE			1		
FLUORIDES		0.62		0.52	0.55
HARDNESS, CA,MG	mg/L	269	293.89	246	229
HEPTACHLOR			0.01		
HEPTACHLOR EPOXIDE			0.01		
HEXACHLOROBENZENE			0.01		

Table 3-49

IEPA North Branch Chicago River Average Water Contamination Analysis from April 1999 through December 2003

		West Fork	Middle Fork	Middle Fork	Skokie River
Parameter	**Units**	**HCCB-05**	**HCCC-02**	**HCCC-04**	**HCCD-09**
IRON, Dissolved	ug/L	50	130.81	57	54
IRON, Total	ug/L	1050	921.05	556.67	596.67
LEAD, Dissolved	ug/L	5	5	5	5
LEAD, Total	ug/L	5	5.49	6.57	5.07
MAGNESIUM, Dissolved	mg/L	25	29.59	23.67	22
MAGNESIUM, Total	mg/L	27.5	30.66	25	23
MALATHION			0.15		
MANGANESE, Dissolved	ug/L	29	126.51	27.33	23.33
MANGANESE, Total	ug/L	63.5	148.63	56.67	49
MERCURY, Total			0.02	0.01	0.01
METHOXYCHLOR			0.05		
METHYL PARATHION			0.01		
METOLACHLOR			0.1		
METRIBUZIN			0.05		
NICKEL, Dissolved	ug/L	25	25	25	25
NICKEL, Total	ug/L	25	25	25	25
NITROGEN, AMMONIA (NH3),	mg/L	1.02	0.18	0.25	0.17
NITROGEN, KJELDAHL, Total	mg/L	2.65	1.09	1.56	1.84
NITROGEN, NITRITE (NO2) +	mg/L	15	0.36	4.86	5.77
PCBS, POLYCHLORINATED			0.1		
PCP, PENTACHLORO-PHENOL			0.1		
PENOXALIN			0.05		
PH		7.62	7.55	7.73	7.74
PHENOLS		12.5	10	10	10
PHEOPHYTIN-A		1.23	1.39	2.79	3.22
PHORATE			0.25		
PHOSPHORUS AS P, Dissolved	mg/L	1.7	0.07	1.02	1.44
PHOSPHORUS AS P, Total	mg/L	2.8	0.15	1.38	1.71
PICLORAM			50		
POTASSIUM, Dissolved	mg/L	11.5	4.32	6.7	7.13
POTASSIUM, Total	mg/L	11.4	4.51	6.97	7.64
SILVER, Dissolved	ug/L	3	3..05	3	3
SILVER, Total	ug/L	3	3	3	3
SILVEX			5		
SODIUM, Dissolved	mg/L	130	158.86	88	77.33
SODIUM, Total	mg/L	135	159.21	88.67	78
STRONTIUM, Dissolved	ug/L	275	343.24	293.33	270
STRONTIUM, Total	ug/L	290	348.95	300	276.67
SULFATE		74.9	60.86	17.6	16.8

Table 3-49
IEPA North Branch Chicago River Average Water Contamination Analysis from April 1999 through December 2003

		West Fork	Middle Fork	Middle Fork	Skokie River
Parameter	**Units**	**HCCB-05**	**HCCC-02**	**HCCC-04**	**HCCD-09**
TERBUFOS			0.1		
TETRACHLOROETHYLENE			1		
TOLUENE			1		
Total Suspended Solids	mg/L	370.25	34.97	278.83	254.33
Total Volatile Solids	mg/L	8	8.51	7.5	5
TREFLAN			0.01		
TRICHLOROETHANE, 1,1,1-			1		
TRICHLOROETHYLENE			1		
TURBIDITY NTU		55	21.91	22	22
VANADIUM, Dissolved	ug/L	5	5	5	5
VANADIUM, Total	ug/L	5	5.03	5	5
VINYLIDENE CHLORIDE			1		
XYLENES MIX OF M + O + P			1		
ZINC, Dissolved	ug/L	100	100	100	100
ZINC, Total	ug/L	100	100	100	100

3.13.2.4 Metal Contamination in North Branch Chicago River Sediments

The 1992 MWRD and U.S. Bureau of Mines study collected sediment samples at 22 sites in the North Branch Chicago River to test for metals contamination as a component of the ChicagoRivers project assessment[18]. Out of the 60 reported tests on samples taken in Lake County, 24 (40%) had elevated metal levels and five (8.33%) had extreme elevations of metal contaminants. The 1995 USGS study assessed the surface water quality of the Upper Illinois River Basin and examined trends in major and trace elements in the water, sediment and biota. For more information, see *Surface-Water-Quality Assessment of the Upper Illinois River Basin in Illinois, Indiana and Wisconsin: Major and Trace Elements in Water, Sediment and Biota, 1978-90* (SGS report 95-4045). Based on the results of the 1992 MWRD and U.S. Bureau of Mines study, along with the 1995 USGS report, it appears that metal contamination of sediments is a problem in the watershed. While the worst contamination is the mainstem of North Branch Chicago River, all three tributary forks (West Fork, Middle Fork and Skokie River) appear to have significant levels of metals in the sediment.

Table 3-50 displays the data collected by IEPA at two locations of the Middle Fork and one location on the West Fork. The survey date for HCCC-04 was August 1, 2001, where as the survey date for both HCCB-05 and HCCC-02 was September 18, 2001. It appears that the metals of greatest concern are not being transported in the water. Their source appears to be from either transport of bound sediment particles eroding into the river or through air deposition, such as atmospheric mercury. Periodic follow-up testing of sediments would help identify whether contamination levels are increasing due to current watershed practices, or whether the elevated levels of metals in the sediments are due to past polluting activities. Based on the data available from these studies, IEPA should consider adding metals as a pollution cause, and contaminated sediments as a pollution source, for all of the assessed reaches of the North Branch Chicago River. The North

[18] *For more information, see Heavy Metals in Sediments From the North Branch Chicago River by James Allen and Irwin Polls from Proceedings: Assessment and Treatment of Contaminated Sediments in the North Branch Chicago River – a model approach for an urban waterway held October 19-20, 1992.*

Branch Chicago River Watershed-Based Plan will address the metals specifically as pollutant issues through sediment. Metals will be addressed through the approach of addressing sediment level contamination as sediment is a much more cost efficient means of evaluating watershed improvements than the expensive analysis involved with metals. The existing biological, chemical and physical monitoring programs within the watershed are appropriate for tracking watershed characteristics. No additional monitoring programs outside of BMP projects are being recommended. A Water Quality Monitoring Program for Metals has been added to the plan as Appendix O.

Table 3-50
IEPA North Branch Chicago River Sediment Contamination Analysis

Parameter	Date	Units	West Fork HCCB-05	Middle Fork HCCC-02	Middle Fork HCCC-04
Arsenic, Total	08/01/01 & 09/18/01	ug/L	6.5	5.9	7.3
Barium, Total	08/01/01 & 09/18/01	ug/L	93	82	75
Cadmium, Total	08/01/01 & 09/18/01	ug/L	0.71	1	1.1
Chromium, Total	08/01/01 & 09/18/01	ug/L	30	26	25
Copper, Total	08/01/01 & 09/18/01	ug/L	47	53	85
Iron, Total	08/01/01 & 09/18/01	ug/L	25000	22000	22000
Lead, Total	08/01/01 & 09/18/01	ug/L	34	54	160
Manganese, Total	08/01/01 & 09/18/01	ug/L	550	510	450
Mercury, Supernate	08/01/01 & 09/18/01	ug/L	0.1	0.1	0.17
Nickel, Total	08/01/01 & 09/18/01	ug/L	31	26	32
Nitrogen, Kjeldahl	08/01/01 & 09/18/01	ug/L	2240	3180	4080
Phosphorus AS P	08/01/01 & 09/18/01	ug/L	935	554	892
Potassium	08/01/01 & 09/18/01	ug/L	2400	18000	2000
Silver, Total	08/01/01 & 09/18/01	ug/L	3.4	2.6	3.9
Zinc, Total	08/01/01 & 09/18/01	ug/L	130	170	220

3.13.3 Point Sources of Pollution

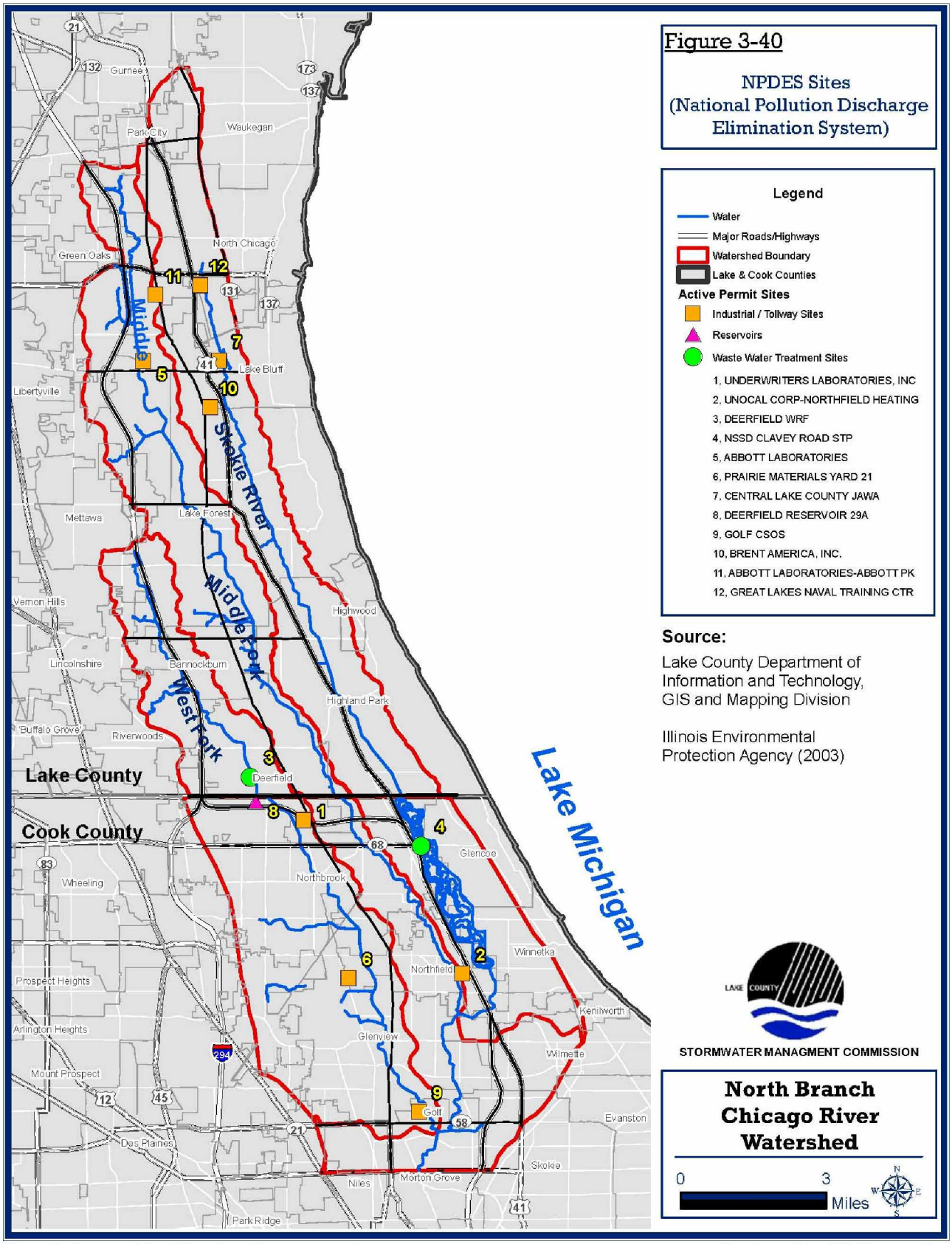
Although IEPA has determined that nonpoint source pollution is the biggest source of water pollution in the North Branch Chicago River, pollution is also discharged into the river at several point sources. This section includes a brief review of the point source discharge permits and identifies several potential point sources of pollution that should be considered.

3.13.3.1 NPDES Permits

Under the NPDES program, there are a total of 12 permitted point discharges into the North Branch Chicago River (eight in Lake County and four in Cook County). The NPDES program, administered by the IEPA, was developed under the federal CWA to reduce pollutants in industrial and wastewater discharges into the nation's waterways. Table 3-51 contains the receiving water (West Fork, Middle Fork, or Skokie River), permittee's name, type of discharge and type of facility for each of the permitted NPDES discharges into the North Branch Chicago River. The general locations of these facilities are included in Figure 3-40. There are five NPDES permitted discharges into the West Fork, two into the Middle Fork, four into the Skokie River and one general use permit.

Table 3-51
NPDES Permitted Discharges to the North Branch Chicago River

Facility ID	Receiving Water	Facility Name	Discharge Type	Type of Facility
IL0028347	W Fork / Lake Co.	Deerfield WWTP	Influent Monitoring, Excess Flow and Sewage Treatment Plant Outfall	Wastewater Reclamation Facility
IL0071714	W Fork / Lake Co.	Deerfield Reservoir 29A	Monitoring Well	Flood Control Reservoir Outfall
IL0066991	W Fork / Cook Co.	Prairie Materials Yard 21	Stormwater Retention Basin	Ready Mix Concrete Manufacturing
ILG250168	W Fork / Cook Co.	Underwriter's Laboratories	Non-Contact Cooling Water (NCCW) and Overflow	Commercial Testing Laboratory
IL0072389	W Fork / Cook Co.	Village of Golf CSOS	Combined Sewer Overflow	CSOS
IL0066435	M Fork / Lake Co.	Abbott Laboratories	Overflow, Stormwater Drainage	Pharmaceutical Preparations
IL0074128	M Fork / Lake Co.	Abbott Laboratories	Cooling Tower, NCCW and Reverse Osmosis	Pharmaceutical Preparations
IL0073156	Skokie / Lake Co.	Brent America, Inc.	Treated Groundwater	Metals
IL0068951	Skokie / Lake Co	Central Lake County JAWA	NCCW	Production and Distribution of Potable
IL0074977	Skokie / Lake Co.	Great Lakes Naval Training	Treated Contaminated Groundwater	Naval Training Center
IL0030171	Skokie / Lake Co.	North Shore Sanitary District -	Influent Monitoring, Combination Water and Excess Flow	Wastewater Treatment Plant
ILG910017	General Use / Cook	Unocal Corp – Northfield	General Use	Pumps and Pumping Equipment



Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.13.3.2 Sanitary and Stormsewer Infiltration and Inflows (I&I)

Infiltration and inflows (I&I) into the sanitary sewer system (due to oversight or illicit connections) have been identified as potential problems that contribute to point source pollution in the watershed. Infiltration occurs when stormwater penetrates fractures and gaps in the sanitary sewer pipes and is not uncommon in older sanitary systems where pipe joints no longer seal, or there are cracks or leaks in the pipes themselves. Stormwater inflows into the sanitary system are generated from manhole covers that are not watertight or from illicit connections to the sanitary system. Illicit discharges happen where pipes conveying stormwater runoff are illegally connected to the sanitary system (examples include directing runoff from roofs, sump pumps etc. into sanitary rather than stormsewer pipes). Inflow from these sorts of connections can be considerable. For instance an average size home in Highland Park can contribute about 3,000 gallons of rooftop runoff alone to the sewers during a one-hour duration 2-year storm event (equivalent to 1.45 inches of rainfall).[19]

Excessive stormwater discharges to the sanitary system can result in both water quality and health impacts. If flows to the sanitary system during wet weather are more than the system can handle, sewage can backup into homes causing flood damage and posing a health risk. Sewer backup is known to have caused flood damage of homes at six flood problem area sites in the Lake County portion of the watershed. Illicit inflows and/or infiltration also result in heavy loads of sewage being transported to wastewater treatment plants (WWTP) during and following significant rain events. Excess influent flow (greater than the plant's hydraulic capacity) is diverted to a backup holding pond or basin to be pumped through the plant for treatment when flows recede. If sewage flows exceed the capacity of the plant and the backup storage ponds/tanks, then the excess flows are chlorinated and discharged without passing through the standard treatment sequence through the plant. These are referred to as wet weather bypasses. These insufficiently treated wastewater discharges contribute to water pollution problems.

Within the Lake County portion of the watershed, both the Deerfield WWTP and the North Shore Sanitary District (NSSD) Clavey Road WWTP experience excess flows of wastewater following significant rain events. Neither of the main treatment plants is designed to handle the amount of surcharge that occurs. The excess flows from significant rain events to the WWTPs indicate that substantial inflow and infiltration of stormwater into the sanitary system is occurring in the North Branch Chicago River watershed in Lake County.

North Shore Sanitary District – Clavey Road WWTP

The NSSD Clavey Road WWTP, discharges to the Skokie River and has an average daily flow (ADF) of 21 million gallons per day (MGD), a design average flow (DAF) of 17.8 MGD and a design maximum flow (DMF) of 28 MGD. The plant has a series of backup retention basins that will store an additional 20.5 million gallons during wet weather flows. Data provided by NSSD for the Clavey Road plant indicates up to a two-fold increase in the in-flow rate of sewage within 24 hours of most rain events. During wet weather events, 28 MGD of flow receives full treatment. Flows exceeding the 28 MGD of capacity are diverted to a series of retention basins where they are stored and pumped through the plant later for full treatment. Treatment in the retention basins includes solids settling and chlorine disinfection. Flows in excess of the 28 MGD and the 20.5 million gallons of storage capacity in the retention basin result in direct discharges from the retention basin without full treatment. The last occurrence was documented as VN Number M-2003-02012, on July 18, 2003.

Deerfield WWTP

Excess wet weather flows of wastewater are also a problem for the Deerfield wastewater treatment system. The Deerfield wastewater system is composed of a main plant facility and two lift stations that serve as off-site excess flow facilities where excess flows receive primary treatment and chlorination prior to discharge. The main treatment facility is located on Hackberry Road in Deerfield. The main plant discharges to the West

[19] *Page 3-5 of the City of Highland Park, Illinois Storm Water Master Plan, Baxter & Woodman, 1989.*

Fork of the North Branch Chicago River. The off-site excess flow lift stations are located at Deerfield Road (with discharge to the West Fork) and Warwick Road (with discharge to the Middle Fork).

The main plant has an average flow of 3.4 MGD, a DAF of 3.5 MGD and a DMF of 8.0 MGD. Excess flows are diverted to the Deerfield Road lift station when flows to the plant exceed the downstream capacity of the sewer system (3.3 MGD). The Deerfield Road lift station has a DMF of 19.4 MGD. The facility is designed for a maximum flow of 16.0 MGD.

3.13.3.3 Other Potential Pollution Sources in the North Branch Chicago River

In addition to discharges from permitted facilities, several other potential sources of pollution identified but not studied for this report include: landfills, Superfund (hazardous waste) sites and unpermitted industrial discharges. While leachate from land disposal operations is technically considered a nonpoint source of pollution by IEPA, they are considered in this section with traditional point sources due to their discrete locations in the watershed. Figures 3-41, and 3-42 indicate locations of landfills (Table 3-52) within the North Branch Chicago River watershed in Lake County and Superfund sites in close proximity to the watershed.

Table 3-52
Landfill Locations in the North Branch Chicago River Watershed

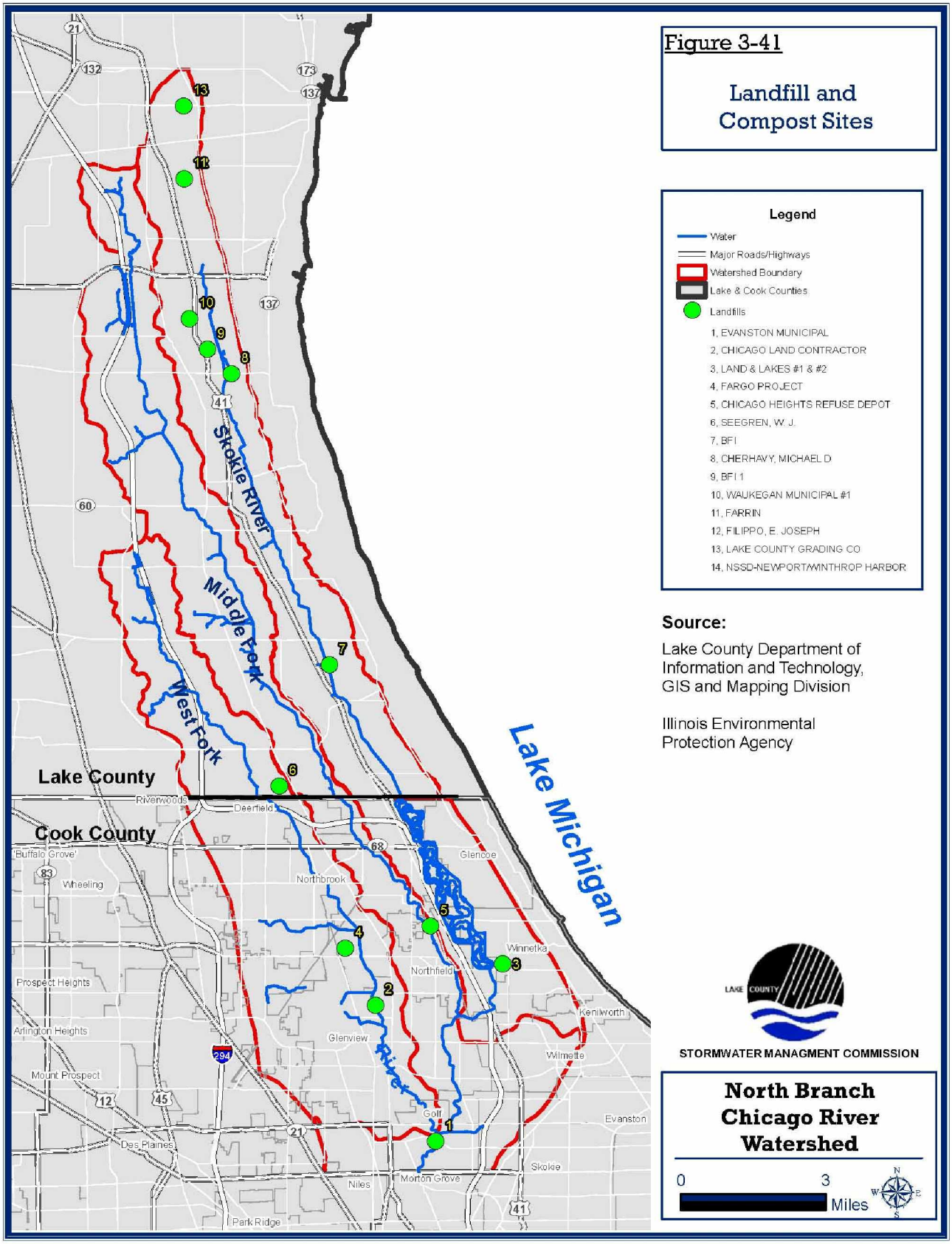
Facility ID	North Branch Fork	Stormsewersheds	Facility Name
0310690002	West	209	Chicago Land Contractor
0316000020	West	201	Fargo Project
0971900007	West	3028	W.J Seegren
0310810001	Middle	411	Evanston Municipal
0310450009	Middle	122	Chicago Heights Refuse Depot
0316000005	Skokie	125	Land and Lakes
0971250003	Skokie	2037	BFI
0970850002	Skokie	1017	Michael Cherhavy
0978020001	Skokie	1015	BFI 1
0971900001	Skokie	1001	Waukegan Municipal #1
0978000002	Skokie	1007	Farrin
0974540001	Skokie	1007	Joseph E. Filippo
0970900001	Skokie	3507	Lake County Grading Co.
0978100002	Skokie	3507	NSSD-Newport

It is uncertain if unpermitted industrial discharges (point sources) are a problem in the watershed because not all small industrial uses have been identified or evaluated for permit requirements. Generally, the Standard Industrial Code (SIC) for an industry determines whether an individual industrial stormwater permit is required. Regional enforcement officers for the IEPA investigate potential unpermitted industrial discharges as they are identified, and monitor reporting requirements for existing NPDES permits.

There is one U.S. EPA Superfund site within the West Fork watershed, two within the Middle Fork watershed, and nine within the Skokie River watershed. None of these Superfund sites are included on the National Priorities List (NPL).

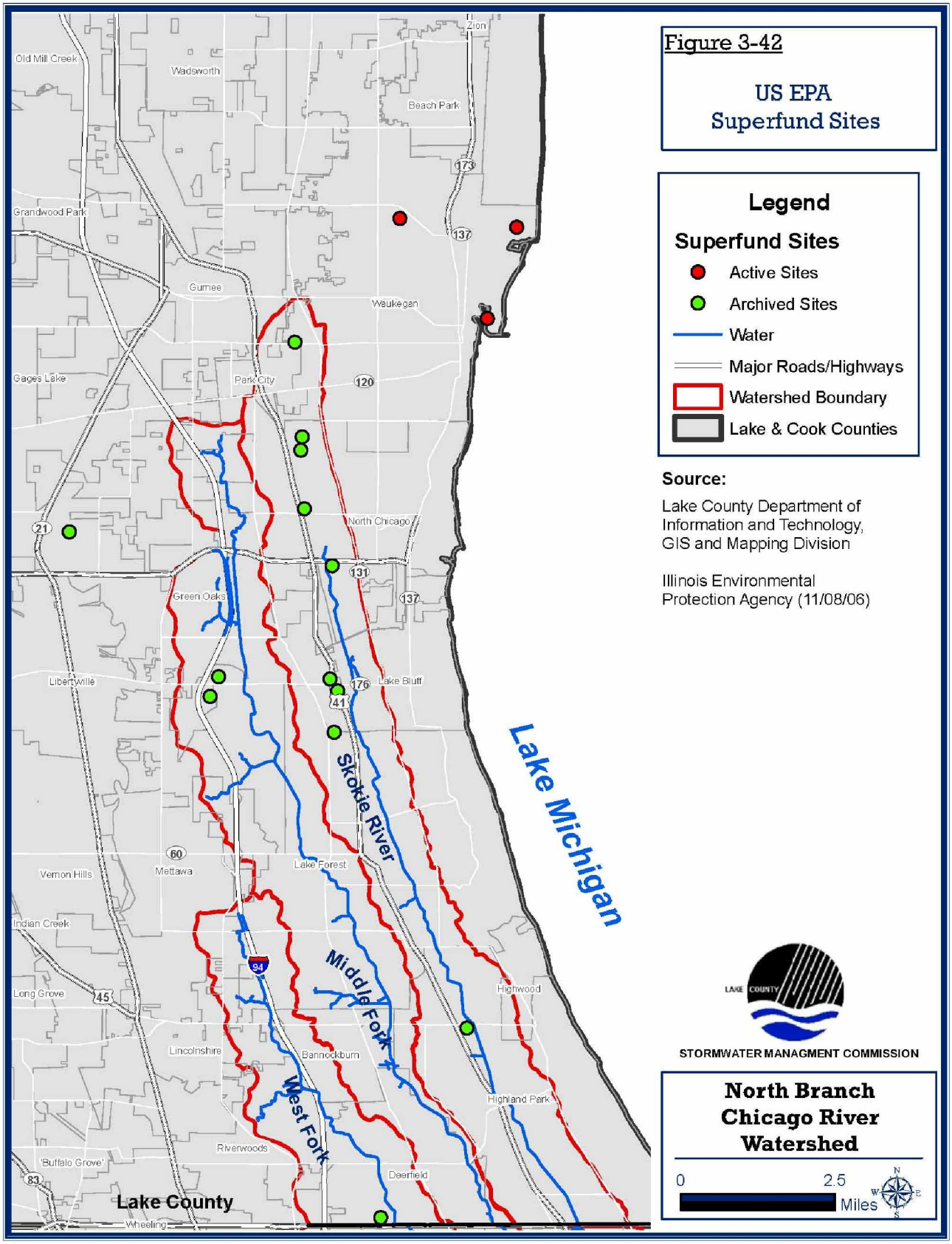
3.13.3.4 Conclusions

The two predominant point source pollution issues that warrant further investigation in the watershed are wet weather problems with wastewater treatment due to sanitary sewer infiltration and the potentially unpermitted discharges from industrial sites. IEPA currently allows different water quality standards for WWTPs under wet versus dry weather conditions. The North Branch Planning Committee could track, review and comment on future NPDES permit applications or renewals for potential changes to the existing standards. In addition, infiltration and illicit hookups are being addressed by the communities in light of the NPDES Phase II rules that were issued in Spring 2003 by the USEPA to address pollution from stormwater. Programs to identify and remedy infiltration and illicit discharges to the stormsewer system are currently required. The North Branch Planning Committee could also establish a working relationship with IEPA enforcement staff to develop a monitoring system to identify industrial discharges that may have been overlooked in the past.



Maps to be used for Planning Purposes only.

Produced by V3 Companies



Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.13.4 Nonpoint Source Pollutant Loading Analysis

A simple nonpoint source pollutant loading model was used to identify potentially significant areas for nonpoint pollution transport to the river. The procedure used for estimating pollutant loads within this document follows NIPC methodology, which had been developed by the IEPA. The NIPC methodology uses Event Mean Concentrations based on differing land use. Pertinent pollutant parameters followed NIPC methodologies, if available. See Appendix F for a copy of the pollutant loading spreadsheets and exhibits. In addition, an overall assessment plan (scorecards) to determine achievement in loading reductions is outlined in Chapter 6.2 and Table 6.1.

The watershed was divided into smaller subbasins (or subwatersheds) based on stormsewer systems. Stormsewer systems often provide a more accurate picture of drainage patterns than topography alone due to the extensive hydrologic modification that has taken place in most urbanized areas, these stormsewer subbasins are referred to as stormsewersheds (SSS). Land use was aggregated for each SSS using a GIS overlay of the SSS boundaries on the land use theme described in Section 3.6. The land use acreage totals were then used in calculations to determine pollution loading estimates for ten pollutants common in urban areas. See Table 3-53 for a list of the pollutants evaluated in the loading analysis.

Table 3-53
Pollutants Addressed in Loading Analysis

BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
TSS	Total Suspended Solids
TDS	Total Dissolved Solids
TN	Total Nitrogen
TP	Total Phosphorous
Cu	Copper
Pb	Lead
Zn	Zinc
Cd	Cadmium
FC	Fecal Coliform

There are 223 SSS's within the North Branch Chicago River watershed. Within the watershed, Lake County has 162 SSS's and Cook County has 68. SSS's that are likely to be contributing the highest nonpoint pollution loads were identified based on loading estimates. Identifying SSS's that are likely to be contributing the highest loads of nonpoint pollutants to the watershed is necessary to focus remedial actions where water quality treatment is most necessary. Once identified, SSS deemed as significant contributors of pollutants can be prioritized for receiving implementation measures or BMP's to reduce pollution at the source, and/or to treat polluted runoff.

3.13.4.1 North Branch Chicago River Watershed Pollutant Load Estimates

Pollutant load estimates are useful for comparing loading from different portions of the watershed. Ten parameters were chosen for evaluation based on the historical water quality sampling performed by IEPA, MWRD, USGS and LCHD and previous discussions in the North Branch Chicago River Watershed Assessment and Management Plan, July 2000. Selected parameters include BOD, COD, TSS, TDS, TN, TP, Cu, Pb, Zn and Cd which provide information on pollutant degradation from organic enrichment, oxygen depredation, erosional sediments and silts, along with four metals. Of the four metals included in the pollutant loading model, cadmium does not appear to be a significant problem in the North Branch Chicago River. Chromium, mercury and silver are not included in the model, although they are potentially significant sediment contaminants in the North Branch Chicago River based on the ChicagoRivers study results. Similarly, Fecal Coliform is not included in the model, however, it is also a significant contaminant within the Watershed. Table 3-54 contrasts the average SSS pollutant loading rates (lbs/acre/yr) of the ten addressed pollutants based on the existing land uses within each of the two counties.

Table 3-54
Average Pollutant Loading Rates by SSS for Priority Pollutants in the North Branch Chicago River Watershed (pounds/acre/year)

	BOD	COD	TSS	TDS	TN	TP	Cu	Pb	Zn	Cd	FC*
Lake County	26.6	193.5	486.7	918.6	7.0	0.84	0.08	0.39	0.84	0.004	7.5
Cook County	26.1	186.1	472.6	855.2	6.8	0.82	4.26	21.14	0.79	0.003	7.8

* FC is provided in units of colony forming units (CFU) per 100mL/acre/year, and as a sum of the assemblage of SSS within the county.

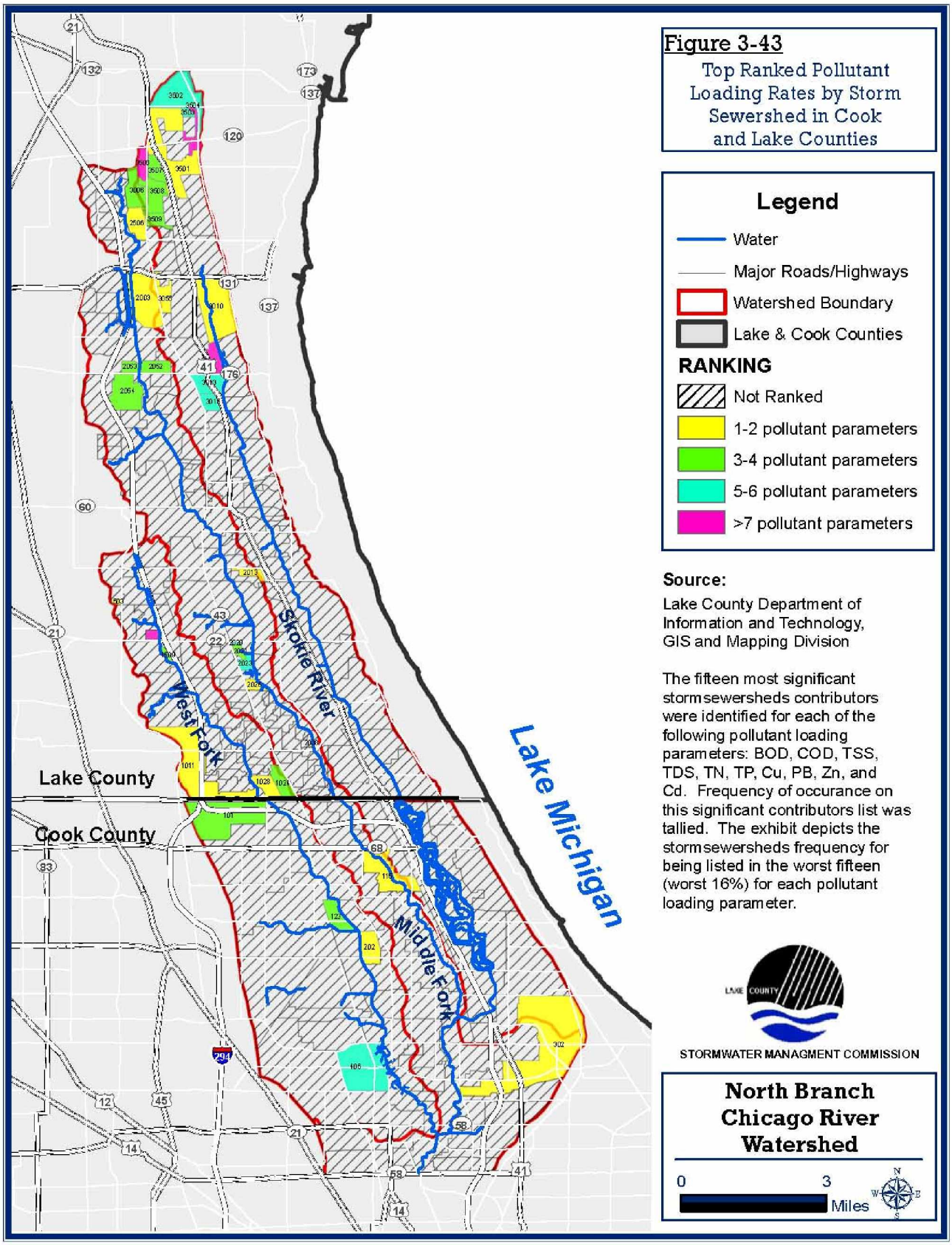
A pollutant loading theme was created in the GIS by using the CMAP pollutant loading model in conjunction with the SSS theme produced by Northeastern Illinois University (NEIU). The process used for delineating SSS is described in the hydrology and hydraulics section (3.14.1). Pollutant loading for Fecal Coliform was generated by the Long-Term Hydrologic Impact Assessment (L-THIA) model for the Watershed by county. The annual loadings for the remaining ten pollutants evaluated were calculated for each land use within the stormsewersheds. The loadings were then summed to provide an estimate of total annual pollutant load for each pollutant parameter by SSS. The total pollutant loads for each SSS were then divided by the corresponding acreage to arrive at an estimated loading rate for each pollutant by stormsewershed.

After computing the annual loading rates, the SSS were ranked in descending order by estimated loading rate for each pollutant. The fifteen most significantly polluted SSS are listed by pollutant parameter in Table 3-55. The locations of these SSS's and the number of times a particular SSS is rated in the top 15 worst areas for each of the 10 parameters evaluated are depicted in Figure 3-43. There are eleven SSS's that appear on five or more of the pollutant parameter lists. Ten of these are upstream in Lake County with only one being from Cook County. Of the eleven worst contributing SSS's, the West Fork is represented by one in the lower portion of the watershed in Cook County, the Middle Fork is represented by two in the middle portion of the watershed in Lake County, and the Skokie River is represented by seven, mostly in the headwaters in Lake County. Four SSS's, 3504, 3505, 3506 and 3512 in the headwaters of the Skokie River, are ranked in the top 15 for all ten pollutant parameters and may be a valuable place to focus initial BMP implementation measures.

Table 3-55 Estimated Annual Pollutant Loading Rates by Stormsewershed

Biochemical Oxygen Demand		Chemical Oxygen Demand		Total Suspended Solids		Total Dissolved Solids		Total Nitrogen	
Stormsewer ID	Loading	Stormsewer ID	Loading	Stormsewer ID	Loading	Stormsewer ID	Loading	Stormsewer ID	Loading
3506	74.63	3504	567.16	3010	1378.82	3504	3302.42	3506	18.61
2023	74.62	3506	561.94	2025	1320.00	3012	3166.27	2023	18.52
3505	67.74	2023	522.05	3504	1291.62	3506	2919.43	3505	16.65
2020	66.17	3012	488.30	3015	1248.89	3502	2910.67	2020	16.48
1024	63.25	3502	486.60	2038	1203.98	3013	2606.02	3013	15.54
406	62.67	3013	486.39	3506	1203.89	2023	2576.66	3504	15.45
3013	62.41	3505	480.04	3012	1192.11	1002	2473.32	1024	15.40
3509	61.58	2020	457.46	3502	1188.74	3509	2372.87	3509	15.36
3504	61.23	1002	448.79	406	1188.09	3505	2303.80	2021	15.11
2021	60.28	406	447.73	3503	1125.16	2021	2210.29	406	14.85
3508	60.11	1024	442.77	3505	1122.98	2020	2169.98	3508	14.82
123	59.46	3509	440.86	302	1120.90	3501	2058.03	123	14.37
2025	52.00	2021	429.22	3508	1073.45	2506	2029.69	210	12.84
3010	51.41	123	408.15	2053	1059.23	1011	2016.49	3015	12.62
210	50.95	3508	398.86	3507	1058.89	1024	1953.89	3510	12.55

Total Phosphorus		Copper		Lead		Zinc		Cadmium	
Stormsewer ID	Loading	Stormsewer ID	Loading	Stormsewer ID	Loading	Stormsewer ID	Loading	Stormsewer ID	Loading
3010	1.42	3504	0.26	3015	1.54	3504	1.79	3503	0.022
2025	1.40	3012	0.26	3503	1.41	3502	1.63	3015	0.021
3015	1.39	3502	0.24	3504	1.32	3506	1.62	2053	0.020
3503	1.35	3015	0.23	2053	1.31	3012	1.62	2052	0.019
2038	1.33	3506	0.22	3507	1.31	1002	1.53	3507	0.019
2053	1.29	1002	0.20	2052	1.27	3015	1.43	2054	0.018
3504	1.28	3503	0.19	3012	1.24	2023	1.41	3006	0.018
3506	1.28	3507	0.19	2054	1.17	3013	1.39	2003	0.017
2052	1.28	3013	0.19	3006	1.17	101	1.36	3055	0.013
406	1.28	101	0.19	3502	1.16	2020	1.34	115	0.013
2054	1.26	2053	0.18	3506	1.13	3505	1.33	101	0.013
3006	1.25	3505	0.18	101	1.10	1024	1.27	3504	0.011
302	1.24	2023	0.18	2003	1.05	1028	1.22	3012	0.010
3505	1.24	2052	0.17	1002	0.99	202	1.22	3506	0.009
3055	1.24	3501	0.17	115	0.96	210	1.21	3502	0.009



Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.13.5 Water Quality Summary

Biological Monitoring
The IEPA 2006 Illinois Water Quality Report indicates that the North Branch Chicago River BSC is poor for the West and Middle Forks and fair for the Skokie River. Biological monitoring reported in the *ChicagoRivers* study concludes that the benthic communities have improved, but they are still limited to taxa that are tolerant to pollution and habitat alterations and therefore remain degraded. Fish surveys conducted for the *ChicagoRivers* study indicate that fish communities have been severely impacted by channelization, sedimentation and contamination by both point and nonpoint sources. The report noted that while the fish community has improved in the past 20 years, it is still considered to be moderately to severely degraded.

Chemical Monitoring
The potential causes of impairment to water quality within the North Branch Chicago River include: Chloride, Dissolved Oxygen, Fecal Coliform, Iron, Oil and Grease, Silver, Total Dissolved Solids, and Zinc. The potential sources include: High Concentrations of Fecal Material and Suspended Solids, Increase in Salt Input, Industrial Waste, and Runoff.

An assessment of water quality based on the chemical monitoring data available is challenging due to the limitations of grab sample monitoring programs. Stream conditions that are limited due to chemistry over shorter periods of time are not reflected in these sampling programs. But, the existing monitoring programs can provide warning signals for chronic problems within the stream.
Specific concerns identified by the data include:

- excessive fecal coliform throughout the North Branch Chicago River;
- low dissolved oxygen levels (in the Middle Fork and Skokie in particular);
- high nutrient levels (especially in the West Fork);
- consistent violations of dissolved oxygen, fecal coliforms, total iron and total dissolved solids water quality standards;
- high total dissolved solids, chlorides from road salt, and nitrate-nitrogen concentrations flowing into the West Fork (based on the Tollway study results);
- several significant violations of the copper standard identified on the West Fork; and
- sediments contaminated by heavy metals (most notably chromium, copper, iron, lead, zinc, mercury and silver).

Conclusions
Water quality in the North Branch Chicago River is being degraded by a number of pollution causes from an even larger number of sources. Specific contributions by source have not been determined within the scope of this study. A nonpoint source pollutant-load model has been used to identify pollutant loading critical areas for nonpoint loading in the watershed that can be targeted for best management practices that reduce pollution loads, but a better monitoring program would help identify particular areas where efforts should be concentrated for greater effectiveness. Monitoring program examples are demonstrated within Appendix K, Maintenance, Management and Monitoring Plan for Recommended BMPs in the North Brach Chicago River watershed. Point source contributions of nutrients and metals were not addressed within the scope of this study. A more detailed analysis needs to be conducted in cooperation with the WWTPs in the watershed to determine if point source contributions of these pollutants are significant. North Shore Sanitary District has supplied SMC with a considerable amount of water quality data that can be used in this effort. A study to identify the specific sources for the excessively high levels of fecal coliforms throughout the watershed also needs to be conducted.

Stream restoration in combination with water chemistry improvements is suggested to improve the biological quality of the North Branch Chicago River. The stream inventory conducted with this assessment identifies

opportunities for restoration and maintenance needs for the channel. Stream maintenance practices will also need to be addressed in order to improve water quality since habitat alteration and hydrologic modifications (channelization, streambank modifications and riparian vegetation removal) are ranked as significant causes/sources of impairment.

3.13.6 An estimate of load reduction expected from management measures

Load reduction calculations were completed with IEPA Urban Runoff BMP Pollutant Load Reduction Worksheet (Appendix F) using land use and associated BMPs for the action proposed. Within the worksheet there are BMPs, such as vegetated filter strips or creating a wetland detention, that can be used as parameters for load reduction by indicating true if it applies to the action or false if it does not. Land use was determined by designating a value of one in the sewered column for all variables that apply. Percent load reduction was calculated for detention basins, outfalls, stream and wetland restorations, flood mitigation, and hydraulic structures based on action recommended. Proposed action for open space protection pertained to legal regulations and not any implementation measure for a change in land use, consequently load reductions could not be quantified as it may or may not involve an improvement. These projections are calculated as a means of predicting potential effectiveness of implementing watershed improvements.

Action recommendations were determined using representative land use values of one for commercial, industrial, institutional, transportation, multi-family and residential. To correct short circuit problems a true statement was created for settling basin which would move the intake further from the outlet and reduce circuiting errors. Another prevalent recommendation was to replace turf grass with native vegetation in which a true statement was added for vegetated filter strips and grass swales. Converting dry-bottom detention basin to wet-bottom detention basin creates true statements for settling basin, extended wet detention, as well as vegetated filter strips and grass swales. Assessing load reduction from retrofitting underground detention basins was determined using a true statement for sand filtration. Action recommendations in site specific projects with more than one of these benefits used combinations of these true statements which followed this system to provide projected load reduction values.

Fecal Coliform levels within the watershed can be improved through implementing BMPs including detention basin retrofits, wetland restorations and eliminating illicit discharges. Nonstructural controls to improve Fecal Coliform levels with the Watershed include pet waste reduction, non-migratory goose management and septic inspection. Management for correcting outfall retrofits included stabilization of erosion, monitoring and maintenance, and removing debris or sedimentation. Actions which pertain to stabilization had true statements assigned to vegetated filter strips and grass swales because of their ability to take hold of soil through root systems. No load reduction estimates were calculated for sites where monitoring and maintenance was the only proposed action. Removing debris or sediment creates a settling basin and was given a true statement in the actions items that met this criteria. Action recommendation for potential wetland restoration created true statements for vegetated filter strips and grass swales, extended wet detention, and wetland detention. Wetland restoration greatly reduced pollutant loading because wetlands act as a natural filter of NPS pollution.

Flood mitigation sites and hydraulic structures had similar action recommendations such as: provide additional storage, debris removal, and reduce erosion. An infiltration basin is designed to use the natural filtering ability of the soil to remove pollutants from stormwater as well increase storage volume. All sites requiring additional storage selected infiltration basin as true statements. The estimated percentage of pollutant load reductions for each site specific management measure is contained in the Site Specific Action Plan – Pollutant Load Reduction Tables 3-56 through 3-62. In addition, an estimate of the pollutant load reduction for high priority streambank stabilization sites, is included in Table 3-63. This estimate includes reductions of phosphorus (lbs./year), nitrogen (lbs./year), and sediment (tons/year) based on the IEPA Bank Stabilization BMP Pollutant Load Reduction Worksheet, which incorporates average bank height, length of eroded channel, and lateral recession rate. An overall assessment plan (scorecards) to determine the achievement of load reduction is located in Chapter 6.2 and Table 6.1.

Table 3-56 Pollutant Load Reduction

Detention Basin Water Quality Retrofits [See Detention Basin Inventory in Appendix G.]

(Note: See Figure 5-3 for detention basin locations.
Dry-bottom and Underground basins are designated "high" priority for retrofits. Opportunities for retrofitting other basins and maintenance needs are noted in the Detention Basin Inventory summary.)

Action Recommendation	BOD %	COD %	TSS %	TDS %	TN %	TP %	Cu %	Pb %	Zn %	Cd %	FC %
Correct short-circuiting problem and replace turf grass with native vegetation.	95	35	95	-	50	95	50	95	95	50	Var.
Replace turf and rip rap shorelines, bottoms, and buffers of all basins with native vegetation.	20	35	95	-	50	30	50	95	95	50	Var.
Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	95	35	95	-	95	95	50	95	95	50	70
Remove concrete bottom detention basin and convert to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	95	35	95	-	95	95	50	95	95	50	70
Identify appropriate filtration system and retrofit underground detention basin.	60	-	18	-	-	62	-	-	-	-	-

Table 3-57 - Pollutant Load Reduction

Outfall Retrofits/Repairs *[See Point Discharge Summary Appendix C.]*
(Note: Location refers to the stream reach and the point discharge reference numbers. See Figure 3-37 for stream reach location. Because of the large number of discharge points with associated problems, only the most significant are listed in this action plan. Lower priority problems that need to be corrected are found in the complete summary.)

Action Recommendation	BOD %	COD %	TSS %	TDS %	TN %	TP %	Cu %	Pb %	Zn %	Cd %	FC %
Stabilize erosion. Monitor and maintain.	20	35	95	-	50	30	50	95	95	50	-
Investigate whether discharge is permitted. Monitor and maintain.	-	-	-	-	-	-	-	-	-	-	-
Identify source of discharge and disconnect/remove. Stabilize erosion. Monitor and maintain.	20	35	95	-	50	30	50	95	95	50	Var.
Stabilize erosion, repair outfall pipe. Investigate water and look for illicit connections, disconnect. Monitor and maintain.	20	35	95	-	50	30	50	95	95	50	Var.
Stabilize erosion, clear fallen trees and sedimentation Monitor and maintain.	20	35	95	-	50	30	50	95	95	50	-
Stabilize erosion. Investigate pool and look for illicit connections, disconnect. Monitor and maintain.	20	35	95	-	50	30	50	95	95	50	Var.
Repair or replace outfall pipe. Monitor and maintain.	-	-	-	-	-	-	-	-	-	-	-
Stabilize erosion. Investigate pool and look for illicit connections, disconnect. Monitor and maintain.	20	35	95	-	50	30	50	95	95	50	Var.
Recommend storm drain stenciling at street inlets Monitor and maintain.	-	-	-	-	-	-	-	-	-	-	-
Confirm source of discharge. Disconnect illicit connection and/or stencil storm drain. Monitor and maintain.	-	-	-	-	-	-	-	-	-	-	Var.

Table 3-58 – Pollutant Load Reduction

Stream Restoration and Maintenance [*See Stream Inventory Summary in Appendix B.*]
(Note: See Figure 3-37 for stream reach locations. Only those stream reaches that are considered a high or medium priority are listed. Reaches with a low priority can be identified from the complete summary.)

Action Recommendation	BOD %	COD %	TSS %	TDS %	TN %	TP %	Cu %	Pb %	Zn %	Cd %	FC %
Stabilize eroded streambanks and remove accumulated sediment in stream reach	95	35	95	-	50	95	50	95	95	50	-
Stabilize eroded streambanks	20	35	95	-	50	30	50	95	95	50	-
Remove accumulated sediment in stream reach	44	-	18	-	-	48	-	-	-	-	-

Table 3-59 – Pollutant Load Reduction

Potential Wetland Restoration Sites
(Note: See Figure 5-6 for locations. Potential wetland restoration sites were identified based on map analysis. Restoration feasibility still to be determined.)

Action Recommendation	BOD %	COD %	TSS %	TDS %	TN %	TP %	Cu %	Pb %	Zn %	Cd %	FC %
Determine wetland restoration feasibility for additional stormwater storage. Implementation where feasible.	95	95	95	-	95	95	50	95	95	50	78
Determine feasibility of small restoration. Implementation where feasible.	95	95	95	-	95	95	50	95	95	50	78
Determine feasibility of wetland restoration in floodplain of Skokie. Implementation where feasible.	95	95	95	-	95	95	50	95	95	50	78

Table 3-60 – Pollutant Load Reduction

Open Space Protection

(Note: See Figure 5-8 for locations. Potential open space protection sites were identified based on stakeholder recommendations and map analysis. Protection feasibility still to be determined.

Action Recommendation	BOD %	COD %	TSS %	TDS %	TN %	TP %	Cu %	Pb %	Zn %	Cd %	FC %
Permanent protection	-	-	-	-	-	-	-	-	-	-	-
Establish conservation easement and greenway	-	-	-	-	-	-	-	-	-	-	-

Table 3-61 – Pollutant Load Reduction

Flood Mitigation Sites

(Note: Flood Problem Area reference numbers were developed for the Lake County Flood Hazard Mitigation Plan. Additional sites were identified during the watershed planning process. See Figure 3-57 for mapped locations.)

Action Recommendation	BOD %	COD %	TSS %	TDS %	TN %	TP %	Cu %	Pb %	Zn %	Cd %	FC %
Create additional storage utilizing existing vacant land. Perform ditch and culvert monitoring and maintenance.	44	35	95	-	40	95	-	35	35	-	-
Restore a detention pond to alleviate flooding.	35	25	25	-	40	35	-	35	35	-	-
Construction of a swale to increase outlet capacity, improve internal drainage, provide additional storage.	70	10	95	-	30	10	50	95	95	50	-
Perform ditch and culvert monitoring and maintenance.	44	-	18	-	-	48	-	-	-	-	-
Monitor for increased flooding to yards	-	-	-	-	-	-	-	-	-	-	-
Create additional storage utilizing existing vacant land. Perform ditch and culvert monitoring and maintenance.	44	35	95	-	40	95	-	35	35	-	-
NBWP funding was received in 2004 to create two ponds in the Lake Forest/Deerpath Golf Course to increase flood storage and reduce the rate and volume of water entering Skokie River, which may reduce flood damages in this area.	44	35	95	-	40	95	-	35	35	-	-
Investigate expansion of storage, For structures perform flood mitigation alternatives analysis[1], review for NFIP compliance	35	25	25	-	40	35	-	35	35	-	-
Refer to Village Department of Public Works for retrofits or maintenance to culverts	-	-	-	-	-	-	-	-	-	-	-
Design wetland restoration site that will increase flood storage and reduce flood problems.	95	95	95	-	95	95	50	95	95	50	-

Table 3-62 – Pollutant Load Reduction

Hydraulic Structures [See Hydraulic Structure Summary Appendix D.]

Action Recommendation	BOD %	COD %	TSS %	TDS %	TN %	TP %	Cu %	Pb %	Zn %	Cd %	FC %
Clean out debris and put structure on regular maintenance/monitoring schedule.	44	-	18	-	-	48	-	-	-	-	-
Remove Sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation). Implement recommended alternative. Monitor and maintain.	95	35	95	-	50	95	50	95	95	50	-
Investigate alternatives to reduce erosion and stabilize streambank. Implement recommended alternative. Monitor and maintain.	20	35	95	-	50	30	50	95	95	50	-
Investigate alternatives for dam removal or dam repair/replacement. Implement recommended alternative.	-	-	-	-	-	-	-	-	-	-	-

Table 3-63

Estimated Annual Pollutant Load Reduction for Streambank Stabilization by Stream Reach

West Fork

Sediment		**Phosphorous**		**Nitrogen**	
Stream Reach ID	Load Reduction (ton/yr)	Stream Reach ID	Load Reduction (lb/yr)	Stream Reach ID	Load Reduction (lb/yr)
WF016	607	WF016	607	WF016	1214
WF010	355	WF010	355	WF010	709
WF012	112	WF012	167	WF012	335
WF001	74	WF001	74	WF001	148

Middle Fork

Sediment		**Phosphorous**		**Nitrogen**	
Stream Reach ID	Load Reduction (ton/yr)	Stream Reach ID	Load Reduction (lb/yr)	Stream Reach ID	Load Reduction (lb/yr)
MF006	831	MF006	706	MF006	1413
MF011	583	MF005	558	MF005	1116
MF005	558	MF011	496	MF011	992
MF013	556	MF013	472	MF013	945
MF018	395	MF018	395	MF018	790
MF003	354	MF003	354	MF003	709
MF022	339	MF022	339	MF022	679
MF001	238	MF001	238	MF001	477
MF023	159	MF023	159	MF023	319
MF033	106	MF033	106	MF033	212
MF034	100	MF034	100	MF034	201
MF029	57	MF029	57	MF029	115

Skokie River

Sediment		**Phosphorous**		**Nitrogen**	
Stream Reach ID	Load Reduction (lb/yr)	Stream Reach ID	Load Reduction (lb/yr)	Stream Reach ID	Load Reduction (lb/yr)
SR028	525	SR028	447	SR028	893
SR017	391	SR017	332	SR017	665
SR035	281	SR035	281	SR035	562
SR016	262	SR016	223	SR016	445

3.14 Flooding

3.14.1 Hydrology and Hydraulics

Hydrology refers to the way that water behaves from its beginning as precipitation, through its movement on or beneath the surface of the earth, to its entry into sewers, streams, lakes, oceans and its eventual return to the atmosphere. More specifically for the North Branch, a hydrologic assessment attempts to model how much precipitation falls in the watershed, what volume ends up in the river and the rate that it is discharged at critical locations. *Hydraulics* addresses how water flows over the land surface, within sewers and stream channels, over and under bridges and dams and through culverts, wetlands, lakes and impoundments (detention basins and reservoirs). A hydraulic assessment of the North Branch is a study of the flow paths, velocities and stages of water as it is conveyed, as a concentrated flow, through the watershed.

The most recent comprehensive hydrologic and hydraulic (H&H) studies of the North Branch were completed in 1994 using H&H modeling. Limited H&H studies were performed on portions of the watershed after the 1994 comprehensive modeling, as described herein. The intent of the studies was to re-map the 100 year floodplain for purposes of the National Flood Insurance Program. The H&H assessment for this plan included:

- An analysis of the hydrographs for the North Branch,
- A review of the original North Branch H&H studies[20] as well as a review of the most recent studies associated with the November 6, 2006 Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRM) and the July 21, 2006 Skokie Headwaters and North Chicago Flood Damage Reduction Feasibility Study Report,
- Mapping stormsewer systems within the watershed,
- Reporting on hydraulic impoundments including a detention basin inventory,
- A review of the regulatory release rates for the watershed, and
- An evaluation of future H&H needs.

3.14.1.1 North Branch: A Flashy Hydrology

Prior to extensive land settlement, most precipitation in the North Branch Chicago River Watershed infiltrated into the ground, was intercepted by vegetation or was stored in the depressional areas or wetlands of the watershed. Because under natural conditions the river channels had less water to transport, they were generally shallower and wider (more marsh-like) than they are today. In the late 1800s and early 1900s, wetlands and other poorly drained land areas in the watershed were tiled to improve drainage for agriculture. The channels of the river were subsequently straightened and ditched in the early 1900s in order to better collect and transport the increased drainage from the land. Suburbanization of the watershed throughout the 1900s has resulted in more drainage improvements to the land, and North Branch hydrology continues to change as the farmland and open spaces were converted to residences and businesses.

Like many other urban watersheds, substantial increases in impervious surface, drain tile and stormsewer drainage improvements in the North Branch have resulted in a watershed with an extremely "flashy flow pattern" and very little stormwater storage capacity. A "flashy flow pattern" means that the water level in the river goes up very quickly during a storm and down quickly afterward. Low flows in the river are lower, and high flows are considerably higher than the pre-development conditions.

---

[20] Technical Support Data Notebook for Lake County, Illinois Flood Insurance Study Books #1-5 *prepared by T-Y-Lin International - BASCOR in April, 1994, and* North Branch Chicago River, Skokie River, restudy for FEMA, Study Narrative, HEC-2 Cross Sections Lake County *by Illinois Department of Transportation - Division of Water Resources in August, 1994.*

Improved drainage and developments have made land in the watershed more economically valuable. However, during and after rain events, the river must convey large volumes of urban runoff traveling at high velocities that carries pollutants to the river, leads to more frequent flooding and results in significant streambank erosion and possible streambed scouring. Both the degraded river channel and flood damage are problems that frequently require expensive solutions. In addition to the problems caused by too much water, extreme low flows during dry periods (like the summer months) result in low dissolved oxygen levels in the river making it inhospitable to fish and other aquatic life.

The USGS collects data from several streamflow gages within the North Branch. See Table 3-64 for the numbers and locations of stream gages in the North Branch, and Figure 3-44 for a map of station locations. A stream gage refers to an instrument used to take measurements of flow at a site along a stream. Three gages are located near the county line on each of the river forks. In addition to these three streamflow gages, one other streamflow gage is located north on the Skokie River at Westleigh Road in Lake Forest and another is located within the Skokie Lagoons. An additional streamflow gage is located on the Middle Fork at Deerfield Road in Deerfield. One precipitation gage is located in the watershed in Highland Park and maintained by the SMC. Precipitation gages records the amount of precipitation over a set period of time. Additional precipitation gages are located just outside of the North Branch Chicago River watershed: the USGS maintains one precipitation gage in Gurnee; and SMC maintains precipitation gages in Waukegan, Lake Forest, and River Woods.

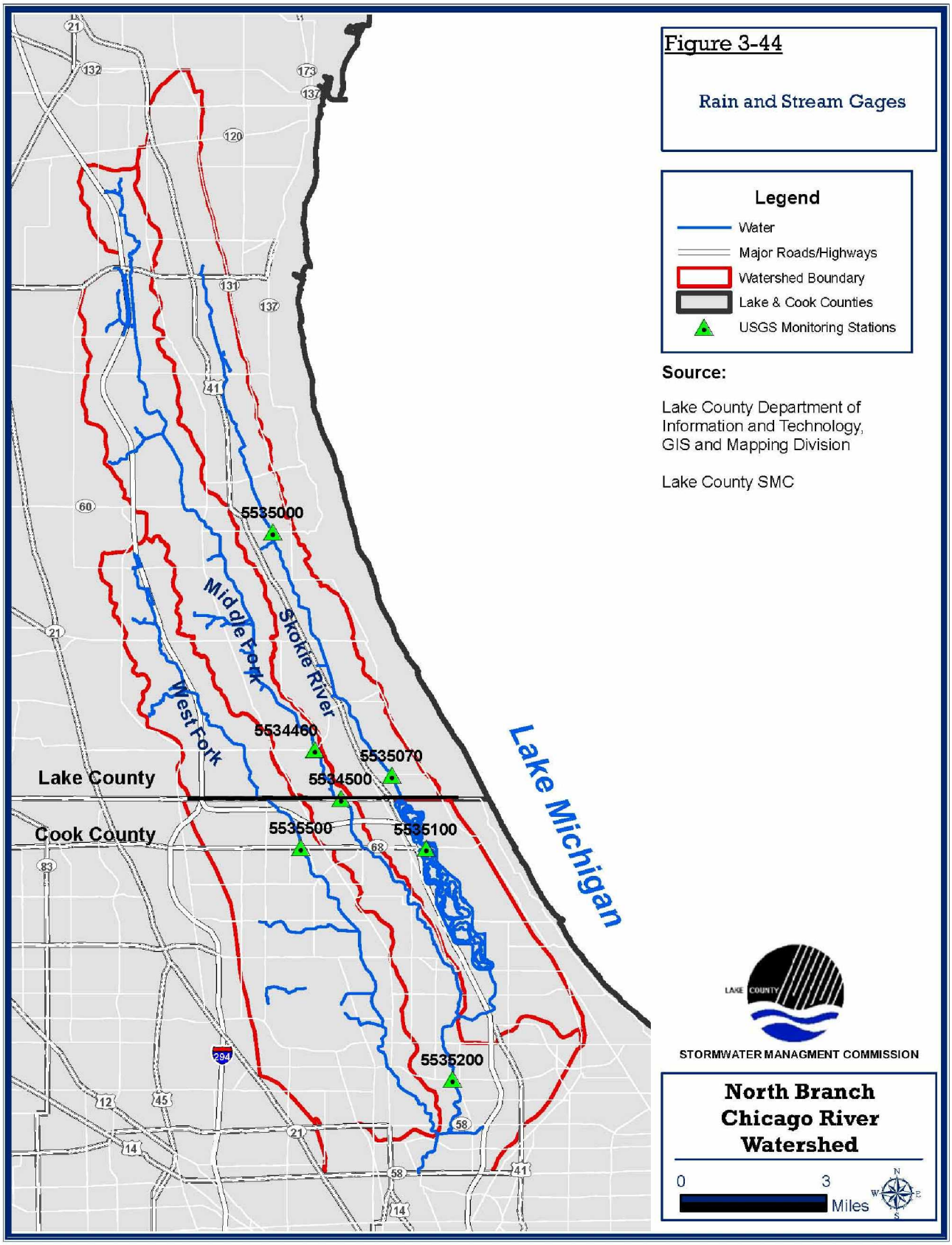
Table 3-64

STREAM GAGE STATIONS IN THE NORTH BRANCH WATERSHED

USGS#	*Fork*	*Location*
05535500	West F.	Dundee Rd., Northbrook
05534460	Middle F.	Deerfield Rd., Deerfield
05534500	Middle F.	Lake–Cook Rd., Deerfield
05535200	Middle F.	Glenview Rd., Glenview
05535000	Skokie R.	Westleigh Rd., Lake Forest
05535100	Skokie R.	Dundee Rd., Glencoe
05535070	Skokie R.	Clavey Rd., Highland Park

Figure 3-45, shows a discharge hydrograph resulted from a rainfall event produced in August 1990 at the Dundee Road station on the West Fork that reflects the typical flashy hydrology of the North Branch. The hydrograph curves rise very rapidly following the rain events to their points of maximum value, and then subsequently recede very rapidly.

A high degree of imperviousness, coupled with an efficient network of stormsewers, results in even larger runoff volumes and peak discharges from the Cook County portion of the watershed. Hydrographs generated by two typical rainfall events are shown for each of the 3 gages near the Lake-Cook county line and at Touhy in Figure 3-46. These hydrographs demonstrate the difference in runoff from the Lake County and Cook County portions of the watershed. A dramatic increase in peak discharge from Lake-Cook Road to Touhy Avenue is clearly illustrated. Peak discharges are 7 to 8 times greater at the Touhy Avenue gage and runoff volumes are also magnitudes greater at Touhy than at Lake-Cook Road. These hydrographs demonstrate flashy characteristics similar to the hydrograph at Dundee Road in the previous figure.

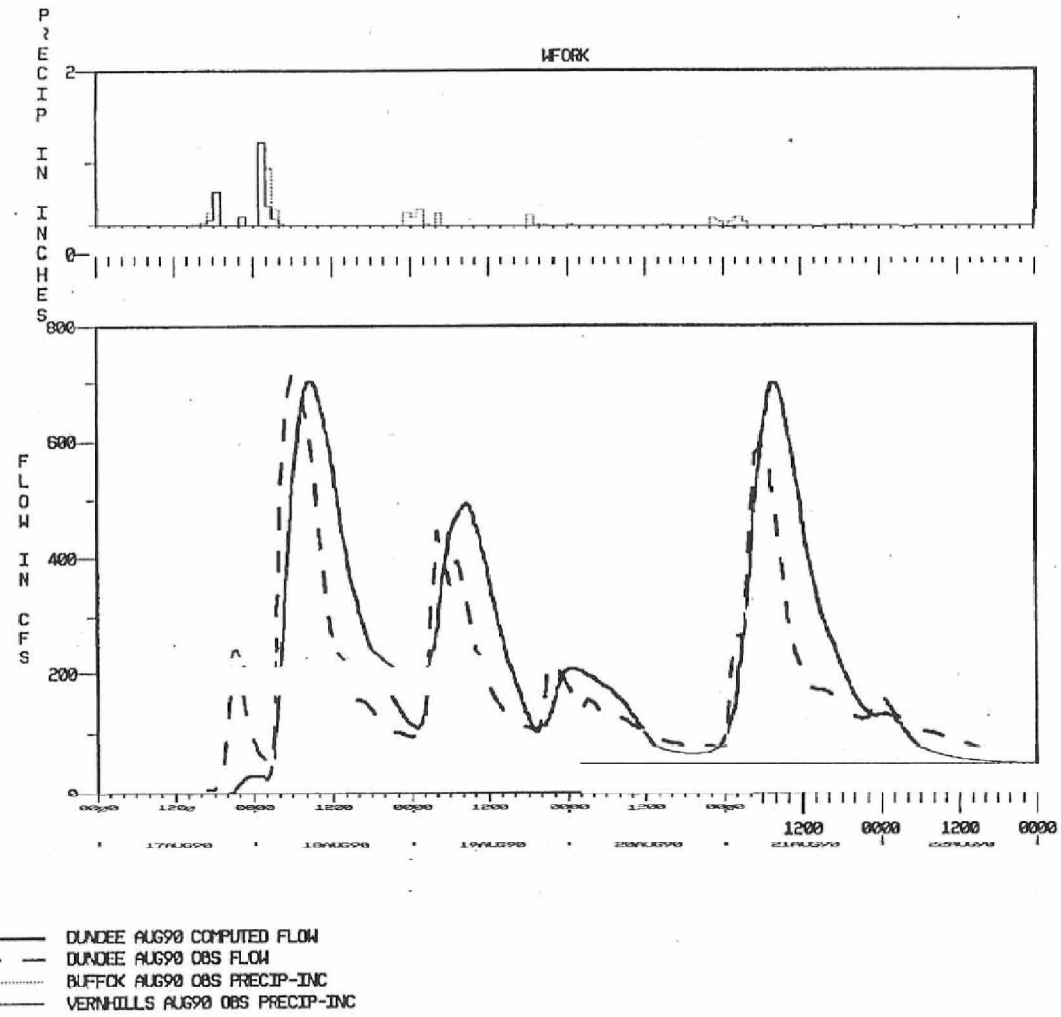


Maps to be used for Planning Purposes only.

Produced by V3 Companies

Figure 3-45

Dundee Road Rainfall Data



STORMWATER MANAGMENT COMMISSION

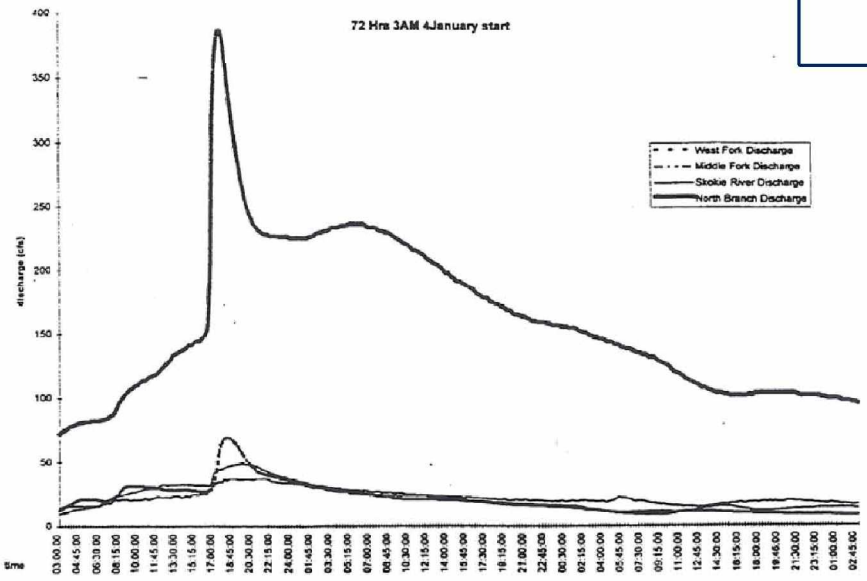
North Branch Chicago River Watershed

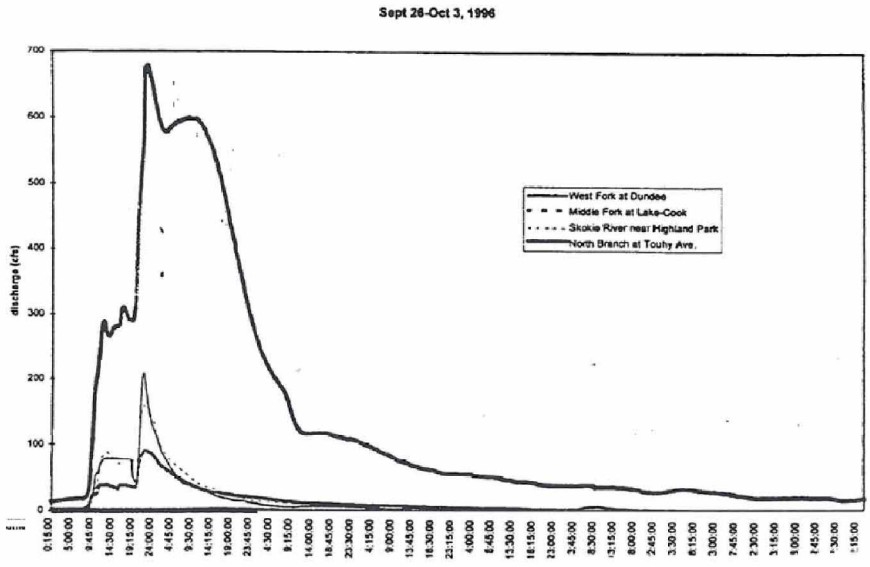
Maps to be used for Planning Purposes only.

Produced by V3 Companies

Figure 3-46

Comparative Hydrographs





Comparative Hydrographs.

LAKE COUNTY STORMWATER MANAGMENT COMMISSION

North Branch Chicago River Watershed

Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.14.1.2 Existing Studies/Floodplain Mapping

T-Y-Lin International - BASCOR completed a revised hydrologic and hydraulic analyses of the Middle and West Forks of the North Branch for the FEMA in March 1994[21]. Similarly, a revised H&H study of the Skokie River subwatershed was completed by the IDOT Office of Water Resources (OWR) in August 1994 [22]. Both studies consisted of H&H computer modeling, 100-year floodplain delineation, 100-year storage floodway delineation and a submittal to FEMA for regulatory mapping purposes that was incorporated into the countywide FIS dated September 3, 1997.

The original hydraulic models were developed using source data from the Natural Resource Conservation Service (NRCS-formerly Soil Conservation Service) WSP-2 model (1972) and the USACE HEC-2 model (1983) as a base. Updated surveyed cross-sections were inserted into each fork where appropriate. The hydrograph calibration procedure was formulated to base selected hydrograph parameters (rainfall distribution, runoff parameters, AMC 'antecedent moisture condition', Clarke's "R" value 'storage coefficient') on a range of historical events, while assuring that they did not significantly vary from expected values. The HEC-1 and HEC-2 models for the West & Middle Forks were calibrated using rainfall data from 5 separate events from 1982 through 1991, while the Skokie HEC models were calibrated using 8 rainfall events from 1982 through 1993. The models were considered calibrated if the computed peak discharges fell within the 95 percent confidence interval of the flow frequency analysis (period of record). Runoff volume was not calibrated.

The Lake County study area made up the northern portion of a comprehensive floodplain study for the entire North Branch Chicago River. The H&H models were constructed for the watershed area north of Touhy Avenue in Niles, Illinois (Cook County) to the headwaters in Lake County.

The latest countywide FIS dated November 16, 2006 revises and updates the previous FIS (dated September 7, 2000 and FIRM for Lake County, Illinois and incorporated areas and was initiated by a Physical Map Revision (PMR) request submitted by the City of Highland Park on September 18, 2002. This revised FIS reflects modifications to the 1- and 0.2-percent-annual-chance floodplain and floodway boundaries along the Skokie River and Middle Fork North Branch Chicago River within the City of Highland Park, Illinois. In addition to the Highland Park PMR, the November 16, 2006 FIS and FIRM now only include information within the boundaries of Lake County for those communities located in multiple counties.

The original HEC-2 hydraulic analyses for the Skokie River and the Middle Fork North Branch Chicago River were updated for the November 16, 2006 FIS and FIRM using HEC-GeoRAS and more detailed topography. The updated modeling was used to evaluate and eliminate negative surcharges and crossing profiles while testing the impacts and sensitivity of new data.

In addition to the November 16, 2006 FIS and FIRM, this plan also includes the results of the Skokie Headwaters and North Chicago Flood Damage Reduction Feasibility Study Report dated July 21, 2006. This report was prepared for Lake County SMC by STS Consultants, Ltd. to evaluate flood storage opportunities within the watershed located in the Skokie River headwaters (Grand Avenue IL 132) to IL 137 (Buckley Road) while enhancing existing environmental characteristics and functions. The H&H analyses used in this study were based on the original HEC-1 and HEC-2 computer models for the Skokie River and were updated with more detailed topography and better defined watershed characteristics and input parameters. The Skokie Headwaters H&H modeling and floodplain mapping has not been approved by FEMA.

The hydraulic analyses and floodplain mapping limits for Lake County are found in Table 3-65. Figure 3-47 depicts the extent of floodplains in the North Branch Watershed Plan area for Lake and Cook Counties based on the latest available FIS and FIRM information. The more detailed information associated with the Skokie

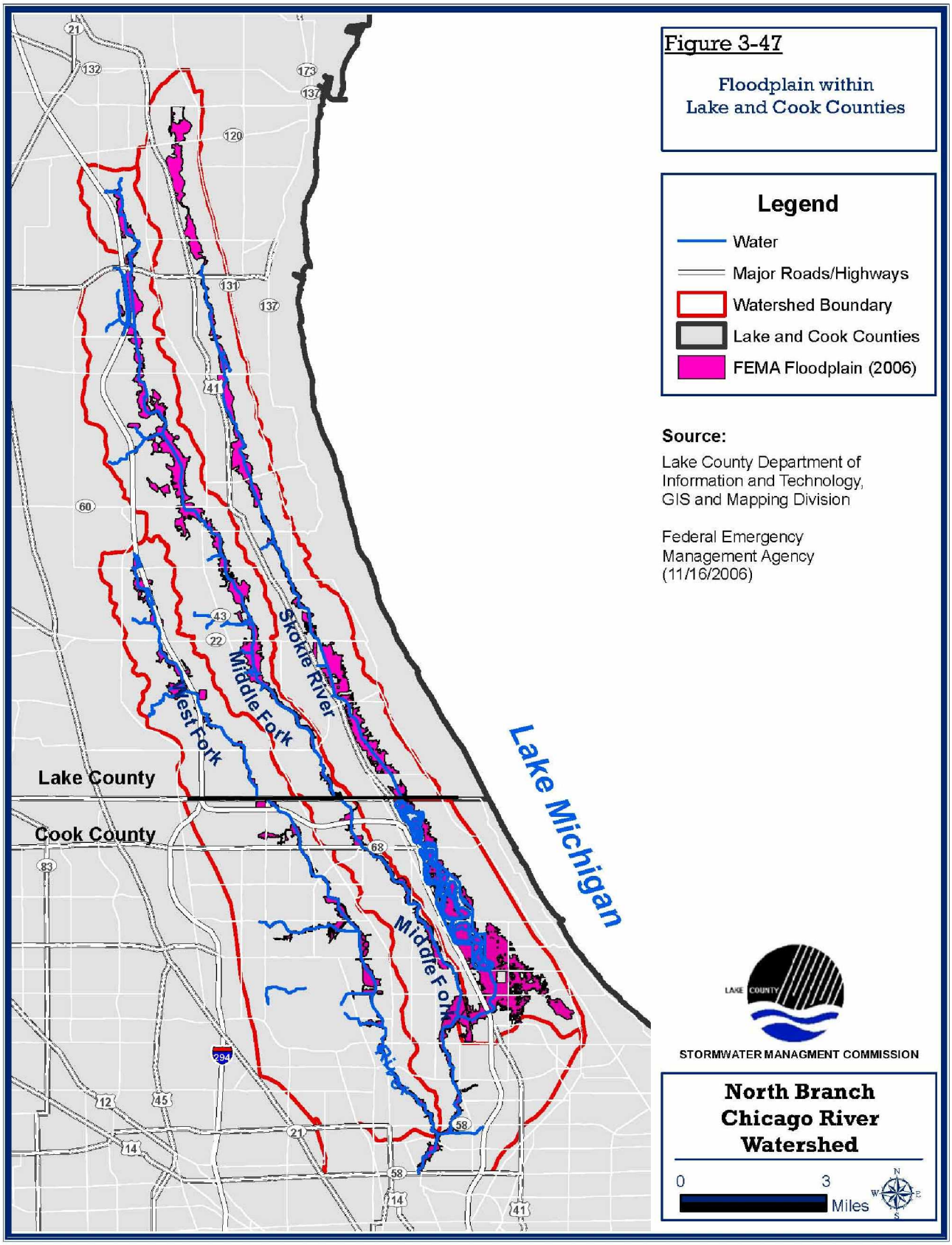
---

21 FEMA Flood Insurance Study, Lake County, Illinois and Incorporated Areas Revised November 16, 2006
22 North Branch Chicago River, Skokie River, Restudy for FEMA, Study Narrative, Lake County.

Headwaters and North Chicago Flood Damage Reduction Feasibility Study Report as well as any LOMC (LOMA, LOMR-F, LOMR) not incorporated into the latest FIS and FIRM information are not reflected in Figure 3-47.

Table 3-65
Hydraulic Analysis and Floodplain Mapping Limits for Lake County

Fork	From:	To:
West Fork	Everett Road (Lincolnshire)	Lake-Cook Road (Deerfield)
Middle Fork	2 Miles Upstream of Buckley Road (Unincorporated)	Lake-Cook Road (Deerfield)
Skokie River	1,800 Feet Upstream of Washington Street (Waukegan)	Lake-Cook Road (Highland Park)



Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.14.1.3 Drainage patterns: Defining stormsewersheds

In efforts to remove water as quickly as possible from the suburban developed areas, municipalities and villages in the North Branch have extensively sewered their respective areas. See Figures 3-52 and 3-53 for a map that identifies the sewered and unsewered areas of the watershed in Lake and Cook Counties. Stormsewer networks (or SSSs) have become the boundaries for subwatersheds in the sewered areas of the North Branch. SSSs were defined by examination of municipal stormsewer maps. SSS boundaries were manually delineated on these maps, with streets and land parcels serving as the boundary between SSSs. These maps were subsequently digitized to create a SSS GIS data layer. In 2006, each of the 25 municipalities were contacted and asked to provide updated stormsewer maps for the purpose of updating the SSS maps. Updates were received from Gurnee, Waukegan, North Chicago, Deerfield, Glenview, and Winnetka; the SSS maps were updated accordingly. 162 SSSs were delineated in Lake County and seventy-four in Cook County. SSS sizes in Lake County range from 2 acres to over 5,000 acres. Acreage totals for sewered and unsewered areas of Lake County are included in Table 3-66.[23] In addition to identifying drainage patterns in the watershed, SSS boundaries were also used to calculate nonpoint pollutant loading critical areas as described in Section 3.13.

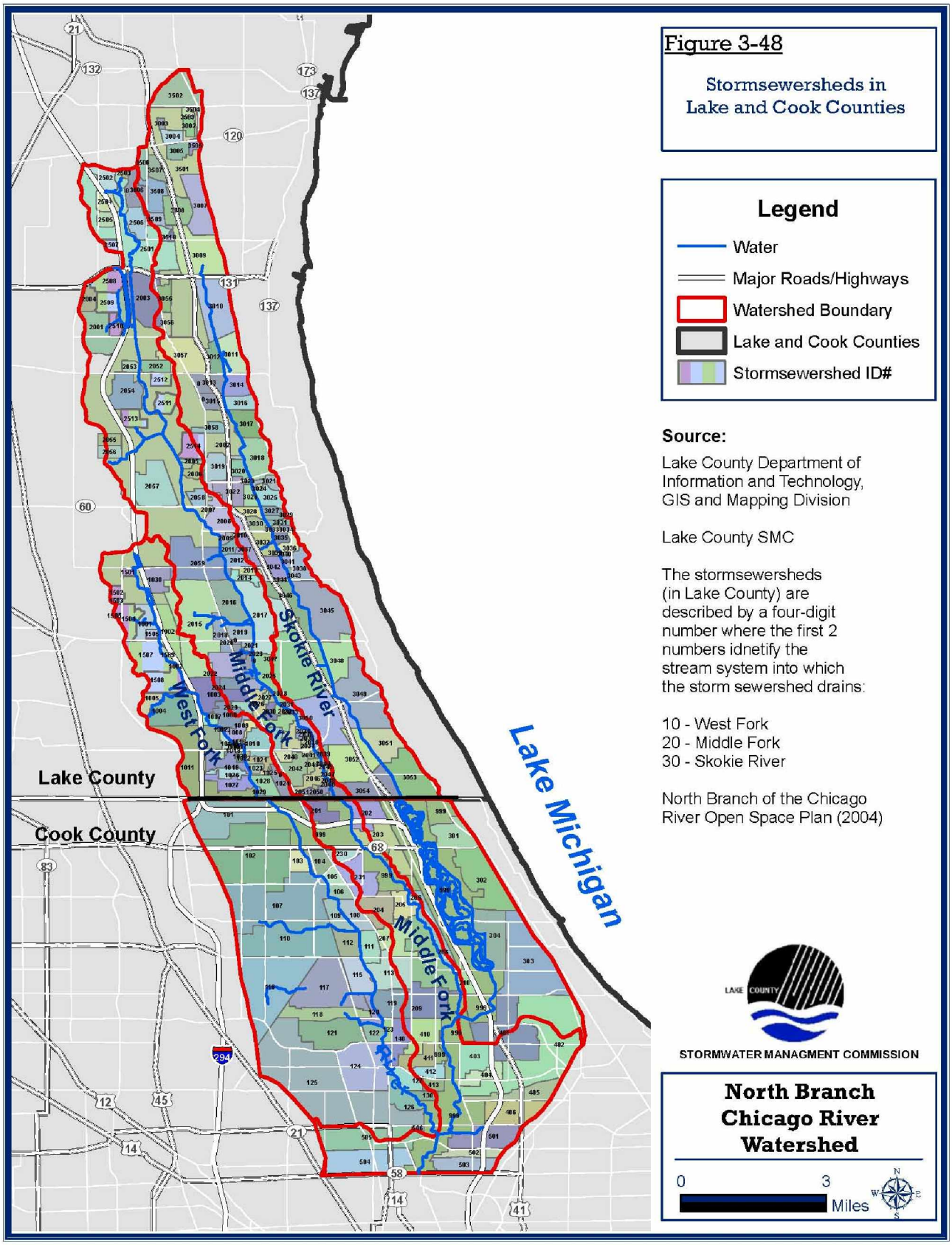
Table 3-66

Stormsewersheds (SSS)

Lake County	Total No. of SSS	Total Sewered Acres (1)	% of Sub-watershed	% of North Branch	Unsewered Areas SSS#	Total Unsewered Acres[1]	% of Sub-watershed	% of North Branch
West Fork	30	4,578	100	14				
Middle Fork	65	9,231	62	29	2002	5,592	38	17
Skokie River	67	12,917	100	40				
Total	162	26,726		83		5,592		17

(1) Stormsewersheds were assigned with the criteria of 'having its center in' a subwatershed rather than split between two subwatersheds. Therefore the total acreage of the stormsewersheds for each of the subwatersheds may not equal the actual subwatershed acreage. Additionally, the total acreage of all stormsewersheds is approximately 30 acres greater than the total watershed area previously determined. This discrepancy is due to Northeastern Illinois University's use of the IDNR watershed boundary while digitizing sub-basins, which is slightly different than the SMC watershed boundary.

[23] *One of the tagged stormsewersheds in Lake County (SSS# 2002) is actually a large area that is either unsewered, or for which the stormsewer system is privately owned and maps are not available. Although this large area is mapped as "unsewered", portions are likely to contain limited stormsewer systems within subdivisions, or it is likely to have a field tile system that ties into the North Branch. This stormsewershed cover over 5,500 acres, or more than 17% of the watershed.*



Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.14.1.4 Hydraulic Impoundments

Hydraulic impoundments on the North Branch Chicago River include seven flood control reservoirs, Lake Eleanor on the West Fork in Lake County and the Skokie Lagoons on the Skokie River in Cook County.

USACE Flood Control Reservoirs

There are seven existing flood control reservoirs on the Middle and West Forks of the river:

West Fork:

- Structure 27 - Bannockburn Reservoir (Duffy Lane)
- Structure 29A - Deerfield Reservoir
- Structure 32A – Northbrook Reservoir
- Structure 32B – Techny Reservoir
- Structure 32C – Glenview Reservoir

Middle Fork:

- Structure 15 – Atkinson Road Reservoir (Green Oaks)
- Middle Fork of the North Branch Reservoir (Northbrook)

Lake County

Three of these reservoirs provide flood protection to Lake County. They are designed to store floodwater in excess of a bypass rate until river stages have receded and the stored water is pumped back into the river. While these reservoirs have provided downstream flood protection, all three have caused backwater flooding to varying degrees. A recent USACE study has resulted in design modifications for Reservoirs 27 and 29A to remedy this problem.[24] A brief description of each of the Lake County reservoirs follows:

- Structure 15 is a 500-acre-foot reservoir constructed on the Middle Fork at Atkinson Road on the eastside of the Tri-State Tollway (I-94). This structure provides downstream flood relief to unincorporated Lake County, Lake Forest and Cook County. According to the engineer for the Village of Green Oaks (located west of Tollway), some residential flooding persists upstream of the reservoir along a tributary.

- Structure 27 is a 525-acre-foot reservoir constructed on the West Fork just east of I-94 and south of Duffy Lane. This structure provides downstream flood relief to Bannockburn and Deerfield, but has created backwater flood damage in Riverwoods. The emergency spillway was lowered to remedy backwater flood damage; however the Village of Riverwoods has determined that the reservoir does not currently operate as designed. It is recommended that a complete engineering review of the operations of Reservoir 27 be completed to determine the appropriate measures to reduce backwater flooding problems.

- Structure 29A is a 575-acre-foot reservoir constructed on the West Fork at Lake–Cook Road. This structure provides flood relief to Deerfield, Northbrook and Glenview, but has also created backwater flood damage in Deerfield. Modifications to this reservoir to remedy this problem include opening up the second by-pass culvert to increase stream flow, and lowering the inlet and emergency overflow spillways.

Detention Basins

A detention basin inventory was conducted in the Lake County portion of the watershed in the summers of 1998 and 1999 and supplemented in 2006. Four hundred and sixty nine basins were identified. The North Branch basin inventory was undertaken to identify maintenance and design problems with existing basins such

[24] *Stage II - Letter Report Analysis, Evaluation of Flood Relief Alternatives at Reservoirs 27 and 29A on the West Fork of the North Branch Chicago River by US Army Corps of Engineers - Chicago District, January 1997*

as shoreline erosion; inlet/outlet design and maintenance; short-circuiting and poor vegetation. Based on the field inspection, SMC sought to identify potential retrofit opportunities to rectify design and maintenance problems and improve pollutant removal effectiveness, thereby adding a water quality function to existing basins. A more detailed explanation of the detention basin inventory is included in the water quality section (3.13) along with a summary of the number and locations of the basins. Appendix G contains the entire inventory summary. Recommendations for basin retrofits can be found in the Site-Specific Action Plan in Chapter 5.

Detention basins were designed to control stormwater runoff and protect against flooding. While they have proven effective at reducing peak flows and preventing localized flood damage, detention basins have little impact on reducing the increased volume of stormwater generated from developed areas that is discharged to the North Branch. Therefore it is expected that on-site detention will prevent future localized flooding problems that are common to the watershed, but is likely to have limited effect on reducing overbank flood damage along the main stem of the North Branch. The primary cause of flood damage at thirty of the forty-seven identified flood problem areas in the North Branch in Lake County is local drainage problems, depressional location or sewer backups. Whereas seventeen of the flood problem areas have overbank flooding as their primary cause. See Section 3.15.2 for more information on the Lake County FPAI.

3.14.1.5 Regulating Runoff/Preserving Floodplains, Lake County

Lake County has an updated WDO that is designed to minimize future increases in flood peaks due to urbanization. The WDO protects floodplain storage by limiting development in floodplains and restricting development in floodways. Compensatory storage must be provided for fill in the floodplain of any stream having a tributary area greater than 100 acres, or for areas of depressional storage greater than .75 acre-feet. In addition to preserving floodplain storage, the WDO seeks to minimize urban runoff impacts by requiring stormwater detention for new impervious surface. The required storage volume for detention basins is determined by the maximum allowable stormwater release rate from a parcel that is being developed (or redeveloped). Currently the maximum release rate per the WDO for Lake County as a whole (including the North Branch) is set at 0.04 cubic feet per second per acre (cfs/acre) for the 2-year 24-hour storm event, and 0.15 cfs/acre for the 100-year 24-hour storm event. The WDO release rates are considered a minimum standard, and development sites in municipalities as well as unincorporated areas within the watershed must meet this requirement. Municipalities have the authority to establish more stringent release rates than the WDO standard.

Establishing more stringent release rates for the entire watershed may be an effective way to lower or maintain peak flows and prevent flooding problems from worsening. To review existing discharge conditions and determine whether more stringent release rates are appropriate, FIS 100-year storm event release rates for the North Branch were compiled. Estimated discharges and release rates were then determined for the locations along the river where there are known flood damage sites (see Table 3-67).

Table 3-67

North Branch Flows per Tributary Area (FIS Study)

Approximate Locations[1]	Drainage Area (acres)	100-yr. Discharge (cfs)	Release Rate/Acre (100 yr. cfs/a)	Known Flood Problem Areas[2]
West Fork				
Reservoir 29A Diversion	5,773	486	0.08	
Deerfield WWTP	4,883	608	0.12	26-01
Deerfield Road	4,122	561	0.14	
Lake Eleanor Spillway	3,533	529	0.15	
Reservoir 27 Outflow	3,034	603	0.20	
Reservoir 27 Bypass	3,034	81	0.03	
Reservoir 27 Diversion	3,034	641	0.21	
Duffy Lane	2,342	551	0.24	26-03
Half Day Road	1,619	519	0.32	
Everett Road, 3,350 ft. downstream	890	303	0.34	26-02
Everett Road	378	531	0.32	
Middle Fork				
Lake-Cook Road	13,011	1,098	0.08	25-13
Deerfield Road	12,339	1,070	0.09	25-12, 25-11, 25-08 [3]
Half Day Road, 1,750 ft. upstream	10,349	1,148	0.11	
Everett Road	8,710	1,032	0.12	25-14
Westleigh Road	8,147	1,057	0.13	
IL Route 60, downstream	7,635	1,041	0.14	
IL Route 60, upstream	7,251	975	0.13	
Mellody Road, 2,500 ft. upstream	7,014	1,004	0.14	25-04 [4]
Wisconsin Central RR, 3,750 ft. downstream.	5,952	923	0.16	
Wisconsin Central RR, 750 ft. downstream	5,107	653	0.13	
Wisconsin Central RR, 2,000 ft upstream	4,685	534	0.11	
EJ&E RR	4,301	540	0.13	
Rockland Road	3,898	423	0.11	25-07
Reservoir 15 Outflow	3,162	575	0.18	
Reservoir 15 Bypass	3,162	184	0.06	

Table 3-67

North Branch Flows per Tributary Area (FIS Study)

Approximate Locations[1]	Drainage Area (acres)	100-yr. Discharge (cfs)	Release Rate/Acre (100 yr. cfs/a)	Known Flood Problem Areas[2]
Reservoir 15 Diversion	3,162	744	0.24	
Buckley Road	1,766	531	0.30	25-05 [5]
Skokie River				
Clavey Road	13,370	1,751	0.13	
Frederickson Place, 3,200 ft. downstream	12,486	1,762	0.14	
Frederickson Place, 900 ft. downstream	11,994	1,762	0.15	
Deerfield Road, 1,450 ft. upstream	11,667	1,714	0.15	24-09, 24-10, 24-21
Deerfield Road, 3,200 ft. upstream	11,110	1,689	0.15	
Half Day Road	9,984	1,613	0.16	24-08
Old Elm Road	9,037	1,410	0.16	
Westleigh Road	8,192	1,142	0.14	24-24, 24-25
Onwentsia Road	7,904	1,106	0.14	
Deerpath Ave.	7,309	1,044	0.14	24-19, 24-23
Laurel Road, 2,250 ft. upstream	6,310	858	0.14	
Rockland Road	5,190	747	0.14	24-17
EJ&E RR	4,621	730	0.16	
Wyoming Ave., 360 ft. downstream	3,021	503	0.17	24-15,24-04
Alaska Ave.	2,816	484	0.17	24-16
22nd Street, 3,500 ft. downstream	2,714	467	0.17	

Table 3-67

North Branch Flows per Tributary Area (FIS Study)

Approximate Locations[1]	Drainage Area (acres)	100-yr. Discharge (cfs)	Release Rate/Acre (100 yr. cfs/a)	Known Flood Problem Areas[2]
22nd Street, 1,200 ft. upstream	2,394	454	0.19	24-03
14th Street, 1,500 ft. downstream	1,862	348	0.19	
14th Street, downstream	1,562	323	0.21	
14th Street, upstream	1,235	278	0.23	
14th Street, 1,350 ft. upstream	1,018	215	0.21	
Belvidere Road, 1,400 ft. downstream	832	209	0.25	24-02
Belvidere Road	832	506	0.61	
Belvidere Road, 2,600 ft. upstream	339	221	0.65	24-05

(1) + or – 100 feet upstream or downstream except where noted.
(2) Reference numbers apply to known flood problem areas in the Lake County FPAI. See Figure 3-52 for a location map. Flood Problem Areas are identified to closest discharge location for release rate calculation.
(3) These 3 sites are located along the Middle Fork between Deerfield and Half Day Roads.
(4) This site is located immediately north of Mellody Road along Lexington Drive.
(5) This site is located approximately 3,000 feet downstream of Buckley Road.

Existing watershed release rates at flood damage sites range from 0.08 cfs/acre on the Middle Fork at Lake-Cook Road to 0.65 cfs/acre on the Skokie north of Belvidere Road. Approximately one-half of the flood problem sites are in locations along the river where release rates are currently less than the WDO standard of 0.15 cfs/acre for the 100-year event. In order to prevent flood damage from worsening, allowable discharge rates for future development should not increase at these sites.

3.14.1.6 Conclusions

1) While the H&H studies utilized the best available data (topographic maps[25], aerial photographs, and existing stream flow data) and supplemental cross-sections, there were limitations with some of the data. The following issues should be addressed for future H&H analysis:

a) Further study of tributary areas is required for flood profile determinations.

b) Many sub-areas of the watershed are already fully built out as indicated by the North Branch models. Existing conditions for years 1990 and 2000 were included in the models. In order to model

[25] *The floodplain boundaries of the Middle Fork, West Fork and Skokie River were mapped using contour maps with 10, 1, and 2 foot contour intervals, respectively. More detailed topography was used for Deerfield, Lake Forest, Highland Park and Park City –as provided by the individual communities.*

conditions for 2030 (a predicted 46% increase in population of the watershed), the models should be modified with land use build-out conditions for developing/redeveloping areas of the watershed. Therefore, supplemental 1 foot contour aerial topography (orthophotogrammetric) map resources, precipitation data and as-built conditions should be incorporated into future H&H modeling efforts to ensure that all tributaries are accurately accounted for in their fully built-out condition.

c) Surveyed cross-sections were inserted where adequate topographic data (1 foot contours) did not exist. The cross-sections were verified with the recent Chicago River IDNR-OWR level circuit survey monuments. Other existing cross-sections were verified with field data. Due to the varying topographic dates and sources, any future model modifications should incorporate updated aerial photogrammetry.

2) Better stream and precipitation data is needed for the watershed; therefore additional rain and stream gages are needed at appropriately spaced locations on the river forks. Currently there are no rain gages in the Lake County portion of the watershed. Other precipitation gages are located nearby outside the watershed. Installing a rain gage in the northern portion of the Lake County watershed would improve rainfall distribution data for future modeling.

   Existing stream gages in Lake County (see Figure 3-44 for mapped locations):

   West Fork: There are no stream gages on the West Fork in Lake County - the closest gage to Lake County is at Dundee Road several miles south in Cook County.

   Middle Fork: Only one stream gage, located at Lake-Cook Road, was available for the H&H analysis on the Middle Fork in Lake County.

   Skokie River: Skokie has the most Lake County data with two stream gages - one at Westleigh Road in Lake Forest and one at Clavey Road in Highland Park.

3) A considerable amount of new development is predicted for the Lake County portion of the watershed with a 10.9% increase in population, a 10.3% increase in households and a 15.0% increase in employment projected for the years 2000 to 2030 (see Section 3.5: demographics). In order to prevent increased flood damage and stream degradation, best management practices that reduce runoff and prevent stream erosion must be aggressively incorporated into the new development projects. These practices include development design and construction that maximizes open space, minimizes impervious surfaces and increases infiltration of precipitation. (See Section 4.2.1.4 for a description of these practices.)

4) The combination of: a) better knowledge about existing flood damage sites, b) the flashy hydrology of the watershed, c) development predictions and d) state data on gauged discharges versus tributary area[26] (see Figure 3-49), indicate that a reduced 100-year allowable release rate is more appropriate for the subject watershed. Based on flood damage and current discharge information, an allowable release rate of 0.10 cfs/acre for the 100-year 24-hour storm event should be considered for the North Branch Watershed.

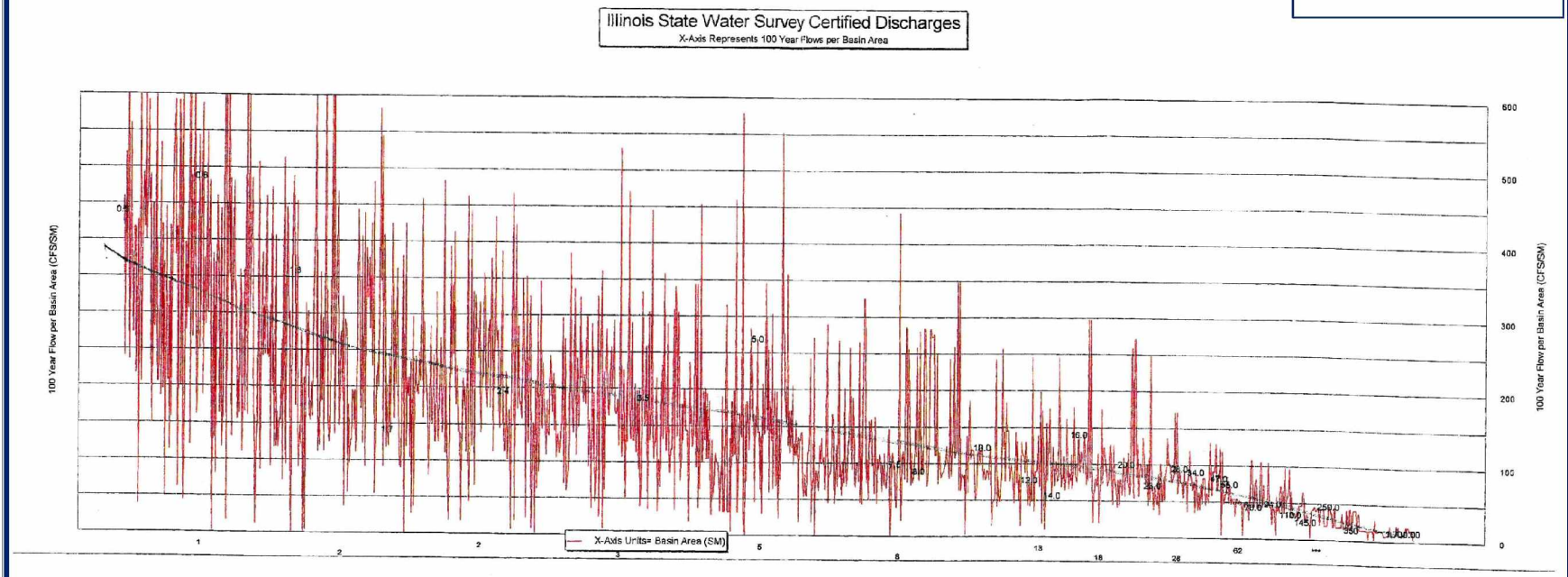
5) The flashy hydrology of the watershed combined with the increased volume of runoff due to the developments and the straightening of the stream channels in some areas have resulted in significant streambank erosion along the North Branch. Modification of detention basin outlets to reduce the release rate for smaller storm events, in combination with the application of the appropriate erosion control measure would reduce in-stream erosion.

---

[26] *Gaged discharge versus basin area graphed by the IDNR OWR based on Illinois State Water Survey certified discharges.*

Figure 3-49

Illinois State Water Survey Certified Discharges



Basin Area (SM)	CFS/ACRE
1	0.62
5	0.2
20	0.12
50	0.09
100	0.06
1000	0.05

STORMWATER MANAGMENT COMMISSION

North Branch Chicago River Watershed

Source: Lake County Department of Information and Technology, GIS and Mapping Division

Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.14.2 Flood Damage

Many residents consider flooding to be a significant problem in the watershed. Flood problems range from nuisance ponding in yards and streets to significant flooding of major travel arteries and flood damage to buildings. Flood damage costs, public health and safety risks spur resident concerns about flooding. Homeowners and businesses suffer direct economic losses when their buildings are damaged. Flooding disrupts traffic and the function of public facilities, which affects all residents. Public health and safety issues arise with risks of drowning, loss of clean water supply, traffic accidents and the cleanup of contaminated floodwaters.

The level of potential and actual flood damage in the watershed is assessed in this section using several resources:

- flood damage studies and reports;
- the Lake County Flood Problem Areas Inventory (FPAI); and
- floodplain maps and aerial photo interpretation were used to identify buildings at risk.

3.14.2.1 Studies/Reports

Watershed-wide flood damage studies were conducted in the 1970s by the USDA Soil Conservation Service[27], and the USACE in the 1980s. Reports of these studies are summarized below. In addition to these reports, individual municipalities within the watershed have sponsored flood damage studies within their municipalities. Due to the segmented nature of these studies they are not reported in this plan, but a list of known local studies can be found in Appendix I.

The IDNR and the USACE are currently working together to develop an Economic Damage Assessment Tool that can be used for the North Branch Chicago River Watershed. The development of this tool has progressed over time from a GIS based tool to a Windows based tool and now back to a GIS based tool. Although not currently available, IDNR believes the Economic Damages Assessment Tool might be ready sometime late in 2007.

Soil Conservation Service Flood Damage Data (1974)

In 1974, the US Department of Agriculture Soil Conservation Service (SCS), with the cooperation of other agencies, completed a Floodwater Management Plan and an Environmental Assessment for the North Branch Chicago River.[28] The two most common types of the identified flood problems and damage for year 2000 were residential damage (58%) and traffic disruption (21%).

Table 3-68 summarizes the impacts of flood damage due to river overbanking, and predicts average annual economic costs by the year 2000. The study only included the projected value of existing developments (in 1974) and did not make projections for development that has since occurred in the watershed. Runoff conditions based on projected development for the year 2000 were used to determine the

Table 3-68
SCS Annual Projected Flood Damage in the North Branch by the Year 2000

Type of Damage	Average Annual Cost
Residential (1002 homes)	$1,730,000
Business and Commercial (20 existing)	$29,600
Traffic Disruption (64,000 disruptions)	$623,000
Golf Courses (8 courses)	$251,500
Other Damage	$360,600
Total Average Annual Damage	$2,994,700

[27] *The Soil Conservation Service was renamed the Natural Resources Conservation Service in October 1994.*
[28] Floodwater Management Plan - North Branch Chicago River, Lake and Cook Counties, Illinois, Environmental Assessment - North Branch Chicago River, Lake and Cook Counties, Illinois, *Soil Conservation Service 1974.*

extent of flooding, however, damages were calculated using the 1973 price base and were only estimated for structures that existed in 1973-74 (assumes no damage to additional structures).

The SCS study found that most of the flood damage in the North Branch was projected for residences. The residential damage projections are broken down by subwatershed in Table 3-69. The West Fork, most developed of the three subwatersheds, had the greatest number of affected residences and the highest projected average annual costs. The Middle Fork followed the West Fork closely in the number of residences affected, but projected damage costs were considerably less than the West Fork. The Skokie had the lowest number of residences damaged by flooding and the lowest amount of projected damage cost.

Table 3-69
Projected Residential Damage by Subwatershed for the North Branch, Lake and Cook Counties

	Homes Damaged	Projected Average Annual Damage (1974 dollars)
West Fork	478	$998,000
Middle Fork	400	$475,000
Skokie River	124	$257,000

The SCS study made the following recommendations for flood damage mitigation in the North Branch:

- land treatment measures such as soil erosion and sediment control, resource conservation plans and forestry practices;
- floodproofing residences;
- stream channel maintenance;
- floodplain use regulations; and
- constructing seven structural flood control reservoirs (see Table 3-63).

US Army Corps of Engineers Flood Damage Data (1983)

The USACE used the projections and recommendations of the 1974 SCS study as a basis for a 1983 study of flooding in the North Branch watershed.[29] The following summary of projected flood damage is for both the Lake and Cook County portions of the North Branch watershed through the year 2020. The results presented assume that none of the seven reservoirs in Table 3-71 were constructed.

Table 3-70
USACE Annual Projected Flood Damage through 2020

Type of Damage	Average Annual Cost
Residential	$1,486,900
Commercial, Industrial and Municipal	95,100
Transportation	17,700
Golf Courses	111,900
Emergency Costs	61,900
Total Average Annual Damages	$1,773,500

As can been seen by comparing project damage costs in Tables 3-68, 3-69 and 3-70, USACE projected flood damage, while still substantial, was considerably lower than the projections made by the SCS study. According to the SCS study, the most common type of flood damage identified by the USACE was damage to residences (84% overall). The USACE projected that flood damage in the West Fork subwatershed would account for approximately two-thirds ($1,178,600) of the total projected annual damage ($1,773,500). The West Fork was expected to have the greatest damage for structural categories such as residential, commercial, industrial, municipal and emergency. Ninety-nine percent of the commercial, industrial and municipal damages were in the West Fork. It was also estimated that 880 residences in the West Fork, 400 residences in the Skokie and 210 residences in the Middle Fork would be damaged by the 100-year flood event if no reservoirs were built. Nineteen percent ($330,800) of the total damage was attributed to the Middle Fork, and 15 percent ($264,100) to the Skokie River subwatershed. Skokie River flooding was expected to cause the greatest damage to golf courses of the three forks. In fact, golf courses damages made up 37 percent ($98,500) of the overall average annual damage projection for the Skokie River in both counties. Table 3-62 summarizes the types of flood damage and predicted overall average annual economic costs through the year 2020 for the entire North Branch watershed in the USACE study.

3.14.2.2 Flood Control Projects

Based on the results of the SCS and USACE studies, flood control reservoirs have been constructed in Lake County by USACE at the Bannockburn site (Site 27) on the West Fork (near Duffy Lane and I-94), and Site 15 on the Middle Fork (at Atkinson Road and I-94). A third reservoir (Site 29A), constructed in Deerfield at Lake-Cook Road, primarily benefits Cook County communities (See Figure 3-50 for mapped locations). USACE predicted that the reservoirs constructed on the West Fork would reduce up to 98% of the average annual residential flood damages in the subwatershed. While the reservoirs have improved conditions, heavy rainfall run-off events in May of 1996 and February 1997 resulted in backwater flooding in Riverwoods and Deerfield upstream of reservoirs 27 and 29A. Further study by the USACE in 1996-1997 resulted in recommendations, now completed, to modify both reservoirs to reduce backwater-flooding impacts. Likewise, the Atkinson Road structure

29 Phase I General Design Memorandum, North Branch Chicago River, August 1983 by US Army Corps of Engineers - Chicago District

has provided some downstream flood relief, but has not resolved all of the flood problems. In fact, the reservoir has worsened flooding immediately upstream in Green Oaks due also to backwater flooding effects. A review of the reservoir's function is underway as part of the Tollway expansion project.

Table 3-71

Proposed/Constructed Flood Control Reservoirs North Branch Watershed

Fork	Reservoir	Location	Year Completed	Storage (acre-feet)	Total Cost (millions)
West	27♦	Duffy Lane and Interstate 94 in Bannockburn	1990	525	7.980
West	29(A)♦	Lake-Cook Road and West Fork in Deerfield	1992	575	13.898
West	32♦	3 interconnected reservoirs located north and south of Willow Road (32 A, B, C)	1979*	1590	9.143
Middle	15♦	Atkinson Road and I-94 in Green Oaks	1992	500	5.557
Middle	18	Waukegan Road and Old Mill Road in Lake Forest (Prairie Wolf Forest Preserve)		2068	12.189**
Middle	♦	Northbrook	1973	600	3.427
Skokie	4	Rockland Road and Skokie River in Lake Bluff (Lake Bluff Forest Preserve)		1800	11.458**
Skokie	7*	Half Day Road and US Highway 41 in Highland Park			
		COMPLETED TOTALS		**3600**	**40.005**

[1] From "Our Community and Flooding" October 1998, prepared by the Resource Coordination Policy Committee

♦ Reservoirs constructed at these sites. See hydraulic impoundments section (3.14) for additional information.

Although Structure 7 was proposed for construction in the 1974 SCS report, it is no longer a potential flood control site and is therefore not included on the map in Figure 3-50.

* Techny 32C was expanded in 1998 from 850 acre-ft to 1040 acre-ft.

** Estimated cost

Two sites within the watershed that are co-owned by the IDNR-OWR and Lake County Forest Preserve District (LCFPD) are still being considered for flood control reservoirs. These sites are the 84-acre Lake Bluff Forest Preserve, and a 158-acre in-holding at the Prairie Wolf Forest Preserve (PWFP). As their names imply, these sites are managed by the LCFPD. The Forest Preserve District does not actively manage any of its flood detention holdings in the North Branch although an active corps of volunteer stewards has been working to restore the ecology of the Lake Bluff site.

The Lake Bluff preserve is located to the east of the UPRR tracks (east of US Highway 41) and south of Rockland Road. Lake Bluff Open Lands Association (LBOLA) volunteers have dedicated hundreds of hours over the past 5-10 years to restoring and managing this site as a natural area. They have also contracted with Dr. Wayne Schennum to provide an ecological assessment of the site. Dr. Schennum concluded that the

Lake Bluff site serves as a critical link between the Skokie River Preserve and the Lake Forest Nature Preserve. The site was identified as having some of the oldest bur oaks in the area and contains a historically significant man-made lake designed by landscape architect Jens Jensen. The in-holding at Prairie Wolf comprises 158 acres of the 431-acre forest preserve and is located near the intersection of Waukegan Road (Illinois 43) and Old Mill Road (Figure 3-50).

In addition to the reservoirs that have been constructed and the sites still being considered for reservoirs, the 1974 SCS study also proposed a second reservoir on the Skokie at Half Day Road and Route 41 (Structure 7). A portion of the proposed Structure 7 has been converted to other uses since the SCS study was completed.

The decision whether to construct reservoirs at the Lake Bluff and Prairie Wolf sites remains to be made. IDNR-OWR, SMC and FOCR requested that the USACE conduct an economic analysis to determine whether flood damage costs justify the expense of reservoir construction at these sites. SMC will begin a flood storage feasibility study in partnership with the IDNR-OWR, and East Skokie Drainage District (ESDD) in 2008 at the Lake Bluff Forest Preserve site. If it is determined that these sites are needed for flood control, they could potentially be designed to provide water quality, recreation and habitat benefits in addition to flood damage reduction.

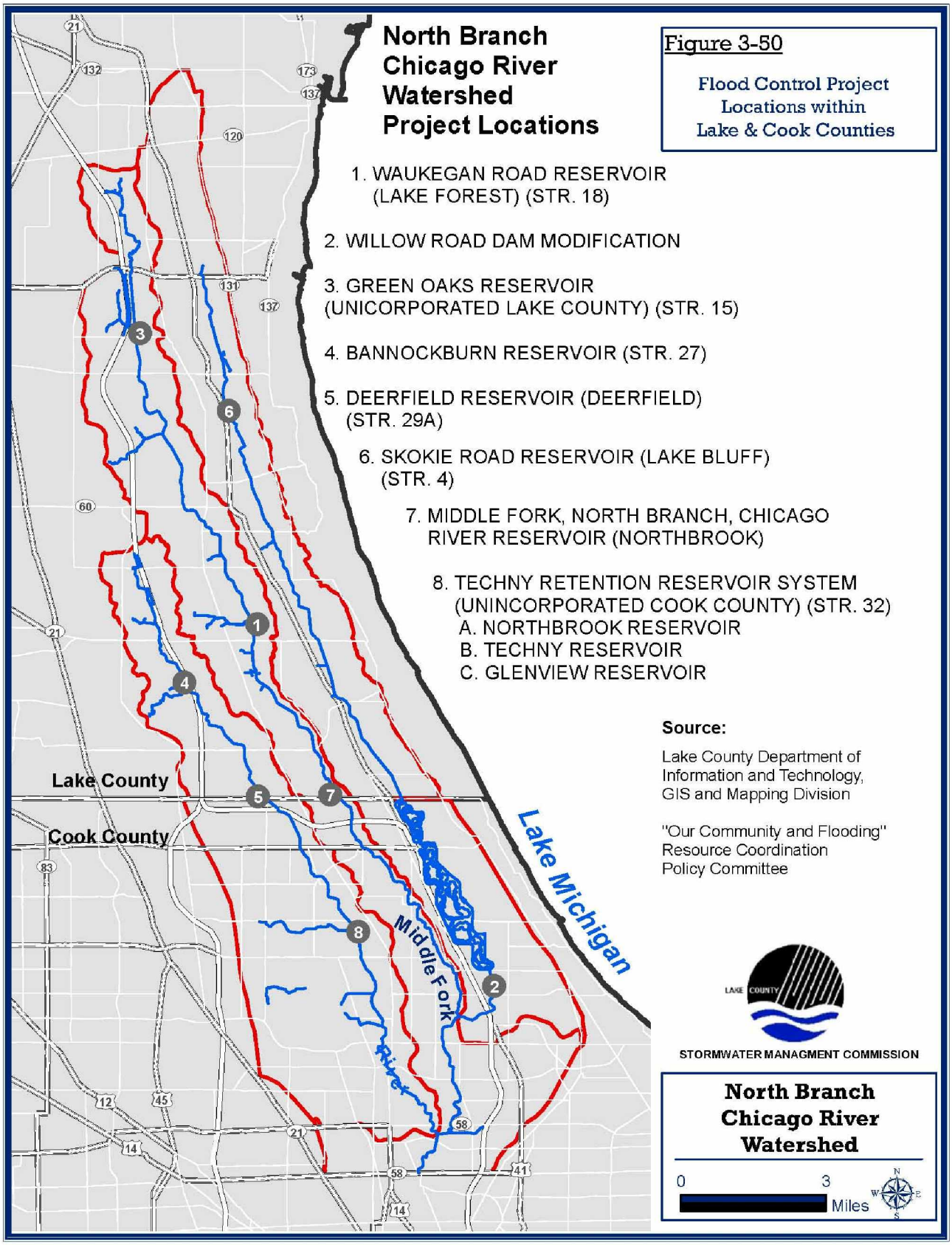
As of November 2006, the USACE has indicated that they have not performed any flood controls projects since the initial watershed plan was drafted (2000) and they do not have any current plans to construct additional flood control facilities in the watershed. It is not clear if IDNR and/or MWRD are evaluating additional flood control projects at this time.

3.14.2.3 Skokie Headwaters and North Chicago Flood Damage Reduction Feasibility Study (2006)

The Skokie Headwaters and North Chicago Flood Damage Reduction Feasibility Study was prepared by STS Consultants for SMC and cooperatively funded by SMC, the cities of Waukegan and North Chicago, Lake County Press, Inc., the ESDD, and the Foss Park District to evaluate the feasibility of flood control options for the Skokie River from its headwaters upstream of Washington Street in Waukegan south to IL Route 137 (Buckley Road) in North Chicago (Figures 3-51). A goal of the study was to identify opportunities/mechanisms for expanding existing flood storage while maintaining or enhancing existing environmental characteristics and functions. The results of the report suggest possible flood stage reductions ranging from 0.3 feet to 1.0 feet with conceptual cost estimates ranging from a little less than a million dollars to more than twenty million dollars.

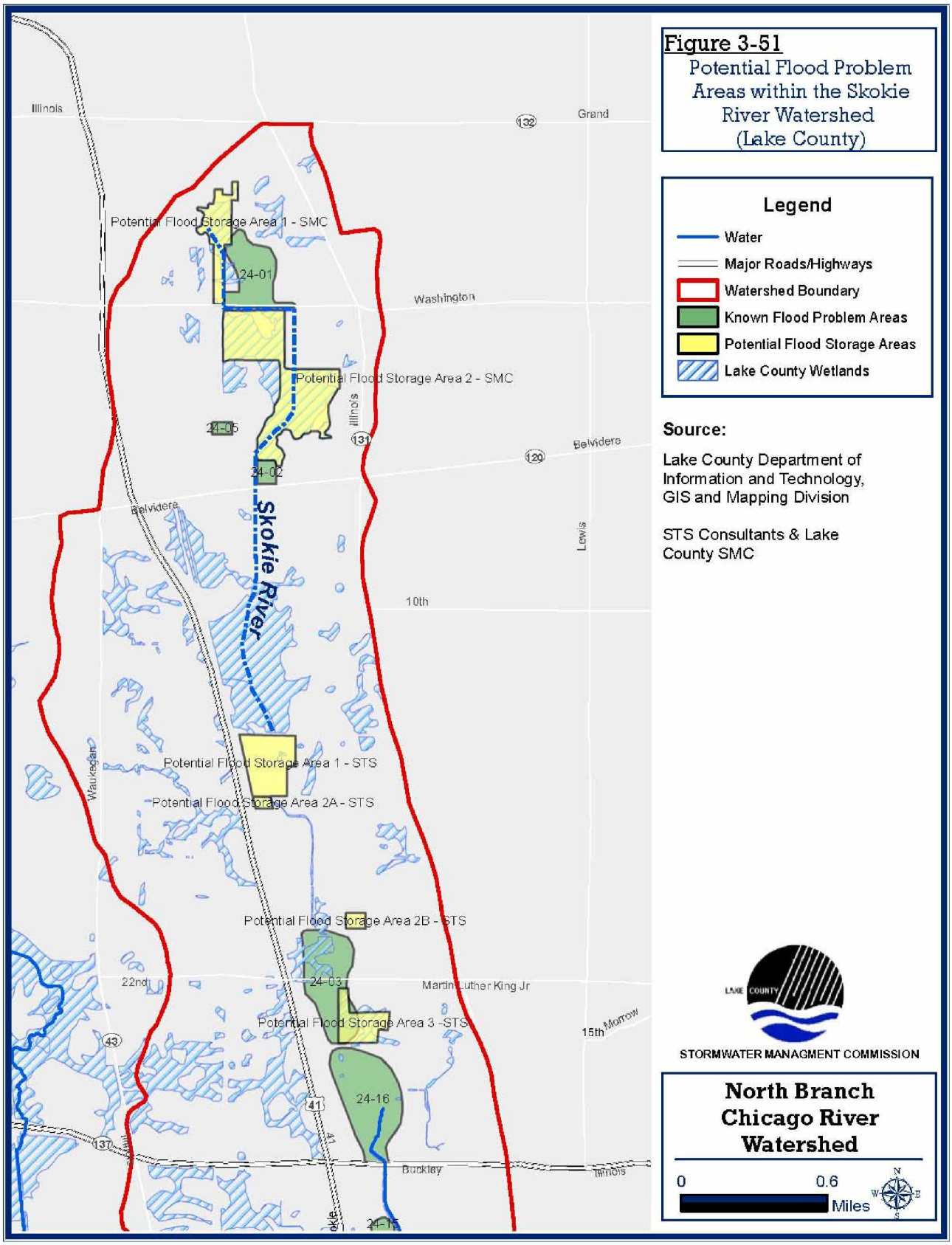
The study area included five sites that have been designated by SMC as Flood Problem Areas and are included in the FPAI (FPA 24-01, 24-05, 24-02, 24-03, and 24-16) and the study included six potential flood control sites identified by SMC. The feasibility study developed and evaluated twenty seven flood control options that ranged from stand alone projects to different combinations of projects. Each project was evaluated with respect to flood stage and discharge reduction, cost, and environmental impact or enhancement.

The report did not include the selection of a preferred flood control alternative but rather focused on the evaluation of various options. Ultimately several stand alone and combination project alternatives were identified as those projects that provide the greatest cost benefit and the least environmental impact. The implementation of any one or combination of proposed alternatives will likely require that SMC and other involved stakeholders discuss and agree on a solution that best satisfies their collective goals and objectives.



Maps to be used for Planning Purposes only.

Produced by V3 Companies



Maps to be used for Planning Purposes only.

Produced by V3 Companies

3.14.2.4 Lake County SMC Flood Problem Areas Inventory

In 1995-96, the SMC conducted a FPAI that identified 35 flood problem sites in the North Branch Chicago River watershed. Two additional flood problem sites, and enlargements of four existing flood problem areas, were identified during interviews with North Branch watershed municipalities in 1997. The two new flood problem areas (26-04 and 26-05) were added to the original Flood Problem Inventory summary.

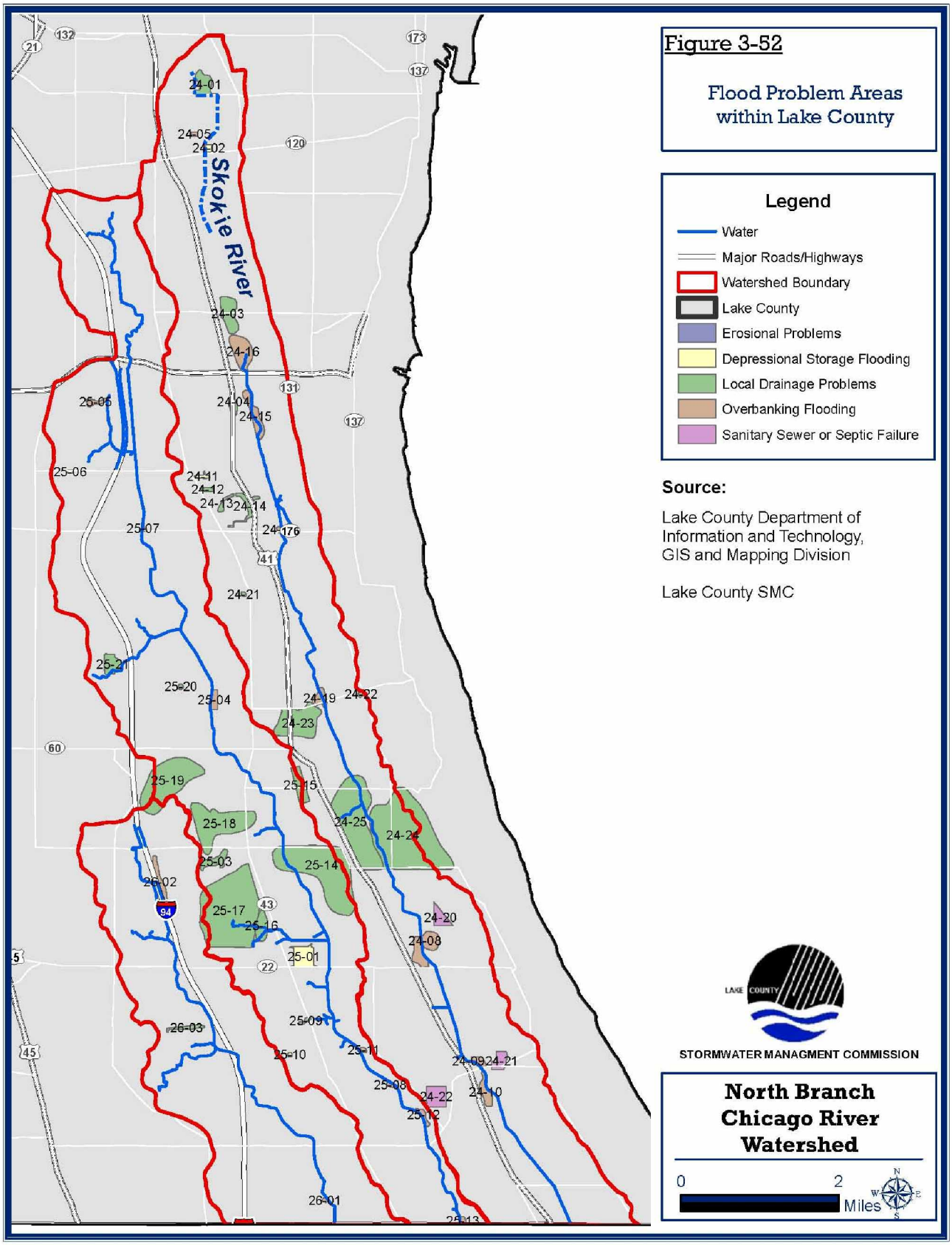
The 2006 updated Flood Problem Area Inventory enlarged and/or combined some of the previously identified flood problem sites and also included additional flood problem areas identified since the 1995-96 inventory, which resulted in an increase in flood problem sites from 37 in 1995-96 to 47 in 2005, which was the last date recorded in the inventory.

A flood problem area may include one or more buildings, roads or other infrastructure that is damaged by flooding. Each flood problem area is assigned a reference number that consists of a subwatershed identifier followed by a sequential number. See Figure 3-52 for the location of known flood problem areas in the North Branch. Twenty five of the 47 sites identified are in the Skokie River subwatershed, 19 are in the Middle Fork and 3 are in the West Fork.

For inventory purposes, flood damage was categorized by type based on the cause of flooding. The following types of flood damage occur in the North Branch and are identified on the flood problem areas map and in the summary tables that follow.

Table 3-72 includes a subwatershed summary of the FPAI aggregated by flood damage type for the North Branch. More than one type of flood damage may occur at an individual flood problem site, however only the primary cause of flooding is identified in the inventory. The type of flood problem areas identified include the following:

- depressional storage flooding
- erosional problems
- local drainage problems
- overbanking flooding
- sanitary sewer or septic failure



Maps to be used for Planning Purposes only.

Produced by V3 Companies

Depressional flooding - flooding that results from stormwater collecting in a depressional area of the landscape that either has no outlet for the water to drain, or an insufficiently sized outlet to efficiently drain the amount of collected run-off.

Local drainage problems - drainage problems that result from nearby development creating more stormwater run-off in a localized area, from poorly located or designed developments that eliminate or alter the natural water storage or drainage system, or from inadequate drainage system infrastructure.

Overbank flooding - flooding caused by water elevations that exceed the banks of a lake, river, stream or other channel and overflows onto adjacent lands.

Septic failure - when a septic field becomes saturated or flooded to the extent that it cannot adequately accept or process the wastewater it receives.

Sewer backup - stormwater infiltration into sanitary sewer lines that results in sewage backing up into streets, yards or basements.

Table 3-72

Flood Problem Sites* North Branch Chicago River Watershed

Flood damage type/ hazard	Primary cause**	% of total
West Fork		
overbank flooding	2	67
local drainage problems	1	33
Total West Fork	3	100
Middle Fork		
overbank flooding	7	37
local drainage problems	9	47
depressional flooding	3	16
Total Middle Fork	19	100
Skokie River		
overbank flooding	8	32
local drainage problems	12	48
depressional flooding	2	8
sewer back-up	3	12
Total Skokie	25	100
North Branch Total		
overbank flooding	17	36
local drainage problems	22	47
depressional flooding	5	11
sewer backup	3	6
Total North Branch	47	100

* A flood problem site may include multiple buildings, roads or other infrastructure.

** More than one type of flooding may occur at a problem site; only the primary cause of flooding is identified in the inventory.

Local drainage problems result in damage at approximately 47% of the flood problem areas and is the leading cause of flood damage in the watershed. All or a portion of 26 of the 47 problem sites in the watershed (55%) are located in mapped 100-year floodplains. Seventeen of these sites are located in mapped floodways. Twenty one of the flood problem sites in the watershed (45%) are located outside of the mapped floodplain. Poor local drainage is the leading cause of flood damage at the non-floodplain sites, followed by depressional flooding. Forty-seven percent of the flood problem sites throughout the watershed suffer from flood damage due to poor local drainage. Flood insurance is not required for properties outside of mapped floodplains, therefore it is more likely that new homebuyers may not be aware of their flood risk, and will not be adequately protected from flood damage.

In addition to identifying flood problem areas, the FPAI also involved collecting flood damage reports and claim files from local, state and federal agencies. This flood damage information was compiled for the North Branch and is summarized in Table 3-73.

Table 3-73
Flood Damage Profile for the North Branch Watershed
Flood Problem Areas Inventory, 1995

	West	Middle	Skokie	N. Branch
Buildings subject to flooding	8-44	50-95	120-216	185-340
Critical facilities at risk of closure or loss of access			7	7
Roads & bridges closed or threatened by flooding	4	10	17	31
NFIP repetitive loss properties	13 (1)	1 (2)	6 (3)	20

(1) One is located at site 26-01. Most of these properties have not had flooding problems since the flood control reservoirs were constructed on the West Fork.
(2) Located at site 25-01.
(3) One of the properties occurs at Site 24-07 in Lake Forest, and another at Site 24-06 in Highland Park. Four other properties are at scattered locations: one in Highland Park, two in Lake Forest and one in Lake Bluff.

The following flood problem areas were classified as critical areas, or priority pollutant loading areas, in the North Branch based on frequency of flooding and damage; funding has been allocated for studies or projects in many of these critical areas.

Flood problem critical areas

- Site 24-01 roughly includes the area north of Washington St. between LeBaron and Noll Avenue in Waukegan. Flooding caused by poor local drainage impacts 10-12 businesses 5-6 times per year and closes off Washington Street about every 5 years. [The Skokie Headwaters and North Chicago Flood Damage Reduction Feasibility Study provided a list of alternatives to reduce flooding in this area.]
- Site 24-03 includes the area north and south of 22nd Street between Northern Avenue and Route 41 in North Chicago. Flooding caused by poor drainage in a depressional location causes road closure and impacts Abbott warehouse and Commonwealth Edison substation. In 2006 WMB funding was provided to restore a detention pond on the Foss Park Golf Course to reduce flooding in this area.
- Site 24-04 at Route 41 & Bonaparte. Flooding caused by poor drainage results in Route 41 closure 2-3 times per year.
- Site 24-14 in Knollwood Subdivision, Shields Township has 3 apartment buildings that flood due to poor drainage following any significant rain. In 2005 funding was allocated to study the subdivision and recommend solutions to reduce flood problems.

The FPAI is a good source for information on locations where flooding is known to occur in the watershed. Much of the information used to identify flood problem areas was collected from municipalities, townships, neighborhood associations and county board members and is anecdotal in nature. The sites were later field checked to determine the likely boundaries of the areas that flood. It is expected that flood problem sites will continue to be added to the inventory as better information is collected. The FPAI currently does not provide enough detailed information for individual sites to assess alternatives and make recommendations for specific flood mitigation measures. Addresses for buildings in flood problem areas still need to be compiled in order to target these building owners for flood mitigation outreach. In addition, surveys will need to be done to determine flood depths at these locations based on the first floor elevations of structures at risk.

3.14.2.5 Preliminary Identification of Structures at Flood Risk

As part of the flood damage assessment for the original watershed report, an estimate was made of the number and types of buildings located within the 100-year floodplain of the North Branch, but only for Lake County. Over 700 buildings were identified within the floodplain during this preliminary analysis (Table 3-66). The original information compiled in Table 3-66 (2000 draft report) was derived by overlaying the digital Flood Insurance Rate Map (dFIRM) effective September 3, 1997, and the latest aerial orthophoto maps of the three subwatersheds of the North Branch Chicago River (1995 photos).

As part of the flood damage assessment for this updated report, another estimate was made of the number and types of buildings (only residential and commercial were identified) located within the 100-year floodplain of the North Branch for both Lake and Cook County. Over 1,700 buildings were identified within the FEMA mapped floodplain (Table 3-74). The updated information compiled in Table 3-66 for Lake County was derived by overlaying the dFIRM effective November 16, 2006 and the latest aerial orthophoto maps of the three subwatersheds of the North Branch Chicago River (2005 photos). For the Cook County portion of the flood damage assessment, hard copies of the FIRM effective November 6, 2000 were scanned, overlayed, and traced as an image on the latest aerial orthophoto maps (2005).

Several steps are required to complete the assessment. They include a more detailed field inventory of structures at risk of flooding, and corresponding analysis to determine the likely economic damage for a 100-year flood event.

Table 3-74.
Preliminary Identification of Structures Located in the 100-year Floodplain of the North Branch Chicago River, Lake & Cook Counties

County	Municipal Location	Residential Homes (1)	Commercial/Industrial Buildings (2)		Residential Homes (1)	Commercial/Industrial Buildings (2)
WEST FORK		**2000 Assessment**			**2006 Assessment**	
Lake	Lake Forest	5	2		8	0
	Lincolnshire	74	0		46	3
	Bannockburn	N/A	N/A		0	1
	Riverwoods	13	0		25	0
	Deerfield	52	1		73	3
	Sub-total	*144*	*3*		*152*	*7*
Cook	Deerfield	N/A	N/A		0	4
	Northbrook	N/A	N/A		65	14
	Cook County	N/A	N/A		4	8
	Glenview	N/A	N/A		183	10
	Sub-total	*0*	*0*		*252*	36
WEST FORK TOTAL		**144**	**3**		**404**	**43**
MIDDLE FORK						
Lake	Waukegan	0	0		0	1
	Green Oaks	2	5		0	0
	Lake County	0	15		9	17
	Lake Forest	10	4		34	3
	Highland Park	36	0		21	0
	Bannockburn	N/A	N/A		0	8
	Deerfield	N/A	N/A		33	1
	Sub-total	*48*	*24*		*97*	*30*
Cook	Northbrook	N/A	N/A		11	0
	Cook County	N/A	N/A		18	0
	Northfield	N/A	N/A		53	3
	Glenview	N/A	N/A		16	2
	Sub-total	*0*	*0*		*98*	*5*
MIDDLE FORK TOTAL		**48**	**24**		**195**	**35**

Table 3-74 cont.
Preliminary Identification of Structures Located in the 100-year Floodplain of the North Branch Chicago River, Lake & Cook Counties

County	Municipal Location	Residential Homes (1)	Commercial/Industrial Buildings (2)		Residential Homes (1)	Commercial/Industrial Buildings (2)
SKOKIE RIVER		**2000 Assessment**			**2006 Assessment**	
Lake	Park City	227	3		334	8
	Waukegan	0	2		0	5
	North Chicago	10	3		14	5
	Great Lakes Naval Training Center	113	2		67	0
	Lake Bluff	0	6		0	1
	Lake Forest	25	0		58	1
	Highland Park	144	29		100	14
	Sub-total	*519*	*45*		*573*	*34*
Cook	Cook County	N/A	N/A		72	5
	Glencoe	N/A	N/A		4	1
	Winnetka	N/A	N/A		342	8
	Northfield	N/A	N/A		137	5
	Wilmette	N/A	N/A		33	1
	Sub-total	*0*	*0*		*588*	*20*
SKOKIE RIVER TOTAL		**519**	**45**		**1161**	**54**
NORTH BRANCH CHICAGO RIVER TOTAL		**711**	**72**		**1760**	**132**

(1) Although residential homes were initially separated into single-family and multi-family homes in the 2000 assessment, they were combined for the 2006 assessment

(2)Commercial & industrial are combined in this study.

Follow-up steps include:

1. compiling addresses for the preliminarily list of structures;
2. determining flood depths at building locations;
3. conducting a more detailed vertical elevation survey to determine which structures are actually located within the 100-year floodplain (This elevation will be based on the individual structures reference elevation per National Flood Insurance Program (NFIP) requirements.); and
4. completing an economic assessment of flood damage based on previous steps.

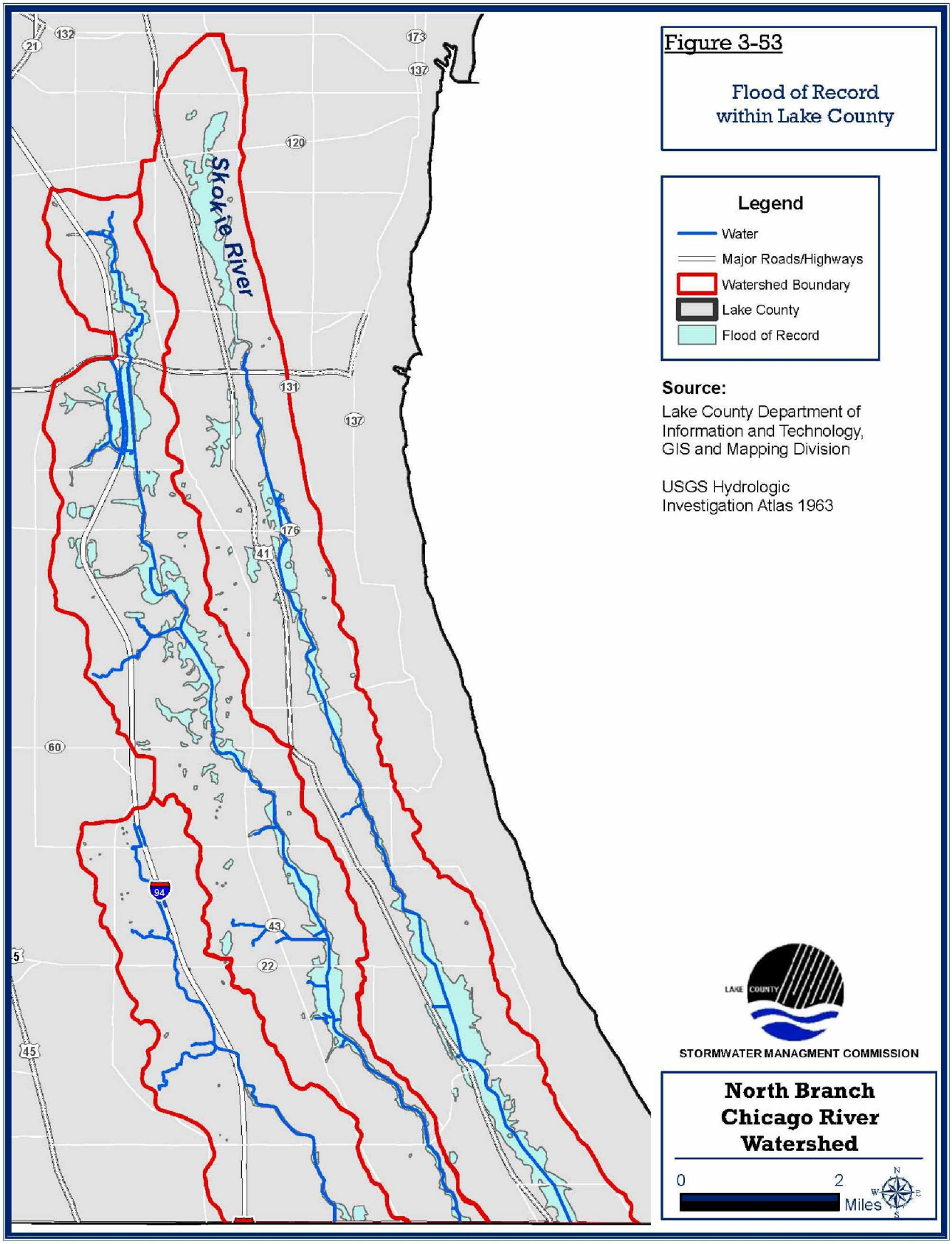
Figure 3-53 is a map of the boundaries of the floods of record for the Lake County portion of the North Branch. The flood of record for the Skokie River and Middle Fork occurred in 1938, while the flood of record for the West Fork occurred in 1957. Both the Middle Fork and West Fork experienced an approximate 50 year-year flood event for the corresponding floods of record[30]. The 1938 flood along the Skokie was

[30] *The November 16, 2006 Flood Insurance Study for Lake County indicates that on July 21-22 of 1982 over 7.5 inches of rain fell in approximately 14 hours a causing a flood event that most likely exceeded the 100-year*

estimated to be a 15-20 year recurrence interval. The current 100-year floodplain boundary exceeds the boundaries of the Floods of Record in a number of areas along all three tributaries putting even more structures at risk than have been flooded historically. An analysis of 1990 land use within the Flood of Record boundaries indicates that construction in the floodplain is not uncommon. Thirty-five percent of the 1938 and 1957 Flood of Record floodplains are now in developed land use categories such as residential, commercial, industrial, institutional or transportation/communication/utilities (Chicago Metropolitan Agency for Planning 2001 land use data).

---

frequency on the West Fork from its source to Lake-Cook Road. Unfortunately, the Hydrologic Atlas that maps the Flood of Record was developed prior to this flood event and has not been updated.



Maps to be used for Planning Purposes only.

Produced by V3 Companies

CHAPTER 4 : WATERSHED RESTORATION AND MANAGEMENT TECHNIQUES

The watershed restoration and management techniques described in this chapter, when applied to the North Branch Chicago River, can achieve the watershed goals and objectives identified in Chapter 2. The watershed techniques presented are broadly organized to reflect the plan goals of flood damage reduction, water quality improvement, natural resources protection and increased watershed coordination. Within each of the Goals Sections, the watershed measures are then categorized as being either Preventative or Remedial in nature.

Preventative measures reduce the likelihood that new watershed problems such as flooding or pollution will arise, or that existing problems will become worse. Preventative techniques generally target new development in the watershed and are geared toward protecting existing resources and preventing degradation. Planning, regulatory and administrative programs and alternative site designs are examples of preventative measures. Prevention also includes measures that protect the natural drainage system through land acquisition and conservation management.

Remedial measures are used to solve known watershed problems or improve current watershed conditions. Remedial measures include retrofitting drainage system infrastructure such as detention basins and stormsewer outfalls to improve water quality, adjust release rates, or reduce erosion. Both water quality and water quantity problems can be addressed by installing measures that improve infiltration and reduce runoff. Examples include disconnecting downspouts from stormsewers, installing biofilters and re-landscaping with deep-rooted native vegetation. Other remedial techniques range from stabilizing eroding streambanks and restoring wetlands to floodproofing and constructing reservoirs for flood mitigation.

Maintenance programs for both the natural and created drainage infrastructure could be categorized as either remedial or preventative depending on the circumstances. For instance, removing a load of debris that is blocking channel flow may remedy some localized backwater flooding, but a regular maintenance program would remove the debris before it causes a flooding problem. Under these circumstances, maintenance would be considered a preventative measure. For purposes of this document, maintenance programs are placed in the preventative category since under almost all circumstances, timely maintenance will serve to prevent future problems.

Successful application of management techniques to improve or protect watershed conditions will depend on how well information about the watershed improvement techniques and their benefits is disseminated to the appropriate watershed stakeholders (and residents). Therefore, the importance of having active education and public outreach programs that inform the public and promote good watershed management cannot be over-emphasized.

For more detailed information on the management techniques presented in this chapter, please see Appendix K.

4.1 Water Quality Measures

The IEPA has identified excess nutrients and pollutants in nonpoint source runoff from suburban land uses as the primary cause of impaired water quality in the North Branch Chicago River. In general, the diverse and diffuse nature of nonpoint pollutant sources presents a challenge for improving water quality. Therefore, to effectively address the scattered and cumulative impacts of nonpoint source pollution, various watershed improvement techniques have to be applied and implemented at numerous sites throughout the watershed.

4.1.1 Preventative Measures: Protecting Water Quality

Preventative measures will address how land needs to be developed and maintained to reduce future increases in nonpoint source pollutant loads. Traditionally, as land has been developed in a watershed, water quality has declined. If land continues to be developed in a traditional manner in the North Branch Chicago

River's watershed, it is anticipated that water quality will continue to degrade. Improvements will need to be made in development designs and in land management practices in order to protect water quality in the North Branch. Development design features are addressed in the water quality measures described below and in the following flood reduction section of this chapter. Maintaining streams and riparian buffers can also go a long way in preventing water pollution. Individual property owners play a significant role in implementing these measures, and in reducing the use of products and practices that contribute to water pollution.

Several preventative techniques for protecting water quality include:

- Regulatory requirements.
- BMPs such as vegetative filter strips, waterway buffers, swales, wetland detention basins and stormwater filters.
- Preservation of riparian buffers along streams.
- Stream maintenance program.
- Nonpoint source pollution prevention program.

4.1.1.1 Regulatory Requirements

Regulatory requirements for water quality protection can be incorporated into state and federal statutes and administrative rules, or local ordinances. Nonpoint source pollution from new developments can be most effectively addressed at the local level since local units of government are responsible for land use planning and development approvals. As a result of past problems, many local municipalities and counties have water quality provisions in development ordinances or separate soil erosion and sediment control ordinances. In addition to local controls, the federal CWA includes several requirements directed at nonpoint source pollution. Water quality impacts are considered in stormwater permits for large municipalities, wetland permitting (Section 404) and with soil erosion and sediment control requirements for new developments (Rule 5).

Lake County Watershed Development Ordinance

Lake County has a Watershed Development Ordinance (WDO) with three primary requirements that address water quality. One requirement is to use BMPs to treat at least 0.01 inches of runoff for every one percent of impervious surface for a development, with a minimum volume equal to 0.2 inches of runoff (e.g. 20% or less impervious = 0.2 inches treated; 50% impervious = 0.5 inches treated; 90% impervious = 0.9 inches treated) before releasing it to the drainage system. The ordinance does not dictate how water quality treatment should be done; it only requires that these runoff quantities be treated. The WDO generally references the Lake County SMC's Technical Reference Manual for design guidance on water quality treatment BMPs.

The second WDO requirement is the installation of soil erosion and sediment control measures on building sites to prevent erosion, or at minimum, to prevent sediment from leaving the site. Soil erosion/sediment control requirements include the use of filter barriers, sediment traps, settling basins, side slope stabilization, filters on stormsewer inlets, and temporary and permanent vegetative stabilization. Filter barriers (such as silt fence) are required for disturbed areas that drain less than one acre. Sediment traps are required for disturbed areas that drain from 1-5 acres, and sediment basins are required for disturbed areas greater than five acres.

The third WDO water quality requirement is to provide buffers for waterbodies that filter sheet flow runoff before it drains into the waterbody. This requirement applies to streams, rivers, wetlands and lakes. See Sections 4.1.1.3 and 4.3.1.4.4 for more detailed information on buffer requirements.

The WDO does not include performance standards for the required BMPs. Therefore, while the effectiveness of various BMPs has been documented, variability in the application, maintenance and monitoring of the BMPs leads to variable results for preventing water quality impacts from development. Recent WDO amendments have improved the clarity of what level of water quality treatment is required by the WDO, and have improved enforcement procedures. A 1999 amendment to the soil erosion/sediment control provision requires

on-site pre-construction meetings prior to the commencement of earthmoving. In 2006, another amendment to the Ordinance requires hiring or employing a Designated Erosion Control Inspector for any development that exceeds ten acres of hydrologic disturbance or exceeds one acre of hydrologic disturbance if floodplain, wetland, or Waters of the US are located on the site. It is anticipated that the water quality amendments will result in more consistent implementation of BMP requirements for water quality protection by all of the watershed communities.

Other Regulatory and Planning Considerations

Water quality improvements can be achieved through other regulatory and planning mechanisms, including:

Conservation Land Planning: Nationwide, many communities are now embracing the concept of conservation design under the name Better Site Design (BSD). This concept was formalized at a National Site Planning Roundtable created by the Center for Watershed Protection in 1997. BSD techniques incorporate development principles designed to reduce impervious cover, minimize site clearing and grading, and preserve native vegetation. Under a BSD program, a municipality can require or encourage a developer to do site planning and design that preserves existing natural areas and uses naturalized drainage and detention measures for stormwater management. For instance, over a decade ago Lake Forest amended its zoning code with an overlay map showing lands on which the municipality strongly encouraged developers to cluster structures and save natural features. Such ordinances can also include density bonuses for good site design and/or a promise of rapid review of a conservation land plan through the approval process. Conservation land planning is now used nationwide as a major tool to protect natural resources. The underlying density allowed on a property is rearranged in the development plan to protect natural resources. Some communities allow density bonuses (more units) for such planning.

Floodplain Zoning: These are regulations established to protect stream corridors and floodplain from development and other encroachments. Several municipalities in the North Branch Chicago River watershed specifically prohibit any floodplain development: for years Lake Forest had such an ordinance without, at the time, any real jurisdictional backup. Currently, the Lake County WDO appropriately restricts and controls this matter for all of Lake County. Based on the WDO, no development is allowed in the regulatory floodplain that will create a potentially damaging increase in flood heights or velocity or will impair the natural hydrologic functions of the floodplain. In cases where floodplain disturbances are unavoidable, all negative impacts must be mitigated. Compensatory storage is required for all storage lost or displaced due to development at a ratio of 1 to 1.2 (fill to cut). The WDO also requires building protection with the lowest floor of a new residential structure having an elevation at least equal to the Flood Protection Elevation (FPE.)

Community Open Space Plans: These are regional (NIPC, 1992, 1997) and municipal plans specifically designating linear open space and/or natural areas to preserve significant natural features and accommodate aesthetic, recreational, and/or transportation uses, including trails. To date, the bulk of existing trails and greenways have been created by the forest preserve districts, land trusts in Lake Bluff and Lake Forest, and the Lake County Division of Transportation (LCDOT) through the use of the U.S. Transportation Enhancement Act funds.

- *Open Space Plans*: This report found no communities with formal open space plans, although this issue did figure generally in several comprehensive plans (Glenview, Northbrook). Lake Forest and Lake Bluff, largely through the efforts of their local land trusts, have informal plans which amount largely to those land trusts pursuing open space opportunities through the private sector. Glenview is currently in the process of adopting a Natural Resources Plan in which many of the components are similar to those in an open space plan.
- *Greenway Plans*: Highland Park appears to be the only community with a formal greenway plan, although Glenview specifically touches on this subject in its comprehensive plan.
- *Trail Plans*: Bannockburn, Highland Park, and Lincolnshire provided this study with specific local trail plans, and North Chicago has an unofficial regional trail proposal. Also, Glenview has adopted a Bike and Sidewalk Master Plan that includes components on both greenway and trail plans.

These plans should also urge the adoption of intergovernmental agreements to coordinate the protection and restoration of open space/trail/greenways areas. The North Branch Open Space Plan, completed in 2005, provides open space recommendations for the entire watershed.

Impervious Area Reduction: These are regulations requiring reduced street widths and building setbacks and encouraging alternative to traditional parking lot and building design. They allow communities to have, for instance, more narrow streets that still provide proper access. To date few municipalities have adopted these, since traditional engineering practices and long-standing public safety (police/fire) policies regarding rapid access to all developed areas still takes precedence. For example, several municipalities such as Lake Forest have allowed reduced rights-of-way (from 66' to 50') in conservation subdivisions.

Some communities also promote the reduction in impervious surfaces by granting developers structural facility size reduction credits, which encourage the use of non-structural water management practices on new sites.[31]

4.1.1.2 Water Quality Best Management Practices

A number of BMPs such as vegetative filter strips, buffers, swales, wetland detention basins, stormwater filters, rain gardens and low impact or conservation development can be incorporated into new developments or redevelopment projects to reduce water quality impacts. Several of these practices have been described in previous sections. To choose an appropriate BMP, it is essential to determine in advance the objectives to be met by the BMP and to calculate the cost and related effectiveness of alternative BMPs. Once a BMP has been selected, expertise is needed to insure the BMP is properly installed, monitored and maintained over time. BMPs to consider for the North Branch and their potential effectiveness in meeting water quality objectives are found in Table 4-1.

Tables 4-2 and 4-3 depict percentage pollutant removal rates for different BMPs from data collected and reported by the Center for Watershed Protection. These removal efficiencies are based on one hundred twenty-three performance monitoring studies that the Center for Watershed Protection compiled into a database. Because performance can be extremely variable within a group of BMPs, estimates of BMP performance should be considered as a long-run average, not as a fixed or constant value. (Schueler 1995, Claytor & Schueler 1996, Schueler 1997, Center for Watershed Protection 1998, Price & Dreher 2000).

[31] *See Maryland's* Stormwater Design Manual *and Pennsylvania's* Handbook of Best Management Practices for Developing Areas.

Table 4-1 BMP Effectiveness toward Meeting BMP Objective

BEST MANAGEMENT PRACTICE	Runoff Rate Control	Runoff Volume Control	Physical Habitat Preservation	Sediment Pollution Control	Nutrient Control	BOD Control	Other* Pollutant Control
Impervious Area Reduction	2	2	2	2	2	2	2
Impervious Area Disconnection	2	2	1	2	2	2	2
Filter Strips	2	2	2	2	2	2	2
Swales	2	2	1	2	2	2	2
Infiltration Devices	2	3	1	3	3	3	3
Porous Pavement	2	2	1	3	3	3	3
Wet Detention	3	1	2	3	2	3	2
Wetland Detention	3	1	2	3	2	3	2
Dry Detention	2	1	1	2	1	1	1
Settling Basins	2	1	1	2	2	2	2
Water Quality Inlets	1	1	1	2	1	1	1
Sand Filters	1	1	1	3	2	2	2
Rock Outlet Protection	1	1	2	2	1	1	1
Storage Area Cover	1	1	1	2	2	1	2-3
Street Sweeping	1	1	1	1-2	1	1-2	1-2
Source Controls	1	1	1	1	2	2	2
Stream Protection/ Restoration	2	1	3	2	2	2	1
Wetland Protection/ Restoration	2-3	2-3	3	2-3	2	2-3	2

Effectiveness Key:
3 = Fully achieves objective
2 = Partially achieves objective
1 = Does not achieve objective
* Other pollutants include toxic compounds such as heavy metals and pesticides, fecal bacteria, petroleum based hydrocarbons and deicing materials such as salt. A "2" in this column indicates that the BMP controls some of these pollutants but not others.
Source: Dreher 1994

Table 4-2
Comparison of Median Pollutant Removal Efficiencies

Best Management Practice	No. of studies[1]	Total Suspended Solids	Total P[2]	Soluble P[3]	Total N[4]	Nitrate	Carbon[5]
	Median Stormwater Pollutant Removal Rate(%)						
Detention pond	2	7	10	2	5	3	(-1)
Dry ED* pond	6	61	19	(-9)	31	9	25
Wet pond	30	77	47	51	30	24	45
Wet ED* pond	6	60	58	58	35	42	27
PONDS [A]	36	67	48	52	31	24	41
Shallow marsh	14	84	38	37	24	78	21
ED* wetland	5	63	24	32	36	29	ND
Pond/wetland	11	72	54	39	13	15	4
WETLANDS	35	78	51	39	21	67	28
Surface sand filters	6	83	60	-37	32	(-9)	67
FILTERS [B]	11	87	51	-31	44	(-13)	66
CHANNELS	9	0	(-14)	(-15)	0	2	18
SWALES [C]	9	81	29	34	ND	38	67

* ED = extended detention
[1] Number of performance monitoring studies.
[2] Total P = total phosphorus
[3] Soluble phosphorus as measured as ortho-P, soluble reactive phosphorus or biologically available phosphorus.
[4] Total N = total nitrogen
[5] Carbon = measure of organic carbon (BOD, COD or TOC)
[A] Excludes conventional and dry ED ponds.
[B] Excludes vertical sand filters and vegetated filter strips
[C] Includes biofilters, wet swales and dry swales

Table 4-3
Median Pollutant Removal Reported for Selected BMP Groups: Fecal Coliform, Hydrocarbons and Selected Trace Metal

Best Management Practice	Bacteria [E]	Hydro-Carbons [F]	Cadmium	Copper	Lead	Zinc
	Median Stormwater Pollutant Removal Rate (%)					
Detention and Dry ED* Ponds	ND	ND	54	26	43	26
Ponds [A]	65	83	24	57	73	51
Wetlands	77	90	69	39	63	54
Filters [B]	55	81	--	34	71	80
Channels	0	ND	55	14	30	29
Swales [C]	(-50)	62	42	51	67	71

* ED = extended detention
[A] Excludes conventional and dry ED ponds.
[B] Excludes vertical sand filters and vegetated filter strips
[C] Includes biofilters, wet swales and dry swales
[D] The number of studies is less than 5 for some BMP groups for bacteria, TPH, Cd and medians should be considered provisional.
[E] Bacteria values represent mean removal rates.
[F] Hydrocarbons measured as total petroleum hydrocarbons or oil/grease.

4.1.1.3 Riparian Buffers

Maintaining riparian buffers along stream and river channels can reduce some of the water quality and habitat degradation effects associated with increased imperviousness (and runoff) in the watershed. Riparian buffers provide hydrologic, wildlife habitat, recreational and aesthetic benefits as well as water quality functions. Sediment, phosphorus and nitrogen are at least partly removed from water passing through a naturally vegetated buffer (see Table 4-4). The percentage of pollutants removed depends on the pollutant load, the type of vegetation, the amount of runoff and the character of the buffer area. The most effective buffer width can vary along the length of a channel. Adjacent land uses, topography, runoff velocity and soil and vegetation types are all factors used to determine the optimum buffer width. Where a standard width is needed for regulatory purposes, 100 feet is considered a minimum buffer width for typical surface water requirements. Wider buffers are recommended for more sensitive areas (Mitchell 1996).

TABLE 4-4
Potential Pollutant Removal Capability of Urban Stream Buffers

Pollutant	Potential ** Removal Rate
Sediment	75%
Total nitrogen	40%
Total phosphorus	50%
Trace metals	60-70%
Hydrocarbons	75%

* From: Center For Watershed Protection, Site Planning for Urban Stream Protection, 1995.

**Potential removal rate based on combined 25-foot grass strip in outer zone and 75 foot forested buffer in middle and streamside zone.

The WDO requires the designation of linear buffers along all stream channels. When the channel has a watershed greater than 20 acres but less than one square mile, the required buffer width is 50 feet on each side of the channel. When the channel has a watershed greater than one square mile, a 30-foot buffer is required. Streams with an IBI rating greater than 40 require a 100 foot buffer. SMC's buffer requirements are considered to be the minimum standard for the county. Individual communities have the option of adopting wider buffer requirements.

Several state and federal programs exist to provide incentives for maintaining riparian buffers. The Wetlands Reserve Program makes funding available for the purchase and restoration of wetlands and riparian buffer connections between wetlands. Property tax incentives for conservation also include reduced assessments for land dedicated to open space, conservation easements on natural areas and common areas in developments through the Real Property Conservation Rights Act and the Natural Areas Preservation Act.

4.1.1.4 Stream Maintenance

Stream maintenance includes an ongoing program to remove blockages caused by accumulated sediment and overgrown weedy, non-native vegetation or debris, along with the repair of eroded streambanks. Debris refers to a wide range of materials that may include tree limbs and branches that accumulate naturally and large items of trash or lawn waste accidentally or intentionally dumped into channels or drainage swales. Routine clearing of debris from streams is a cost effective measure to prevent flooding. In addition to sediment and debris removal, stream maintenance can also involve using BMPs to stabilize eroding streambanks. However, stream maintenance activities normally do not alter the shape of the channel (Dreher and Heringa 1998; Stowe and DuPage County 1991; Wildlife Society 1983; IDNR 1983).

In Lake County, parks, public works or highway departments, the Forest Preserve District and/or drainage districts (where rights-of-way are established or easements have been granted) generally are responsible for channel maintenance. All three forks of the North Branch are incorporated into four drainage districts. Maintenance activities vary considerably in each depending on the level of interest and funding availability. The WSDD continues with regular stream checks and deals with reports of blockages from villages. The East Skokie Drainage District (ESDD) completed their channel cleaning project within three years and have been maintaining clean-up rather than intermittent massive clean up jobs. They have been working on bank restoration for water quality and flow in Highland Park, Lake Forest, and have plans for a North Chicago project. The ESDD has also focused on cooperating with other organizations such as the Lake County SMC.

Channel maintenance and restoration have been a component of several river and stream projects in other parts of Lake County. These projects include the pool/riffle installation at the Waukegan River restoration project, and the bioengineering techniques for streambank stabilization along sections of Flint Creek in Barrington and Lake Zurich. See North Branch website for watershed examples, www.co.lake.il.us/smc/planning/NorthBranch.

The SMC has developed "A Citizen's Guide for Riparian Area Management", which educates landowners about debris removal and riparian landscaping. There are currently no coordinated program or maintenance standards established at the county-level for stream maintenance. Maintenance is typically done as needed in response to problems or complaints about blockages or erosion. SMC anticipates adopting environmentally friendly stream maintenance standards in the future to provide guidance and consistency for projects throughout Lake County.

4.1.1.5 Nonpoint Source Pollution Prevention Program

Pollution prevention or source reduction programs reduce the generation and exposure to the elements of pollutants that collect on streets, parking lots and other surfaces and eventually wash into streams, rivers and lakes. Because nonpoint source pollution is generated in relatively small amounts from numerous sites (including homeowner's lawns and driveways, schools, construction sites and businesses), the most effective source reduction programs are community programs that include a combination of regulation, guidance and education.

Source controls keep pollutants from entering the stormwater in the first place. In most cases, source controls are more cost effective than structural water quality BMPs to reduce pollutant loading. However, a combination of source reduction and structural BMPs are usually the most effective method to control pollution from runoff.

Source reduction is simply changing everyday practices to reduce the quantity of pollutants that end up on the land and in the water. In addition to reducing pollutant inputs, pollution prevention programs also recommend using environmentally friendly products and changing the timing of some activities to minimize the amount of materials that wash off. Opportunities to reduce pollutant loads are numerous and range from recycling and reducing applications of lawn chemicals to driving less and minimizing road salt usage. Some common source reduction opportunities are listed in Table 4-5.

Table 4-5 Source Reduction Activities	
Source Reduction Activity	**Who's Responsible**
1. Collect and recycle crankcase oil	homeowners, business, government
2. Reduce pesticide and fertilizer applications to lawns	homeowners, business, government
3. Don't litter	everyone
4. Clean up and properly dispose of pet wastes	homeowners
5. Properly store and dispose of household chemicals	homeowners
6. Remove illegal and improper connections to storm drains	homeowners, business, government
7. Landscape yards and business grounds to reduce runoff	homeowners, business, government
8. Maintain septic tank properly	homeowners
9. Direct downspouts from paved surfaces	homeowners, business, government
10. Install rain barrels	homeowners
11. Sweep up rather than hose off to clean	homeowners, business, government
12. Sweep street gutters and keep stormsewer inlets clean of leaves and trash	homeowners, business, government
13. Prevent erosion	homeowners, business, government
14. Minimize quantity of road salt used	businesses, government

4.1.2 Remedial Measures: Improving Water Quality

Water quality in the North Branch Chicago River can be improved using a number of retrofitting techniques. Retrofitting refers to modification of existing stormwater control structures including detention basins and conveyance systems such as ditches and stormsewers. These structures were originally designed to improve drainage and reduce flood risk, but they can also be retrofitted to improve water quality. This section will focus on the retrofit of existing detention basins, stormwater outfalls and stabilizing streambanks to improve water quality.

4.1.2.1 Detention Basin Retrofits

The goal of detention basin retrofitting is to enhance the basin's water quality values by changing its functional design so it collects and filters sediment and other pollutants from stormwater while it is being stored. Existing detention basins can be retrofitted in several ways to improve water quality. Water flows can be adjusted by reducing release rates for more frequent rain events to provide more time for settling. For even better results, the outlets on dry bottom detention basins can be altered to create wet bottom (or wetland) basins that significantly improve water quality. Wet detention basins hold some level of water all of the time. Wet basins can store the first flush of runoff from impervious surfaces and allow sufficient time for sediment and other solids to settle out to the bottom of the basin. This settling process results in cleaner water being discharged from the basin than the inflow stormwater. Wetland plants in the basin aid in the water cleaning process by trapping, absorbing and transforming nutrients, solids and metals from the inflow stormwater. Therefore, the primary detention basin retrofit goals are to increase the residence time for stormwater in the basin so that pollutants can settle out; and using wetland vegetation in the basin in combination with deep-rooted plants around the basin to filter, absorb and transform pollutants and reduce erosion.

Redesigned detention basins also offer opportunities for improving the aesthetics of the basin, discouraging nuisance geese and providing habitat for other wildlife. Turf grass on the side slopes can be replaced with

deep-rooted native vegetation to stabilize slopes and discourage nuisance geese and related pollution. For the best results, all of these techniques can be combined along with excavation of micro-pools and establishment of wetland vegetation in the basin to provide multiple benefits. Constructed wetland detention basins (detention wetlands) use features found in natural wetlands and lakes. They are designed with shallow shoreline slopes, emergent wetland vegetation and open water areas. Detention wetland designs allow for water quality improvement through filtration of runoff by vegetation and by allowing water to pool so sediment can settle out. Detention wetlands also provide more habitat for plants and animals and are often more aesthetically pleasing. Detention wetlands generally require less maintenance than traditional designs, and are also less attractive to nuisance geese (Price and Dreher 1995, 1997; Price, Dreher and Schaal 1994; Terrene Institute 1994)

The North Branch watershed includes hundreds of detention basins constructed to temporarily store excess stormwater runoff to reduce flood peaks. When properly designed, constructed and maintained, detention basins control stormwater release rates from developed sites. Although most were originally constructed as single purpose facilities for flood reduction, many of these basins can be retrofitted to significantly reduce water pollution from lawns, streets, sidewalks, parking lots and rooftops before it is discharged into the river.

4.1.2.1.1 North Branch Detention Basin Inventory, Lake County

A detention basin inventory was conducted in the Lake County portion of the watershed in 1998 and 1999, and supplemented in 2006 to document existing conditions in the basins, and to identify opportunities for detention basin retrofits. More than 450 basins in ten Lake County North Branch municipalities were surveyed in the field. (See Table 4-6 for a summary.) Two of the municipalities (Highwood and Gurnee) currently do not have any detention basins located in the North Branch watershed.

During the inventory North Branch detention basins were physically located in the field, photographed and identified as one of four design types; dry bottom; wet bottom; wetland; and underground. In addition to identifying basin type and location, maintenance and design problems such as shoreline erosion, clogged inlets/outlets and short-circuiting (water rushing straight through the basin rather than being stored for a period of time) were recorded.

Table 4-6
North Branch Chicago River Watershed Detention Basins

Municipality	West	Middle	Skokie	Total
Bannockburn	18	27		**45**
Deerfield	24	5		**29**
Green Oaks		37		**37**
Highland Park		13	104	**117**
Lake Bluff			22	**22**
Lake Forest	15	68	22	**105**
Lincolnshire	26			**26**
Mettawa	3	1		**5**
North Chicago			17	**17**
Park City			3	**3**
Riverwoods	2			**2**
Waukegan		14	25	**40**
Unincorp Lake Co	**5**	**10**	3	**18**
Unspecified				**3**
Total	**196**	**175**	**93**	**469**

Detention Basin Inventory Findings
Appendix G is a table that includes a description for each of the 469 detention basins that were inventoried in the North Branch. A summary of the inventory findings follows.

Basin Type and Pollutant Removal Effectiveness
In general, provided there are no design problems such as short circuiting, wet bottom and wetland detention basins are considered to have positive water quality benefits (or 'good' pollutant removal effectiveness). Of the detention basins inventoried in the North Branch, 301 (or nearly 65%) are wet bottom basins. Twenty-eight of the basins (6% of total) are wetland basins - in a few cases natural wetlands were used for detention purposes. Therefore, over two-thirds (70 percent) of the basins in the North Branch (329 basins) have the potential to be fairly effective at removing pollutants from runoff. In reality, of the 223 wet basins, 65 basins (22 percent of total wet basins) had only fair pollutant removal effectiveness due to design problems such as short-circuiting and low-flow bypasses made of concrete or other materials. Of the 28 wetland basins, eight had similar problems that reduced their pollutant removal effectiveness to the fair level (Table 4-7).

Table 4-7
North Branch Chicago River Watershed Detention Basin Types & Pollutant Removal Effectiveness

			Pollutant Removal		
Type	**No.**	**%**	**Good**	**Fair**	**Poor**
Wet bottom	301	64	236	65	0
Wetland	28	6	20	8	0
Dry bottom	68	14	0	0	68
Underground	49	10	0	0	49
Unspecified	12	3	0	0	12
Under Construction	11	2	n/a	n/a	n/a
Total	**469**		**259**	**73**	**128**
Percent of Total			45%	21%	32%

Of the remaining 140 basins, 68 are dry bottom detention basins and 49 are underground (presumably in concrete vaults). Twelve basins were unspecified and eleven were under construction (or located on a site under construction) at the time of the inventory. All dry bottom detention basins are assumed to have poor pollutant removal effectiveness, and unless specifically designed with water quality features (such as sand filters), the 49 underground basins are expected to provide no water quality benefit at all.

Key Problems with Detention Basin Design and Maintenance

The detention basin inventory included assessing each basin in the field for several key design and maintenance problems:

Shoreline and side slope structure and condition: 55 of the 329 wet and wetland basins exhibited moderate or high levels of shoreline erosion at the water line. 40 of the 55 basins with moderate or high erosion had riprap side slopes. In all, 126 basins (or 27% all basins) had riprap side slopes.

Turf grass: Turf grass is not the best vegetation choice for use in detention basins. It is relatively intolerant of frequent wetting and drying, conditions common to detention basins. Turf grass also attracts nuisance geese. Of the 469 detention basins inventoried, 304 basins (65% of all basins) had turf grass on all or part of the side slopes and 61 also had turf grass on the basin bottom.

Turbidity: 79 of the wet and wetland detention basins exhibited moderate or high levels of turbidity. These turbidity problems are most likely due to shoreline erosion or erosion upstream of the basin. All 79 of the turbid basins exhibited at least some degree of shoreline erosion.

Excess algae: 61 of the wet and wetland basins had moderate or high algae problems that were likely due to nutrient loading from upstream and surrounding land uses.

Excess sediment accumulation: Only 3 of the 68 dry detention basins exhibited excess sediment accumulation. Sediment accumulation was noted at 23 of the wet and wetland basins.

Inlet or outlet problems: Of the 469 detention basins that were inventoried, two-thirds (316 basins) exhibited deficiencies or problems with at least one inlet and/or outlet. Some of the problems identified include scour or erosion around the inlet or outlet, inlet/outlet location, lack of restrictor or restrictor size, or lack of a trash rack on the outlet.

Paved low-flow channels: Nine basins were constructed with concrete low-flow channels. These channels immediately pass runoff (with pollutants) downstream rather than allowing it to be filtered by vegetation. Concrete channels also preclude low flow runoff from infiltrating into the ground. The basins with paved low-flow channels were rated as having poor pollutant removal effectiveness.

Illicit connections: Only 7 of the 469 basins exhibited evidence of potential illicit upstream connections. The seven cases all appeared to be minor problems.

Poor drainage in areas intended to be dry: Of the 69 dry detention basins, 21 (30%) exhibited wet conditions in areas that were intended to be dry bottom basins.

Potential Detention Basin Retrofit Opportunities for the North Branch

Several different types of retrofit opportunities were identified during the detention basin inventory:

DETENTION BASIN RETROFITS

- Modify outlet to reduce release rate for smaller storm events.
- Eliminate low-flow bypass channels and replace with meandering vegetated swales.
- Install berms to lengthen flow path and eliminate short-circuiting.
- Install stilling (or settling) basin at inlets.
- Replant basin bottom with wetland plants.
- Create wetland shelf along the periphery of a wet basin to stabilize shoreline, filter pollutants and provide habitat.
- Plant native grasses and flowers on the slopes and in a buffer around the basin to stabilize the soil, discourage nuisance geese and provide habitat for other wildlife.

Create wet or wetland basin: Dry basins can be converted to wetland basins by excavating portions of the basin bottom to create wetland pockets and/or redesigning the outlet to allow for some water retention and planting wetland vegetation. Settling (or stilling) basins could be installed at the inlets and the basins planted in native vegetation. The increase in pollutant removal effectiveness will be a function of the volume of stormwater stored as the first flush size and the length of time it is stored. The excavated wetland pocket(s) as well as the extent to which native vegetation is used in the basin and buffer areas will also be determinants in pollutant removal effectiveness.

Remove concrete channels and low flow channels: Concrete channels could be removed and converted to vegetated swales or filled in to allow water to spread out throughout the basin. After the concrete is removed, the newly created swale and existing low-flow channels in other basins (not constructed of concrete) could be planted in native vegetation to improve infiltration and pollutant removal rates.

Retrofit basins to reduce short-circuiting: Basins with severe short-circuiting problems can be retrofitted by adding a berm or other structure to prevent water from flowing directly from the inlet to the outlet. Increasing the length of the flow path should increase pollutant removal effectiveness especially if the basin is planted in native vegetation.

Repair inlet and outlet problems: Inlet and outlet problems vary in terms of the types of problems and the degree to which they are a problem. In many of the basins, the repair needed is as simple unclogging the inlet or outlet pipe. On the other hand, many of the inlets had serious erosion problems that require stabilization. Many of the outlets and/or inlets need to have trash racks installed to keep large debris out of the river. Depending on design capacity, restrictors in outlets can also be modified.

Stabilize shorelines and improve buffers: Shorelines of wet basins with erosion problems could be stabilized using native vegetation. Eroding shorelines within the basin can contribute to the amount of sediment, nutrients and other pollutants eventually draining to the river. Native vegetation buffers should be established around the perimeter of all basins where possible to stabilize shorelines, discourage nuisance geese (and their pollution contribution) and filter pollutants.

Replace turf grass with native vegetation: Turf grass is relatively intolerant of water level fluctuations and is maintenance intensive. In addition, it is not as effective as native vegetation for filtering, absorbing and transforming pollutants in runoff. For these reasons, strong consideration should be given to replacing turf grass with native vegetation in detention basins throughout the watershed.

The action plan prioritizes detention basins for retrofits based on a qualitative assessment of their existing pollutant removal effectiveness as well as by their location in the drainage system. Basins that collect

stormwater from developments with greater amounts of impervious surface such as industrial parks and commercial developments are more likely to contribute greater pollutant loads than sites with lower impervious surface coverage such as single family residential developments. Therefore, detention basins located in stormsewersheds that have been identified as higher contributors of pollutant loading based on land use, are given the highest priority for retrofits. See Figure 5-3 in the Chapter 5 Action Plan for a map that locates detention basins identified for retrofits.

4.1.2.2 Outfall Retrofits Created Wetland Meanders

Outfalls, especially stormsewer pipes, can be retrofitted to add water quality benefits. One technique for retrofitting outfalls is to daylight stormsewers to flow through created pocket wetlands or wetland meanders before the stormwater is discharged to the stream. The created wetlands filter pollutants from the runoff and dissipate energy before the water reaches the stream. The Village of Barrington has successfully used this technique on Flint Creek.[32]

End-of-Pipe and Stormsewer Structure Retrofits

End-of-pipe and stormsewer structure retrofits can also be used to filter runoff before discharging it to the stream. Sand filters are underground vaults that have a number of chambers with different media that remove pollutants from stormwater runoff. For this reason they are also known as a multi-chamber treatment train (MCTT). In a sand filter, the first chamber is usually empty or filled with water and is used to capture heavier solids. The second chamber contains sand or other filter media that removes smaller solids and dissolved and organic materials. Sand filters are moderately to highly effective for pollutant removal and can last for an extended period of time although they can require significant maintenance. MCTT filters have also been designed to use other filter media such as compost or peat.

The Vortechs storm water treatment system removes floating pollutants and settleable solids from surface runoff. This system combines swirl concentrator and flow-control technologies to separate from the flow. The Vortechs uses four structures to optimize storm water treatment through its system.

Oil/grit separators provide some water quality treatment for small urban lots where larger BMPs are not feasible due to site constraints. Oil/grit separators are best used in commercial, industrial and transportation types of land use. Advantages of oil/grit separators include:

- Providing pretreatment of runoff before it is delivered to other BMPs.
- Easily accessed for maintenance.
- Longevity is high, with proper maintenance.
- Relatively easy to install.
- Compatible with storm drain system.

4.1.2.3 Streambank Stabilization

As discussed in Chapter 3, Section 3.12.2, streambank erosion is a serious problem in all three forks of the North Branch in Lake County. Streambank erosion results in a number of problems including poor water quality (because of high sediment loads), loss of terrestrial habitat (due to land loss) and degradation of aquatic habitat (loss of aquatic vegetation and clean substrate when deposited sediment buries the streambed).

Streambank erosion problems can be improved using a number of techniques that range from soft, natural solutions such as native vegetation to hard solutions like rock riprap. The preferred technique for streambank stabilization is soil bioengineering. Soil bioengineering utilizes living plant materials as the primary component of a structural system. The end result is a mechanically stable native plant community that is capable of self-repair over time.

---

[32] *For more information on the design of created wetland meanders, contact John Heinz, Public Works Director for the Village of Barrington at 847-381-7903.*

With soil bioengineering, native vegetation can be used alone or in combination with harder structures such as A-jacks or lunkers. The use of native vegetation alone is a relatively low-cost method for stabilizing streambanks that is most effective in lower velocity portions of the river. Combining native vegetation with structural measures such as coconut rolls, A-jacks and lunkers can stabilize streambanks where volumes and velocities are higher. These measures are specifically used to stabilize the toe of the slope, providing a stable rooting area and habitat benefits (Dreher and Heringa 1998; Stowe and DuPage County 1991; Wildlife Society 1983; IDNR 1983; Price, Dreher and Schaal 1994).

In cases where the volume and energy of the stormflow is extreme, a bioengineering solution may not be effective. In this case, rock outlet protection or riprap may be the most effective technique. Rock outlet protection refers to the use of riprap or stone underlain with filter fabric to prevent erosion or scour where a stormsewer or other outfall drains into the river.

4.1.2.4 Correcting Sanitary and Stormsewer Infiltration and Illicit Discharges

Infiltration and inflows (I&I) into the sanitary sewer system during wet weather conditions can result in problems such as bypasses of wastewater at treatment plants and sanitary sewer backup flooding of homes and businesses. Infiltration and illicit discharges (also considered inflows) into the stormsewer system and/or cross connections between the sanitary and stormsewer systems result in contamination of stormwater that drains directly to rivers, streams, and wetlands. In either case both health threats and water pollution can be the consequence.

The NSSD works specifically within the Skokie River area. They are responsible for sewer lines and pumping stations that transfer wastewater from local sewer systems to wastewater treatment plants. They cooperate with other municipalities to prevent wet weather overflow but problems still exist after heavy rain events. Also a study to identify service areas that contribute to significant inflow during wet weather was completed.

Under the NPDES Phase II requirements, MS4s must develop a program to detect and eliminate illicit discharges. This primarily will be accomplished by developing a stormsewer system map, an ordinance prohibiting illicit discharges, a plan to detect and address these illicit discharges, and an education program on the hazards associated with illicit discharges. Currently these programs are under development and will provide significant water quality improvement when fully functional.

In addition to the programs under development and already in place, several measures as described below can be employed by communities, individual property owners, sanitary districts and IEPA to identify and remedy I&I problems.

Identifying Sources of Wet Weather Inflows and Contaminants in Dry Weather Flows

Dye and smoke testing, in-sewer flow metering and television inspection are several measures that can be used to identify sources of infiltration and inflow. Tracer testing can be used to identify sources of contamination. Inspection of outfalls during dry weather flows is the first step in identifying potential locations of contaminant discharges to the stormsewer system. Physical parameters that indicate potential problems and the need for further investigation include odor, color, turbidity, floatable matter, deposits and stains, vegetation and damage to the outfall structure. Municipalities and sanitary sewer districts are the obvious lead partners in funding and conducting inspections and testing. Inspections could also be incorporated into Drainage District stream monitoring and maintenance programs.

Sealing Sanitary Sewer Manholes

Possibly the easiest and most cost efficient method of reducing inflows into the sanitary system is to replace seals or entire lids of sanitary sewer manholes to make them watertight. First step would include an inspection of manhole covers to identify those that are not watertight. Highest priority would be those manholes located within the floodplain. Municipalities and the County would take the lead role in implementing this measure.

Disconnecting Illicit Discharges

Once an illicit connection or cross connection has been identified, it is the responsibility of the property owner to remedy the problem. Sump pumps are the most likely illicit connection to the sanitary system, although downspouts may also be connected to sanitary rather than stormsewer pipes. The optimum method of handling stormwater from downspouts and sump pumps would be to drain it into infiltration trenches or bioretention areas away from the building. Municipalities and the County would take the lead on insuring that disconnection on private property has been performed in the appropriate manner.

4.2 Flood Damage Reduction Measures

4.2.1 Preventative Measures: Keep Flood Damage from Expanding

Flood prevention techniques seek to prevent flooding problems before they occur. Techniques such as zoning and floodplain regulations seek to prevent flood damages by limiting development in areas where flooding is most likely to occur. Land acquisition maintains open space, preserving rainfall infiltration and natural storage areas. Several categories of flood prevention techniques involve runoff reduction. Runoff reduction techniques reduce flood damage potential at the source by decreasing the amount of runoff from a developed site. One category looks at improved infiltration on-site, the other uses alternative development techniques that include natural drainage measures and minimization of impervious surfaces.

4.2.1.1 Floodplain Zoning

A zoning ordinance regulates development by dividing the community into zones or districts and setting development criteria for each district. Zoning can be used to control where new development or redevelopment occurs, so that new flood problems are not created and existing flood problems are not worsened. Two zoning approaches can be used to prevent inappropriate development in flood prone areas. They involve establishing separate zoning districts or using overlay zoning. Separate districts designate floodplain as a special zoning district that only allows development that is not susceptible to flood damage, such as some recreational uses, or conservation or agriculture. Overlay zoning adds special development limitations to the underlying zoning (i.e. residential, commercial, industrial etc.) in areas subject to flooding.

4.2.1.2 Floodplain Regulations

In addition to zoning ordinances, regulations that restrict construction in floodplains are usually found in one or more of the following documents: subdivision ordinances, building codes, and/or separate stand alone floodplain ordinances such as the WDO in Lake County. If the zoning for a site allows a structure to be built, then the applicable subdivision and building regulations will impose construction standards to protect buildings from flood damage, and will require compensatory storage to prevent the development from aggravating the flooding problem. Subdivision ordinances specifically govern how land will be subdivided into lots, and regulate standards for infrastructure provided by the developer including roads, sidewalks, utilities, stormwater detention, stormsewers and drainage ways. Building codes should establish flood protection standards for all structures.

The IDNR regulates development in the floodplain through a permit program. For Lake County, IDNR has delegated floodplain permitting authority to the SMC subject to concurrence by the IDNR. All development in floodplains requires a WDO permit. The WDO restricts development in mapped floodways and limits development in the 100-year floodplain. Lowest floor elevations (including basements) must be a minimum of 2 feet above the base flood elevation (BFE) for residential structures constructed in the floodplain. Non-residential structures must also meet these lowest floor elevation requirements, or be dry-floodproofed to 2 feet above the BFE. In addition to elevating the structures, compensatory storage must be provided for water storage lost due to floodplain fill at a ratio of 1.2:1 for riverine floodplain and 1:1 for depressional floodplain.

All Lake County communities must adhere to the standards required in the WDO as minimum development requirements for their community. Depending on flood risk, individual communities can adopt floodplain regulations that are more restrictive than the minimum requirements of the WDO.

Most of the North Branch watershed was developed before the WDO became effective; therefore WDO requirements for detention and water quality treatment did not apply to these areas. But many of the older municipalities in the North Branch watershed are experiencing a trend towards redevelopment. Since the WDO applies to both new developments and redevelopment projects, the WDO flood prevention and water quality provisions have the potential to improve conditions in redeveloped areas. In addition, although the North Branch is a highly developed watershed, there are still large areas of undeveloped land that will fall under WDO purview when developed. These undeveloped parcels are mostly found in the northern portions of the Middle Fork subwatershed.

Tailoring the Lake County WDO to the specific conditions that exist in the North Branch watershed would be an effective tool to prevent further flood damage (and water quality degradation – Section 4.1.1). The main provisions of the WDO that affect runoff are the maximum allowable release rates and the runoff volume reduction hierarchy. (Components of the runoff volume reduction hierarchy are presented in Section 4.2.1.4). The release rate requirement applies to the maximum runoff rate that can occur from a parcel after it has been developed. Currently, the maximum release rate is 0.04 cubic feet per second per acre (cfs/ac) for the 2-year 24-hour storm event and 0.15 cfs/ac for the 100 year, 24 hour storm event. An effective way to lower or maintain peak flows and to prevent new flooding problems is by establishing more stringent release rates specific to the North Branch watershed. The MWRD is currently developing a WDO that would apply to the Cook County portion of the North Branch watershed.

4.2.1.3 Floodplain Acquisition

Floodplain acquisition can be an effective tool for reducing future flooding because it prevents developments in the floodplain. This technique has been used extensively in the Cook County portion of the watershed, and somewhat less in the Lake County portion of the watershed. In Cook County, the Forest Preserve District owns much of the North Branch floodplain outside the City of Chicago. The LCFPD owns two substantial parcels in the floodplain along the Middle Fork of the North Branch (Prairie Wolf and Middle Fork Savanna). They also own Skokie River headwater floodplain in the Greenbelt Forest Preserve and several tracts where flood control reservoirs are currently located or being considered for future construction. A number of community parks, golf courses and conservation easements are also located in the floodplain of the North Branch tributaries. In addition to eliminating floodplain development and the resulting flooding damage, floodplain acquisition provides multiple benefits with the addition of amenities such as greenways, recreational trails, river access points and wildlife habitat corridors.

4.2.1.4 Runoff Reduction

Runoff reduction is divided into two broad categories. One category of techniques improves infiltration of precipitation at newly developed sites or existing developments. The other involves implementing alternative site designs that incorporate nonstructural practices like preserving the natural drainage system and reducing the amount of impervious surface in newly developed or redeveloped areas.

4.2.1.4.1 Infiltration Techniques

1. Natural Landscaping

One technique for reducing runoff (and thereby preventing new flooding problems) is the use of natural landscaping. Natural landscaping utilizes deep-rooted native vegetation such as grasses, wildflowers and wetland plants rather than turf grass in both new and existing developments. Natural landscaping has a number of benefits:

- It promotes increased infiltration of stormwater thereby reducing runoff.
- It filters runoff and improves water quality.
- Native vegetation and natural landscaping provides habitat for plants and animals.
- Installation and maintenance costs less long term than conventional landscaping.

Some larger sites where native vegetation could be used include: institutional sites such as schools, churches and hospitals; office and industrial parks; housing developments; community parks; and golf courses. In addition to larger sites, native vegetation also is an appropriate replacement for traditional lawns and gardens on individual residential and commercial lots and can be very effective at infiltrating runoff from rooftops, decks, driveways and parking lots. Local landscaping and weed ordinances may need to be revised to allow for - and promote - the use of native vegetation. (NIPC 1997; USDA NRCS, 1997; Buslaff 1997; Highland Park Environmental Commission 1998).

2. *Permeable Pavers and Porous Pavement*

Another way to reduce runoff from a site is to use permeable paving blocks or porous pavement. Permeable pavers contain openings that are filled with soil and planted with vegetation. Porous pavement uses large size aggregate material so that precipitation can rapidly infiltrate into the ground. Permeable pavers and porous pavement are effective techniques when used in low traffic areas such as emergency drives, overflow or seasonal parking lots and residential driveways. Using permeable pavers and porous pavement can reduce runoff volumes and pollutant loadings (Dreher and Price 1997).

3. *Infiltration Devices*

Infiltration trenches and basins are two similar runoff reduction devices. Infiltration trenches and basins are generally excavated depressional areas where stormwater runoff is directed. Infiltration areas are planted with appropriate vegetation (also referred to as bio-infiltration or bioretention practices) or covered with decorative rock. Both infiltration trenches and basins reduce runoff and recharge groundwater, thereby decreasing the need for stormwater storage. Bioretention/infiltration practices not only provide water quantity control benefits, but also improve water quality. These types of practices are especially appropriate as designed rain gardens that have the added advantage of being aesthetically pleasing. Individual yards and business sites can be designed or retrofitted to include bioretention practices.

Infiltration devices can be used in the North Branch watershed with a few limitations. First, they may freeze up in winter making them temporarily ineffective. Designs should include a backup system for this circumstance. They may also require a sediment trap to reduce the frequency of clogging. More importantly, infiltration trenches and basins require permeable soils (hydrologic soil groups A and B). Approximately 16 percent of the North Branch watershed in Lake County (or 5,200 acres) has soils in hydrologic soil groups A or B suitable for the installation of infiltration devices. In Cook County, approximately 9 percent of the North Branch watershed (2,800 acres) has soils in hydrologic soil groups A or B. When properly installed on sites with permeable soils, infiltration devices can be an effective tool for reducing the runoff rate, volume and pollutant loads (Dreher and Price 1997, Department of Environmental Resources Prince George's County, 1997).

4.2.1.4.2 Alternative Site Designs

Alternative site design techniques are approaches that can be used for new developments and some redeveloped sites. Alternative site designs use a series of BMPs to:

- Reduce the amount of impervious surface area on the development site thereby reducing the amount of stormwater runoff and the risk of new flooding.
- Preserve the natural infiltration and storage characteristics of a site.
- Improve the water quality of runoff from a site by using the landscape to filter and infiltrate runoff.

Alternative site designs incorporate runoff reduction strategies, water quality enhancements, and protect more open space for infiltration and recreational opportunities. Alternative site designs use the following techniques: maintain the natural drainage system; use vegetated swales rather than traditional curb and gutter with a stormsewer system; reduce the percent of impervious surface; and cluster buildings (Dreher and Price 1997; Price, Dreher and Schaal 1994; Terrene Institute 1994; Schueler 1995; Arendt 1996).

When the techniques described in this section are used together on a development site to reduce runoff, this is referred to as a runoff reduction hierarchy. The goal of this hierarchy is to maintain runoff volumes and rates from the developed site as close as possible to pre-development conditions. When these techniques are combined with an integrated on-site system to also improve water quality, this system is called a treatment train. The goal of the treatment train is to reduce pollutants in urban stormwater runoff to the maximum extent possible through the use of multiple stormwater management techniques.

Table 4-8
Relationship Between Impervious Cover and Stream Quality

Impervious cover	Stream quality
0 -10%	good (stressed)
11 - 25%	fair (impacted)
>25%	low (degraded)

From: *Impervious Cover as an Urban Stream Indicator and a Watershed Management Tool*, Schueler & Claytor, The Center for Watershed Protection

1. Natural Drainage Measures

A series of features that can be used in new development sites (and larger redevelopment sites) throughout the watershed are 'natural' drainage measures. Rather than using stormsewers, concrete-lined channels, or curbs and gutters, natural drainage measures use vegetated swales, filter strips and other techniques that absorb, filter and convey runoff. Natural drainage measures can significantly reduce runoff volumes by allowing infiltration of stormwater, while conventional drainage systems such as stormsewers accelerate the delivery of runoff to the river or other receiving water body. In addition to infiltration benefits, natural drainage measures can remove pollutants from runoff by using vegetation to filter and absorb pollutants. Natural drainage measures often cost less to build than conventional drainage systems, and the use of native vegetation with natural drainage practices requires less maintenance and also provides wildlife habitat.

As an example, in 1999 and 2000 Abbott Laboratories installed native plant species in drainage swales that were previously mowed/turf-lined or lined with rip rap. The newly naturalized drainage swales reduce runoff by increasing infiltration potential and promote water quality enhancing the pollutant filtration capabilities of the swales. The deep rooted plantings help stabilize soils and reduce potential for erosion and sedimentation.

2. Impervious Area Reduction

The greater the amount of impervious surface, the greater the runoff volume will be from a site. In fact, CMAP estimates that, on an annual basis, stormwater runoff volumes from impervious surfaces such as parking lots are four times as great as the volume off of lawns (Dreher and Price 1997). Along with the increased amounts of runoff, there are also greater amounts of nonpoint source pollutants carried in the runoff. (See Section 3.6.4 for more information on land use and water quality.)

Studies indicate that there is a direct relationship between the amount of impervious surface in a watershed and the quality of the receiving stream (Table 4-8). Percent impervious cover in the North Branch Chicago River watershed was estimated based on land use in the watershed. Impervious cover is estimated at 30% of the watershed study area as a whole, with the Lake County portion of the watershed estimated as having 29% impervious cover.

There are several ways to reduce imperviousness through the use of alternative site designs. The three techniques that are most applicable in the North Branch Chicago River watershed are the use of alternative streetscapes, alternative parking lot designs, and green roofs.

3. Alternative streetscapes

Alternative streetscapes are most often recommended and used in residential developments. Designing the development to include smaller turnarounds, narrower streets, narrower sidewalks and shorter setbacks are examples of impervious reduction practices in alternative streetscapes.

Residential streets should be designed for the minimum required pavement width needed to support travel lanes, parking and emergency and service vehicles, and should be based on the volume of traffic. Excessive pavement widths make streets the largest single component of impervious cover in a subdivision, therefore,

narrowing streets can significantly reduce the amount of impervious surface. For example, reducing lower density residential street widths from 32 to 20 feet will result in an approximate 18% reduction in impervious surface for a typical ¼ acre lot subdivision, and a 6% reduction in impervious area over an entire watershed (Table 4-9).

Table 4-9
Innovative Site Planning Techniques and Their Effect on Impervious Cover

	Strategy	Impervious Reduction (%)
1	Reduce residential sidewalks by 50% by installing sidewalks on only 1 side of the street	1.3
2	Reduce residential sidewalks from 5 feet to 4 feet width	0.5
3	Reduce local access street widths from 32 feet to 27 feet Reduce local access street widths from 32 feet to 25 feet Reduce local access street widths from 32 feet to 20 feet	2.5 3.5 6.0
4	Reduce commercial parking by 5 percent Reduce commercial parking by 10 percent Reduce commercial parking by 20 percent	2.7 5.3 10.7
5	Reduce multifamily parking by 5 percent Reduce multifamily parking by 10 percent Reduce multifamily parking by 20 percent	0.7 1.5 3.0
6	Reduce commercial, industrial and multifamily roof areas by 10 percent Reduce commercial, industrial and multifamily roof areas by 20 percent	4.3 8.5

*From: Center for the Watershed Protection, *Estimating and Future Impervious Cover (draft) 1998.*

Examples of narrow residential street widths range from 16-20 feet with no parking, to 26-28 feet with parking. "Several national engineering organizations have recommended that residential streets can be as narrow as 22 feet in width (AASHTO, 1994; ASCE, 1990) if they serve neighborhoods that produce low traffic volumes (less than 500 daily trips, or 50 homes)."[33] Narrower streets also tend to discourage cut-through traffic and speeding. Turnarounds offer another opportunity to reduce unnecessary street pavement. A hammerhead design requires the least amount of pavement. Additionally, cul-de-sacs can be constructed with a smaller radius and the center can be recessed, left open and landscaped for runoff infiltration and snow storage in the winter.

Another significant reduction in impervious area can be achieved by reducing building setbacks. Reduced setbacks result in shorter driveways and less impervious surface. For example a 30 foot setback decreased to 20 feet still allows sufficient length for parking in the driveway. However, it eliminates 10 feet of wasted driveway space (and impervious surface) that was too short for another car length. This design practice adds the benefit of more back yard, which tends to be utilized for living space more than front yard areas.

Sidewalk area can also be decreased to reduce imperviousness without losing functionality. For example, sidewalks can be narrowed from 5 feet to 4 feet in residential areas, and/or only installed on one side of the street. Another option for reducing paved area is to design pervious paths located away from the streetscape as an alternative to traditional sidewalks. Overall, combining the above reductions in impervious area from narrower streets, smaller turnarounds, shorter setbacks and narrower sidewalks will result in a significant reduction in imperviousness within a development (Dreher and Price 1997).

[33] *Better Site Design: A Handbook for Changing Development Rules in Your Community, Pg. 29, Center for Watershed Protection, 1998.*

4. Parking lots

Alternative parking lot designs that reduce impervious surface can be used in most types of non-residential developments and some multi-family developments. Techniques used to reduce parking lot runoff include either reducing the size of the paved parking lot, or designing the parking lot to catch and infiltrate runoff.

Several techniques used to reduce the size of parking lots include:

- reviewing and updating peak parking demand assumptions to make sure that allocated parking is actually needed and being used;
- banking parking for new developments rather than constructing a parking lot that will initially be oversized;
- reducing the size of some of the parking stalls for smaller vehicles; and
- sharing parking lots between users.

Parking lot designs that increase infiltration usually incorporate excavated islands or swales between rows of cars where runoff is directed through curb cuts. The vegetated swales infiltrate and filter the runoff, thereby reducing the volume of stormwater directed to stormsewers. Alternative parking lot designs frequently cost less to build and maintain than traditional lots. For example, bio-swales used in a parking lot at the Oregon Museum of Science and Industry resulted in a $78,000 savings compared to a conventional lot design (USDA NRCS 1997).

As an example, in 2001 the Village of Northbrook made improvements to existing parking lots in the downtown business district to reduce runoff and improve water quality. The parking lots were located adjacent to a river; the Village reduced the size of the existing parking lots to reduce stormwater runoff. Other project improvements included addition of curb & gutter to the parking lot edge to prevent untreated sheet flow from directly entering the river, and adding water quality filter units to the stormsewer system to treat runoff prior to discharge to the river.

5. Green Roofs

Green roofs can be used to reduce stormwater runoff from commercial, industrial, and residential buildings. In contrast to traditional asphalt or metal roofing, green roofs absorb, store, and later evapotranspire initial precipitation, thereby acting as a stormwater management system and reducing overall peak flow discharge to a stormsewer system. Green roofs also have the potential of reducing discharge of pollutants such as nitrogen and phosphorous due to soil microbial processes and plant uptake. If these systems are implemented at a wide scale, green roofs will reduce the volume of stormwater entering local waterways resulting in less in-stream scouring, lower water temperatures and better water quality (IEPA 2007).

4.2.1.4.3 Stormwater Regulations

1. Runoff reduction hierarchy

A matter of policy debate is whether some or all of the runoff reduction techniques presented in the preceding section should be implemented on a voluntary basis, or be required as a part of a stormwater management regulatory program. In Lake County, the WDO includes a runoff reduction hierarchy that is intended for use when designing and permitting new developments. The runoff volume reduction hierarchy specifies that sites should choose a strategy that minimizes the increase in runoff volumes and rates from development, but the WDO does not provide explicit incentives for developers to use the hierarchy. Therefore, the runoff reduction hierarchy is not given as much consideration in designs as it should, and is frequently overlooked during review. The hierarchy is found in Table 4-10. In addition, experience has shown that permit reviewers from certified communities have interpreted the requirements of the hierarchy in different ways, therefore the hierarchy has not been consistently applied throughout the county. The runoff volume reduction hierarchy language in the WDO was amended in 1999 to provide more clarity. Individual communities have the greatest authority to improve the use and effectiveness of the hierarchy by attaching density or other incentives to its use.

Table 4-10 WDO Runoff Volume Reduction Hierarchy
1. Preservation of natural resource features of the development site (e.g. floodplains, wetlands, prairies and woodlands).
2. Preservation of the existing natural streams, channels, and drainageways.
3. Minimizing impervious surfaces created at the site (e.g. narrowing road width, minimizing driveway length and width, clustering homes, and shared driveways).
4. The use of open vegetated channels to convey stormwater runoff.
5. Preservation of the natural infiltration and storage characteristics of the site (e.g. disconnection of impervious cover and on-lot bioretention facilities).
6. Structural measures that provide water quality and quantity control
7. Structural measures that provide only quantity control and conveyance

2. *Stormwater detention*

The WDO emphasizes the use of detention as the primary stormwater management control measure for Lake County. Detention is used to prevent an increase in the rate of runoff from a site after it is developed, and is the designated measure to achieve the post-development release rates required by the WDO. The release rate requirements apply to all development where the total land area in an ownership parcel results in: 1) more than one acre of new impervious surface; or 2) has more that 3 acres of hydrologically-disturbed area (unless the new impervious surface is less than one-half acre); or 3) has an impervious surface area ratio of 50% or greater (unless the new impervious surface is less than one-half acre). The additional volume of runoff generated by new impervious surface is not directly addressed in WDO requirements, although the runoff reduction hierarchy (presented in the previous section) is designed to mitigate the effects of increased runoff.

The MWRD is in the process of establishing a county-wide stormwater ordinance for Cook County. Therefore, stormwater management requirements are less-uniform in Cook County. The MWRD has some stormwater detention standards for multi-family residential, commercial and industrial developments that are greater than 5 acres and single-family residential developments greater than 10 acres. The MWRD exempts development in combined sewer overflow areas from detention requirements. Individual Cook County municipalities may have more stringent stormwater management requirements than the MWRD. An evaluation of municipal stormwater requirements in the North Branch Chicago River watershed will be incorporated into the Cook County watershed plan assessment.

4.2.2 Remedial Measures: Fixing Flood Damage

Flooding and other water quantity problems can be reduced by both structural and non-structural means. Structural flood control measures require the building of structures such as reservoirs, levees and floodwalls to control the flow of floodwaters and to reduce flood damages. Non-structural measures include practices such as acquisition or relocation of flood prone buildings, floodproofing and use of runoff reduction techniques such as native landscaping.

4.2.2.1 Structural Flood Control

Structural measures control or contain water and are generally designed to prevent floodwaters from reaching buildings. Structural alternatives generally include reservoirs, levees and floodwalls, diversions, stream channel conveyance improvements and drainage and stormsewer improvements.[34] Because of their

[34] A diversion tunnel for flood control was proposed to transfer floodwaters from the North Branch Chicago River to Lake Michigan. This proposal was determined not feasible due to water quality treatment requirements prior to discharge into Lake Michigan.

size and cost, structural projects are often implemented with help from state or federal flood control agencies such as the IDNR- Office of Water Resources (OWR), the USACE, and the USDA NRCS.

Since structural flood control is generally the most expensive type of mitigation measure in terms of installation time and costs, maintenance requirements and environmental impacts, a thorough assessment of alternatives should be conducted before choosing a structural flood control measure. The advantages and disadvantages of structural flood control techniques are discussed in Table 4-11 (Association of State Floodplain Managers 1996).

Table 4-11
Benefits and Drawbacks to Structural Flood Control Measures

Advantages	Shortcomings
♦ May provide the greatest amount of protection for land area used. ♦ Because of land limitations, may be the only practical solution in some circumstances. ♦ Can incorporate other benefits into structural project design such as water supply and recreational uses. ♦ Regional detention may be more cost-efficient and effective than requiring numerous small detention basins.	♦ They disturb the land and disrupt natural water flows, often destroying wildlife habitat. ♦ They require regular maintenance, which if neglected, can ``have disastrous consequences. ♦ They are built to a certain flood protection level that can be exceeded by larger floods, causing extensive damage. ♦ They can create a false sense of security, as people protected by a project often believe that no flood can ever reach them. ♦ Although it may be unintended, in many circumstances they promote more intensive land use and development in the floodplain. ♦ They can create new flooding problems if improperly designed or built. ♦ Levees and reservoirs can significantly degrade riparian and aquatic habitat and water quality.

4.2.2.1.1 Reservoirs/Regional Detention

Reservoirs and regional detention are large structures that control flooding by holding high flows behind dams or in storage basins. After a flood peaks, water is released or pumped out slowly at a rate that is equal to or less than the capacity of the downstream channel. Reservoirs that maintain a normal water level may be used for water supply and/or to provide water-based recreational benefits. In addition, wet or dry detention basins can serve multiple uses by doubling as parks or providing other open space uses.

The amount of land needed, coupled with the expense of construction, management and maintenance limit the use of reservoirs. Additionally, reservoirs may fail to prevent floods that exceed their design levels; may eliminate the natural and beneficial functions of the floodplain; and may negatively impact water quality and aquatic habitat. Impoundments are also known to affect temperature, pH, dissolved oxygen and nutrient transport. In addition, reservoirs frequently act as giant sediment basins accumulating sediment over a period of years that reduces stormwater storage capacity.

As described in Chapter 3, Section 3.14, in the early 1990's, three flood control reservoirs were constructed in the Lake County portion of the North Branch Chicago River watershed. Construction of these reservoirs resulted from flood damage studies begun in the 1970s. Because the reservoirs were built solely for flood damage reduction, they offer no environmental or recreational amenities. The IDNR-OWR and LCFPD currently co-own two land parcels along the Middle Fork and Skokie River that are being considered for flood control reservoirs in the future.

4.2.2.1.2 Detention Basins

Some localized flooding problems can be remedied by enlarging or adjusting flows through existing detention basins, or by constructing new basins. Detention basins are considered to be effective at flood

reduction in watersheds of up to 30 square miles. While regional detention is generally more cost-effective than constructing numerous small detention facilities, in some cases there may not be sufficient land available for regional detention. Also, for very localized flood problems, a smaller detention basin may be the most economical solution. In addition, slowing release rates from new and existing detention basins can reduce the downstream flood risk and some of the impacts of flashy hydrology on the stream channel.

The City of North Chicago has been constructing detention ponds as redevelopment projects to alleviate neighborhood-flooding problems. An example includes the Gillette detention basin constructed in 1998-1999 in the upper Skokie River watershed on vacant industrial property to reduce flooding in an existing subdivision nearby. The detention site is designed to provide water quality, educational and recreational amenities in addition to flood control.

Approximately 50% of the known flood problem areas in the Lake County North Branch Chicago River watershed suffer flood damage primarily caused by poor local drainage or a depressional location rather than flood damage from the river overbanking. Retrofitting older detention basins with restrictors that regulate the 2-year event, expanding detention basin capacity where feasible and installing new detention in localized flood problems areas are three types of retrofit opportunities available to mitigate flood damage at some North Branch Chicago River flood problem sites.

4.2.2.1.3 Levees and Floodwalls

Earthen levees or concrete floodwalls are erected between the river and the properties to be protected. Levees and floodwalls confine water to the stream channel by artificially raising the banks. Levees must be well designed to account for large floods, underground seepage, pumping of internal drainage and erosion and scour. A serious concern with levees is that they frequently offer a false sense of security. In some cases land use behind a levee can change to high intensity, high-value occupation under the false assumption that all future floods will be controlled by the levee, when in reality, large floods may overtop or breach the levee creating more flood damage than would have occurred. Problems also arise when the present runoff volume in the channel exceeds the design capacity of older levees that were constructed for lower flow conditions.

Levees and floodwalls have other limitations. Placed along the river or stream edge, they degrade riparian and aquatic habitat. Levees are expensive to construct, require considerable land and maintenance and are more likely to push floodwater onto other properties upstream or downstream. In some cases, it may be necessary to include expensive and noisy pumping operations for internal drainage. Levees also act as barriers to river access, block views and disrupt local drainage patterns.

4.2.2.1.4 Barriers

Constructing barriers such as low floodwalls and berms around an individual property can keep floodwaters from reaching the building. Berms are commonly used in areas subject to shallow flooding. Not considered engineered structures, berms are made by re-grading or filling an area. Low floodwalls may be built around stairwells to protect the basement and lower floor of a split-level home. By keeping water away from the building walls, the problems of seepage and hydrostatic pressure are reduced.

As with levees, the use of floodwalls and berms must also include a plan to install drainpipes and/or sump pumps to handle leaks and water seepage through or under the barrier, and to get rid of water that may collect inside. Care must be taken in the design, location and installation of berms or floodwalls to insure that floodwaters are not inadvertently pushed onto adjacent properties.

4.2.2.1.5 Improved Channel Conveyance

Channel conveyance improvements alter the channel so that more water is carried away at a faster rate. Improvements generally include making the channel wider, deeper, smoother and/or straighter. Some channels in urban areas have also been lined with concrete or put in underground pipes.

Straightening, deepening and/or widening a stream or river channel, commonly referred to as channelization, has traditionally been the common remedy for local drainage or flooding problems. Channelized rivers and

streams drain water faster from area adjacent to and upstream of the channel, but can create or worsen flooding problems downstream as larger volumes of water are transported at a faster rate. Channelized waterways tend to be unstable and experience more streambank erosion. Therefore, the need for periodic reconstruction, streambank stabilization and silt removal becomes cyclic in these circumstances making stream and channel maintenance very expensive.

Dredging is another type of conveyance improvement. It is frequently cost prohibitive due to the expense of disposing of the dredged material. In addition, unless instream and/or upstream tributary erosion are corrected, the dredged areas usually fill back in within a few years, and the process and expense have to be repeated. Channel conveyance improvements such as channelization and dredging are considered to be environmentally destructive. Pool/riffle and riparian habitat are lost negatively impacting both aquatic and terrestrial plants and animals. Increased water temperature and higher turbidity are two types of water quality impacts associated with improved channel conveyance.

The North Branch Chicago River and its West Fork, Middle Fork and Skokie River tributaries exemplify some of the local advantages of channel modification while also demonstrating many of the watershed-wide, long-term disadvantages. As discussed in the hydrology and hydraulics section of Chapter 3 (3.14.1), all three forks of the North Branch Chicago River were converted from meandering streams and wetlands to straight channels in the early 1900s. Changing the hydraulics of water transport with channelization has permanently changed the hydrology of the watershed. The big advantage of improving conveyance in the watershed was that it made more land available first for agriculture and later for suburban development. The disadvantages include the costs associated with the continual need for channel stabilization and maintenance, habitat loss, degraded water quality, and the costs of remedying the resulting downstream flood damages.

4.2.2.1.6 Drainage Improvements

Drainage improvements can be in the form of open ditches, swales or stormsewers. Man-made ditches and stormsewers help drain areas where the surface drainage system is inadequate, or where underground drainageways may be safer or more practical. Particularly appropriate for depressions and low spots that will not drain naturally, drainage and stormsewer improvements usually are designed to carry the runoff from smaller, more frequent storms. Stormsewer improvements include installing new sewers, modifications of sewer inlets, installing larger pipes and using measures such as flap gates to prevent back flows.

Because drainage ditches and stormsewers convey water faster to other locations, improvements are only recommended for small local problems where the receiving stream or river has sufficient capacity to handle the additional volume and flow of water. To reduce the cumulative downstream flood impacts of numerous small drainage projects, additional detention and/or runoff reduction practices should be undertaken in conjunction with drainage system improvements.

In some areas, streets, parking lots or athletic fields can be modified to store water from larger, less frequent storms to relieve and reduce overloading of the local drainage system. Although street modifications for stormwater storage are not appropriate in all areas, in many circumstances, they can be more effective and less expensive than increasing the size of receiving stormsewer systems.

4.2.2.2 Non-Structural Flood Control

In addition to structural controls for flood remediation, flooding problems can also be addressed using non-structural means. Some of the non-structural flood control techniques include floodproofing, acquisition of floodplain buildings, building elevation and building relocation. More communities and county-wide agencies could get involved in non-structural programs such as acquisition by helping to identify repetitively flooded properties. In addition to being used for prevention, runoff reduction techniques may also be used by individual homeowners or neighborhood associations in retrofit projects to lessen flooding problems.

4.2.2.2.1 Building Relocation

Moving a building to higher ground is an extremely effective way to protect it from flooding. While almost any building can be moved, the cost goes up for heavier structures, such as those made of brick, and for large

or irregularly shaped buildings. Building relocation is generally cost-effective where flooding is relatively severe and/or frequent. Buildings that have suffered structural damage or contamination from frequent or long duration flooding should not be considered for relocation.

While relocation is typically the responsibility of the building owner, government-sponsored loans or grants may be available for cost-share. Communities and county-wide agencies could play a greater role in building relocation by improving public and local official awareness of this option, and by identifying buildings or properties well-suited for relocation and seeking potential cost-share funds to assist individual property owners.

4.2.2.2.2 Buyouts/Acquisition

Like relocation, acquisition ensures that buildings in a flood prone area will cease to be subject to damage. The major difference is that acquisition is undertaken by a government agency, so the cost is not borne by the property owner, and the land is converted to an appropriate permanent public use such as a park. Acquiring and clearing buildings from the floodplain is not only the best long-term flood protection measure; it also is a way to convert a problem area into a community asset that can provide environmental and recreational benefits.

- More communities and countywide agencies could get involved in acquisition by:
- Improving public awareness of this option;
- Budgeting the 25% matching funds necessary for state and federal funding;
- Establishing guidelines for determining when acquisition is preferable to flood control or flood proofing; and
- Prioritizing properties for purchase.

To achieve maximum benefits from this type of public investment, acquisition and land reuse should be a component of a community's redevelopment plan, and be incorporated as a strategy in park, greenways and capital improvement plans.

4.2.2.2.3 Building Elevation

Raising a house above the flood level is the best way to protect a structure that cannot be removed from the floodplain. The structure is elevated on a foundation or piers so that the lowest floor is above the BFE. When flooding occurs, water levels stay below the main floor, causing no damage to the structure or its contents. Raising a building above the flood level is cheaper than moving it, and can be less disruptive to a neighborhood. Commonly practiced in flood prone areas nationwide, this protection technique is required by law for new and substantially damaged residences located in a 100-year floodplain.

Although flood damages can be reduced significantly or eliminated through building elevation, there are some limitations to remaining in a flood prone location. While the building itself is sufficiently elevated to be protected from flood damage, flooding may isolate the building and make it inaccessible. Flood waters surrounding the building can also result in a loss of utility service or septic use, making the building uninhabitable. Additionally, pollutant contamination in floodwaters may present health and safety concerns.

4.2.2.2.4 Floodproofing

Floodproofing measures can provide either wet floodproofing or dry floodproofing. In areas where there is shallow flooding, dry floodproofing measures can be used to prevent water from entering some buildings. A wet floodproofing strategy allows water to enter the building, but moves damageable belongings, appliances and utilities out of harm's way. Wet floodproofing includes some of the least expensive and easiest mitigation practices to install. Although floodwaters are not controlled, with wet floodproofing damage can be greatly reduced.

1. Dry Floodproofing

Dry floodproofing is a combination of practices that are used to seal a building against floodwaters. The building must be waterproofed; that is, walls, floors and all openings must be sealed and made watertight. Buildings with crawlspaces generally cannot be dry floodproofed because water can seep under walls into the crawlspace. However, buildings on slabs and buildings with basements can benefit from dry floodproofing.

Because of the need to address hydrostatic pressure, a structural engineer should be consulted when designing the dry floodproofing measures. If a dry floodproofed structure is not sufficiently reinforced basement walls and floors can become cracked, buckled or broken by the pressure of floodwater.

2. Wet Floodproofing

Wet floodproofing protects from damage when floodwaters cannot be kept out of a building. It is a relatively simple means of making sure that nothing gets damaged or ruined when floodwaters get in. Wet floodproofing techniques range from moving a few valuable items to a higher floor, to totally rebuilding the area that floods. At the very least, several low-cost steps can be taken to wet floodproof a structure. Simply moving furniture and electrical appliances out of the flood prone portions of the building can prevent thousands of dollars in damages. One strong advantage is that no matter how little is done; flood damage will be reduced.

Wet floodproofing measures work in cases where there is a level above the flood zone to which items can be relocated. It generally does not work for one-story houses where living areas get flooded. An advantage of using wet floodproofing vs. dry floodproofing is that by allowing water in the structure, the danger of wall collapsing due to uneven pressure is alleviated.

4.2.2.2.5 Runoff Reduction

Examples of runoff reduction techniques that can be installed as retrofits in developed areas include the use of natural landscaping, permeable pavement, infiltration trenches, green roofs, basins or swales, and disconnection of downspouts from impervious areas. Descriptions of natural landscaping, permeable pavement and infiltration techniques were provided in the flood prevention section (Section 4.2.1.4). Disconnecting downspouts is relatively simple and inexpensive. A number of communities have initiated programs to disconnect downspouts from the stormsewer system in older neighborhoods. In these cases, runoff from rooftops is collected in rain barrels or diverted directly to lawns or rain gardens (bioretention areas) for infiltration.

Implementing these runoff reduction retrofits is generally the responsibility of individual property owners. While these techniques may not have a significant impact when applied individually on a single site, the cumulative effect when used at numerous sites throughout the watershed can result in significant flood reduction benefits. For example, a 1989 engineering report by Baxter & Woodman for the City of Highland indicates an average-sized home in Highland Park can contribute 3,000 gallons to sewers during a one-hour duration, 2-year frequency storm (1.45 inches).[35] Since public participation is necessary for watershed effectiveness, an aggressive public information and outreach effort should be used for implementation of these techniques.

4.2.2.2.6 Insurance

Insurance does not prevent flooding or flood damage; it helps owners protect their property investments by paying for repairs and replacement of items damaged in a flood. While a typical homeowner's insurance policy does not cover flood damages to property, flood insurance coverage is available through the National Flood Insurance Program (NFIP), as is additional basement backup insurance.

Federal law demands that all federally insured lending institutions require that buildings located in the 100-year floodplain have flood insurance. Flood insurance is available to anyone located within a community that

[35] *Page 3-5, Baxter & Woodman, City of Highland Park Stormwater Master Plan, Nov. 1989.*

participates in the NFIP regardless of their location respective to the mapped floodplain. With the exception of the City of Highwood, all of the municipalities within the Lake County North Branch Chicago River watershed are members of the NFIP.

The Villages of Deerfield and Linconshire in the Lake County North Branch Chicago River watershed and the Village of Northbrook in the Cook County North Branch Chicago River watershed also participate in the Community Rating System (CRS), which is a program that credits a community for exceeding the minimum requirements of the NFIP. Residents of CRS communities pay reduced flood insurance rates as a result of their community's flood mitigation activities. Lake County SMC provides technical and planning assistance to municipalities regarding NFIP compliance and to a limited extent for the CRS program.

4.3 Natural Resource Measures

Natural resources in the North Branch Chicago River watershed can be protected and enhanced by:

- Maintaining and connecting open space and protecting natural areas,
- Protecting threatened and endangered species and their habitat,
- Preserving and restoring wetlands,
- Restoring streams and riparian buffers, and
- Designating corridors for greenways, trails and river access.

Improving natural resources and providing recreational access along the river is key to changing public perceptions of the North Branch Chicago River so the river is viewed as an asset.

4.3.1 Preventative Measures: Natural Resources Protection

4.3.1.1 Protecting Open Space and Natural Areas

Several techniques can be used for protecting natural areas and open space in both public and private ownership. The first step in the process is to identify and prioritize properties for protection. The highest priority natural areas should be permanently protected in the ownership or under the management of public agencies or private organizations dedicated to land conservation. Other open space can be protected using conservation design development techniques, and is more likely to be managed by homeowner associations.

4.3.1.1.1 Protected Ownership

There are several options for land transfer ranging from donation to fee simple purchase. Donations can be solicited and encouraged through incentive programs. Unfortunately, while preferred by money-strapped conservation programs, land donations are often not adequate to protect high priority sites. A second option is outright purchase (or fee-simple land purchase). Outright purchase is frequently the least complicated and most permanent protection technique, but is also the most costly. Because of high land values in the North Branch Chicago River watershed, outright purchase may be the most attractive protection technique to property owners. The conservation easement is a less expensive technique than outright purchase that does not require the transfer of land ownership but rather a transfer of use rights. Conservation easements might be attractive to property owners who do not want to sell their land at the present time, but would support perpetual protection from further development. Conservation easements can be donated or purchased.

The North Branch Open Space Plan provides further description of the above options and how they can be used as tools for preserving the remaining open space in the North Branch Chicago River:

***Donation*:**

Land may be given to a qualified organization and the value taken as a charitable gift. Land may also be donated through a will after the landowner dies, reducing estate taxes.

Purchase:

Outright: This remains the most frequent and time-tested mechanism in use. There are two outstanding examples of this in the North Branch Chicago River watershed. The LCFPD has received over $100 million in the last fifteen years through three highly successful public referenda, and used part of these funds to buy over 600 acres in the North Branch Chicago River watershed. Earlier, the Libertyville Township Open Space District passed a referendum issuing bonds for open space preservation in that township, a portion of which were used on the western edge of the North Branch Chicago River watershed.

Individual municipalities and park districts have also had some success in this area. Land trusts purchase land as well: Lake Forest Open Lands Association has spent over $20 million (subsequently all recovered through limited development). The LFOLA owns or holds conservation easements on 21 properties totaling 389 acres. The Village of Winnetka recently received public approval to buy some open space from Loyola University, and in 2001 the City of Lake Forest won public approval to purchase 20 acres on its west side for a public park. Lincolnshire recently purchased 63 acres at the corner of Everett and Riverwoods Roads and has created an entirely new park and natural area. Glenview preserved substantial open space by deciding not to sell some of their land, including a remnant prairie, in the redevelopment of the Glenview Naval Air Station.

The Forest Preserve District of Cook County has not sought public approval for any land acquisition. As a result, this body has bought no land in the North Branch Chicago River watershed in several decades.

Bargain Sale: A bargain sale is the sale of land below fair market value. The difference between the fair market value and the actual price may qualify as a tax-deductible donation. Persons wanting to preserve land but still needing some return on the sale frequently use this mechanism.

Installment Sale: An owner may choose to sell a portion of land yearly rather than all at once, usually to lessen the impact of capital gains tax or to take full advantage of the charitable gift benefit if the owner has modest income and must therefore absorb the tax advantages over a long period of time.

Right of First Refusal: Any prospective buyer may obtain the right (usually by purchasing it for a nominal fee) to have the first chance at an open space parcel when it is offered for sale at some future date. This effectively gives the buyer some control over a parcel, and also provides time to raise funds for this goal.

Option: This is another method of purchasing time before concluding a sale, and to assure a purchaser's promises to preserve the purchased property.

Conservation Buyer: Occasionally land trusts and other conservation groups will find a person who is willing to buy a parcel, restrict its future development, and take advantage of the resultant charitable gift such as a conservation easement or donation of part of the property to the land trust. The buyer in effect is a partner and agent for the land trust, sharing the same conservation interests and willing to help fund their goals.

Conservation Easement:

This is a widely used tool in the Chicago region, including the North Branch Chicago River watershed. A private landowner places a permanent restriction on the future use of land in the form of a conservation easement, which effectively is an attachment to the property deed stating the land (or a portion thereof) will remain as open space forever. As a result the landowner could reap significant reductions in property taxes as well as a substantial charitable gift applied towards federal income tax. A qualified conservation body, such as a land trust or public agency dedicated to open space preservation, will accept the conservation easement gift as a tax-deductible gift.

Conservation easements can also be placed in escrow. If a number of landowners are considering conservation easements they can each pledge the easement in escrow. Their individual easement will become

binding only after all parties have done the same, and all easements are then recorded at the same time and become permanently binding.

***Life Estate*:**
Landowners may designate their property for permanent preservation during their lifetime by donating it to a public interest group, but retain lifetime use of the property. The owner may thus take immediate tax advantage of the charitable gift, yet enjoy the land until it passes to permanent conservation on his or her death.

***Charitable Remainder Trust*:**
Income-producing property may be donated to a charitable group during one's lifetime, and one can continue to receive the income from the property. Upon the landowner's death the income-producing assets in the property also pass to the charitable group.

***Purchase of Development Rights (PDRs)*:**
Successfully used by Libertyville Township in 1986 (and currently in Kane County), this technique compensates landowners for a portion of the equity in their land while leaving actual ownership in their hands. If the land is vacant, residential, or being used for farming, but qualifies for more intense uses, the value of this difference is used to determine the purchase price of the development rights. The land subsequently remains in private ownership but must also, by deed restriction, remain in its current use.

***Transfer of Development Rights (TDRs)*:**
This technique has been successfully used in other parts of the United States, beginning in the 1980s in the rapidly growing Montgomery County, MD area. Property rights inherent in property ownership are divided between the property's natural condition and those associated with its development potential. By severing the development rights (credits) from the natural land, a commodity is created that other landowners may trade or purchase.

Zoning ordinances or by-laws may provide for special permits authorizing the transfer of development rights within or between districts. These ordinances may include incentives such as increases in population density, intensity of use, and amount of floor space or percentage of lot coverage, all to encourage the TDRs to protect open space. However, sufficient lands must be available (up-zoned or receiving areas) to create a market for other landowners to buy the development rights from the downzoned, sending areas.

Such a situation may no longer be possible in the North Branch Chicago River watershed due to current zoning and the probable lack of receiving areas. This issue and others related to TDRs all require a strong planning and zoning framework at the local municipal level.

***Open Space Trading*:**
This is difficult to do in a largely developed watershed such as the North Branch Chicago River, but provides for a municipality or other entity to trade an existing parcel of open space for development to preserve a more desirable piece of open space elsewhere. Private groups such as The Nature Conservancy and Openlands Project operate such trade lands programs.

***Limited Development*:**
Used to date largely by land trusts and other non-profit entities, this technique shows great promise in communities that can organize themselves to protect their natural resources. Under this scenario, a local land trust or other non-profit entity acts as a developer, purchasing land from willing sellers. Instead of developing the land to its maximum profit, however, the land trust will develop only enough of the parcel to recoup its investment. It then keeps the rest of the land, which would normally have been developed as well and sold as cash profit, as permanent open space for the community.

Limited development differs from cluster or conservation development in that the developer, a non-profit group itself, develops only enough land to break even — usually about 50% of the units allowed by the underlying zoning. Cluster housing, in contrast, is profit-driven and simply clusters the full density on a smaller portion of the land. The non-profit developer instead takes this cash profit as additional open space. In the North Branch Chicago River watershed, the LFOLA has protected over 200 acres of land in this fashion over the last 15 years.

Open Space Act:
This Illinois law allows persons owning 10 acres or more to have their land assessed as open space rather than the highest and best use as long as their land continues to be used for open space purposes (woodland protection, hobby farm, etc.). There is no permanent protection for the land, however, and there is some tax recapture if the land is later developed. Still, this program does provide an interim solution to slow down the development process.

Preferential Treatment of Common Areas
This Illinois law encourages open space in residential developments, and would be useful for new efforts in this area. Eligible land is reduced for assessment purposes to $1.00/year.

Preservation Options Summary
It should be noted that all of the above land preservation options require legal advice, and that every landowner situation will be different. These are tools used to tailor a land conservation plan to a landowner's wishes and needs.

An individual or group that understands land preservation and management needs, can see or create opportunities, and can contact and work with landowners on a long-term basis is essential. It is not unusual for a land preservation deal to take five or ten years to accomplish. Success requires a constant eye on many variables and constant attention to and visits with landowners. Building a land preservation program requires much time and constant focus on relationship building.

4.3.1.1.2 Conservation Design Developments
The goal of conservation development is to protect open space and natural resources for people and wildlife while at the same time allowing development to continue. Conservation design developments designate half or more of the buildable land area as undivided permanent open space. They are density neutral, allowing the same density as in conventional developments, but that density is realized on smaller areas of land by clustering buildings and infrastructure. In addition to clustering, conservation design developments incorporate natural riparian buffers and setbacks for streams, wetlands, other water bodies and adjacent agricultural land (Dreher and Price 1997; Terrene Institute 1994; Schueler 1995; Arendt 1996).

The first and most important step in designing a conservation development is to identify the most essential lands to preserve in conservation areas. Natural features including streams, wetlands, lakes, steep slopes, mature woodlands, native prairie and meadow (as well as significant historical and cultural features) are included in conservation areas. Clustering is a method for preserving these areas. Clustered developments allow for increased densities on less sensitive areas of a site, while preserving the remainder of the site in open space for conservation and recreational uses (such as trails, soccer or ball fields).

Clustering is often used in planned unit developments (PUDs) or planned residential developments (PRDs). PUDs contain a mix of zoning classifications that may include commercial, residential and light industrial uses, all of which are blended together. As with clustering, the purpose of a PUD is to maintain density while preserving open space. Well-designed PUDs usually locate residences and offices within walking distance of each other to reduce traffic. PRDs apply similar concepts to residential developments.

A good example of a clustered development and permanent open space protection in the North Branch Chicago River watershed is the Mellody Farms project on the Middle Fork in Lake Forest. Mellody Farms is a

small residential development containing approximately 10 homes. LFOLA formed a partnership with a developer to protect open space on the site. By working together, the developer was able to build on the perimeter of the site, while at the same time allowing LFOLA to preserve sensitive savanna, wetland and prairie habitat in the interior.

4.3.1.2 Threatened and Endangered (T&E) Species

Threatened and endangered species are those plant and animal species that are in danger of extinction. Both the federal government and the State of Illinois maintain lists of species that meet threatened or endangered criteria within their respective jurisdictions. Federally endangered species are those that are in danger of extinction throughout all or a significant portion of their range. A state-endangered species is any species that is in danger of extinction as a breeding species in Illinois. Threatened species are those that are likely to become endangered in the foreseeable future.

Considerations in protecting endangered species include:

- Protecting sufficient habitat or critical areas used for foraging, shelter and reproduction throughout an animals life cycle or required soils, hydrology and growing conditions for plants.
- Providing corridors for those species that need to move between sites.
- Protecting them from impacts due to changes in hydrology or increased pollutant loadings.

Several techniques can be used to protect T&E species. One technique is to acquire sites where T&E species occur. Purchase and protection of the site where the species is located (with adequate surrounding buffer) may be sufficient to protect that population. In some instances it just is not financially feasible to buy the needed land. Where the site and buffer area isn't available for purchase, where an animal moves in too large an area (or migrates between sites), or where changes in hydrology or pollution from outside the site affect the species, other techniques must be used to protect the T&E species. Developing a resource conservation or management plan for the species and habitat of concern is the next step. Resource plans consider the need for buffer areas and habitat corridors, and consider watershed impacts from hydrology changes or pollutant loadings. The conservation plan will include recommendations for management specific to the species and its habitat, whether located on private or public lands. The conservation plan will guide both the property owner, and the local unit of government that plans and permits adjacent land uses, in how to manage habitat to sustain the species.

The North Branch Chicago River watershed has six animals and more than 20 plants listed as T&E species in Lake County, as well as nine T&E species of animals and plants in Cook County. There are two sites with T&E natural communities. In addition to the T&E occurrences, there are two INAI sites and three dedicated Illinois Nature Preserves in the Lake County watershed, with a combined sixteen sites located throughout the watershed. Sites with T&E species generally do not have management plans (unless they are designated as nature preserves or owned by a resource agency). Illinois Nature Preserves, on the other hand, are provided the highest level of legal protection, and management plans have been prepared for each of the three sites in the Lake County North Branch. (See Chapter 3, Section 3.8 for more information about T&E species and natural areas in the North Branch.)

4.3.1.3 Greenways and Trails

Greenways can provide a large number of functions and benefits to nature and the public. For plants and animals, greenways provide habitat, a buffer from development and a corridor for migration. Greenways located along streams include riparian buffers that protect water quality by filtering sediments and nutrients from surface runoff and stabilizing streambanks. By buffering the stream from adjacent developed land use, riparian greenways offset some of the impacts associated with increased impervious surface in a watershed. Maintaining a good riparian buffer can mitigate the negative impacts of approximately 5% additional impervious surface in the watershed (Schueler 1995). Greenways also provide important connections between fragmented natural areas allowing animals to migrate. This helps maintain population size and diversity

Existing greenways in the watershed include one along the Skokie River in Cook County which is protected as part of the forest preserve district. Two other greenways in the Lake County include one through Northbrook and Highland Park and another one through Lake Forest and Lake Bluff. Both greenways run parallel to the Skokie River.

Greenways also provide long, linear corridors with options for recreational trails. Trails along the river provide watershed residents with an opportunity to exercise and enjoy the outdoors. Even more important, trails allow users to see and access the stream, thereby connecting people to their river and watershed. Trails can also be used to connect natural areas, cultural and historic sites and communities, and serve as a safe transportation corridor between work, school and shopping destinations (NIPC and Openlands Project 1997a, 1997b; Labaree 1992).

Currently the trail system in the watershed is disconnected. The longest trail is located along the Skokie River in Cook County running from Dempster Street to the county line. Fragmented sections exist parallel to Route 41, and use the old North Shore Railroad on the Skokie River. The Skokie River in Cook County has a designated canoeing water trail as well.

Techniques for establishing greenways and trails involve several steps. The first step involves the development of a plan that proposes general locations for greenways and trails. In the case of trails, the plan also identifies who the users will be and provides direction on trail standards. Plans can be developed at the community and/or county level as well as regionally, statewide, and in a few cases, at the national level. Public and stakeholder input are crucial for developing successful greenway and trail plans.

Several techniques can be used for establishing greenways and trails. Greenways can remain in private ownership, they can be purchased, or easements can be acquired for public use. If the lands remain in private ownership, greenway standards can be developed, adopted and implemented at the local level through land use planning and regulation. Development rights for the greenway can be purchased from private landowners where regulations are unpopular or not feasible.

If the greenways will include trails for public use, the land for trails is usually purchased and held by a public agency such as a forest preserve district or local park system. In some cases, easements will be purchased rather than purchasing the land itself. Usually longer trail systems are built in segments, and completing connections between communities depends heavily on the level of public interest in those communities.

In new developing areas, the local planning authority can require trails. Either the developer or the community can build the trails. In some cases, the developer will voluntarily plan and build a trail connection through the development and use this as a marketing tool to future homebuyers. In other cases, the local planning authority may require the developer to donate an easement for the trail.

To install trails through already developed areas, land can purchased by a community agency with a combination of local, state and federal funds. Impediments to land purchase can significantly slow up trail connections in already established areas.

4.3.1.4 Wetlands

Wetlands provide a multitude of benefits and functions. Most important for the North Branch Chicago River are water quality improvement, flood control and wildlife habitat. Wetlands improve water quality by removing suspended sediment and dissolved nutrients from runoff. They control the rate of runoff discharged from the watershed and reduce flooding by storing rainfall during storm events. Wetlands also provide habitat for plants and animals including many of those that are threatened and endangered.

Wetland protection techniques that can be employed in the North Branch include:

- adopt a watershed regulation requiring no-net-loss of wetlands with a corresponding policy recommending gains in wetland acreages;
- develop management plans for high quality (ADID) wetlands;
- prioritize and acquire high quality wetlands outright or purchase easements;
- develop regulatory requirements for wider wetland buffers;
- mitigate all wetland losses within the same watershed;
- provide local incentives for voluntary wetland protection and restoration; and
- solicit cost-share funding from established regional, state and federal funding programs for wetland acquisition and restoration.

4.3.1.4.1 No-Net-Loss/Wetland Mitigation

Approximately 68% of the wetlands in the Lake County portion of the watershed have been converted to other uses, while the watershed in Cook County has lost approximately 81% of its wetlands. Since the 1970s, wetlands have been regulated through a permit program administered by the USACE under the authority of the CWA. In 2001 Lake County amended the WDO to add regulations for isolated wetlands. The WDO has been further amended to encourage a net-gain policy. Even with the regulatory program, wetlands continued to be converted, albeit at a slower rate.

In the 1990s the Federal government adopted a policy of no-net-loss of wetlands to stem the tide of continued wetland losses. The no-net-loss policy has generated requirements for wetland mitigation so that permitted losses due to filling and other alterations can be replaced. Wetland mitigation for some projects involves the purchase of credits in established wetland mitigation banks. However, there are presently no wetland mitigation banks located in the North Branch Chicago River watershed. Therefore, in permit cases that allow the purchase of mitigation credits, North Branch wetland conversions are actually being replaced in other watersheds, rather than in the North Branch. In 2005 Lake County amended the WDO to create a Wetland Restoration Fund to allow fees in lieu of mitigation in areas not served by wetland banks. The Lake County Stormwater Management Commission (SMC) approved the SMC Wetland Restoration Fund Program on November 3, 2007. SMC created the fund as an alternative for wetland mitigation in watersheds that do not have wetland mitigation bank credits. At this time, the fund only compensates for impacts to Isolated Waters of Lake County (IWLC).

In order to address the specific circumstances and conditions in individual jurisdictions, and to protect local interests, state and local units of government have adopted more stringent laws than the Federal requirements to protect wetlands. Frequently these laws and ordinances add support to the no-net-loss wetland policy. Substantive amendments were made to the Lake County WDO in 2001 when the regulation of isolated wetlands was added. Where wetland impacts cannot be avoided, there is a minimum requirement to mitigate impacts to isolated wetlands that exceed 0.25 acres. A mitigation ratio of 1.5:1 is required, but this rises to 3:1 for impacts to high quality aquatic resources and 6:1 for high quality forested wetlands. Preservation of these areas and mitigation for impacts helps preserve water storage, infiltration, evaporation, and transpiration areas. Protected wetland areas, their buffers and mitigated wetlands are then permanently deed-restricted.

4.3.1.4.2 Management Plans for ADID Wetlands

Twenty-two wetlands in the Lake County portion of the watershed are classified as ADID wetlands by the 1992 Lake County Wetland Inventory. Management plans, developed cooperatively between the wetland owners and local, state and federal agencies, are a measure that could prevent degradation of these high quality wetlands. The management plans would provide guidance to owners, whether private or public, on how to manage the ADID wetlands to sustain their values as high quality wetlands. Management plan recommendations could also be incorporated into appropriate park and forest preserve district plans, local land use and transportation plans, and the watershed based plan (WBP).

4.3.1.4.3 Acquisition of High Priority Wetlands

Acquisition as a protection technique is covered under Protected Ownership in Section 4.3.1.1 Protecting Open Space and Natural Areas. The location of T&E species, ADID wetlands and high quality natural areas are several criteria, among others, that could be used to prioritize wetlands for acquisition.

4.3.1.4.4 Wetland/Stream Buffers

Wetland buffers protect a wetland from water quality and hydrologic impacts resulting from adjacent land uses. In addition, if vegetated and managed properly, buffers can provide considerable wildlife habitat. Buffers should be comprised of native, unmowed vegetation that is periodically managed for non-native and invasive species.

The Lake County WDO currently requires that buffers be maintained around all areas defined as Waters of the United States including isolated wetlands, exceptional functional value wetlands (including ADID wetlands), other wetlands, lakes and ponds. The *Native Plant Guide for Streams and Stormwater Facilities in Northeastern Illinois* is the minimum standard for revegetation of buffer areas. Buffers are divided into two types in the WDO, linear buffers and water body buffers.

Linear buffer requirements (designated along both sides of the channel):

- For channels with a watershed >20 acres but < one square mile, a minimum buffer of 50 feet on each side of the channel is required.
- For channels with a watershed > one square mile, a minimum buffer of 30 feet on each side of the channel is required.
- For linear exceptional functional value wetlands and streams with an Index of Biotic Integrity greater than 40, a minimum buffer width of 100 feet is required

Water body buffer requirements:

- For water bodies or wetlands > 1/3 acre < 1 acre, a minimum 30-foot buffer is required.
- For water bodies or wetlands > 1 acre < 2 ½ acres, a minimum 40-foot buffer is required.
- For water bodies or wetlands > 2 ½ acres, a minimum 50-foot buffer is required.
- For all exceptional functional value wetlands (including ADID wetlands), a minimum 100-foot buffer is required.

These buffer requirements are considered to be the minimum standard for the county. Individual communities have the option of adopting more stringent buffer requirements. Adjacent land use, topography, runoff velocity and soil and vegetation types are all factors in determining the optimum buffer width for wetlands. Where a standard width is needed for regulatory purposes, 100 feet is considered a minimum buffer width for typical surface water requirements. Wider buffers are recommended for sensitive areas (Mitchell 1996). Required setbacks from the wetland should be calculated from the outer edge of the buffer rather than from the wetland itself.

4.3.1.4.5 Wetland Incentives and Cost-Share Opportunities

There are a number of incentive programs to implement wetland projects. Fund sources for wetland protection and restoration, as well as technical assistance, are available from programs at the local, regional, state and federal levels of government.

1. USACE Continuing Authorities Program

At the Federal level, the USACE CAP from Section 206 of the 1996 Water Resources Development Act targets wetland restoration. This section, also known as the Aquatic Ecosystem Restoration program gives the USACE the authority to carry out aquatic ecosystem restoration and protection if the projects will improve the quality of the environment, are in the public interest and are cost effective. The objective of section 206 is to restore degraded ecosystem structure, function and dynamic processes to a less degraded and more natural condition. The local sponsors of aquatic ecosystem restoration projects are required to contribute 35% towards the total project cost.

2. *USDA Wetlands Reserve and Environmental Quality Incentives Programs*

The USDA NRCS has two incentive programs that may have limited applicability in the North Branch watershed: the Environmental Quality Incentives Program (EQIP) and the Wetland Reserve Program (WRP). The goal of the WRP is to restore and protect degraded wetlands such as farmed wetlands. The WRP has three options available: permanent easements, 30 year easements and 10 year restoration cost share agreements. NRCS will reimburse the landowners for easements on the property plus a portion of the restoration costs based on the type of easement agreed to by the landowner. The EQIP program is primarily concerned with improvement of conservation practices such as grassed waterways and filter strips around water resources (including wetlands). Funding for the EQIP program is limited in the North Branch because the watershed is not designated as a natural resource priority concern area by the NRCS. Unfortunately EQUIP and WRP are only applicable to agricultural lands. As of 2001, only 3 percent of the North Branch watershed in Lake County (~960 acres) was in agricultural use.

3. *USFWS Partners for Wildlife*

At least 50% cost-share funding is available for private landowners with restorable wetlands through the Partners for Wildlife program of the USFWS and the IDNR – Division of Wildlife Resources. The landowner must agree to maintain the restored wetland for a minimum of 10 years. The restored wetlands should fulfill multiple objectives including providing habitat for waterfowl, improving water quality, providing flood protection and recharging groundwater.

4. *IDNR Conservation 2000*

The State of Illinois' Conservation 2000 Ecosystems Program (C2000) is made up of Ecosystem Partnerships, which are coalitions of local stakeholders -- private landowners, businesses, scientists, environmental organizations, recreational enthusiasts, and policy makers. The C2000 program, administered by the IDNR Office of Realty and Environmental Planning seeks to maintain and enhance the ecological and economic conditions in resource-rich landscapes by supporting Ecosystem Partnerships of local and regional interests. The North Branch Chicago River watershed became one of 41 Ecosystem Partnerships in 2000.

5. *IEPA Section 319*

Funding for wetland related projects is provided by the IEPA through the Nonpoint Source Management Program (Section 319 of the CWA). Wetland-related projects funded with 319 funds, be they buffers, wetland restorations or other projects, must help to control nonpoint source pollution, improve Illinois water resources, and promote the public's knowledge and awareness of nonpoint source pollution.

6. *Northeastern Illinois Wetlands Conservation Account*

Wetland restoration funds are also available through grants from the Northeastern Illinois Wetlands Conservation Account. This funding source is applicable to the 6 county Chicago region and is jointly administered by The Conservation Fund and the USFWS.

7. *Wetlands Restoration Fund*

Wetland restoration money is available through this fund formed to accept fee-in-lieu of wetland mitigation monies generated by the wetlands permitting program. Corlands administers this fund for the 6 county Chicago region.

8. *LCSWCD Technical Assistance*

At the local level, technical assistance is available from the Lake County Soil and Water Conservation District (LCSWCD). The LCSWCD, along with NRCS staff, offers free assistance to develop conservation plans, assist with technical design of conservation practices and provide and interpret natural resources information. LCSWCD assistance would be especially useful in development of management plans for ADID wetlands.

9. Tax Assessment Reduction

At the local level, incentives are available to preserve land in open space through the County Assessor's office. Land that remains in open space for at least three years is eligible for a dual assessment. This means that as long as the land is used as open space, taxes are paid on a lower use value (rather than market value) based on the value of the poorest open space land in the county (according to court decisions). In order to be eligible for assessment as open space, the property must be at least 10 acres and meet a number of other criteria.

4.3.2 Remedial Measures: Restoring Natural Resources

4.3.2.1 Stream Restoration

Stream restoration techniques are used to improve stream conditions so they more closely mimic natural conditions. For an urban stream like the North Branch, restoration to natural conditions may not be possible or feasible. For instance, physical constraints due to adjacent development may limit the ability to re-meander a stream. In addition, the natural stream conditions may not be able to accommodate the increased volume of flow from the developed watershed. Other factors such as economics and politics may also come into play.

Even in cases where restoring the stream to its natural condition isn't possible, the stream can still be naturalized and improved by reestablishing riparian buffers (as described in Section 4.3.1.4.4), performing stream channel maintenance (described in Section 4.1.1.4), stabilizing streambanks using bioengineering techniques (described in Section 4.1.2.3), and, where appropriate, by removing dams and installing pool/riffle complexes. Stream restoration projects may be one component of floodplain restoration projects, and can be supplemented with trails and interpretive signs, providing recreational and educational benefits to the community.

4.3.2.1.1 Pool/Riffle Complexes

Establishing pool/riffle complexes in the streambed is another method for restoring stream conditions. Pools and riffles naturally occur in streambeds in a sequence that follows the meander of the stream. However, pool/riffle sequences are usually lost when streams are channelized.

Riffle restoration is usually done with rock weirs placed in sequences at spacing intervals determined by the bankfull width of the stream. The cobble and boulder weirs are spaced so a distance of approximately six bankfull widths separates them. Pools develop between the riffles. The pool/riffle sequences benefit fish and macroinvertebrates by aerating the water during low flow conditions, and by providing more diverse substrate and deeper water for habitat.

The placement of the stone for the riffles can also reduce streambank erosion immediately downstream as stream flow is funneled through the center of the stream channel and away from the banks. Pool/riffle complexes are often installed in conjunction with the other streambank stabilization techniques described above for even better stream restoration results (Illinois State Water Survey 1998).

4.3.2.1.2 Dam Removal

Dam removal is a technique that can be used to restore streams for fish habitat. Dams serve as barriers to the upstream/downstream movement and dispersal of aquatic organisms. Therefore, removing unnecessary dams can open reaches to provide more habitat for breeding, feeding and cover and will increase the number and diversity of fish and other aquatic organisms.

There are two dams located in the Lake County reaches of the North Branch and an unknown number in Cook County reaches.[36] The dam on the West Fork creates Lake Eleanor and removal is likely not feasible. The second Lake County dam is located on the Skokie River in Lake Forest. It is an old dam that has failed and alternatives for its removal will need to be investigated.

---

[36] *Lake County SMC only has authority to plan for the Lake County portion of the watershed. MWDR is initiating a comprehensive plan for the North Branch in the Cook County portion of the watershed.*

4.3.2.2 Wetland Enhancement and Restoration

Because agriculture and urbanization have degraded many of the remaining wetlands in the North Branch watershed, wetland enhancement projects are necessary to improve the diversity and function of degraded wetlands. The term enhancement refers to improving the functions and values of an existing wetland. Converted wetland sites (or sites that were formerly wetlands but have now been converted to other uses) can also be restored to provide many of their former wetland benefits. Wetland restoration is the process of establishing a wetland on a site that is not currently wetland, but was in the past prior to conversion.

Wetland functional values vary substantially from wetland to wetland; they receive special consideration because of the many roles that they play. Because of the wetland protection laws currently in place, the greatest impact on wetlands from future development in the North Branch watershed will likely be a shift in the types of wetlands. Often in mitigation projects, various types of marshes, wet prairies and other wetlands are filled and replaced elsewhere, usually with open water wetlands. This replacement may lead to a shift in the values served by the wetland communities due to a lack of diversity of wetland types. The wetland restorations that are proposed in the North Branch should include a variety of different wetland types to increase the diversity of wetlands in the North Branch. The restoration of wetlands will provide new stormwater storage areas, will improve water quality by treating stormwater runoff and will create new and better plant and animal habitat. In addition to these values, wetlands can be part of a regional greenways or trails network, they can be constructed with trails to allow the public to explore them more easily and they can be used to educate the public through signs, organized tours and other techniques. Wetland restorations are an exceptional way to meet multiple objectives within a single project.

4.4 Watershed Coordination Measures

4.4.1 Planning and Policy Coordination

Three forums currently exist for planning and policy coordination in the North Branch watershed. One is the North Branch Chicago River Watershed Management Board (WMB), an advisory board to the SMC. The second is the Planning Committee for the North Branch Watershed Project, which includes representation by non-governmental stakeholders in addition to WMB members for Lake County and governmental and non-governmental representatives from Cook County. The third is the MWRD Watershed Planning Council.

4.4.1.1 Lake County North Branch Watershed Management Board

The WMB was established in 1990. The WMB, formed under the direction of the Lake County Comprehensive Stormwater Management Plan, is made up of the chief elected official from every municipality, township, drainage district and county board district in the North Branch watershed in Lake County. The WMB makes recommendations to SMC on financial, institutional and programmatic aspects of the drainage system and stormwater management services within the watershed. The board's primary role is to serve as a forum for the coordination and allocation of resources, to contribute to basin planning projects and to resolve inter-jurisdictional watershed issues.

4.4.1.2 North Branch Planning Committee

The North Branch Planning Committee was established in 1996 to guide the work of the North Branch Watershed Project. The committee is composed of representatives from both Lake and Cook Counties. All of the Lake County WMB members were invited to serve on the committee in addition to other county, regional, state and federal government representatives and non-governmental stakeholders that have been identified through previous watershed project partnerships or outreach activities.

The North Branch Planning Committee is an open organization that meets on a quarterly basis with new members being added as they are identified. The Planning Committee, administered by SMC staff, provides guidance and review for watershed plans. Planning Committee meetings and field trips provide a forum for sharing information and coordinating projects and other activities of watershed stakeholders. The Planning Committee has several specialized work groups and subcommittees including the BMP Selection Team. The

BMP Selection Team is a subcommittee of the Planning Committee that reviews project proposals and makes funding recommendations to IEPA for Section 319 projects in the watershed for both Lake and Cook Counties.

4.4.1.3 MWRD Watershed Planning Council

The authority for general supervision of stormwater management in Cook County was given to the MWRD pursuant to the passage of Public Act 93-1049 (Act) by the Illinois State Legislature on November 17, 2004. The MWRD has worked with a number of communities to create various Watershed Planning Councils, including one for the North Branch of the Chicago River. Currently, the Council is working on the watershed based plan for the Cook County portion of the North Branch of the Chicago River watershed.

4.4.2 Regulatory Coordination

Several opportunities present themselves for regulatory coordination in the North Branch Chicago River watershed. The most obvious coordination opportunity is with implementation of the WDO in Lake County. Intergovernmental coordination with the federal wetlands regulatory program has been identified as a second opportunity for the watershed.

4.4.2.1 The Watershed Development Ordinance

Lake County's WDO was enacted as a preventative measure and requires that consistent stormwater management practices be applied countywide. In concept, the WDO should be a fairly effective measure for coordinating at the watershed level to prevent both water quantity and quality problems. In practice however, most of this watershed was developed before the WDO became effective, and the fourteen jurisdictional entities that administer the ordinance within the watershed do not consistently interpret and apply the WDO standards.

While SMC has administrative responsibility for the WDO in the county, many communities, upon request, have been delegated the authority to administer and enforce the ordinance through a certification process. In the North Branch Chicago River watershed, twelve of the fourteen municipalities, and the Lake County Planning Building and Zoning Department (for unincorporated areas), have been certified. Highwood, Lincolnshire, and Park City are the only three non-certified communities in the watershed where SMC directly administers the WDO.

Because of limited staff and varied priorities, WDO enforcement by certified communities is not always effective. Strategies to improve WDO enforcement that have been incorporated into the amendments of the ordinance include providing more training opportunities for enforcement officers, making participation in specific training workshops a requirement for community re-certification and holding certified communities more accountable for lax enforcement within their jurisdictions during re-certification. In particular, the water quality requirements in the WDO are not consistently applied and enforced throughout the watershed. WDO amendments improved the ordinance language and more clearly specify WDO requirements so they are not as subject to loose interpretation and application.

4.4.2.2 Wetlands Regulations

Another preventative measure that can benefit the North Branch Chicago River watershed is the wetlands regulatory program. Since the 1970s, wetlands have been regulated through a permit program administered by the USACE under the authority of the CWA. In 1997, the USACE, the NRCS, LCSWCD and the SMC entered into a cooperative agreement to more stringently review and enforce soil erosion and sediment control on development sites that include wetlands. While coordination among the permitting staff of these agencies has improved dramatically, the watershed would also benefit from better coordination regarding wetland mitigation and restoration.

Because of the existing flooding and water quality problems in the watershed, it is important that the watershed not lose any more wetland acreage through the USACE permit program. A local wetland regulatory program that is more stringent than the USACE is one measure that could be implemented to reduce wetland loss. Substantive amendments were made to the Lake County WDO in 2001 when the

regulation of isolated wetlands was added. The WDO states that where impacts cannot be avoided, there is a minimum requirement to mitigate impacts to isolated wetlands that exceed 0.25 acres. A mitigation ratio of 1.5:1 is required, but this rises to 3:1 for impacts to high quality aquatic resources and 6:1 for high quality forested wetlands. Preservation of these areas and mitigation for impacts helps preserve water storage, infiltration, evaporation, and transpiration areas. Protected wetland areas, their buffers and mitigated wetlands are then permanently deed-restricted.

Another measure to prevent wetland loss centers on where wetland mitigation and restoration occur. Historically, wetlands lost in the watershed have been mitigated in any watershed throughout the six-county Chicago metropolitan region. Subsequent changes to the WDO required that all wetland losses in Lake County be mitigated in Lake County in order to receive a Watershed Development Permit. The WDO follows a mitigation hierarchy for preferred mitigation alternatives. Under the hierarchy, on-site mitigation is preferred, followed by the purchase of credits in an USACE or LCSMC approved mitigation bank within the watershed. If neither of these options is feasible then mitigation may be provided out of the watershed, within the county, although a higher mitigation ratio would be required. If no wetland mitigation credits are available within the watershed where the impacts occur then mitigation may be provided by payment into the LCSMC Wetland Restoration Fund. While these requirements cover watershed-based mitigation in Lake County, it does not apply to the Cook County portion of the watershed. A coordinated effort could be developed between USACE, LCSMC, USFWS, and NRCS to encourage in watershed mitigation for all wetland losses occurring within the Cook County portion of the watershed.

4.4.2.3 Municipal Advisory Committee

The Lake County Municipal Advisory Committee (MAC) is a collaborative body to LCSMC with duties in four different areas. First, MAC is a way for local government representatives in Lake County to discuss inter-jurisdictional issues and projects. It is a resource and suggests or recommends actions to Technical Advisory Committee on WDO administration. Second, MAC contributes to the development and implementation of annual NPDES Phase II program for the SMC Qualifying Local Program and Municipal Separate Storm Sewer Systems (MS4s). Third, MAC helps with coordination and communication between SMC and local government representatives on issues related to SMC activities. Finally, the MAC deals with WDO administrative issues, primarily the discussion of delegation of ordinance enforcement responsibilities to certified communities.

The MAC meets every other month or more if necessary. Meeting times, locations, and notes are posted on the Lake County SMC website (http://www.co.lake.il.us/smc/regulatory/mac/mac_default.asp). The chair appoints a vice-chair and presides over the meetings. In the absence of the chair, the vice-chair presides over the meetings.

CHAPTER 5 : ACTION PLAN

This action plan chapter attempts to answer the questions, who, what, where and when regarding watershed improvements. The chapter is divided into three parts. The first section includes a description of the roles and responsibilities of the affiliated partners or stakeholders in North Branch watershed management. While the North Branch stakeholder list is too extensive to name everyone, this section is an effort to identify key partner organizations and groups for purposes of coordinating implementation of the watershed plan. This section describes the roles and responsibilities of the stakeholders highlighted as lead and supporting agencies in the action grids in the remaining two sections of the chapter.

The second and third sections of this chapter include the action recommendations. Section two is programmatic recommendations (Programmatic Action Plan), while section three includes site-specific recommended actions (Site-Specific Action Plan). The Programmatic Action Plan has general applicability throughout the watershed, although many of the preventative measures may be more appropriate to the still rapidly developing northern half of the watershed. The Site Specific Action Plan includes recommendations for watershed improvement projects at specific locations. The site-specific recommendations are certainly not all-inclusive of the opportunities for best management practice projects in the watershed, they merely reflect the opportunity sites identified by stakeholders, stream and detention basin inventories, and other components of the assessment. There are certain to be many more opportunity sites for using BMPs that will be identified during the implementation phase. As a living document, it is anticipated that both programmatic and site-specific recommendations will be added to the plan as problems continue to be identified by watershed stakeholders.

Both the programmatic and site-specific plans are organized based on the goals and objectives presented in Chapter 2. They are formulated in a grid structure that includes a priority ranking, identifies responsible stakeholders and sets a target date for action. Some of the recommended actions can be completed within a five-year framework, while others require a longer-term outlook (up to 20 years). In addition, some actions will have to be completed in phases, initial phases may be completed in the near future, while an entire multi-phase project may require 10 or 20 years until it is considered complete.

Priority ranking of the actions can take several forms. Actions were ranked (high, medium, low) in this plan based on watershed needs without looking at the feasibility, economic value or term of the action recommendation. As can be seen in the action grids, this approach offers a fairly extensive list of watershed actions. There was some discussion at the planning level that advocated assigning a high priority to actions that met the following criteria:

- the action can realistically be accomplished in the next 5 years,
- actions that will produce the biggest bang for the buck (economic return), and
- actions that will likely attract a lead agency to undertake (therefore are most feasible).

While this approach was considered, it was not used because it was determined that it would limit the success of the plan for the following reasons:

1) The approach of assigning high priority to those recommendations that can be accomplished in 5 years would result in some worthwhile long-term actions not being undertaken because they are considered low priority.

2) Economic return might be a valid ranking criteria to use during the implementation phase of this plan, but since no economic analysis was performed in this phase of the plan process, it would be premature to use this as a ranking criteria at this stage.

3) Since there is such a broad array of interests represented by the stakeholders, it is difficult to determine at this stage what is feasible, therefore assigning a low priority to an action might actually make it less feasible.

For these reasons, a universe of actions are presented in the action plans, and they are ranked based on watershed management needs. A more detailed analysis will have to be performed prior to undertaking these programmatic and site-specific actions to determine economic and political feasibility.

5.1 Watershed Roles & Responsibilities

Table 5-1
North Branch Chicago River Watershed Partners, Lake County

Watershed Partner	Abbreviation
Chicago Botanic Garden	CBG
Chicago Metropolitan Agency for Planning	CMAP
Corporate Landowners	Corp
Corporation for OpenLands	CorLands
Deerfield Wastewater Treatment Plant	DWWTP
Drainage Districts	DD
▪ East Skokie	ESDD
▪ West Skokie	WSDD
▪ Union #1 West Fork	UDDWF
▪ Union #1 Middle Fork	UDDMF
Federal Emergency Management Agency	FEMA
Friends of Chicago River	Friends
Great Lakes Naval Training Center	GLNTC
Golf Courses	Golf
Home Builders Association of Lake County	HBALC
Illinois Department of Natural Resources	IDNR
Illinois Department of Transportation	IDOT
Illinois Emergency Management Agency	IEMA
Illinois Environmental Protection Agency	IEPA
Illinois State Toll Highway Authority	ISTHA
Lake Bluff Open Lands Assoc.	LBOLA
LC Board	CB
LC Department of Transportation	LCDOT
LC Emergency Management Agency	LCEMA
LC Forest Preserve District	LCFPD
LC Health Department	LCHD
LC Planning, Building, & Development Department	PB&D
LC Soil & Water Conservation District	SWCD
LC Stormwater Management Commission	SMC
Lake Forest Open Lands Assoc.	LFOLA
Metropolitan Water Reclamation District	MWRD
Municipalities	MUNIC
North Branch Planning Committee	NBPC
North Shore Sanitary District	NSSD
Openlands Project	OP
Park Districts	PD
Residents	Residents
Townships	TWP
US Army Corps of Engineers	USACE
US Fish & Wildlife Service	USFWS
Resources Conservation Service	USDA Natural NRCS

Increasingly, watershed stakeholders are realizing the importance of promoting "green" practices and projects. Through the implementation of this plan and the projects outlined within it, stakeholders will help to promote and achieve their "green" initiatives within the watershed. A list of some watershed stakeholders can be found in Table 5-1. A description of each stakeholder and their role and responsibility in the watershed follows.

Chicago Botanic Garden

The Chicago Botanic Garden (CBG) is located on the Skokie River immediately south of Lake County (south side of Lake–Cook Road). The CBG has completed an extensive stream restoration and enhancement project on the Skokie River running through their property including streambank stabilization and riparian wetland restoration using bioengineering techniques, low flow meandering, pool/riffle development and native prairie plantings in the floodplain buffer. A video was produced documenting the procedures used in the stream restoration and the Garden continues to monitor the success of the BMPs used. The CBG is currently undertaking an extensive initiative to monitor water quality and stabilize eroded shoreline surrounding the lagoons at the Garden.

The CBG offers many educational programs for the general public and professionals. The Garden could target watershed municipalities and drainage districts for future tours and presentations - sharing their experiences and training others on the techniques that have been used

successfully at the Garden. A representative of the Botanic Garden has participated on the North Branch Planning Committee (NBPC), and the Garden has hosted a number of meetings and workshops for the North Branch Project providing strong partner support.

Corporate Landowners

Corporate landowners have a significant influence on watershed management in the North Branch. Corp participation in watershed improvement projects can take a variety of forms. Commercial and industrial businesses can retrofit their existing facilities, grounds and parking lots to reduce runoff volume and pollutant loadings. There are also several large corporate ownerships of considerable vacant land. Of special significance are properties owned by Abbott in the upper reaches of the watershed. Several of these undeveloped parcels are of great ecological and hydrologic value offering significant opportunities for open space protection and wetland restoration. As an example, Abbott has conscientiously managed their property (known as the Wrigley tract) to protect and enhance an endangered plant.

In addition to management of their own properties, North Branch Corporations has been generous in funding and supporting other watershed improvement projects and education initiatives. Abbott hosted a tour of projects on their property for Friends, SMC and CMAP and participated in the stakeholders meeting for action plan development.

Corporation for OpenLands (CorLands)

CorLands is an affiliate of the OpenLands Project described later in this section. CorLands is the OpenLands' primary vehicle for preserving open space through land acquisition. CorLands accepts land donations for conservation purposes and assists local units of government in negotiating and implementing purchases of land for any permanent open space use. Unusual transaction structures are not uncommon in CorLands acquisitions for local governments. They can go to greater lengths than many local governments to make a transaction work to save open space while minimizing acquisition costs. CorLands can serve as an interim landholder for up to three years. The LCFPD has utilized the services of CorLands extensively in the past in negotiating purchases for forest preserves. CorLands also specializes in conservation easements in addition to outright land acquisition.

Deerfield Wastewater Treatment Plant (DWWTP)

The DWWTP serves the residents of Deerfield, a portion of Bannockburn, and a small portion of Highland Park. The facility has the capacity to process 8 MGD of sewage and is also able to treat an additional 10 MGD as part of excess flow in the event of a storm. The treated effluent is discharged to the West Fork of the North Branch in Deerfield. Flows in excess of the plant's capacity are diverted to excess flow lift stations where the effluent receives primary treatment prior to discharge into the West Fork and the Middle Fork of the North Branch.

Drainage Districts (DD)

There are four drainage districts in the North Branch. The ESDD has jurisdiction over the Skokie River. The WSDD covers the upper part of the Middle Fork extending to Deerfield Road, the Union Drainage District #1 for the Middle Fork (UDDMF) covers the lower reaches in Lake County and extends to Dundee Road in Cook County. Union Drainage District #1 (UDDWF) covers the West Fork in Lake County and extends into Cook. See Figure 3-5 for a map of drainage district boundaries.

The drainage districts assess property owners fees to repair and maintain the North Branch main tributaries as a drainage system. They are responsible for the maintenance and upkeep of the river channel within a 35-50 foot easement on each streambank. The drainage districts are primarily concerned with conveyance and flooding issues. The WSDD and UDDWF manage and maintain the Atkinson Road and Bannockburn flood control reservoirs constructed by the Army Corps of Engineers, respectively.

In recent years, Union Drainage District #1 has completed several streambank stabilization projects along the most severely eroded reaches of the West Fork. The East Skokie Drainage District has also completed a

number of streambank stabilization projects and has also been actively televising the pipes that convey the Skokie in upper reaches that flow underground. The West Skokie District has completed one streambank stabilization project along the Middle Fork, near Deerfield High School.

Federal Emergency Management Agency

FEMA is the lead federal agency responsible for flood mitigation and response. The following two divisions provide service to the North Branch.

- The *Mitigation Division* is responsible for coordinating community participation in the NFIP and the CRS. This division helps communities draft and enforce local floodplain ordinances; coordinates FISs; and publishes FIRMs.

The NFIP is administered by FEMA. Federally-backed flood insurance policies can be written directly through private insurance companies. The NFIP provides insurance coverage for properties subject to surface water flooding. Rates vary based upon calculated risk of flooding depending on a number of factors such as a structure's location within or outside of the 100-year flood elevation boundary.

The Mitigation Division also administers two programs that provide funding assistance for mitigation. The *Flood Mitigation Assistance Program* (FMA) provides pre-disaster funding for preparing a hazard mitigation plan. The FMA provides 75 percent cost-share grants for mitigation planning and projects implemented as a result of the plan. The *Hazard Mitigation Grant Program (Section 404)* provides 75 percent cost-share funds for mitigation projects in a state following a presidentially declared disaster.

- The *Response and Recovery Division* responds when a flood or other disaster results in sufficient damage to warrant a disaster declaration by the President. Assistance may be provided for both private property and public building damage. 100 percent grants are available to individuals for limited home repairs, temporary housing, and small mitigation projects under the Individual and Family Grant Program. 75 percent cost-share grants are available to help rebuild public and private nonprofit facilities and for mitigation projects to protect them from future damage.

Friends of Chicago River (FOCR)

Friends of Chicago River (FOCR) has been a leader in revitalizing the Chicago River. FOCR sponsors canoe trips, an annual river clean-up day and other fun and educational activities in the watershed. FOCR emphasizes their ability to bring people, funding and watershed improvement projects together. As part of the North Branch Project, FOCR has developed an active public education and outreach program with a focus on school children. FOCR has also developed interest in, and coordinated, watershed best management practice demonstration projects that include wetland, pond and floodplain restoration and streambank stabilization.

Great Lakes Naval Training Center (GLNTC)

The GLNTC located adjacent to North Chicago occupies a portion of the Skokie River watershed. A golf course and military housing are the primary uses of GLNTC land in the watershed. Although not under the County's regulatory authority, GLNTC is committed to meeting the County's stormwater requirements for new development and redevelopment. A representative of the GLNTC Environmental Department has participated on the NBPC.

Golf Courses (Golf)

There are 14 golf courses that cover 2,610 acres in the Lake County portion of the North Branch watershed. Twelve of the fifteen golf courses are located immediately adjacent to the river channels. Openlands Project conducted a study of North Branch golf courses (June, 1998) since they make up such a significant portion of the watershed's land use, especially along the river channels. Based on that study, Openlands determined that approximately one-half of the land dedicated to golf courses is not playable, nor used for infrastructure, and could be enhanced using conservation practices. Several golf courses in the North Branch have already

completed, or are undertaking streambank stabilization projects but there is still significant opportunity for natural resource enhancement, and potentially stormwater storage at some golf courses. Many golf courses also offer opportunity sites for BMPs to improve water quality.

Illinois Department of Natural Resources (IDNR)

Office of Water Resources

The IDNR OWR is the state's lead agency on regulating floodway development and structural flood control and flood mitigation. OWR owns two sites in the North Branch watershed that are being considered for flood control reservoirs. Three divisions within the OWR provide assistance in local floodway regulation and flood mitigation efforts.

- The Division of Water Resource Management administers the floodway management program. This program regulates and requires permits for channel and floodway construction. In Lake County this regulatory authority has been delegated to SMC, although OWR concurrence is required for permits that affect changes to the base flood elevation or the delineated floodway. NFIP coordinators work with local governments by reviewing regulatory compliance and helping with mitigation and planning. The NFIP coordinator for Lake County is a member of the NBPC.

- The Division of Planning does initial surveys and makes recommendations for flood control or acquisition projects to local officials for local flood problem areas. If a project is within OWR authority, the Division coordinates planning and funding and provides project design. The Planning Division can contribute financial assistance on small projects of up to $75,000 at a single locality.

- The Division of Project Implementation prepares design plans and specifications for water resource construction projects. This division also acquires needed right of way and supervises construction activities. They are responsible for operation and maintenance of state managed dams and facilities on waterways.

Office of Realty and Environmental Planning

The IDNR Office of Realty and Environmental Planning (OREP) is responsible for natural resource and outdoor recreation planning.

- The *Division of Ecosystems and Environment* administers the Illinois Endangered Species and Illinois Natural Areas Preservation Acts. These Acts require local units of government (municipalities and counties) to participate in a consultation process with OREP prior to approving, funding or performing activities that will disturb water, land or air (development). The Division will issue a biological opinion if threatened or endangered species or Illinois natural area sites are impacted by development.

- OREP includes the *C2000*. IDNR provides technical assistance and funding through a grant program to established partnerships. The North Branch Chicago River is included as part of the Chicago Wilderness Ecosystem partnership.

- OREP also performs natural resource and greenways corridor planning and helped fund the development of the Northeastern Illinois Regional Greenways Plan, which includes a system of existing and proposed trails and greenways in the North Branch watershed. A representative from this division participated in the NBPC.

Office of Architecture, Engineering, and Grants

The Office of Resource Conservation (ORC) reviews Section 404 wetland permits for impacts to fish & wildlife resources. The ORC also performs fish surveys as part of basin studies and biannual sampling programs.

- The *Division of Fisheries* protects, restores, and enhances fisheries and other aquatic resources in Illinois through regulation, ecological management, and public education.

Office of Architecture, Engineering, and Grants
The *Office of Architecture, Engineering, and Grants (OAEG)* manages, coordinates, and executes capital programs through construction projects or grants to local government entities. OAEG administers IDNR grants including both state and federal grants for open space programs. Open Space Lands Acquisition and Development (OSLAD) is the state's grant program, Land and Water Conservation Fund (LWCF) is the federal program. These grants provide 50% reimbursement funding for open space acquisition.

Office of Scientific Research and Analysis (OSRA)
The Office of Scientific Research and Analysis (OSRA) conducts research, provides information and formulates natural resource policy.

- The *Water Survey*, a division of OSRA has significant expertise in stream restoration and has hosted several field trips and provided technical assistance to the North Branch project for restoration using pool/riffle development, and streambank stabilization using soil bioengineering techniques.

Illinois Department of Transportation (IDOT)
IDOT is responsible for transportation planning, road and bridge construction, and maintenance along some sections of the highways that traverse the North Branch Watershed. Major highways in the North Branch that fall under the state's jurisdiction include Routes 41, 43, 22, 60, 176, 132, 137 and 120. IDOT administers the Statewide Transportation Improvement Program (STIP) program in cooperation with the Federal Highway Administration. This fund source also can provide up to 80% federal cost-share for pedestrian and bicycle transportation paths.

Illinois Emergency Management Agency
Illinois Emergency Management Agency (IEMA) coordinates flood and other disaster planning, response and mitigation activities for the State of Illinois. IEMA provides training programs for local governments, reviews local plans, offers advice and assistance on emergency preparedness, and provides operational support during an emergency. IEMA also collects flood damage data from local units of government and administers FEMA funded programs for the state of Illinois, including the mitigation grant programs. (These programs are described under FEMA.)

Illinois Environmental Protection Agency (IEPA)
The IEPA has been delegated authority by the federal government (under the CWA) to monitor and initiate programs and practices that protect the chemical, biological and physical condition of the state's water resources. With this authority IEPA regulates point and nonpoint source pollutant discharges into the state's waters through both regulatory (permit & monitoring requirements) and non-regulatory programs. IEPA also monitors the condition of the state's waters (including the North Branch Chicago River) and reports on water conditions to the federal government in a biennial report. IEPA has several sites on the North Branch that are sampled for water quality on a regular basis.

IEPA has played a leading role in encouraging watershed management for the North Branch through staff and funding support for watershed planning and best management practice projects in the watershed (to reduce nonpoint source pollution in the river). Several IEPA representatives have served on the NBPC, and IEPA has provided considerable cost-share funding for the North Branch Watershed Project under its section 319 program.

Illinois State Toll Highway Authority (ISTHA)
The ISTHA constructs and maintains highways in Northeastern Illinois. I-94 is a major transportation route that runs north-south through the North Branch watershed. As a transportation corridor, the tollway has been a significant influence on the amount and location of commercial and industrial development in the North Branch watershed.

Lake Bluff Open Lands Association (LBOLA)

The goal of LBOLA is to preserve native landscapes, wildlife and open space in the village of Lake Bluff. LBOLA was founded in 1981 and currently manages thirteen open space parcels (225 acres), four of those parcels are in the North Branch watershed. The most significant parcel under their management is the Lake Bluff site co-owned by the LCFPD and the IDNR that was identified as a site for a potential regional flood control reservoir. LBOLA volunteers are working to restore the site and manage the site in cooperation with the LCFPD volunteer steward program.

Lake County Departments

The Lake County Board and a number of county departments and agencies are key stakeholders in the North Branch watershed. The county has the same role and responsibility as municipalities for land use planning, development, natural resource protection and drainage system maintenance in the unincorporated areas of the watershed. The County also maintains separate public works and transportation departments to install and maintain sewer systems, county roads and bridges.

- *Lake County Board* is composed of 23 board members, 8 of those board members represent the North Branch Watershed. The County Board has decision-making authority for county policies and ordinances [including the WDO and Unified Development Ordinance (UDO)].

- *Planning Building and Development Department* (PB&D) is responsible for formulating and administering county ordinances related to land use and development, which includes the county zoning ordinance. PB&D also reviews and makes recommendations to the Planning Committee for development proposals in the unincorporated areas of the county, and does long term land use planning. In April, 2000, PB&D adopted a new UDO for Lake County that combined and improved the regulatory and planning provisions of several ordinances. In addition, in November, 2004, the county also adopted the *Regional Framework Plan*, as Lake County's comprehensive land use plan for managing land use, directing growth, and protecting the natural environment. The Engineering and Environmental Services Division of PB&D is responsible for administering and enforcing the WDO as well as other PB&D ordinances in unincorporated areas.

- *Lake County Division of Transportation* is responsible for all county roads, bridges, road culverts, and drainage in the road right-of-way. LCDOT activities cover all aspects of transportation ranging from long-term planning and coordination with other transportation agencies, to regular road and bridge maintenance.

- The *Lake County Health Department Lake Management Unit (LMU)* is active in water quality sampling on lakes throughout Lake County.

Lake County Forest Preserve District (LCFPD)

The LCFPD has a significant role in watershed management through its land acquisition and education programs. LCFPD has five guiding requirements for land acquisition: protect wildlife habitat, form trail and greenway corridors, preserve natural communities, add to existing Preserves and flood control management. LCFPD has acquired floodplain along the Middle Fork including Middlefork Savanna and Prairie Wolf. Acquisition priorities for these properties are for habitat restoration and protection. Middlefork Savanna is considered a globally significant prairie system and Prairie Wolf includes restored wetland that provides habitat, water quality, recreation and education benefits. Flood control is not a high priority in most acquisition decisions, but rather is viewed as an added benefit.

In addition to ownership of floodplain, the LCFPD also owns two properties in the North Branch that have actively managed flood control reservoirs (Atkinson Road and Bannockburn), and two properties with IDNR-OWR in-holdings for potential reservoirs (Lake Bluff and Prairie Wolf). See Figure 3-23 for a map of LCFPD holdings.

Lake County Soil & Water Conservation District (SWCD)

The SWCD provides Natural Resource Inventories (NRIs) and technical assistance to communities within the District's boundaries. The SWCD boundaries were extended to include all of Lake County as of January 1, 2000, therefore, all of the communities within the North Branch watershed are currently in the SWCD. Lake County residents benefit from SWCD assistance through their cooperative work with other agencies and one-on-one assistance.

Lake County Stormwater Management Commission (SMC)

The Lake County Stormwater Management Commission (SMC), composed of 6 county board members and 6 municipal representatives, was formed in 1990 to address stormwater management issues on a watershed basis throughout the county. SMC performs planning, regulatory and advisory functions for the County of Lake and its 52 municipalities. SMC staff administer the countywide WDO through a permitting program, provide consultant services for stormwater BMPs to communities and citizens, develop watershed plans for the county's 26 subwatersheds, and coordinate multi-jurisdictional stormwater management projects. SMC coordinates the North Branch Project and will take the lead role in formulating and implementing the North Branch Watershed Plan, and be responsible for evaluating and revising the plan as needed.

Lake Forest Open Lands Association (LFOLA)

LFOLA, as its name implies, is active in protecting open space in Lake Forest and surrounding communities. LFOLA, founded in 1967, has acquired ecologically significant properties for protection, and has formed several unique partnerships with developers to protect open space associated with new residential developments. LFOLA owns or holds conservation easements on 21 properties totaling 389 acres in the Middle Fork and Skokie River subwatersheds.. In addition, the LFOLA also oversees the care and maintenance of 168-acres of City Property and nearly 225 acres under conservation easement. LFOLA was the first recipient of IEPA cost-share funds through the North Branch Watershed Project to restore the Middle Fork floodplain at Mellody Farms. LFOLA has also proposed a substantial river/floodplain/wetland restoration project as part of the implementation phase of the watershed plan.

Metropolitan Water Reclamation District (MWRD)

The MWRD manages sanitary and stormwater infrastructure (including the Deep Tunnel system) in Cook County. MWRD projects are largely responsible for the dramatic improvement in the water quality of the North Branch. MWRD actively monitors water quality in the Cook County portion of the North Branch using both chemical and biological monitoring practices. Monitoring sites begin at Lake-Cook Road, which also provides sampling data for Lake County. In late 2004 state legislation gave MWRD authority over stormwater management activities throughout Cook County. As of early 2007, the MWRD completed a Stormwater Management plan for Cook County and is writing a countywide stormwater ordinance. MWRD has also established a North Branch Watershed Planning Council (NBWPC). MWRD staff have participated in this plan update through the NBPC.

Municipalities

Municipalities have a principal role in watershed management. They have primary responsibility for land use and development decisions within their jurisdiction. Municipalities use comprehensive land use planning and zoning, subdivision, erosion control, stormwater, natural resource protection and landscaping ordinances to govern where and how development will occur in their jurisdictions. Within the development review process densities, open space conservation, and allowable quantity and quality of stormwater discharge is determined. Municipalities also are in the first line of responsibility for monitoring and enforcing development-related ordinances and maintaining drainage system infrastructure. Key municipal bodies include: plan departments and commissions, public works departments and boards, village or municipal boards, park departments and boards, environmental and/or stormwater commissions and the mayor or village president.

North Branch Plan Committee (NBPC)
The NBPC is composed of watershed stakeholders. The planning committee has a mailing list of about 250 people, with approximately 20 members participating on a regular basis. Meetings are held quarterly. The NBPC advises project partners on watershed planning methods and issues, demonstration project selection and provides technical assistance.

North Shore Sanitary District (NSSD - Clavey Road Sewage Treatment Plant)
The NSSD serves most of the residents of the North Branch Watershed in Lake County. The NSSD service area covers the Lake County watershed east of I-94. The Clavey Road WWTP treats the largest percentage of the sanitary flow with a design average flow of 17.8 MGD and a design maximum flow of 28.0 MGD. Treated effluent is discharged to the Skokie River at several locations. The main discharge outfall is downstream of the Skokie Lagoons several miles south of Willow Road in Cook County. Emergency discharge outfalls are located at the treatment plant at the former main discharge outfall near Clavey Road, and at the Dundee Road effluent lift station bypass.

Chicago Metropolitan Agency for Planning (CMAP)
In 2006, the Northern Illinois Planning Commission (NIPC) merged with the Chicago Area Transportation Study (CATS) to form the Chicago Metropolitan Agency for Planning (CMAP). CMAP has developed model ordinances on stormwater management, soil erosion and sediment control, streams and wetlands, and floodplains for local governments to use in developing regulatory programs. CMAP provides technical assistance and training opportunities to local governments to improve watershed management activities - including watershed planning and stormwater management. Training opportunities include CMAP sponsorship of courses and workshops on design and implementation of stormwater BMPs, wetland management, soil erosion/sediment control and hydrologic computer modeling. CMAP also assists local governments in applying for federal and state funding for watershed improvement projects.

In addition to their other activities, CMAP was one of the major partners in the development of the Northeastern Illinois Greenways Plan, which includes existing and proposed trails and greenway corridors for the North Branch watershed.

OpenLands Project (OP)
OpenLands is a regional organization dedicated to promoting green open space as part of the formal infrastructure. Founded in 1963, OpenLands leads and participates in a number of greening projects at both the regional and neighborhood level. OpenLands is a partner in the development of the Northeastern Illinois Greenways Plan that includes the North Branch watershed. As part of the North Branch Watershed Project, OpenLands conducted a survey/assessment of golf courses in the North Branch watershed that culminated in a one-day training workshop for golf course managers/superintendents on watershed-friendly golf course management.

Park Districts
There are six park districts located in the North Branch watershed in Lake County. Park districts are similar to school districts in that they get a share of property taxes and are governed by elected board members. Park districts also frequently rely on user fees for some of their services, and use state and federal grants to expand park holdings and facilities. Park districts generally work closely with their affiliated municipal government in park planning and acquisition. The future amount and quality of open space, floodplain protection and the trail network in the watershed will depend largely on the level of active participation by local park districts in watershed management.

Residents
Many relatively small practices undertaken by watershed residents can result in a significant cumulative benefit to the watershed. These practices can range from simply using fewer chemical applications on lawns, to installing native landscaping and rain gardens, or disconnecting roof downspouts from the sanitary or stormsewer system. Residents also play an important role in determining the level of emphasis their elected

officials and municipalities place on flood reduction, water quality and wetland/aquatic habitat in governmental programs and expenditures.

Townships (TWP)

Townships have a limited role in watershed management in the North Branch because most of the land area in the watershed has been annexed and incorporated into one of the 14 municipalities. Generally, TWPs have responsibility for local road upkeep and maintenance in unincorporated areas of the watershed. Townships also sponsor drainage system improvement projects for problem areas in unincorporated areas. As an example, West Deerfield Township has co-sponsored resolution to a chronic drainage problem in Del Mar Woods, an unincorporated subdivision in the watershed.

Another township that positively impacts the North Branch watershed is Libertyville Township with their open space program. Libertyville Township is active in open space protection using special bond funds for land acquisition, and has targeted several properties in the North Branch watershed for purchase as open space. Libertyville Township currently own one property, located north of Atkinson Road, within the North Branch watershed.

US Army Corps of Engineers (USACE)

The USACE has played a leading role in flood reduction for the watershed by installing flood control reservoirs. The USACE has contributed up to 75% of the cost for the regional reservoirs in the watershed. Future federal and state cost-share for flood reduction practices will depend on future flood damage studies undertaken by USACE.

USACE also has a significant regulatory influence on wetland protection in the watershed through Section 404 (of the CWA) permit requirements for wetland alterations. The success of a watershed policy of no-net-loss of wetlands will depend largely on the Corps regulatory practices and mitigation requirements. The Chicago District of the USACE has established a fund account to collect fees-in-lieu of mitigation. This fund is managed by Corlands as a source of grant funding for wetlands restoration in the 6 county northeastern Illinois region.

In addition to their regulatory program and traditional role in flood control projects, USACE has several programs that may support environmental studies and floodplain and wetland restoration. These programs include Section 206 Aquatic Ecosystem Restoration, Section 1135 Project Modifications for Improvement of the Environment and their new Challenge 21 Program that promotes multi-objective floodplain management and restoration.

US Fish & Wildlife Service (USFWS)

The USFWS, like the NRCS, provides many technical assistance services to watershed organizations and communities. USFWS serves on the Technical Advisory Committee to the SMC, and reviews most Section 404 CWA permits under the Fish & Wildlife Coordination Act. In addition, USFWS has played an active role in assessing the condition of the watershed's natural resources. The USFWS inventoried river corridor wetlands and sampled the North Branch for fish and macroinvertebrates as part of the *ChicagoRivers* Demonstration Project.

USFWS also has several grant and cost-share programs that fund wetland and aquatic habitat restoration. The success of wetland restoration projects at Prairie Wolf and Gompers Park was largely dependent on USFWS expertise and funding support. USFWS co-administers the Northeastern Illinois Wetlands Conservation Account, which funnels money collected from wetlands regulatory violations into a grant account for wetland restoration/enhancement. Other USFWS watershed/wildlife enhancement programs that provide funding and technical support include the Partners for Wildlife Program and small grants under the North American Wetlands Conservation Act.

USDA Natural Resources Conservation Service (NRCS)
The NRCS offers significant technical expertise in soil erosion/sediment control, wetland restoration and community planning. NRCS has also been a key partner in several watershed projects including the Prairie Wolf Slough wetland restoration. NRCS has several cost-share and incentive programs targeted to water quality and wetland restoration including EQIP and WRP. These programs may have limited applicability in the North Branch since they are geared to agricultural lands.

The former Soil Conservation Service (SCS) did the original flood control study for the North Branch in the early 1970s. SCS designed the flood detention reservoirs later built by the USACE in the 1980s and early 90s.

5.2 Programmatic Action Plan

The Programmatic Action Plan includes policies and programs that will improve watershed management in the North Branch. The Programmatic Action Plan is organized into categories of actions based on the goals and objectives in Chapter 2. Note that in some cases a recommended action might address multiple objectives, and could fit into more than one goal/objective category. In this circumstance, the action was placed under the objective where it appears to provide the most benefit.

5.2.1 Goal 1: Improve Water Quality in the North Branch Chicago River

Water quality has been classified as poor in the West and Middle Forks of the North Branch Chicago River. Water quality is classified as fair in the Skokie River (North Branch Chicago River Open Space (Green Infrastructure) Plan 2005). At the time the previous North Branch Watershed Plan, during 2000, all three branches of the North Branch had a water quality classification of fair. The previous watershed plan had identified improving the classifications from fair to good for each of the West Fork, Middle Fork, and Skokie River. Since this time, none of these branches have achieved this goal, and two of these branches have been downgraded. This plan would like to set as an achievable goal, the return of both the Middle and West Forks to a classification of fair water quality. An aggressive long term goal would be to strive towards achieving a water quality classification of good in all three branches of the North Branch Chicago River. Considering the population density of the watershed is projected to increase 14.1% to 12.42 people/acre by 2030[37], this may not be achievable without a dramatic course of action to improve conditions. Based on a look at the sampling data for the North Branch, the most pervasive pollution problems include excess nutrient loading (nitrogen and phosphorus), fecal coliform, low levels of dissolved oxygen in some reaches during the summer, and high concentrations of chromium in sediments. The sources for the chromium in the sediments and fecal coliform in the water are still to be determined. Excess nutrients can be generated from a variety of nonpoint sources including run-off from streets, lawns, campus grounds, golf courses and construction sites. Excess nutrients may also be contributed from municipal wastewater treatment plants. Low levels of dissolved oxygen that are associated with low flow conditions in the summer can be attributed to an excess of organic inputs in combination with low base flow volume and high water temperature.

Actions to achieve the water quality improvement goal are targeted at improving the existing condition of the watershed by retrofitting the drainage system to absorb and filter pollutants before they reach the river, and at preventing the river from further degradation as land in the watershed continues to be developed. Providing incentives for retrofitting the drainage system, conducting education (outreach/training) programs, and strengthening regulatory and monitoring programs will be key to improving water quality in the North Branch Chicago River.

The actions to achieve this goal are categorized to meet four identified objectives:

- Reduce nonpoint and point source pollutant loadings from runoff by improving the water quality in the North Branch Chicago River.

[37] *Northeastern Illinois Planning Commission 2030 forecast.*

- Reduce streambank and streambed erosion.
- Correct wastewater overflow conditions that have a significant impact on water quality.
- Protect and restore riparian greenways and buffers along and around all water resources.

Objective 1: Reduce Nonpoint and Point Source Pollutant Loadings from Runoff by Some Measurable Standard

Remedial water quality activities largely involve retrofitting and repairing the detention basins and the drainage system of the watershed using BMPs to infiltrate and filter the pollutants found in urban runoff. Retrofit projects will require a strong local initiative. Local interest in installing BMPs will be developed through community outreach and providing training opportunities. Recommended detention basin and outfall modifications to retrofit for water quality can often be economically implemented as scheduled repairs and upgrades are made to the existing drainage system. While up-front costs for retrofit landscaping (native plantings), installing bio-filters and stream bio-engineering may be considered high, because these BMPs lower long-term maintenance costs and provide multiple benefits (flood reduction, water quality and wildlife habitat), they are usually the best economic choice.

Preventative programs and policies for this section focus on: reducing pollution loading at the source; providing incentives for and requiring water quality BMPs in new developments; and strengthening review and enforcement of the water quality provisions in the WDO. Providing training opportunities for enforcement officers and design engineers will be critical to successfully incorporating BMPs into new developments. Outreach to the development community and local officials will be necessary for changes to the WDO, and public education will be the most important factor for changing established behaviors to reduce nonpoint pollutants at the source.

With regards to open space planning to improve water quality, the North Branch Open Space Plan (NBOSP) indicates that there is a need to protect/restore riparian greenways/buffers along and around all water resources. This goal is based on the NBOSP inventory, which has identified the following:

- 586 open parcels (6,948.00 acres) within 100' of a watercourse. Of this, 327 parcels (4,721.59 acres) are protected and 259 parcels (2,226.41 acres) are unprotected.
- 116 partially open parcels (1,718.82 acres) within 100' of a watercourse. Of this, 18 parcels (399.84 acres) are protected and 98 parcels (1,318.98 acres) are unprotected

Open space parcels suitable for BMPs, which are either in proximity to water resources or that include or are adjacent to non-point source pollution critical areas or pollution point sources (National Pollutant Discharge Elimination System permitted facilities) can be identified.

In addition to the actions presented in this section, the runoff reduction actions (that minimize impervious cover and maximize infiltration) under the flood reduction goal will also provide significant water quality improvement. The quantity of pollutants in runoff will be reduced, and a smaller volume of runoff reaching the stream channel will reduce erosion within the channel and along the streambanks. Improved infiltration should increase the baseflow in the river, which will improve the level of dissolved oxygen in the water during the dry months of the year.

Objective 2: Reduce Streambank and Streambed Erosion

Fifty-eight percent of the North Branch stream reaches in Lake County and 98% of the reaches in Cook County are considered moderately to severely eroded. In addition to erosion along the main tributaries, many of the swale/gullies and pipe outfalls that discharge into the river are also eroded and contribute sediment loads to the river. While three of the four drainage districts have undertaken several streambank stabilization projects in the worst areas of the channel, little attention has been given to address erosion throughout the river system. Plan recommendations focus on institutionalizing programs to regularly monitor and maintain the river system, as well as stabilizing the streambanks.

Objective 3: Correct Wastewater Overflow Conditions that Have a Significant Impact on Water Quality

Large inflow fluctuations into the sewage treatment plants and sanitary sewer backup flooding problems are indications that stormwater discharges or infiltration into the sanitary system may result in polluted discharges to the North Branch Chicago River. The action plan recommends further study of this problem. Municipalities (who have not already done so) will need to take the lead in remedying this problem by developing programs to identify and remove illicit hookups and repair sanitary sewer lines to reduce I&I. Plan recommendations support NPDES Phase II requirements for instituting an I&I program. Education and outreach will be critical to public cooperation and acceptance of this program.

Objective 4: Protect and Restore Riparian Greenways and Buffers Along and Around all Water Resources

There are 586 open parcels, which total 6,948 acres, within 100 feet of a watercourse. Of this total, there are 327 parcels totaling 4,722 acres that are protected and 259 parcels totaling 2,226 acres that are unprotected. In addition, there are 116 partially open parcels totaling 1,719 acres, within 100 feet of a watercourse. Of this partially open total, there are 18 parcels totaling 400 acres that are protected and 98 parcels totaling 1,319 acres that are unprotected. The plan recommends that high priority areas be identified along streams for riparian corridor restoration. Severely eroding streambanks are to be restored. Invasive species of plants are to be removed. A riparian corridor with 50 foot widths of native riparian vegetation should be established along both sides of all stream resources. The development of a long-term monitoring and maintenance plan is recommended to evaluate the success or failure of achieving this objective.

Specific program and policy action recommendations to improve water quality are contained in the programmatic action plan table.

5.2.2 Goal 2: Reduce Flood Damages in the North Branch Chicago River

Forty-seven flood damage problem areas have been inventoried in the Lake County portion of the North Branch watershed. (All or a portion of 26 of the 47 problem areas, 55%, are located in mapped 100-year floodplains.) In addition to the known flood problem areas, preliminary analysis locates approximately 1,900 structures in the mapped 100-year floodplain of the river in the North Branch watershed. The flood damage reduction goal in this watershed plan addresses both the existing and the potential future flood damage in the watershed. Recommendations for mitigating existing flood damage include drainage system repairs, property protection measures (i.e. building elevation, flood-proofing, etc.), and providing additional storage for run-off in the watershed. The potential for future flood damage will be mitigated by preventative actions like maintaining and restoring floodplain and wetland function, using run-off reduction BMPs, and maintenance of the drainage system on a regular basis.

The actions to achieve the flood damage reduction goal are categorized by five objectives:

1. Reduce flow rates and volumes from existing developed areas and prevent increases in flow rates and volumes from new development. (Runoff Reduction)
2. Protect and restore floodplain functions. (Floodplain Protection)
3. Maintain and manage the river corridor and other drainageways to preserve conveyance of stormwater in an environmentally-friendly manner. (River Corridor Maintenance)
4. Mitigate flood damages using both remedial and preventative measures including property protection. (Flood Mitigation).
5. Determine potential locations and feasibility of regional stormwater detention sites. (Regional Flood Control).

Objective 1: Reduce Flow Rates and Volumes from Existing Developed Areas and Prevent Increases in Flow Rates and Volumes from New Development

BMPs that reduce run-off are the best alternative to reducing flood damage. Run-off reduction practices can be installed in developed areas as a remediation measure, and when required in new developments they serve as a preventative measure. These practices center on reducing the amount of impervious surface that generates runoff, and infiltrating runoff from the impervious surfaces. Alternative site designs that cluster homes and campus buildings and reduce the amount of impervious surface by using narrower and shorter streets, smaller set-backs and minimizing parking lot area are the best practices both in terms of economics and environmental protection for minimizing increases in runoff volume from new development. Infiltration devices such as bio-filters, swales and permeable paving surfaces in combination with site designs that do not concentrate runoff into stormsewer systems, are examples of practices recommended by the plan to reduce runoff and improve infiltration, either as a retrofit to existing developed areas or as requirements on new developments. Specific action items to achieve this objective are included in tables at the end of this chapter.

Objective 2: Protect and Restore Floodplain Functions

Protecting and restoring floodplain and wetland functions to collect and store the additional runoff volume from a developed watershed is also necessary to protect against flood damage. The infrequency of flood events often allows communities to forget about the importance of floodplain and wetland storage. As North Branch municipalities continue to expand their population, and developable land becomes scarce, increasing pressure is exerted on communities to fill and build in floodplains and wetlands. In addition to losing the natural storage capacity of the floodplain to protect residents when large floods occur, this also adds to the number of structures at risk of flood damage. Actions recommended to protect and restore floodplains include purchasing and removing repetitively flooded buildings in floodplains, and restoring wetlands and floodplain for storage. The plan recommends protecting existing floodplain and wetland through public or conservation ownership or easements (see Figure 5-1 for map) and/or strengthening restrictions on floodplain development through zoning and regulation. The NBOSP supports these activities by recommending maintenance of all undeveloped floodplain as open space and identification of open space parcels suitable for wetland restoration, detention basins and/or flood storage that are adjacent to or near known flood problem areas. Specific action items to achieve this objective are included in tables at the end of this chapter.

Objective 3: Maintain and Manage the River Corridor and Other Drainageways to Preserve Conveyance of Stormwater in an Environmentally-Friendly Manner

The high volume of runoff to the North Branch in combination with the instability of ditched channels, has resulted in excessive erosion and debris blockages in the river. The accumulated silt and debris severely limit water conveyance in some reaches. Backwater flooding and significant streambank erosion have resulted from these blockages, making a regular maintenance and repair schedule for the entire drainage system necessary. The plan recommends that BMPs and a schedule for stream maintenance be developed and adopted by the drainage districts and municipalities to guide a regular maintenance program. Specific action items to achieve this objective are included in tables at the end of this chapter.

Action items within Goals 1 and 3 (Improve water quality, and protect and enhance natural resources) offer recommendations to stabilize the river corridor to prevent erosion and sedimentation, and to protect the corridor in greenways to limit development (and subsequently, reduce runoff and erosion potential as preventative maintenance.)

Objective 4: Mitigate Flood Damages Using Both Remedial and Preventative Measures Including Property Protection

In cases where other mitigation measures are not enough to keep floodwaters away from buildings or infrastructure, individual property protection measures may be the best solution to flood damage reduction. Property protection measures can include elevating structures, removing flood-prone buildings from harm's way using government acquisition or relocation, or flood-proofing. Building acquisition and relocation programs generally target repetitively flooded properties and are initiated by a local unit of government in cooperation with state and federal agencies that provide up to 75 percent cost-share funding. On the other

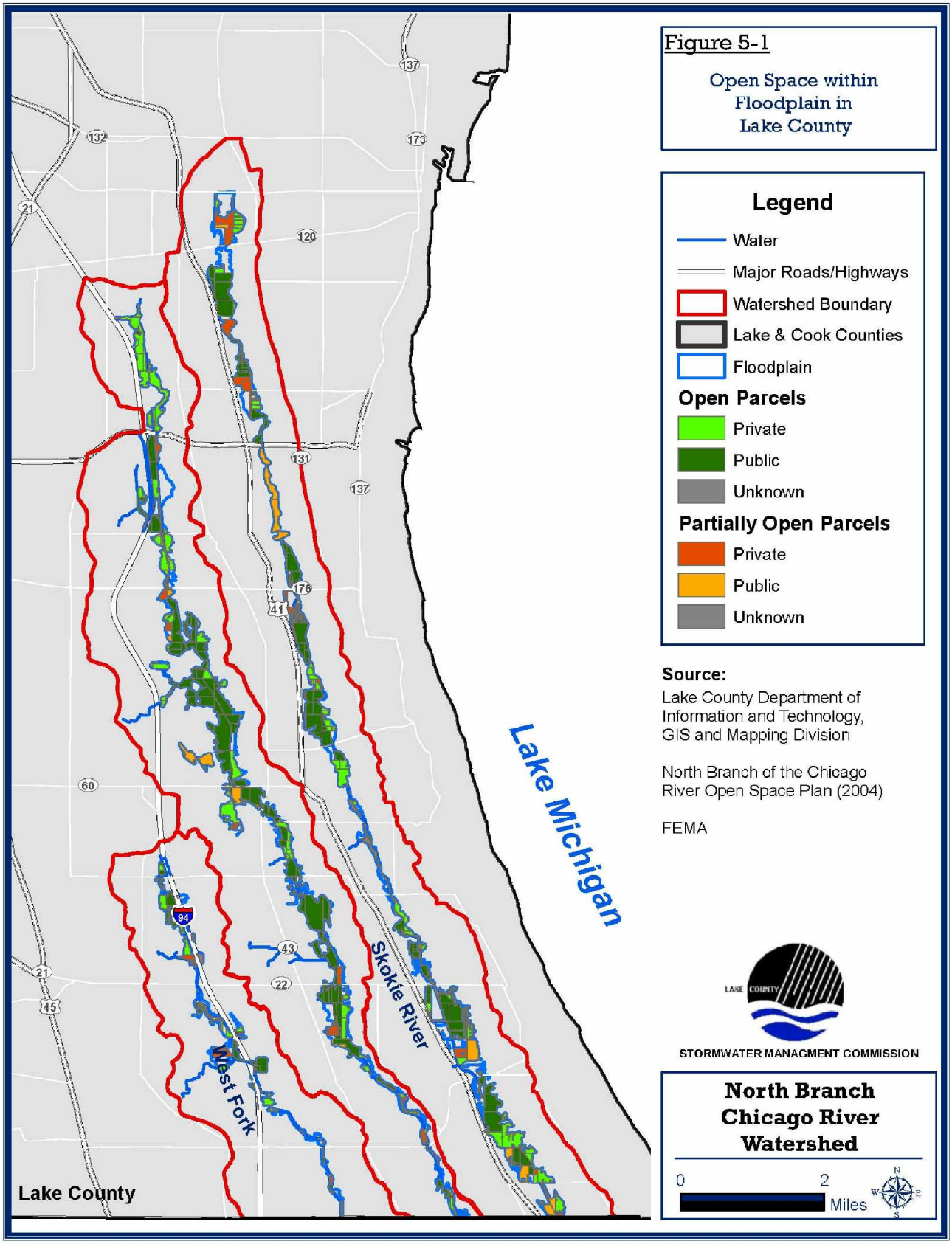
hand, building elevation and floodproofing are usually initiated and funded by the property-owner, although federal assistance may be available to offset these expenses following a flood that is declared a federal disaster. If a building with flood insurance coverage is substantially damaged (or in some cases repetitively damaged), Increased Cost of Compliance (ICC) coverage can help pay to elevate, floodproof, demolish or relocate the structure. This program depends on a partnership with local governments. Local governments must verify substantial damage and verify that the modified structure is protected appropriately. Plan recommendations include identifying properties at risk of flooding by address and targeting these properties with information about property protection measures. A phased approach would include a field survey to determine first floor elevations, estimating potential damage, and prioritizing properties for mitigation efforts based on risk level. Specific action items to achieve this objective are included in tables at the end of this chapter.

Objective 5: Determine Potential Locations and Feasibility of Regional Stormwater Detention Sites

Seven flood control reservoirs have been constructed in the North Branch project area to alleviate flood damages. Two of the reservoirs are located in Lake County. Two additional sites in Lake County are held by the IDNR-OWR and LCFPD for reservoir construction if future need warrants. Construction of flood control reservoirs is costly and time-consuming, requiring an extensive cost/benefit analysis prior to undertaking as a mitigation measure. In order to determine the need and feasibility of new reservoir construction at these sites, the plan recommends that an economic analysis of flood damages, and a feasibility study, be completed by the USACE with the cooperation of IDNR-OWR.

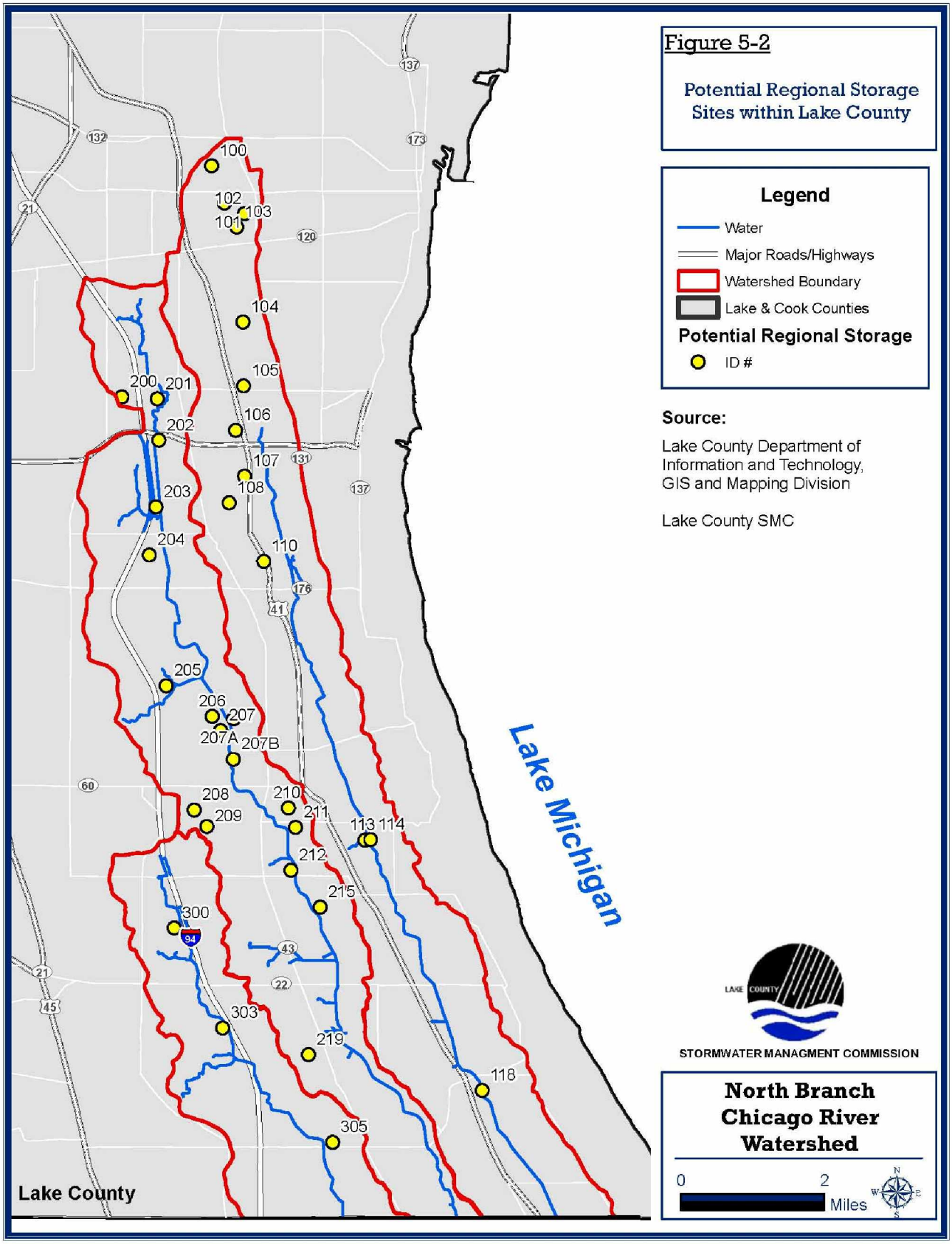
In 2007, several areas were identified as being potential regionally significant storage locations. These areas were identified based on land use, location relative to a known flood problem area, and topography (See Figure 5-2). A summary of the potential regional storage locations, including an approximation of existing and potential storage volume, can be found in Appendix H. Plan recommendations include further evaluation of these storage locations based on feasibility, multi-objective uses, and environmental sensitivity.

Specific program and policy action recommendations to reduce flood damage are contained in the programmatic action plan table.



Maps to be used for Planning Purposes only.

Produced by V3 Companies



Maps to be used for Planning Purposes only.

Produced by V3 Companies

5.2.3 Goal 3: Protect and Enhance Natural Resources and Provide Associated Recreational Opportunities

Although the watershed is largely developed (77% in Lake County and 86% in Cook County) the North Branch still contains some significant high quality natural areas, wetlands and T&E species that warrant protection. Currently only 8 percent of the land in the watershed is in conservation use, the rest of the undeveloped land is vacant land in private ownership or is used for agriculture and available for future development. The high quality natural resources that need to be protected and the opportunities for restoration generally occur on the undeveloped lands of the watershed. However, there are also opportunities for restoration on some of the existing recreational open space parcels.

While there are a number of sites in the watershed that can be restored, it makes sense to focus also on identifying and protecting the best remaining sites. In terms of economics, land that is in public ownership already is the least expensive restoration option. If restoration or protection requires the purchase of land, generally protection is much less costly from a dollar and cents perspective, and much less labor intensive, than restoring what has been lost or degraded. For instance, it is far less costly in most instances to initially protect wetlands for natural stormwater storage than it is to restore wetlands or build flood control structures later. In addition, the state of science for restoration ecology is not yet capable of successfully restoring the highest quality natural communities with all of its intricate complexities. Therefore, it makes sense to protect what is valuable through avoidance and preservation, rather than having to come back and repair the problems caused when a natural resource value is disturbed, altered and lost. Once the priority sites have been addressed for protection, then the focus can be shifted to restoration to remedy existing problems or degraded conditions.

The action plan specifically addresses protection and restoration of wetlands, open space and biodiversity (including T&E species). Recommendations for recreation opportunities associated with these natural resources are also included under this plan goal. Actions to achieve the natural resource protection goal are categorized by the following three objectives:

1. Protect and restore wetland and streams to improve water quality and aquatic habitat.
2. Protect and enhance plant communities, wildlife habitat and biodiversity.
3. Identify and develop potential areas for river-based recreational opportunities such as hiking, fishing, canoeing, running, biking, birding, peace of mind and tranquil setting for social benefit.

Objective 1: Protect and Restore Wetlands and Streams to Improve Water Quality and Aquatic Habitat

Fourteen percent of the North Branch watershed in Lake County is wetland, which represents about half of the watershed's original wetland acres. Twenty-four of the remaining wetlands are classified as ADID wetlands. Although federal and local regulations have greatly reduced the rate of wetland conversion, wetlands are still being lost to development in the North Branch, and pressure to convert wetlands is anticipated to increase with the significant development that is projected for the upper reaches of the watershed. (See Figure 3-30 in Chapter 3, Section 3.9.) The NBOSP recommends that, in addition to high quality wetlands, Illinois Nature Preserves and Illinois Natural Inventory Sites should also be protected from the impacts of on-site or adjacent development. The NBOSP biodiversity inventory revealed:

- 1,853.33 acres of open parcels intersecting with or adjacent to high quality wetlands in the Lake County potion of the watershed. Of this, 1,272.37 acres are protected and 580.96 acres are unprotected.
- 319.76 acres of partially open parcels intersecting with or adjacent to high quality wetlands in Lake County. Of this, no acres are protected.

- 2,387.31 acres of open parcels intersecting with or adjacent to Illinois Nature Preserves and Illinois Natural Inventory Sites. Of this, 1,795.19 acres are protected and 592.12 acres are unprotected. All Nature Preserves are protected.
- 346.95 acres of partially open parcels intersecting with or adjacent to Illinois Nature Preserves and Illinois Natural Inventory Sites. Of this, 9.84 acres are protected and 337.11 acres are unprotected. All Nature Preserves are protected.

In some cases, wetland loss in the watershed is made up of the actual acres authorized for fill under the permit program. While in other cases, the total acres of wetlands may remain the same due to mitigation, but the function, type or quality of the converted wetland is not being replaced. Wetland quality and function is also degraded by adjacent land development. In these circumstances, although fill of large acres of wetland is effectively discouraged through the permit program, wetlands are still being degraded by changes in hydrology and polluted runoff due to adjacent development. Smaller acreages of wetland are also being lost through the general permit mitigation program, which allows wetlands to be replaced through purchase of credits in mitigation banks outside of the watershed. (There are currently no mitigation banks in the North Branch.) The wetlands no-net-loss objective addresses these circumstances.

From a preventative perspective, the plan recommends that all units of government in the watershed fully adopt the no-net-loss policy. Several additional action recommendations support this policy including:

- the establishment of a mitigation bank and/or utilization of SMC's wetland restoration fund to accommodate the individually small (but cumulatively significant) unavoidable wetland impacts;
- an increase in buffer width requirements to reduce the impacts of adjacent development;
- development of management plans for the ADID wetlands; and
- long-term monitoring and enforcement of wetland protection and mitigation.

Remedial action recommendations address the past loss of wetland acres and stream quality through restoration. Fifty-three sites have been identified in the Lake County watershed that offer potential for wetland restoration.

Objective 2: Protect and Enhance Plant Communities and Wildlife Habitats

High quality vegetative communities containing plant species with high coefficients of conservatism (native mean C), high quality aquatic resources (HQARs), ADID wetlands, beneficial wildlife habitat and biodiversity will collectively benefit from the protection of open space and increased possibility to enhance areas with marginal opportunities. Although there are a considerable number of smaller parcels that could be protected and connected in the southern portion of the county, most of the opportunities for protecting large tracts of open space in the North Branch primarily occur in the northern reaches of the watershed. Currently four classes of land use are considered open space in the North Branch: vacant land (7% of the watershed); farmland (2% of the watershed); recreational open space (11% of the watershed) and conservation open space (8% of the watershed). Combined open space makes up approximately 28 percent of the watershed under current conditions.

The goal of this watershed plan is to maintain 25 percent of the watershed in open space and 15 percent in conservation use. The NBOSP indicates that a total of 15,162 acres in the watershed as open space will need to be protected to meet the 25 percent of watershed objective. With the amount of development that is anticipated for the watershed, only a coordinated planning effort among the North Branch communities and open space agencies to map a desired open space network will provide hope of achieving the open space goal. Once established, the effectiveness of the open space network to provide wildlife habitat and opportunities for recreational trails will depend on greenway connections between open space parcels.

The NBOSP recommends utilizing its prioritization of open and partially open space parcels to meet the current and future green infrastructure needs and to identify management opportunities for individual parcels.

ADID wetlands and riparian corridors are the highest priorities for open space acquisition. There are five wetland complexes identified in the action plan (some contain multiple wetlands) that are high priority for permanent protection in the North Branch. Twenty-nine sites have been identified as having potential for open space protection in the Lake County watershed.

Greenways in the form of riparian corridors along the North Branch tributaries, although difficult to identify as specific sites, are also a high priority for protection. Riparian greenways will connect open spaces and buffer the river from the water quality and habitat impacts that result from impervious surface runoff. Conservation easements are a logical protection measure for the riparian buffers in private ownership. There are several state and federal funding incentives for buffer easements that will be fully investigated and promoted during plan implementation. The NBOSP recommends connecting open space greenway areas with conservation corridors. Large sections of greenways exist throughout the watershed. The longest one is found on the Skokie River in Cook County. Another greenway of nearly equal length has been assembled over the last 30 years along the Middle Fork through Lake Forest, Bannockburn, and Highland Park. A shorter segment runs along the Skokie River through Lake Forest and Lake Bluff. These sections however do not form a continuous system. For example, in Lake Forest, two major forest preserves and over 100 acres of land trust holdings cannot be joined due to a key parcel not yet being preserved.

In addition to protecting wetlands and open space, managing for biodiversity within the watershed also includes protecting natural areas and T&E species. Three identified natural areas located in the Lake County North Branch are privately owned; one is an Illinois Nature Preserve, while two sites currently have no protection. These areas are high priorities for public acquisition or conservation easements covered under open space recommendations. The NBOSP biodiversity inventory identified 3,913.48 acres with high biodiversity (T/E species, INAI sites and nature preserves). Of this, 1,322.56 acres are unprotected. The inventory also identified 3016.96 acres with potential for high biodiversity ('remnant landscapes'). Of this, 866.14 acres are unprotected. All of these site should be permanently protected. Buffer parcels should be provided for sites with T&E species.

Beyond acquisition, habitat improvement BMPs, land use planning and outreach are recommended techniques in the action plan for protecting and enhancing T&E species, natural areas and biodiversity. Habitat improvement BMPs include enhancing detention basins and other components of the drainage system with appropriate wetland and native plants, and providing adequate native buffers for wetlands and other sensitive areas. A good example of land use planning is developing and adopting the connected open space network plan, and then following up the plan with appropriate zoning for areas that should be protected. Local planning for T&E species, natural areas and biodiversity in general is hampered by lack of information. Information on known locations of natural areas and T&E species is protected by the IDNR and other natural resource agencies in order to protect the species and areas from wanton destruction. While this confidentiality policy may effectively serve this purpose, it also makes it difficult for local governments to include T&E sites and natural areas when developing land use plans. To overcome this limitation, the action plan recommends addressing biodiversity and T&E protection by first developing a map of high biodiversity for the watershed, and then using outreach to work with local units of government on how best to protect the sites within their jurisdictions.

The NBOSP inventory identifies thousands of acres of existing, permanently protected open space that, if properly managed, would protect and improve existing habitat throughout the watershed. In Cook County, for instance, there are over 3,000 acres of forest preserve lands in need of native landscape restoration and management.

Objective 3: Identify and Develop Potential Areas for River-Based Recreational Opportunities such as Hiking, Fishing, Canoeing, Running, and Biking

Opportunities for river-based recreation in the North Branch are limited due to lack of access to the river and the limited areas of riparian trail. In order to fish, bird watch or gain peace of mind through spending time in a tranquil setting along the waters banks, an individual must have the ability to access the North Branch Chicago River. The development of new trails along reaches that currently have none was recommended by focus groups for the *Chicago Rivers* demonstration project. The NBOSP recommends east-west and north-south trail connections within and between communities and institutions, as well as establishing regional trails because the watershed is only partly accessible.

There are currently 77 miles of greenways and trails, all concentrated in discontinuous open space holdings. Large parts of the watershed have no trail access at all. There is a nearly continuous trail system to the east and west of the watershed, extending from Chicago proper to the Illinois/Wisconsin line. There is little formal access to these recreational opportunities from the watershed. Highland Park, Bannockburn, and North Chicago have plans for expanding trails and greenways systems within their borders. In Lake County, the current availability of trails is largely limited to local parks except for Lake Forest Open Lands trail system located between IL 176 and Deerpath along the Skokie River. The only regional trail connection in the watershed is the North Shore Trail that runs east-west through the watershed along the south side of 176. Implementation of the Northeastern Illinois Regional Greenways and Trails Plan in combination with the trails at Prairie Wolf and Middlefork Savanna have greatly enhanced the availability of riparian recreation opportunities in the North Branch.

In addition, future plans to expand the trail system along the upper reaches of the Middle Fork and Skokie River, north of IL 176, will also improve riparian recreational opportunities. Currently, the only trail system in that area includes an east-west trail connection between the North Shore Bike Path and the Des Plaines River Trail. The NBOSP recommends that current and future active and passive recreation needs to be identified and matched with appropriate open space areas.

Providing access to the North Branch Chicago River enables opportunities for various river-based recreational activities. Specific program and policy action recommendations to improve water quality are contained in the programmatic action plan table.

5.2.4 Goal 4: Develop a Public Information and Education Program within the Watershed Communities.

Public information and education recommendations are not confined specifically to this section, but can be found interspersed throughout other sections of the action plan as well.

Watershed Information and Education (I&E) Programs are a vital component to any watershed planning effort because they raise awareness about the impacts that humans have on the quality of the watershed, and about how changes in behavior can improve watershed conditions. An effective I&E program leads to changes in social behavior, public cooperation, and motivation to take action to meet water quality and other watershed goals and objectives.

A successful I&E program first raises awareness amongst stakeholders of watershed issues and problems. This is followed by education and actions that stakeholders can take to address the issues and problems. The I&E program should include the following components (EPA 2005):

1) Define I&E goals and objectives.
2) Identify and analyze the target audiences.
3) Create the messages for each audience.
4) Package the message to various audiences.
5) Distribute the message.
6) Evaluate the I&E program.

The NBOSP recommends that in order to generate community support and improve public relations within the watershed, it is important to create awareness in communities within the watershed prior to work. Current outreach is fragmented and rudimentary. The Friends of the Chicago River promotes the Chicago River Schools Network program, and several land trusts and nature centers use the river for school programs as well. However, even the river itself is seldom identified at road crossings.

A successful public outreach/education program must do more than provide information to stakeholders about the watershed; a successful outreach initiative will help to change people's perspective of the watershed and enhance their understanding of their impact on the watershed.
Since nonpoint source pollution accumulates from numerous activities and sources, the USEPA encourages municipalities to include citizen involvement in developing and implementing stormwater management programs as a remedy. Phase II rules for the NPDES include two requirements that are directly covered under this goal. One is developing a local public outreach and education program on stormwater impacts; the second targets public involvement and participation in stormwater management.

Conferences, training workshops, field trips, group presentations and one-on-one meetings will all be necessary to persuade watershed stakeholders and the general public of the advantages of multi-objective watershed management for the North Branch.

Actions to achieve the education and public outreach goal are categorized by four objectives:

1. Develop and implement a schools-based river curriculum.
2. Provide public I&E program to community leaders, elected officials, businesses and homeowners.
3. Improve stewardship of the North Branch Chicago River and its aquatic resources by increasing public participation in the upkeep of the River.
4. Identify open space parcels adjacent to or near schools or existing public facilities that would be appropriate for outdoor education.

Objective 1: Develop and Implement a Schools-Based River Curriculum

Friends initiated an aggressive education program for school teachers in 1996. The program includes developing a resource summary of river-based curricula, providing training opportunities for teachers, and establishing the Chicago River School Network (CRSN) to coordinate and link school-monitoring activities along the river. In 2003, FOCR developed a new K-4 curriculum in partnership with the Indiana Dunes Environmental Learning Center and area K-4 teachers. And in 2005, the CRSN launched River Citizen, a program for middle school students. Through River Citizen, student scientists determine the main cause of pollution and develop a plan of action for how to reduce pollution in the Chicago River. To date the education program has primarily involved schools located in the southern reaches of the North Branch watershed and the larger Chicago River watershed in Cook County. Objective 1 addresses increasing participation of North Branch watershed schools by specifically targeting teachers in the North Branch including schools in Lake County.

The strategy of developing a school-based education program provides both long and short term benefits for the watershed. The education program strives to develop future watershed citizens that are educated and environmentally aware of the importance of the river and active in watershed protection. In the short term, school children can be effective advocates for the river, and the education program will bring along parents as they monitor and participate in their children's school activities. The corporate adopt-a-school program is also targeted to get business support for a school's river/watershed activities.

Objective 2: Provide Watershed Public Information and Education for Community Leaders and the Public

Community support is absolutely critical to the long-term success of the North Branch watershed planning effort. Support is especially needed to get stakeholders involved in implementing the voluntary aspects of the plan, but support will also be necessary to implement changes to regulatory programs. A public outreach campaign that targets both specific audiences and the general public is recommended to generate community support.

The public outreach campaign will include informational materials, slide presentations, general conferences and audience specific field trips and workshops. Specifically planned for wide distribution is a color watershed map with watershed project photos and text highlights of the watershed plan on the backside of the map. Slide presentations are also planned for community groups and municipal leaders. One of the challenges faced during the planning process was getting municipal participation in developing the watershed plan. To stimulate municipal interest in the watershed plan, Friends and SMC staff have made presentations several of the Lake County municipalities. The action plan recommends expanding public outreach efforts with presentations for all village and township boards, city councils and supporting administrative staff. The general community and stakeholders will be reached by the annual Chicago River Summit held by the Friends and the Office of the Lieutenant Governor, and through planned watershed promotional events and topic specific workshops. The action plan also recommends workshops and field trips to reach targeted audiences such as local government engineers, planning staff, golf course managers, park districts, and landscape businesses. In-the-ground projects funded through the North Branch Project include a plan for public information and education whenever feasible.

Objective 3: Improve Stewardship of the North Branch Chicago River and its Aquatic Resources by Increasing Public Participation in the Upkeep of the River

The desired product of the education and public outreach objectives described above is improved public and private stewardship in the North Branch watershed. Stewardship takes education and outreach to the next step – activities that result in watershed improvement projects sponsored and conducted by watershed stakeholders. Although there is a wide range of stewardship activities that can be undertaken in the North Branch (a number are already recommended under previous goals), a few specific actions directly related to public education and outreach that build on current watershed programs are included under this objective. They include expanding the Friends river rescue program in Lake County, encouraging more volunteer monitoring sites in the watershed, and developing high profile watershed improvement projects such as Prairie Wolf that include public participation in restoration.

Objective 4: Identify Open Space Parcels Adjacent to or Near Schools or Existing Public Facilities that Would be Appropriate for Outdoor Education

The NBOSP identified a number of open and partially open parcels near school districts or existing public facilities. In an effort to make outdoor education a part of the education and outreach component, the open space parcels need to be investigated and categorized into parcels that would be appropriate for outdoor education.

Specific education and outreach action recommendations are contained in the programmatic action plan table.

5.2.5 Goal 5: Improve Participation and Coordination in Watershed Improvement Activities

Local government participation is critical to the successful implementation of this watershed plan. Local governments exert substantial influence on streams and other watershed resources through their authority over stormwater management and maintenance, land use, development practices, erosion control and other factors. As described in Chapter 3 (Section 3.4) and in the first section of this chapter (5.1), there are a multitude of governmental jurisdictions in the North Branch watershed. In addition to these political jurisdictions, there are various county agency authorities (SMC, LCHD, LCDOT etc.), state and federal agency authorities (IDNR, IEPA, EPA, USACE, USFWS, NRCS etc.), and the political jurisdictions of state and federal representatives and senators. Many of the agencies have programs that directly affect the watershed. Types of programs range from voluntary education initiatives, to in-kind and financial support for planning and BMP projects, to regulatory programs that permit or decline development activities.

Better coordination of agency programs, political initiatives and regulatory activities in the watershed was a watershed priority identified in stakeholder input sessions. Three objectives have been identified to meet this goal. They cover actions to support an overall watershed coordination authority, expand participation in watershed improvement projects, and increase monitoring efforts and data sharing. The three objectives are:

1. Coordinate North Branch Chicago River Watershed Plan implementation activities.
2. Educate and encourage public and private landowners to increase their involvement in implementing BMPs.
3. Increase river and watershed monitoring efforts and coordinate data sharing.

Objective 1: Coordinate North Branch Chicago River Watershed Plan Improvement Activities

The NBPC that includes stakeholder representation from the entire watershed will continue to be the coordinating body for implementing the watershed plan. The NBPC will establish criteria for objectively evaluating and ranking watershed improvement projects, and will identify potential sources and make recommendations for funding. The Planning Committee will provide guidance to project staff, and members will offer technical expertise and assistance to watershed stakeholder organizations as appropriate. Initiating a periodic evaluation and update of the watershed plan will also be the responsibility of the NBPC.

Objective 2: Educate and Encourage Public and Private Landowners to Increase Their Involvement in Implementing BMPs

The degree of local government participation in plan implementation will determine the success of the North Branch Watershed Plan and the level of watershed improvement. To improve local government participation, a watershed coordinator in Lake County will work directly with communities to develop and package recommended BMP projects with funding and partners. The watershed coordinator will be in a position to promote inter-jurisdictional watershed improvement projects that require multiple funding sources and coordination time and effort beyond a single community's resources. Individual communities can participate without having to take the lead for getting the project done.

In addition to coordinating in-the-ground projects, the watershed coordinator will also work with communities to facilitate a policy review of their existing ordinances to determine their impact (positive or negative) on watershed protection. Requirements for street setbacks, lot sizes, road widths, curb and gutter, detention

design, landscaping, open space and parking lot sizes are some of the development practices that will be reviewed to determine if ordinances are conducive to alternative site designs and conservation development.

Objective 3: Increase River and Watershed Monitoring Efforts and Coordinate Data Sharing

Monitoring provides valuable information about the condition of the watershed. River monitoring can be used to identify the causes and sources of pollution in the river and to determine the needs for streambank stabilization, debris removal and habitat improvement. Monitoring other natural resources such as wetlands and forests is a good way to determine what impacts may be occurring on these resources as the watershed continues to develop. Chemical, biological and physical monitoring are all recommended for the watershed. Although a number of sites in Lake County have been sampled at different times, only the Lake-Cook Road sites have been monitored on a regular basis. The IEPA and the MWRD have provided the most consistent monitoring of water chemistry at the Lake-Cook County line. Biological monitoring throughout the watershed has been less consistent.

Action recommendations for the monitoring objective include aggregating and sharing past and current sampling data collected by local, state and federal agencies, coordinating the existing monitoring programs, expanding monitoring to new sampling sites, and sampling on a more regular basis for fish and macroinvertebrates. Enlarging the volunteer monitoring network, especially in the upper reaches of the watershed, is recommended to help meet the expansion objective. Structured volunteer monitoring programs such as RiverWatch and the program being developed with local high schools promote watershed stewardship while providing useful data to supplement the monitoring efforts of governmental agencies.

The expanded monitoring program should include sampling for diurnal swings in dissolved oxygen, bacteria and wet weather flows in addition to biological monitoring stations. Direct monitoring of at least one of the in-the-ground BMP projects using USEPA standards is also recommended in order to evaluate the effectiveness of the practices used. Because of the poor physical condition of the stream banks and river channels, a regular physical monitoring program by the drainage districts is also recommended. Regular monitoring is the only way to determine trends and changes in the river and watershed, and is necessary to evaluate the success of watershed improvement projects.

Specific participation and coordination action recommendations are contained in the programmatic action plan table.

5.3 An Estimate of Load Reduction Expected From Management Measures

Load reduction calculations were completed with IEPA Urban Runoff BMP Pollutant Load Reduction Worksheet (Appendix F) using land use and associated BMP for the action proposed. Within the worksheet there are BMPs such as vegetated filter strips or creating wetland detention, that can be used as parameters for load reduction by indicating true if it applies to the action or false if it does not. Land use was determined by designating the acreage of each contributing land use within the sewered column for all variables that apply. Percent load reduction was calculated for detention basins, outfalls, stream and wetland restorations, flood mitigation, and hydraulic structures based on action recommended. Proposed action for open space protection pertained to legal regulations consequently load reductions could not be assessed. These calculations should be used as a guide for predicting potential effectiveness of implementation of management recommendations and are not definite reduction amounts.

Action recommendations for detention basin water quality retrofits were determined using land use values of one for commercial, industrial, institutional, transportation, multi-family and residential. This value system was also used in all other site action plans except open space. To correct short circuit problems a true statement was created for settling basin which would move the intake further from the outlet and reduce circuiting errors. Another prevalent recommendation was to replace turf grass with native vegetation in which a true statement

was added for vegetated filter strips and grass swales. Converting dry-bottom detention basin to wet-bottom detention basin creates true statements for settling basin, extended wet detention, as well as vegetated filter strips and grass swales. Assessing load reduction from retrofitting underground detention basins was determined using a true statement for sand filtration. Action recommendations in any combination followed this system to provide load reduction values.

Management for correcting outfall retrofits included stabilization of erosion, monitoring and maintenance, and removing debris or sedimentation. In all action pertaining to stabilization true statements were assigned to vegetated filter strips and grass swales because of their ability to take hold of soil through root systems. Sites where monitoring and maintenance were the only proposed action load reduction estimates could not be calculated. Removing debris or sediment creates a settling basin and was given a true statement in all actions that met criteria. Action recommendation for potential wetland restoration created true statements for vegetated filter strips and grass swales, extended wet detention, and wetland detention. Wetland restoration greatly reduced pollutant loading because wetlands act as a natural filter of NPS pollution.

Flood mitigation sites and hydraulic structures had similar action recommendations such as provide additional storage, debris removal, and reduce erosion. An infiltration basin is designed to use the natural filtering ability of the soil to remove pollutants from stormwater as well increase storage volume. All sites requiring additional storage selected as true statements.

Goal 1: Improve Water Quality in the North Branch Chicago River.

Objective 1: Reduce nonpoint and point source pollutant loadings from runoff by some measurable standard.

Programmatic Action Plan No.	Action Recommendation	Priority	Lead Agencies/ Owner	Supporting Agencies/ Owner	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Implementation Schedule	Local Shortcomings Identified	Maintenance & Monitoring Schedule	Maintenance & Monitoring Plan
1.1	Develop recommendations for planting native vegetation that increases stormwater infiltration and reduces pollution. Review and update landscaping recommendations/requirements in local ordinances to provide regulatory incentives that encourage native landscapes.	Med	MUNIC, CGB, GLNTC	SMC, Friends, CMAP, USFWS, NRCS, SWCD	Spraying = $1,500/acre Soil prep = $2,000/acre Native seed = $3,500/acr Blanketing = $5,500/acr Ranges $10-20K per acre		Varies	Medium	Medium	IEPA, IDNR, Chicago Wilderness, USFWS	Consultant, MUNIC	5-10 years	Possible Technical or Funding	0-10 years	See Appendix K
1.2	Educate landowners in the watershed to the benefits of replacing turf lawns with native landscaping to infiltrate and filter runoff and provide habitat benefits. Identify corporate campus, industrial park, institution or other large sites to act as native vegetation retrofit demonstration sites for runoff reduction and water quality improvement.	High	Friends, SWCD, corporate landowners	SMC, MUNIC, CMAP, Wild Ones, USFWS, NRCS, SWCD	Spraying = $1,500/acre Soil prep = $2,000/acre Native seed = $3,500/acr Blanketing = $5,500/acr Ranges $10-20K per acre		Varies	Low	Low	IEPA, IDNR, Chicago Wilderness, USFWS, SMC, Friends	SMC, Consultant, MUNIC	0-5 years	Possible Technical or Funding	n/a	
1.3	Replace turf in road R-O-Ws with native vegetation to reduce and filter runoff and provide habitat benefits.	Med	IDOT, ISTHA, LCDOT, MUNIC, TWPHD, GLNTC	SWCD, SMC, CMAP, USFWS	Spraying = $1,500/acre Soil prep = $2,000/acre Native seed = $3,500/acr Blanketing = $5,500/acr Ranges $10-20K per acre		Varies	Low	Low	IDOT, LCDOT, MUNIC	County, MUNIC	5-10 years	Possible Technical or Funding	0-10 years	See Appendix K
1.4	Retrofit detention basins for improved water quality, to restrict flow rate (to reduce in channel erosion), for increased storage and for habitat and aesthetic benefits. Develop incentive program and funding sources to support retrofits.	High	SMC, MUNIC	NRCS, SWCD, CMAP, Property Owners	Varies from $2,000 to $75,000 per acre			High	High	IEPA, IDNR, Chicago Wilderness, USFWS, Property Owners	Consultant, MUNIC	0-5 years	Possible Technical or Funding	0-10 years	See Appendix K
1.5	Prioritize and retrofit outfalls to add water quality treatment through created wetland pockets or appropriate filters (vegetative, sand or others).	High	SMC, ESDD, WSDD, UDDWF	MUNIC, Property Owners	Varies			Medium	Medium	IEPA, IDNR, Chicago Wilderness, USFWS, SMC, Friends	SMC, Consultant, MUNIC	0-5 years	Possible Technical or Funding	0-5 years	See Appendix K
1.6	Identify demonstration sites for application of water quality filters (sand or otherwise).	High	Friends, SMC, SWCD	MUNIC, CMAP, GLNTC	Varies			Medium	Medium	SMC, Friends, SWCD, Chicago Wilderness	Friends, SMC	0-5 years	Possible Technical or Funding	n/a	
1.7	Develop a non-point source reduction program for commercial facilities and homeowners and pilot test it in a targeted sub-basin or neighborhood.	High	Friends, MUNIC	IEPA, Solid Waste Research Center, CMAP	Varies			Medium	Medium	SMC, Friends, SWCD	SMC, Consultant, MUNIC	0-5 years	Possible Technical or Funding	0-5 years	See Appendix K
1.8	Encourage stringent review during renewal of NPDES permits to ensure that IEPA water quality standards are being met. Contributions of phosphorus and other pollutants of concern also need to be addressed in NPDES permits.	High	IEPA	USEPA, NBPC, Friends, SMC	Varies			Low	Low	IEPA	MUNIC	0-5 years	Possible Technical or Funding	n/a	
1.9	Determine source(s) of high fecal coliform found throughout the river and make recommendations for source reduction. Encourage IEPA to perform annual metals contamination monitoring from sediment and Fecal Coliform monitoring from water column.	High	MWRD, LCHD, NSSD	IEPA, Friends, USFWS, DePaul, IDNR	Varies			High	High	SMC, Friends, IEPA, Chicago Wilderness	County, Consultant, MUNIC	0-5 years	Possible Technical or Funding	0-5 years	See Appendix K
1.10	Institute a community program to inspect stormsewer outfalls to identify and test potential inflow/infiltration of wastewater and contaminant discharges into the stormsewer system consistent with NPDES Phase II requirements.	Med	MUNIC, County, SMC	ESDD, WSDD, UDDWF,NBPC, IEPA	Varies			Medium	Medium	SMC, Friends, SWCD, MUNIC	County, Consultant, MUNIC	5-10 years	Possible Technical or Funding	0-10 years	See Appendix K
1.11	Provide required training for enforcement officers and field staff to improve enforcement of SE/SC and other water quality provisions of WDO in certified communities.	High	SMC, CMAP	MUNIC, LCPB&D, NRCS, SWCD	Varies			Low	Low	MUNIC	County, MUNIC	0-5 years	Possible Technical or Funding	0-10 years	See Appendix K
1.12	Encourage uniform application of water quality treatment requirements in WDO by certified communities by focusing on water quality in recertification review.	Med	SMC	MUNIC, LCPB&D	Varies			Low	Low	MUNIC, IEPA	County, MUNIC	5-10 years	Possible Technical or Funding	n/a	
1.13	Maintain open space and install best management practices that infiltrate and treat all stormwater runoff on-site. Use voluntary incentives or regulatory requirements for implementation.	High	Developers, MUNIC, County	SMC, USACE, SWCD, NRCS, USFWS	Varies			Medium	Low	IEPA, IDNR, Chicago Wilderness, USFWS, SMC, Friends	County, Consultant, MUNIC	0-5 years	Possible Technical or Funding	0-10 years	See Appendix K
1.14	Require that all detention basins for new development be wet-bottom/wetland basins that provide water quality treatment (WDO amendment).	High	SMC	MUNIC, CGB, Friends, CMAP	Varies			Low	Low	Owner	SMC, Consultant, MUNIC	0-5 years	Possible Technical or Funding	n/a	

[1] See Table 5-1 for a list of organization abbreviations.

Programmatic Action Plan No.	Action Recommendation	Priority	Lead Agencies/ Owner	Supporting Agencies/ Owner	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Implementation Schedule	Local Shortcomings Identified	Maintenance & Monitoring Schedule	Maintenance & Monitoring Plan
Objective 2: Reduce streambank and streambed erosion.															
1.15	Set up one or more public demonstration sites for native streambank vegetation restoration and management, and where feasible, replace non-native invasive plant species along stream channels and banks with deep-rooted native plants.	High	ESDD, WSDD, UDDWF	MUNIC, LCFPD, PD, USFWS, NRCS, SWCD, GLNTC	Varies			Medium	Medium	IEPA, IDNR, Chicago Wilderness, USFWS, SMC, Friends	SMC, Consultant, MUNIC	0-5 years	Possible Technical or Funding	0-5 years	See Appendix K
1.16	Stabilize eroded streambanks and tributary swale/gullies using appropriate soil bio-engineering techniques.	High	ESDD, WSDD, UDDWF, UDDMF	SMC, FPD, PD, NRCS, GLNTC, Property owners	Varies from $100 to $1,000 per linear foot			High	High	IEPA, IDNR, Chicago Wilderness, USFWS, SMC, Friends	SMC, County, Consultant, MUNIC	0-5 years	Possible Technical or Funding	0-10 years	See Appendix K
1.17	Replace and stabilize erosive/failed outfalls and hydraulic structures.	High	ESDD, WSDD, UDDWF, MUNIC	Property Owners, LCDOT, IDOT	Replacing failed outfalls may vary from $10,000 to $500,000			High	High	IEPA, IDNR, Chicago Wilderness, USFWS, SMC, Friends	County, Consultant, MUNIC	0-5 years	Possible Technical or Funding	0-10 years	See Appendix K
1.18	Review stream maintenance standards developed in Appendix K for streambank stabilization and riparian zone/buffer vegetation maintenance that include soil bio-engineering techniques, vegetation appropriate to North Branch conditions.	High	SMC, ESDD, WSDD, UDDWF, SWCD, IEPA	NRCS, IDNR, USFWS, LFOLA, LCFPD, CMAP	Varies			High	High	IEPA, IDNR, SMC, MUNIC	SMC, Consultant, MUNIC	0-5 years	Possible Technical or Funding	0-10 years	See Appendix K
Objective 3: Correct wastewater overflow conditions that have a significant impact on water quality.															
1.19	Assess wastewater treatment plant capacity at Clavey Road and determine whether maximum treatment capacity should be expanded to double the daily average flow per IEPA inspection report.	Med	NSSD, IEPA		Varies			High	High	MUNIC	IEPA, Consultant	5-10 years	Possible Technical or Funding	0-10 years	See Appendix K
1.20	Conduct first flush analysis and convert to composite sampling at Deerfield WWTP excess flow facilities.	High	Deerfield, IEPA		Varies			High	High	MUNIC	IEPA, Consultant	0-5 years	Possible Technical or Funding	0-5 years	See Appendix K
1.21	Remedy incomplete treatment problems identified in IEPA inspection reports for Deerfield excess flow facilities.	High	Deerfield, IEPA		Varies			High	High	MUNIC	IEPA, Consultant	0-5 years	Possible Technical or Funding	0-5 years	See Appendix K
1.22	Based on NSSD I&I study, identify areas of high inflow/infiltration and target as high priority areas for evaluating seals on sanitary sewer manhole lids. Replace with watertight seals/lids.	High	MUNIC, County	NSSD	Varies			High	High	IEPA, IDNR, Chicago Wilderness, SMC, SWCD	SMC, Consultant, MUNIC	0-5 years	Possible Technical or Funding	0-5 years	See Appendix K
1.23	Based on NSSD I&I study, identify and eliminate illicit downspout, storm drain and/or sump pump hookups in areas of high inflow. Implement IDDE program	High	MUNIC, County	NSSD, Property Owners	Varies			High	High	IEPA, IDNR, Chicago Wilderness, SMC, SWCD	SMC, Consultant, MUNIC	0-5 years	Possible Technical or Funding	0-5 years	See Appendix K
1.24	Educate homeowners and businesses concerning the problems with illicit hookups and identify cost-share and other incentives to reduce/eliminate illicit hookups on private property.	Med	MUNIC, County	IEPA, SMC, Friends	Varies			Medium	Medium	SMC, Friends, SWCD, Chicago Wilderness	SMC, Consultant, MUNIC	5-10 years	Possible Technical or Funding	n/a	
Objective 4: Protect and restore riparian greenways and buffers along and around all water resources.															
1.25	Identify open space parcels in proximity to water resources that are suitable for best management practices to infiltrate or filter stormwater runoff.	High	SMC, Friends	Drainage Districts	Varies			Medium	Medium	SMC, Friends, SWCD, Chicago Wilderness	SMC, Consultant, MUNIC	0-5 years	Possible Technical or Funding	n/a	
1.26	Install best management practices on parcels with open space that include or are adjacent to non-point source pollution hotspots or pollution point sources (National Pollutant Discharge Elimination System permitted facilities).	High	Property Owner		Varies from $2,000 to $50,000 per acre			Medium	Medium	IEPA, IDNR, Chicago Wilderness, USFWS, SMC, Friends	SMC, Consultant, MUNIC	0-5 years	Possible Technical or Funding	0-5 years	See Appendix K

[1] See Table 5-1 for a list of organization abbreviations.

Goal 2: Reduce Flood Damages in the North Branch Chicago River.

Programmatic Action Plan No.	Action Recommendation	Priority	Lead Agencies/ Owner	Supporting Agencies/ Owner	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Implementation Schedule	Local Shortcomings Identified	Maintenance & Monitoring Schedule	Maintenance & Monitoring Plan
Objectives 1: Reduce flow rates and volumes from existing developed areas and prevent increases in flow rates and volumes from new development.															
2.1	Perform more detailed hydrology and hydraulics modeling on the watershed using up-to-date topography to provide a rigorous assessment of release rate alternatives. Include build out land use conditions with existing WDO detention requirements compared to	High	SMC, IDNR, MWRD	MUNIC, CMAP, USACE	Hour	$125	$125	High	High	SMC, IEPA, USACE, IDNR, SWCD	SMC, Friends, MUNIC, Consultant	0-5 years	Possible Technical or Funding	n/a	
2.2	Reduce allowable release rates from new developments and redeveloped sites in the North Branch Watershed to .10 cfs per acre for the 100 year 24 hour storm event.	High	SMC	MUNIC, GLNTC	n/a	n/a	n/a	Low	Low	n/a	n/a	0-5 years	No	n/a	
2.3	Identify opportunity sites for installing new multi-objective detention basins on vacant lots or in parks (Target Flood Problem Areas).	High	SMC	MUNIC, ESDD, WSDD, UDDWF, PD, LCFPD, GLNTC	Acre	$15,000-20,000	$15,000-20,000	Medium	Medium	SMC, IEPA, USACE, IDNR	SMC, Friends, MUNIC, USACE, IDNR, Consultant	0-5 years	Possible Technical or Funding	See Appendix K	
2.4	Identify older detention ponds where smaller restrictors could be installed to better control flows from more frequent rain events and reduce in-stream erosion. Assess feasibility of increasing volume of existing detention ponds.	Med	MUNIC, Park Districts	SMC	Each	$5,000-10,000	$5,000-10,000	Medium	Medium	SMC, IEPA, USACE, IDNR	SMC, MUNIC, Consultant	5-10 years	Possible Technical or Funding	See Appendix K	
2.5	Disconnect roof-top runoff from the storm sewer system wherever possible in new developments and in existing developed areas. Reduce drainage assessment or offer rebate for properties with disconnected rooftops.	High	Property Owners, MUNIC, ESDD, WSDD, UDDWF, GLNTC	SMC, CMAP, Friends, TWP	Each	$250	$250	Low	Low	n/a	n/a	0-5 years	No	n/a	
2.6	Create floodplain zoning regulations to protect floodplain areas and wetland areas from development.	High	SMC	MUNIC	n/a	n/a	n/a	Low	Low	n/a	n/a	0-5 years	No	n/a	
2.7	Retrofit existing sites to include infiltration devices.	High	Property Owners	MUNIC, SMC, SWCD, CMAP, Friends	Each	$5,000-20,000	$5,000-20,000	High	High	SMC, IEPA, USACE, IDNR	SMC, Friends, MUNIC, Consultant	0-5 years	Possible Technical or Funding	See Appendix K	
2.8	Educate residents and businesses and provide cost-share incentives to install infiltration trenches or basins, rain barrels, or rain gardens where soil conditions are favorable to collect rooftop, driveway and parking lot runoff. Identify demonstration sites appropriate for application of infiltration devices, and permeable paving block or porous pavement. Encourage preventative actions.	Med	Friends, SMC	CMAP, MUNIC, SWCD, LCHB, GLNTC	n/a	n/a	n/a	Medium	Medium	SMC, IEPA, USACE, IDNR, SWCD	SMC, Friends, MUNIC, Consultant	5-10 years	Possible Technical or Funding	n/a	
2.9	Encourage alternative site designs to use runoff reduction hierarchy and reduce impervious areas, preserve natural features, use alternative streetscapes and use natural drainage measures. Attach detention reduction and density incentives to installation of BMP treatment trains and application of the runoff volume reduction hierarchy in the WDO.	High	SMC, MUNIC, LCPB&D		n/a	n/a	n/a	Low	Low	n/a	n/a	0-5 years	No	n/a	
Objective 2: Protect and restore floodplain functions.															
2.10	Buyout repetitively flooded properties in floodplains and relocate or demolish buildings to restore floodplain function.	High	SMC	CB, MUNIC, GLNTC, TWP	Each	Varies	Varies	Low	High	SMC, IEMA, FEMA	n/a	0-5 years	Possible Technical or Funding	n/a	
2.11	Identify opportunity areas and funding partners for wetland and floodplain restoration.	High	SMC, Friends, USACE, NRCS, IEMA, USFWS, SWCD	FEMA	n/a	n/a	n/a	Low	Low	Operations Budget	n/a	0-5 years	No	n/a	
2.12	Identify and acquire (purchase, donation or conservation easements) remaining undeveloped wetlands and floodplains and maintain as open space. Identify and acquire open parcels identified in the NBOS plan as suitable for wetland restoration, detention basins and/or flood storage that are located near flood problem areas.	High	LCFPD, PD, IEMA, USACE	LFOLA, LBOLA, FEMA, MUNIC, USFWS	Acre	Varies	Varies	Medium	Medium	SMC, IEMA, FEMA	SMC, Friends, IDNR, USACE, MUNIC, Consultant	0-5 years	Possible Technical or Funding	n/a	
2.13	Protect wetlands and floodplains using land use management techniques such as a special zoning classification and/or more stringent restrictions on floodplain development in the WDO.	Med	SMC, MUNIC, LCPB&D, GLNTC		n/a	n/a	n/a	Low	Low	Operations Budget	n/a	5-10 years	Possible Technical or Funding	n/a	

See Table 5-1 for a list of organization abbreviations

Programmatic Action Plan No.	Action Recommendation	Priority	Lead Agencies/ Owner	Supporting Agencies/ Owner	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Implementation Schedule	Local Shortcomings Identified	Maintenance & Monitoring Schedule	Maintenance & Monitoring Plan
Objective 3: Maintain and manage the river corridor and other drainageways to preserve conveyance of stormwater in an environmentally-friendly manner.															
2.14	Remove large debris blockages that are obstructing drainage ways.	High	ESDD, WSDD, UDDWF, UDDMF	LCFPD, MUNIC, GLNTC	Linear Foot	$50	$50	Low	Low	Operations Budget	n/a	0-5 years	No	See Appendix K	
2.15	Review environmentally sound standards and procedures for regular channel maintenance developed in Appendix K to preserve conveyance and adopt a schedule for regular stream maintenance in the North Branch.	High	SMC, ESDD, WSDD, UDDMF	CMAP, USACE, IDNR, USFWS	Linear Foot	$50	$50	Low	Low	Operations Budget	n/a	0-5 years	No	See Appendix K	
2.16	Adopt a schedule for regular maintenance of hydraulic structures such as bridges and culverts to prevent sediment and debris blockages.	High	MUNIC, ESDD, WSDD, UDDWF, LCDOT, TWP Highway Dept., IDOT, ISTHA, UDDMF	LCFPD, PD, GLNTC	Each	$1,000	$1,000	Low	Low	Operations Budget	n/a	0-5 years	No	See Appendix K	
Objective 4: Mitigate flood damages using both remedial and preventative measures including property protection.															
2.17	Sanitary sewer infiltration problems that result in flood damage from sanitary sewer backup should be targeted for repair.	Med	MUNIC	NSSD	Linear Foot	$100	$100	High	High	SMC, IEPA, USACE, IDNR	MUNIC, Consultant	5-10 years	Possible Technical or Funding	n/a	
2.18	Identify individual addresses of buildings at risk of flooding (located within the 100 year floodplain and/or in flood hazard areas identified in the Lake County Flood Hazard Mitigation Plan). Survey buildings to determine first floor and adjacent grade elevations to identify the actual structures at risk of flooding. Prioritize buildings at greatest risk of flood damage. Coordinate an annual flood hazard notification program for owners of buildings at risk of flooding that includes information on flood hazard mitigation with a survey to identify candidates for flood mitigation activities.	High	MUNIC, SMC	LCEMA, FEMA, IEMA, GLNTC	Hour	$125	$125	High	High	SMC, IEMA, FEMA	SMC, MUNIC, IDNR, FEMA, IEMA, Consultant	0-5 years	Possible Technical or Funding	n/a	
2.19	Provide technical assistance to property owners in high priority flood prone areas to use wet/dry flood proofing, building elevation and other approved measures to reduce flood losses. Identify cost-share funds for these practices.	Med	MUNIC, LCPB&D	IDNR, IEMA, GLNTC	Hour	$125	$125	High	Low	Operations Budget	SMC, MUNIC, Consultant	5-10 years	Possible Technical	n/a	
2.20	Develop sources for combined county and municipal cost share fund to meet local match requirements for acquisition or relocation of flood prone buildings.	Med	SMC, LCPB&D, MUNIC	FEMA, IEMA, GLNTC	n/a	n/a	n/a	Low	Low	n/a	n/a	5-10 years		n/a	
2.21	Sponsor flood proofing workshops in neighborhoods and municipalities with greatest flood risk.	Med	IDNR, SMC, LCPB&D	LCEMA, FEMA, IEMA	Each	Low	Low	Medium	Low	n/a	SMC, MUNIC, Consultant	5-10 years	Possible Technical	n/a	
2.22	Provide flood hazard area maps and data to municipalities and other county agencies involved in flood mitigation.	High	SMC	FEMA	Each	$100	$100	Medium	Medium	SMC, IEMA, FEMA	SMC, MUNIC, Consultant	0-5 years	Possible Technical or Funding	n/a	
Objective 5: Determine potential locations and feasibility of regional stormwater detention sites.															
2.23	Determine need for new flood detention reservoirs in the watershed. Review appropriateness of IDNR in-holdings in Lake Bluff and Lake Forest for flood detention. Flood control measures proposed for the Lake Bluff site must be compatible with the ecological benefits of the site. Locate potential sites for multi-objective and environmentally sensitive regional flood detention in addition to existing in-holdings if need is determined. Complete feasibility study for recommended regional detention facilities.	High	SMC, LCFPD	ESDD, WSDD, USACE, IDNR, MUNIC	Hour	$125	$125	High	High	SMC, IEPA, USACE, IDNR	SMC, IDNR, USACE, MUNIC, Consultant	0-5 years	Possible Technical or Funding	See Appendix K	

See Table 5-1 for a list of organization abbreviations

Goal 3: Protect and Enhance Natural Resources and Provide Associated Recreational Opportunities.

Objective 1: Protect and restore wetlands and streams to improve water quality and aquatic habitat.

Programmatic Action Plan No.	Action Recommendation	Priority	Lead Agencies/ Owner	Supporting Agencies/ Owner	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Implementation Schedule	Local Shortcomings Identified	Maintenance & Monitoring Schedule	Maintenance & Monitoring Plan
3.1	Restore stream and aquatic habitat using created pool/riffle complexes; planting emergent vegetation in the channel; and re-meandering channel where feasible.	Med	UDDMF, Friends, ESDD, WSDD, UDDWF	IDNR, LCFPD, LFOLA, PD, USFWS	$250-500/linear feet			High	High	IEPA, IDNR, Chicago Wilderness, USFWS	SMC, Consultant, MUNIC	5-10 years	Possible Technical or Funding	0-5 years	See Appendix K
3.2	Replace turf grass around detention ponds and other wetlands with native plant buffers to provide wildlife habitat and discourage nuisance geese.	Med	MUNIC, SMC, GLNTC, Homeowners Assn.	Friends, CMAP, USFWS, NRCS, SWCD	$10,000-30,000/acre			High	High	IEPA, IDNR, Chicago Wilderness, USFWS	SMC, Consultant, MUNIC	5-10 years	Possible Technical or Funding	0-5 years	See Appendix K
3.3	Convert dry bottom detention ponds into wetland design detention ponds.	High	MUNIC, Property Owners, Homeowner Assn.	SMC, Friends, CMAP	$30,000-40,000/acre			High	High	IEPA, IDNR, Chicago Wilderness, USFWS	SMC, Consultant, MUNIC	0-5 years	Possible Technical or Funding	0-5 years	See Appendix K
3.4	Prioritize potential wetland restoration sites based on benefits derived from location, land owner cooperation and fundability.	High	SMC, NBPC/WMB, Property Owners	USACE, NRCS, USFWS, SWCD	Varies			Medium	Medium	SMC, Operations Budget	SMC, Consultant, MUNIC	0-5 years	Possible Technical or Funding	n/a	
3.5	Initiate private/public partnerships and identify applicable cost-share funding for wetland restoration projects.	High	SMC, Friends	USFWS, USACE, IDNR, IEPA, NRCS, SWCD	Varies			Medium	Medium		SMC, Friends, Municipalities, Consultants	0-5 years	Possible Technical or Funding	n/a	
3.6	Develop management plans for ADID wetlands.	Med	USFWS, Property Owners	SMC, IDNR, USEPA, NRCS, USACE, SWCD	Varies			High	High	IDNR	SMC, Consultant, MUNIC	5-10 years	Possible Technical or Funding	n/a	
3.7	Identify sites and pursue development of wetland mitigation bank within the North Branch watershed (to mitigate for small wetland losses that are unavoidable).	High	Bank Developer, SMC, USFWS, USEPA, ACOE,	Friends, IEPA, ESDD, WSDD, UDDWF	Varies			High	High	SMC, Operations Budget	SMC, Consultant, MUNIC	0-5 years	Possible Technical or Funding	n/a	
3.8	Develop a communication system between USACE, SMC and communities as a follow-up for monitoring and enforcement of wetland permit requirements.	Med	USACE, MUNIC	SMC, LCSWCD, NRCS, IEPA	Varies			Medium	Low	n/a	SMC, ACOE, MUNIC	5-10 years	n/a	n/a	
3.9	Increase buffer width requirements in WDO for minimum 50-foot natural vegetative buffers for streams, 100-foot for wetlands and lakes, and 150-feet for ADID wetlands.	High	SMC	USFWS, NRCS, SWCD, USACE, OL	Varies			low	Low	n/a	SMC	0-5 years	n/a	n/a	
3.10	Where possible re-meander stream under baseflow conditions to aerate water and improve aquatic habitat.	Med	ESDD, WSDD, UDDWF	SMC, IDNR, USFWS, Friends	Varies			High	High	IEPA, IDNR, Chicago Wilderness, USFWS	SMC, Consultant, MUNIC	5-10 years	Possible Technical or Funding	n/a	
3.11	Use native vegetation extensively in BMPs to enhance wildlife habitat.	Med	MUNIC, PB&D, GLNTC, Developers	USFWS, UDDMF, ESDD, WSDD, UDDWF, SMC, CMAP, NRCS, SWCD	Varies			Medium	Medium	IEPA, IDNR, Chicago Wilderness, USFWS	SMC, Consultant, MUNIC	5-10 years	Possible Technical or Funding	n/a	

[1] See Table 5-1 for a list of organization abbreviations.

Programmatic Action Plan No.	Action Recommendation	Priority	Lead Agencies/ Owner	Supporting Agencies/ Owner	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Implementation Schedule	Local Shortcomings Identified	Maintenance & Monitoring Schedule	Maintenance & Monitoring Plan
Objective 2: Protect and enhance plant communities and wildlife habitat and biodiversity.															
3.12	Work with municipalities and county agencies to adopt and incorporate the open space network in municipal and county land use plans and maps. Encourage separate zoning class for land in open space network, or develop open space zoning overlay that requires conservation developments.	High	OP, MUNIC, PB&D, CB, NBPC	TWP, Friends, SMC, LCFPD, NRCS, SWCD	Varies			Low	Low	n/a	n/a	0-5 years	n/a	n/a	
3.13	Identify opportunities for habitat improvement on existing open and partially open space parcels such as business parks, schools and other institutions, forest preserves, parks, and golf courses.	Med	IDNR, LCFPD, USFWS, Corlands	PD, LFOLA, LBOLA, TWP	Varies			Medium	Medium	IEPA, IDNR, Chicago Wilderness, USFWS	SMC, Consultant, MUNIC	5-10 years	Possible Technical or Funding	n/a	
3.14	Connect open space areas with conservation corridors.	Med	IDNR, LCFPD, USFWS, Corlands	PD, LFOLA, LBOLA, TWP	Varies			Medium	Medium	IEPA, IDNR, Chicago Wilderness, USFWS	SMC, Consultant, MUNIC	5-10 years	Possible Technical or Funding	n/a	
3.15	Develop coordinated program to protect remaining high quality natural sites through public or conservation organization acquisition or conservation easements.	High	LCFPD, OP, Property owners	PD, LFOLA, LBOLA, TWP, SMC, Friends	Varies			Medium	Medium	IDNR	SMC, Consultant, MUNIC	0-5 years	Possible Technical or Funding	n/a	
Objective 3: Identify and develop potential areas for river-based recreational opportunities such as hiking, fishing, canoeing, running, biking, birding, peace of mind, tranquil setting for social benefit.															
3.16	Develop partnership with municipalities, park districts, schools and forest preserve district to prioritize and coordinate implementation of Northeastern Illinois greenways and trails and NBOSP recommendations.	High	CMAP, OP, IDNR, NBPC	LCFPD, SMC, LCDOT, LFOLA, LBOLA, TWP, PD, MUNIC, GLNTC	Varies			Low	Low	n/a	n/a	0-5 years	n/a	n/a	
3.17	Sponsor recreational programs in North Branch watershed such as river walks, bike rides, river trail theme race, and canoe outings.	Med	Friends, PD	LCFPD, LFOLA	Varies			Low	Low	n/a	n/a	5-10 years	n/a	n/a	
3.18	Increase public access to river with canoe launches, fishing sites and trails where appropriate based on Northeastern Illinois Water Trails Plan and NBOSP.	High	Friends, CMAP	LCFPD, PD, LFOLA, LBOLA	Varies			Medium	Medium	SMC, Friends, Operations budget	SMC, Friends, Municipalities, Consultants	0-5 years	Possible financial and technical	n/a	
3.19	Provide east-west and north-south trail connections within and between communities and institutions, and connecting to established regional trails.	Med	MUNIC, LCFPD, LCDOT	SMC, Friends	Varies			High	High	IDOT, American Greenways, IDNR	SMC, Consultant, MUNIC	5-10 years	Possible Technical or Funding	See Appendix K	
3.20	Identify current and future active and passive recreation needs and match with appropriate open space.	High	SMC, Friends, MUNIC, LCFPD	SMC, Friends, MUNIC, LCFPD	varies			Low	Low	Operation budget	SMC, Consultant, MUNIC	0-5 years	Possible Technical or Funding	See Appendix K	

[1] See Table 5-1 for a list of organization abbreviations.

Goal 4: Develop a Public Information and Education Program within the Watershed Communities.

Programmatic Action Plan No.	Action Recommendation	Priority	Lead Agencies/ Owner	Supporting Agencies/ Owner	Unit	Unit Cost	*Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Implementation Schedule	Local Shortcomings Identified	Maintenance & Monitoring Schedule	Maintenance & Monitoring Plan
Objective 1: Develop and implement a schools-based river curriculum.															
4.1	Target teachers in Lake and northern Cook Counties for CRSN workshops.	Medium	Friends	SMC, School Districts, MUNIC	Varies			Low	Low	Friends, SMC, Operations budget	n/a	5-10 years	Possible financial	n/a	
4.2	Conduct annual "Rivers Project" teacher training program.	Medium	Friends	SMC, School Districts, MUNIC	Varies			Low	Medium		n/a	5-10 years	Possible financial	n/a	
4.3	Hold annual Chicago River Student Congress.	High	Friends	SMC, School Districts, MUNIC	Varies			Low	Medium		n/a	0-5 years	Possible financial	n/a	
4.4	Publish "CRSN Notes", a network newsletter.	Medium	Friends		$260-450 (per advertisement)			Low	Medium	Friends, SMC, Operations budget	n/a	5-10 years	Possible financial	n/a	
4.5	Develop and institute a corporate adopt-a-school program that would enlist corporate financial support and classroom mentors.	High	Friends	SMC, School Districts, MUNIC	Varies			Low	Medium	Friends, SMC, Operations budget, corporate sponsors	n/a	0-5 years	Possible financial	n/a	
4.6	Put Chicago River Educator's Resource Guide on the Friends web page.	Medium	Friends		Varies			Low	Low	Friends, SMC, Operations budget	n/a	5-10 years	Possible financial	n/a	
Objective 2: Provide public information and education programs to community leaders, elected officials, businesses and homeowners.															
4.7	Make slide show presentations for community groups, environmental organizations and local government audiences.	Medium	Friends, SMC	SWCD, NRCS	Varies			Low	Low	Friends, SMC, Operations budget	n/a	5-10 years	Possible financial	n/a	
4.8	Conduct topic workshops for targeted groups such as developers/builders, corporate facility managers, municipal planners, landscape businesses, golf course superintendents, park and forest preserve districts and organize field trip series for engineering and planning staff to demonstrate BMPs.	High	Friends, CMAP	SMC, USFWS, SWCD, NRCS	Varies			Low	Medium	IDNR, Friends, IEPA	n/a	0-5 years	Possible financial	n/a	
4.9	Coordinate annual watershed workshop for municipalities and other watershed partners to evaluate progress on plan implementation and update.	High	SMC	Friends, NBPC	Varies			Low	Medium	IDNR, Friends, IEPA	n/a	0-5 years	Possible financial	n/a	
4.10	Develop publicity tools for the North Branch project.	High	Friends, SMC	NBPC	Varies			Low	Medium		n/a	0-5 years	Possible financial	n/a	
4.11	Create brochures and fact sheets with information such as recreation opportunities, ordinance summaries, and education opportunities	Medium	SMC, Friends		$1.60-2.40 (per unit)			Low	Low		n/a	5-10 years	Possible financial	n/a	
4.12	Create newsletter or newspaper articles to inform the public of various watershed issues including meetings and events	High	SMC, Friends		Varies; $260-450 (per advertisement)			Low	Low	Friends, SMC, Operations budget	n/a	0-5 years	Possible financial	n/a	
4.13	Use media outlets such as cable and public access television, radio, and newspapers to circulate watershed information focusing on public service announcements or local event advertisements.	Medium	SMC, Friends		TV: $2,750-4,000 (per annoucement); Radio: $40-60 (per annoucement); Newspaper: $260-450 (per advertisement)			Low	Low	Friends, SMC, Operations budget	n/a	5-10 years	Possible financial	n/a	

[1] See Table 5-1 for a list of organization abbreviations.

Programmatic Action Plan No.	Action Recommendation	Priority	Lead Agencies/ Owner	Supporting Agencies/ Owner	Unit	Unit Cost	*Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Implementation Schedule	Local Shortcomings Identified	Maintenance & Monitoring Schedule	Maintenance & Monitoring Plan
Objective 3: Improve stewardship of the North Branch Chicago River and its aquatic resources by increasing public participation in the upkeep of the River.															
4.14	Promote high profile watershed projects that include hands on public participation in restoration activities.	High	Friends, SMC, NBPC	USFWS, NRCS, SWCD	Varies			Low	Low	Friends, SMC, Operations budget	n/a	0-5 years	Possible financial	n/a	
4.15	Develop stormsewer marker program in North Branch watershed.	Medium	Friends, LCHD	TWP, SWCD, MUNIC	Varies; $2,500-3,500 per field assessment and stormsewer marking kit.			Low	Medium	Friends, MUNIC, Operations budget	n/a	5-10 years	Possible financial	n/a	
4.16	Research need and feasibility of expanding the Friends clean-up day to 2 days per year.	Medium	Friends	SMC, MUNIC	Varies			Low	Low	Friends, SMC, Operations budget	n/a	5-10 years	Possible financial	n/a	
4.17	Expand RiverWatch program in watershed by targeting high schools, college groups, and other volunteer organizations.	Medium	Friends	SMC, MUNIC, Drainage Districts	Varies			Low	Medium	Friends, SMC, MUNIC, Drainage Districts	n/a	5-10 years	Possible financial	n/a	
Objective 4: Identify open space parcels adjacent to or near schools or existing public facilities that would be appropriate for outdoor education.															
4.18	Review open space parcels adjacent to and near schools identified in the NBOS plan.	High	Friends		Varies			Low	Low	SMC, Friends, Operations budget	n/a	0-5 years	Possible financial	n/a	
4.19	Prioritize protection and restoration of open space parcels identified for education and recreation.	High	Friends	SMC, School District, MUNIC	Varies			Low	Low	SMC, Friends, Operations budget	n/a	0-5 years	Possible financial	n/a	
4.20	Identify cost-share opportunities to create education and recreation areas.	Medium	Friends	SMC, School District, MUNIC	Varies			Low	Low	SMC, Friends, Operations budget	n/a	5-10 years	Possible financial	n/a	
4.21	Develop outdoor recreation and education areas. Open Space Plan use high priority locations next to schools.	Medium	Friends	Friends, School District, MUNIC	Varies			Medium	Medium	SMC, Friends, IDNR, The Conservation Fund	SMC, Friends, MUNIC, Consultants	5-10 years	Possible financial and technical	n/a	

*** See Tables on following page for typical unit costs for equipment and outreach techniques**

[1] See Table 5-1 for a list of organization abbreviations.

Unit Costs for Typical Subwatershed Field Assessment Equipment

Equipment	Unit Cost	Total Cost
Waders (3 pair)	$70.00	$210.00
GPS Unit (2)	$150.00	$300.00
Digital Camera (2)	$200.00	$400.00
Tape Measure (2)	$15.00	$30.00
Metal Clipboards (6)	$10.00	$60.00
Field Binders (10)	$5.00	$50.00
Street Maps (2)	$40.00	$80.00
Pry Bar (1)	$25.00	$25.00
First Aid Kits (2)	$30.00	$60.00
Backpacks (3)	$15.00	$45.00
Measuring Rod (1)	$25.00	$25.00
100 Pack Disposable Latex Gloves (2)	$25.00	$50.00
Water Quality Probes (2) - optional	$400.00	$800.00
Wide-mounth Sample Bottles (20)	$5.00	$100.00
Disposable Supplies* (1)	$250.00	$250.00
TOTAL		**$2,485.00**

**Includes batteries, copies of field forms, pencils, papers, ine, etc.*
Source: Center for Watershed Protection: Methods to Develop Restoration Plans for Small Urban Watersheds, version 2.0.

Unit Costs for Outreach Techniques

Technique	Unit	Unit Cost
Overall residential outreach	Per year	$0.14-$1.11
Designer for material layout	Per hour	$100-$150
Coloring books	Per 1,000 produced	$0.45
Decals	Per 1,000 produced	$0.17
Magnets	Per 1,000 produced	$0.30
Posters (4 double-sided, color, 11x17)	Per 1,000 produced	$2.75
Printed materials (Flyers)	Per 1,000 produced	$0.60-$0.84
Printed materials (Tri-fold panel brochures)	Per 1,000 produced	$1.60-$2.40
Stickers	Per 1,000 produced	$0.08
Tote bags	Per 1,000 produced	$3.50
Billboards	Per billboard/per month	$550-$1,850
Exterior bus advertisements	Per bus/per month	$750-$1,450
Tabletop display	Per display	$500-$800
Educational video	Per minute of video	$1,800.00
Movie theatre slides	Per month	$150-$1,400
Newspaper ads in small local paper	Per advertisement	$260-$450
Photo displays	Per display	$121
Public attitude phone survey	Per survey of 1,000	$15,000
Radio public service announcement*	Per annoucement	$40-60
TV public service announcement*	Per annoucement	$2,750-$4,000

**Assume free airtime*
Source: Center for Watershed Protection: Methods to Develop Restoration Plans for Small Urban Watersheds, version 2.0.

Goal 5: Improve Participation and Coordination in Watershed Improvement Activities.

Programmatic Action Plan No.	Action Recommendation	Priority	Lead Agencies/ Owner	Supporting Agencies/ Owner	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Implementation Schedule	Local Shortcomings Identified	Maintenance & Monitoring Schedule	Maintenance & Monitoring Plan
Objective 1: Coordinate North Branch Chicago River Watershed Plan implementation activities.															
5.1	Evaluate and update watershed plan.	High	NBPC	SMC, Friends	varies			Medium	Medium	IEPA, IDNR, USFWS	SMC, Friends, MUNIC, Consultant	0-5 years	Possible financial and technical	n/a	
5.2	Offer technical expertise and assistance to watershed stakeholders.	Medium	SMC, Friends	NBPC, NRCS, SWCD, USFWS, IEPA, IDNR, CMAP	varies			Medium	Medium	SMC, Friends, Operations budget	SMC, Friends, MUNIC, Consultant	0-20 years	Possible financial and technical	n/a	
5.3	Incorporate North Branch watershed plan recommendations into: regional plans (public works, greenways/trails, water resources, roads etc.); county plans (Framework, Forest Preserve, Capital Improvements, roads etc.); and municipal plans (land use, capital, storm water, roads etc.).	Medium	MUNIC, County, FPD, PD, CMAP, IDOT, LCDOT, ISTHA, NSSD	SMC, Friends, NBPC	varies			Medium	Medium	IEPA, IDNR, USFWS	SMC, Friends, MUNIC, Consultant	5-10 years	Possible financial and technical	n/a	
Objective 2: Educate and encourage public and private land owners to increase their involvement in implementing best management practices.															
5.4	Coordinate watershed restoration projects and develop cost-share funding for best management practices.	High	SMC, Friends	NBPC, MUNIC, TWP, SWCD, LFOLA, NRCS, GLNTC, Private	varies			Medium	Medium	SMC, Friends, Operations budget	SMC, Friends, MUNIC, Consultant	0-5 years	Possible financial and technical	n/a	
5.5	Work with communities individually or in workshop setting to review municipal ordinances and procedures to determine their impact on watershed protection. Make recommendations for changes needed to support watershed best management practices.	High	Friends, SMC, MUNIC	CMAP, NRCS, SWCD	varies			Medium	Medium	SMC, Friends, Operations budget	SMC, Friends, MUNIC, Consultant	10-20 years	Possible financial and technical	n/a	
5.6	Establish cooperative working relationship with municipal and county inspectors and enforcement officers to monitor wetland mitigation.	Medium	USACE, SMC	USFWS, NRCS, SWCD	n/a			Low	Low	n/a	n/a	5-10 years	n/a	n/a	
5.7	SMC will work with drainage districts through the WDO permitting process to formalize what stream restoration/stabilization practices can or cannot be done in easement.	High	SMC, ESDD, WSDD, UDDWF, UDDMF	MUNIC, CB, GLNTC, NBPC	varies			Medium	Medium	IEPA, IDNR, USFWS	SMC, Friends, MUNIC, Consultant	0-5 years	Possible financial and technical	n/a	
5.8	Coordinate with Great Lakes Naval Training Center on developing best management practice projects on GLNTC properties.	Medium	SMC, GLNTC	NBPC	varies			Medium	Medium	IEPA, IDNR, USFWS	SMC, Friends, MUNIC, Consultant	5-10 years	Possible financial and technical	n/a	
5.9	Institute annual policy and legislative meetings in the watershed.	Medium	CBG, Rep. Porter	all units of government	varies			Medium	Medium	IEPA, IDNR, USFWS	SMC, Friends, MUNIC, Consultant	5-10 years	Possible financial and technical	n/a	
Objective 3: Increase river and watershed monitoring efforts and coordinate data sharing.															
5.10	Develop and implement procedures and schedule for regular monitoring of stream condition for erosion, sedimentation and debris blockages. Establish a system (follow-up on monitoring program) for notifying municipalities and private landowners of erosion associated with municipal discharge points or individual property (sump & gutter) discharges into the river.	High	ESDD, WSDD, UDDWF	SMC, MUNIC, GLNTC	varies			Medium	Medium	IEPA, IDNR, USFWS	SMC, Friends, MUNIC, Consultant	0-5 years	Possible financial and technical	n/a	
5.11	Establish a regular monitoring program using hand-held equipment that is designed to assess known problem areas for water quality that incorporates diurnal dissolved oxygen, macroinvertebrates and fisheries.	High	Friends	IEPA, MWRD, USFWS, DePaul, IDNR, LCHD	varies			Medium	Medium	IEPA, IDNR, USFWS	SMC, Friends, MUNIC, Consultant	0-5 years	Possible financial and technical	n/a	
5.12	Monitor one watershed project that includes several BMPs as a demonstration project. Monitoring should conform with USEPA standards where practicable.	Medium	Friends, SMC, MUNIC	IEPA, MWRD, USFWS, DePaul, IDNR, LCHD	varies			Medium	Medium	IEPA, IDNR, USFWS	SMC, Friends, MUNIC, Consultant	5-10 years	Possible financial and technical	n/a	
5.13	Promote reinstatement of RiverWatch, ForestWatch, and WetlandWatch sites for volunteer monitoring of the river and other natural resources in the North Branch watershed.	High	Friends, IDNR	SMC, LCFPD, IEPA	varies			Medium	Medium	SMC, Friends, Operations budget	SMC, Friends, MUNIC, Consultant	0-5 years	Possible financial and technical	n/a	
5.14	Form a watershed subcommittee to develop collection and reporting standards for biological, chemical and physical monitoring, expand the number of monitoring sites and share data at meeting.	Medium	LCHD, IEPA, MWRD, NSSD	Friends, SMC, IDNR, DePaul, CRSN, FPDs, USGS	varies			Medium	Medium	IEPA, IDNR, USFWS	SMC, Friends, MUNIC, Consultant	5-10 years	Possible financial and technical	n/a	
5.15	Adopt water quality testing protocols and establish the Chicago River Data Base to contain student and volunteer generated data.	Medium	Friends	IEPA, IDNR, LCHD	varies			Medium	Medium	IEPA, IDNR, USFWS	SMC, Friends, MUNIC, Consultant	5-10 years	Possible financial and technical	n/a	

[1] See Table 5-1 for a list of organization abbreviations.

5.4 Site Specific Action Plan

The process of identifying specific sites that are in need of, or suited to, watershed improvement projects was begun during the planning process. While this process has identified a large number of potential project sites, there are certain to be many opportunities that are yet to be identified during implementation of the plan. Watershed improvement projects in the site specific plan range from small maintenance and repair tasks, to large wetland restoration and open space protection projects. In some cases, the programmatic action plan recommends steps that will lead to the identification of additional sites for watershed improvement activities. One example is the recommendation to survey buildings in floodprone properties.

Within the scope of developing this plan, several methods were used to locate project sites.

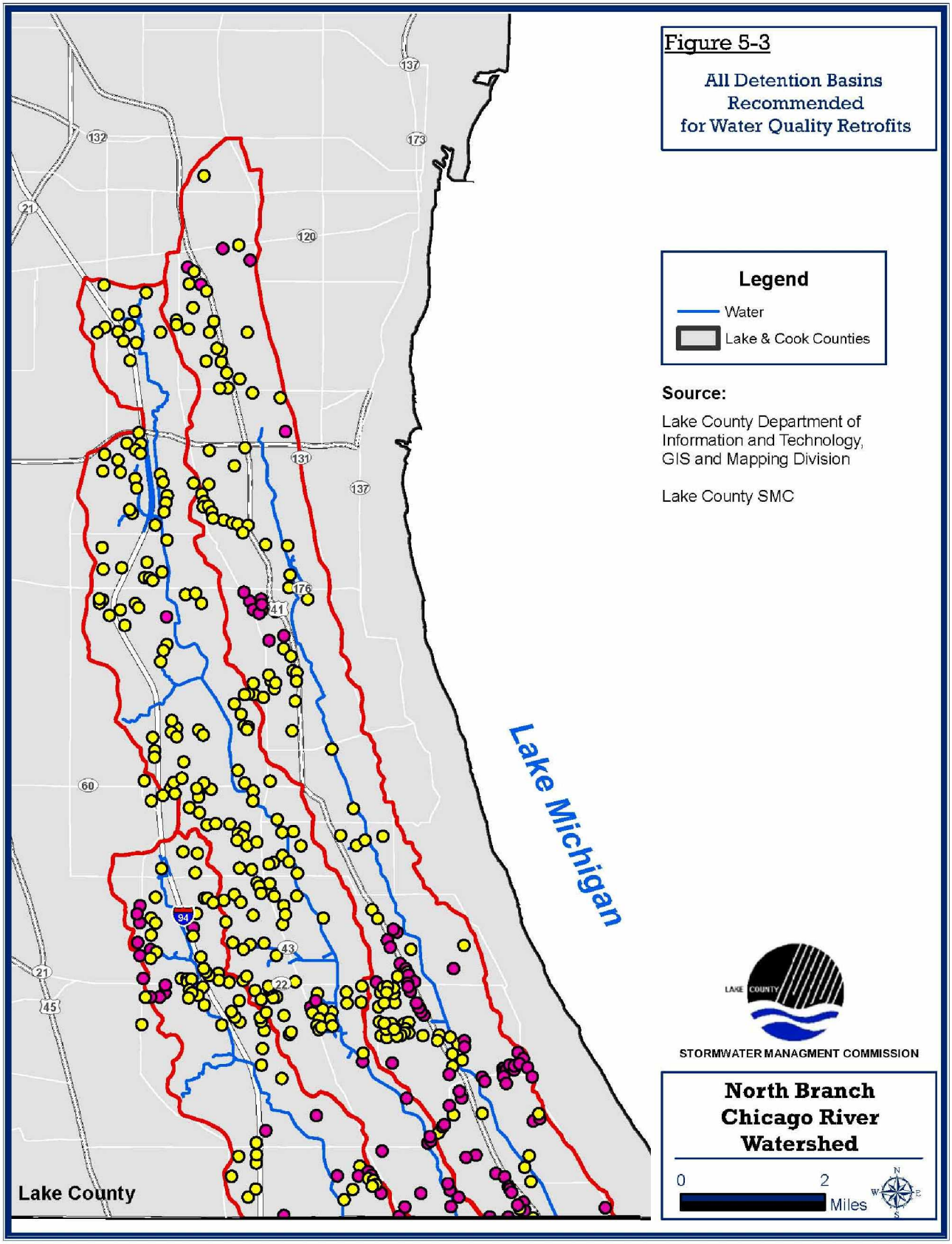
1) Watershed stakeholders made site and project recommendations to the planning staff during individual interviews or input meetings.
2) Sites were identified based on the results of previous watershed studies such as the All Hazard Mitigation Plan and the *Chicago Rivers Demonstration Project*.
3) New data was collected that identified a number of sites for drainage system retrofits/repairs and natural resource enhancements. Most notably, the stream and detention basin inventories and nonpoint pollutant loading analysis pointed out specific opportunity sites and priority areas for projects.
4) Extensive map analysis using existing data including land use, wetlands, soil, floodplain and open space overlays identified a number of potential sites that will be investigated in the field for future wetland restoration and open space protection projects.
5) Recommendations and project sites from the NBOSP were evaluated and incorporated into this plan.

The following grid is organized by municipality[38] type of project. Each recommended activity includes location information, priority ranking and the watershed stakeholder(s) who will most likely be responsible for its implementation. Location information includes a number identification, municipal name and stream reach number where applicable. Following are brief project descriptors and the location identifier for each.

Stormsewersheds (SSS)
Sub-basins mapped based on the stormsewer maps acquired from watershed municipalities. The SSS# includes a subwatershed identifier (10=West Fork, 20=Middle Fork, 30=Skokie) and a sequential number that follows. A simple model was used to estimate nonpoint pollutant loadings based on land use within these sub-basins. See Figure 3-43 for a map of the stormsewersheds with the highest pollutant loadings identified as critical areas.

Detention Basins
Detention basins were assessed based on a field survey. The survey summary can be found in Appendix G. See Figure 5-3 for a map that locates the basins recommended for retrofit in the action plan. They are located using a subwatershed identifier (24=Skokie, 25=Middle Fork, 26=West Fork) followed by a dash and sequential number.

[38] *This grid bas been organized by municipality*



Maps to be used for Planning Purposes only.

Produced by V3 Companies

Stream Restoration

The Stream Inventory identified locations of erosion and debris loads in the river. A summary of the inventory can be found in Appendix B. The most severely eroded or blocked stream reaches are included in the plan as high priority for maintenance and restoration. Specific areas are identified based on stream reach number (see Outfalls below) and municipality. Figures 3-33 through 3-37 depict stream condition by stream reach. See Figure 5-4 for a map of priority stream inventory reaches within Lake County.

Outfalls

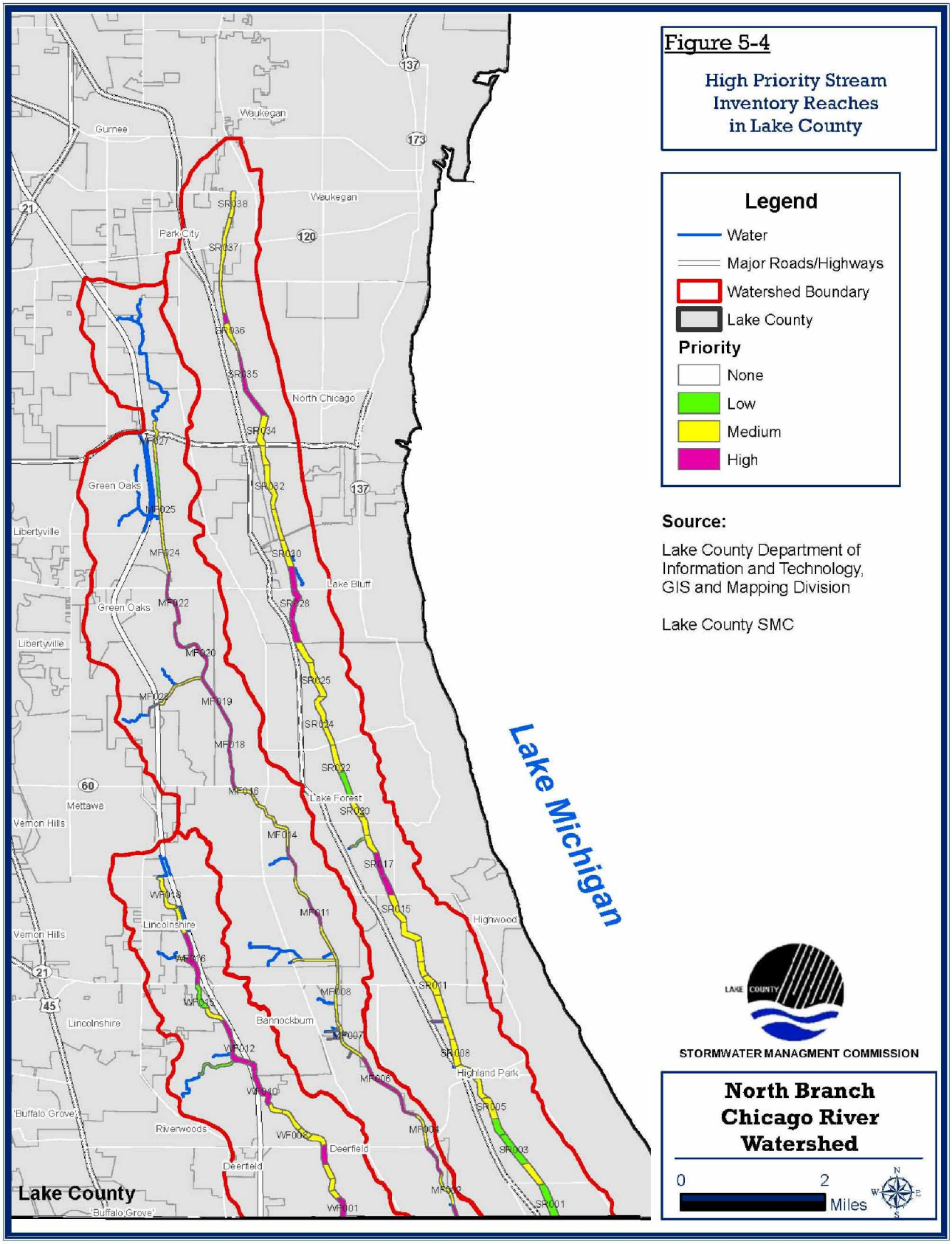
The size, location and condition of all outfalls were identified in the Stream Inventory. A summary of outfalls can be found in Appendix C. Outfalls recommended for retrofits or repairs to reduce erosion and improve water quality are located by stream reach and a sequential number (WF1=West Fork stream reach #1).

Wetland Restoration

An overlay of map themes that included land use, open space, existing wetlands and hydric soils used in conjunction with 2005 aerial photos was analyzed to identify potential wetland restoration sites. Development in the watershed since 2005 may have eliminated restoration potential at several of the sites. Detailed field surveys of the sites and land cost and availability will need to be determined to assess restoration feasibility. Potential wetland restoration sites are tagged with the letters WL followed by a sequential number. See Figures 5-5 and 5-6 for a map of the potential sites and sites of significant priority.

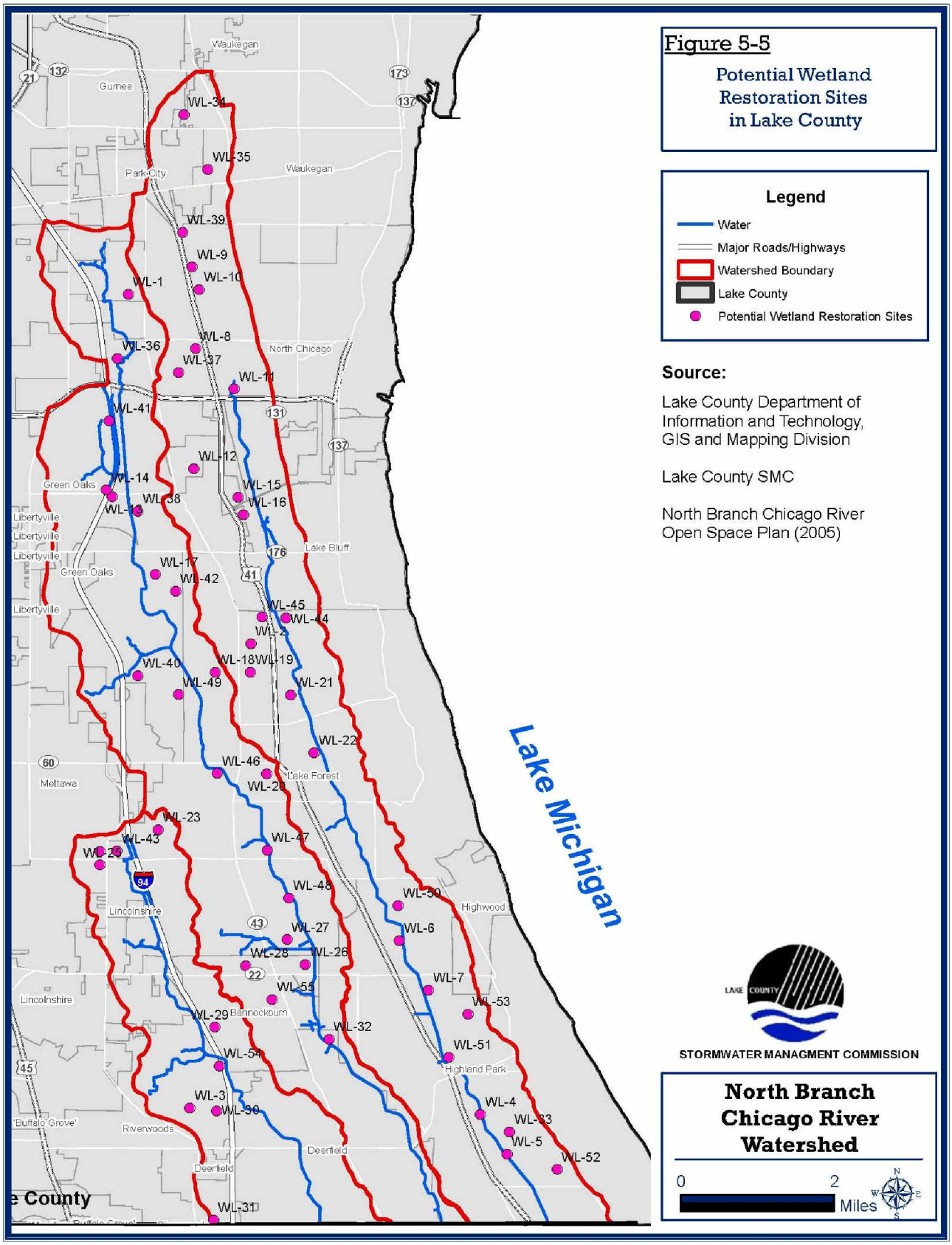
Open Space

The 2005 aerial photos in combination with land use, wetlands, T&E locations and existing open space overlays were used to identify potential sites for open space protection. The feasibility of open space protection at these sites still needs to be determined based on field visits to determine site quality, availability and land cost. As with the wetland restoration sites, development in the watershed since 2005 may have eliminated open space potential at several of these sites. Potential open space sites are tagged with the letters OS followed by a sequential number. See Figures 5-7 and 5-8 for a map of the sites and sites of significant priority.



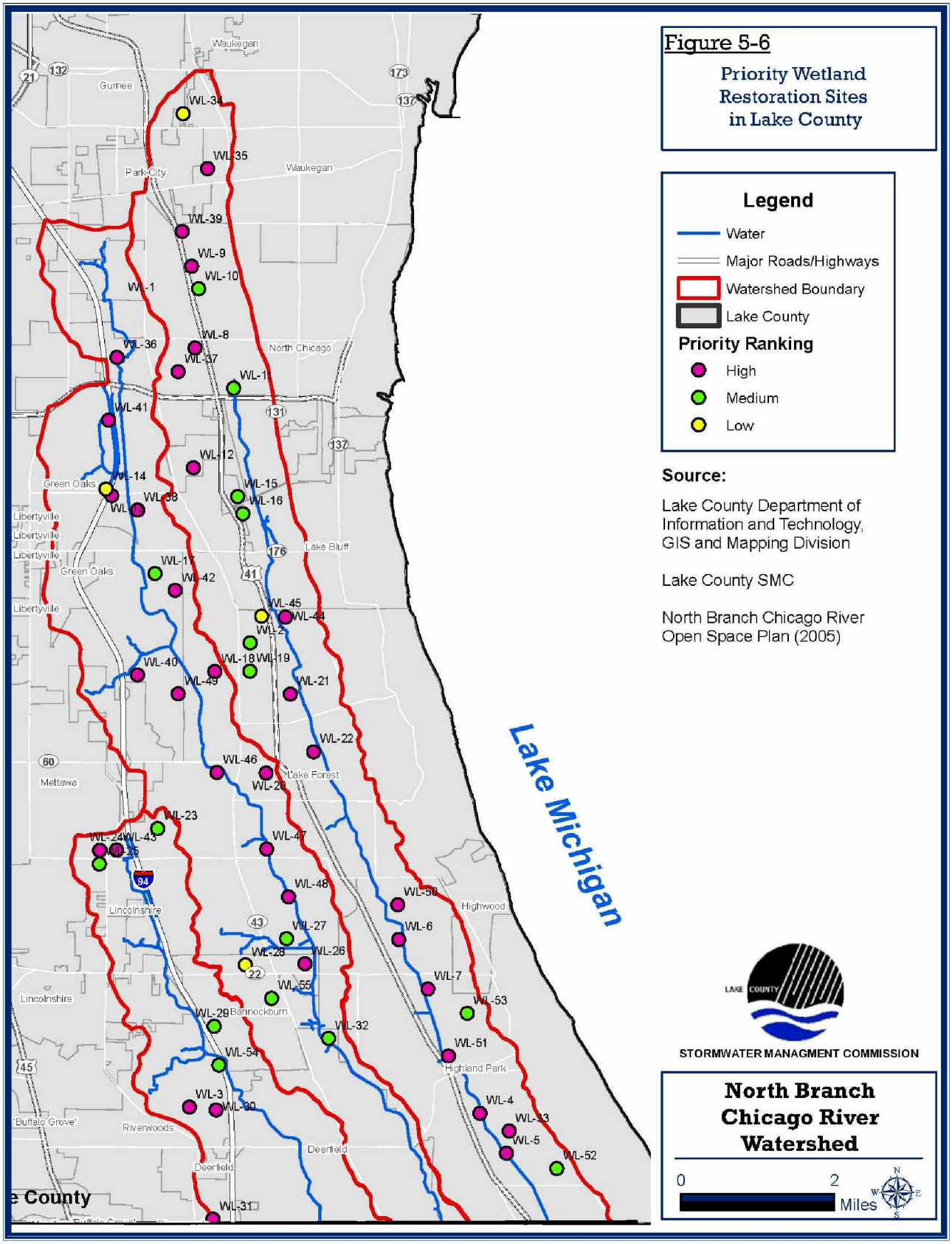
Maps to be used for Planning Purposes only.

Produced by V3 Companies



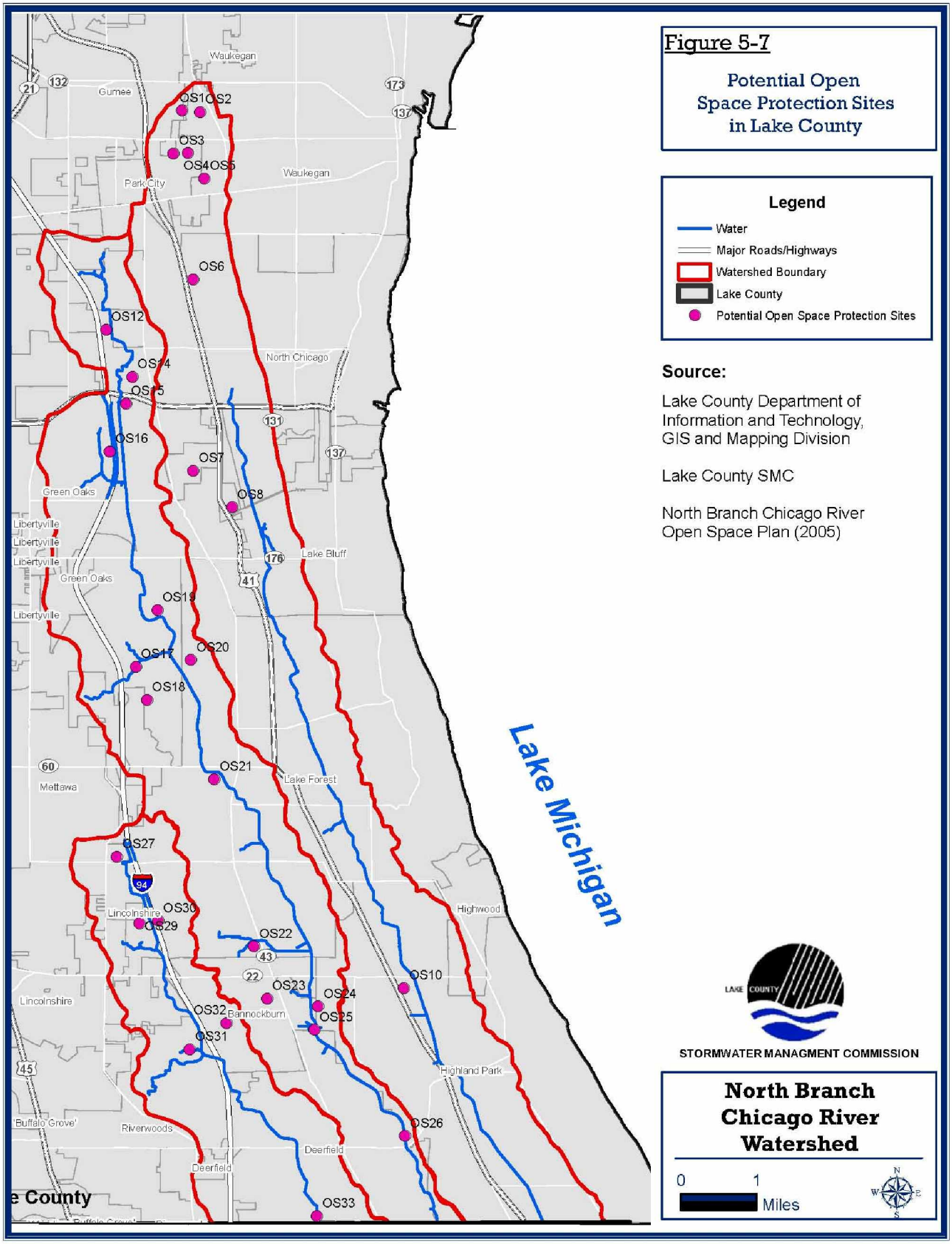
Maps to be used for Planning Purposes only.

Produced by V3 Companies



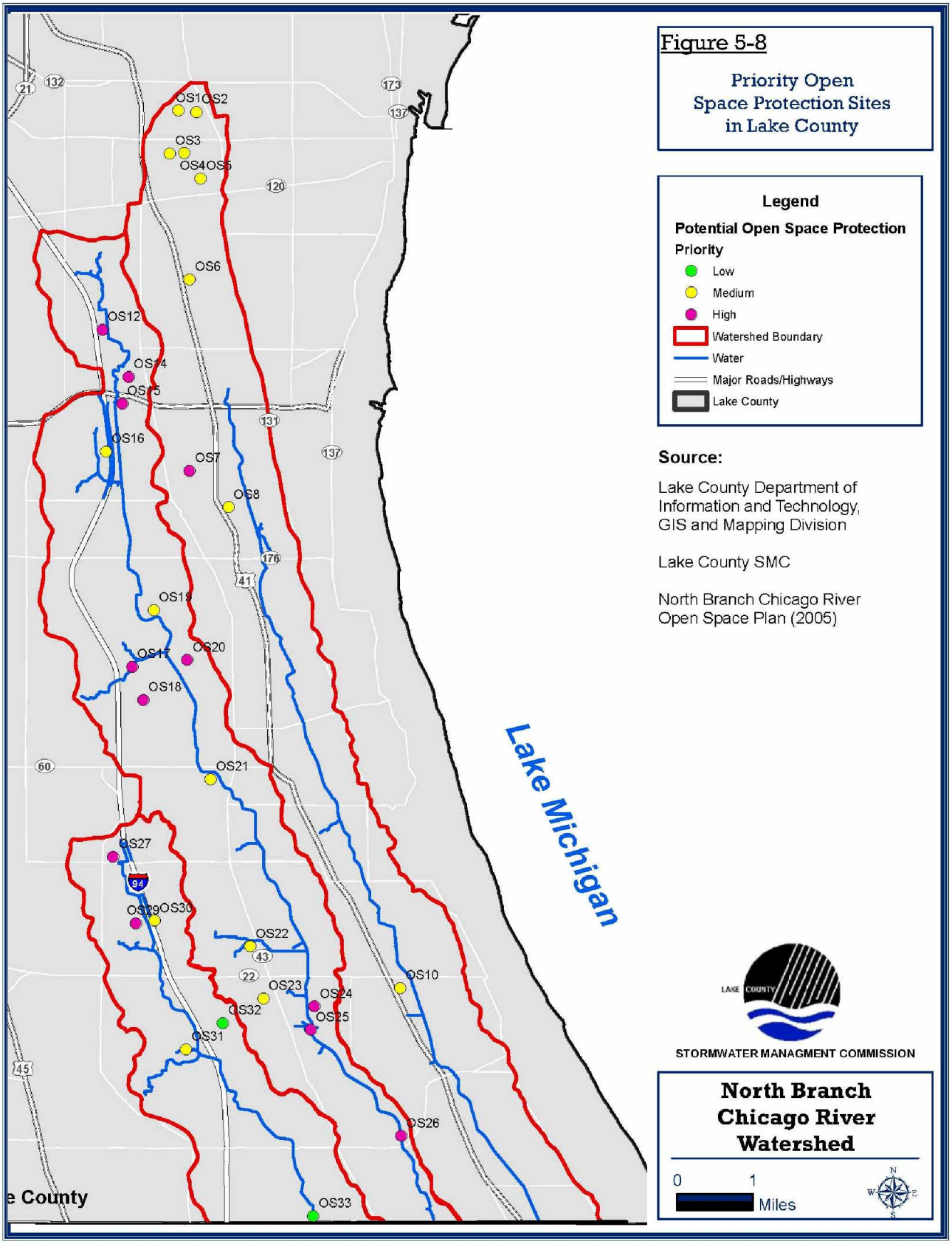
Maps to be used for Planning Purposes only.

Produced by V3 Companies



Maps to be used for Planning Purposes only.

Produced by V3 Companies



Maps to be used for Planning Purposes only.

Produced by V3 Companies

Hydraulic Structures

Hydraulic structure refers to bridges, culverts, dams and seawalls. The size, condition and location of all North Branch hydraulic structures was identified in the Stream Inventory. A summary of the hydraulic structures can be found in Appendix D. Hydraulic structures recommended for retrofits or repairs are located by stream reach (WF1=West Fork stream reach #1) and are identified by the letters HS followed by a dash and sequential number.

Flood Mitigation Sites

Flood problem areas in the North Branch were identified during an inventory conducted in 1995 for the Flood Hazard Mitigation Plan. The action plan grid includes information on the flood damage cause in addition to the site location, action recommendation and responsible agencies. Flood Problem Areas are identified using a subwatershed identifier (26=West Fork, 25=Middle Fork, 24=Skokie River) followed by a dash and sequential number. See Figure 3-52 for a map that locates the flood problem areas.

Recommendations for application of watershed BMPs at specific sites are contained in the site specific action plan table.

This Site Specific Action Plan includes recommendations for watershed improvement projects within Bannockburn. Bannockburn contributes 1,305 acres to the North Branch Chicago River Watershed making up 2.1% of the total watershed. Approximately 1.0 river mile is located within the municipal boundaries.

These site-specific recommendations are certainly not all-inclusive of the opportunities for best management practice projects in the watershed, they merely reflect the opportunity sites identified by stakeholders, stream and detention basin inventories, and other components of the assessment. The following grid is organized by type of project. Each recommended activity includes location information, priority ranking and the watershed stakeholders who will most likely be responsible for implementation.

Detention Basin Water Quality Retrofits *[See Detention Basin Inventory in Appendix G.]*

(Note: See Figure 5-3 for detention basin locations.
Dry-bottom and underground basins are designated "high" priority for retrofits. Opportunities for retrofitting other basins and maintenance needs are noted in the Detention Basin Inventory summary.)

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2	26-56	2015	Bannockburn	College Park Subdivision II	Inlet problems; inlet/outlet orientation; moderate shoreline erosion	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Bannockburn, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $20,000-$30,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	26-59	1002	Bannockburn	College Park Athletic Club	Outlet problems; inlet/outlet orientation; high algae; purple loosestrife	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Bannockburn, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $20,000-$30,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	26-64	1002	Bannockburn	100 Corporate North Building	Inlet problems; inlet/outlet orientation; rip rap side slopes; geese	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Bannockburn, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $20,000-$30,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	Various		Bannockburn			Replace turf and rip rap shorelines, bottoms, and buffers of all basins with native vegetation.	Low	Property Owner, Bannockburn	SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	10-20 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-113	2021	Bannockburn	Putorian Furniture	Inlet/outlet problems and purple loosestrife	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Bannockburn, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-115	2021	Bannockburn	Bannock-burn Green Retail Center	Inlet/outlet problems and geese	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Bannockburn, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-109	2018	Bannockburn	Mehta	Inlet/outlet problems and orientation	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Bannockburn, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding

Detention Basin Water Quality Retrofits - Continued

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2	25-114	2018	Bannockburn	Bannock-burn Lake Office I	Outlet problems; inlet/outlet orientation; rip rap side slopes	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Bannockburn, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	Various		Bannockburn			Replace turf and rip rap shorelines, bottoms, and buffers of all basins with native vegetation.	Low	Property Owner, Bannockburn	SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	10-20 years	Possible Tech and Funding

Outfall Retrofits/Repairs *[See Point Discharge Summary Appendix C.]*

(Note: Location refers to the stream reach and the point discharge reference numbers. See Figure 3-33 for stream reach location. Because of the large number of discharge points with associated problems, only the most significant are listed in this action plan. Lower priority problems that need to be corrected are found in the complete summary.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit ($)	Unit Cost ($/linear foot)	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Stream Restoration and Maintenance *[See Stream Inventory Summary in Appendix B.]*

(Note: See Figure 3-33 for stream reach locations. Only those stream reaches that are considered a high or medium priority are listed. Reaches with a low priority can be identified from the complete summary.)

Programatic Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Down-stream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.14	WF011	357	Bannockburn	350	High sediment accumulation	Remove accumulated sediment in stream reach	High	UDDWF	Bannockburn, homeowners	site specific for sediment removal - varies based on amount of sediment				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	0-5 years	Possible financial
1.17, 2.14	MF008	474	Bannockburn/ Unincorporate d Lake County	461	Moderate bank erosion and moderate sediment accumulation	Stabilize eroded streambanks and remove accumulated sediment in stream reach	Medium	WSDD	Bannockburn, Lake County, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	MF031	2294	Bannockburn	2283	Moderate instream debris load and moderate sediment accumulation	Remove accumulated sediment and debris in stream reach	Medium	WSDD	Bannockburn, homeowners	site specific for debris and sediment removal - varies based on type and amount				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial

Potential Wetland Restoration Sites

(Note: See Figure 5-6 for locations. Potential wetland restoration sites were identified based on map analysis. Restoration feasibility still to be determined.)

Programation Action Plan No.	ID	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
3.4, 3.5	WL-28	2015	Bannockburn	WL28: Bannock-burn, Broadleys Ct.	Privately owned parcel with wetlands	Determine feasibility of wetland restoration.	Low	SMC,	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, WRF, NEIWCA	SMC, Consultant, Municipality	10-20 years	Possible technical or financial
3.4, 3.5	WL-29	2015	Bannockburn	WL29: Bannock-burn, Duffy Lane	Village of Bannockburn owned, with wetlands	Determine feasibility of wetland restoration.	Medium	SMC, *Village of Bannockburn*	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, WRF, NEIWCA	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
3.4, 3.5	WL-55	2022	Bannockburn	WL55: Bannock-burn, Waukegan	Privately owned parcel with wetlands	Determine feasibility of wetland restoration.	High	SMC	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, WRF, NEIWCA	SMC, Consultant, Municipality	0-5 years	Possible technical or financial

Open Space Protection

(Note: See Figure 5-7 for locations. Potential open space protection sites were identified based on stakeholder recommendations and map analysis. Protection feasibility still to be determined.)

Programatic Action Plan No.	ID No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.14, 1.26, 3.15	OS32	2015	Bannockburn	Northeast corner of I 94 & Duffy Ln.	Linear site that extends east to Thornapple Rd.	Establish conservation easement and consider wetland restoration	Low	Municipality, Trinity College	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	10-20 years	Possible Financial
1.14, 1.26, 3.15	OS23	2022	Bannockburn	Between Telegraph & US 43/ South of Half Day/ North of Duffy Lane	Two wetlands surrounded by development on all sides.	Permanent protection	Medium	Municipality, Park District	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	5-10 years	Possible Financial
1.14, 1.26, 3.15	OS24	3047	Highland Park/ Bannockburn	South of Half Day between Middle Fork & Tennyson	Wetland along Middle Fork. (May have already been added to Prairie Wolf Slough Forest Preserve.)	Permanent protection	High	Municipality, Forest Preserve District	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	0-5 years	Possible Financial
1.14, 1.26, 3.15	OS25	2024	Deerfield/ Highland Park/ Bannockburn	Middle Fork & Deerfield High School	Large wetland that follows Middle Fork south to Berkley Rd.	Permanent protection (Portions of this wetland may already be protected based on 2004 data from the NBOS plan.)	High	Municipality, Park District	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	0-5 years	Possible Financial

* Land acquisition costs will vary greatly throughout the watershed. Based on 2004 data from the North Branch Open Space Plan, the cost per acre (averaged throughout Lake County) is approximately $15,000.

Flood Mitigation Sites

(Note: Flood Problem Area reference numbers were developed for the Lake County Flood Hazard Mitigation Plan. Additional sites were identified during the watershed planning process. See Figure 3-52 for Mapped Locations.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies			Flood Problem Areas Inventory No.	Cost Estimate[2]	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.2, 2.16	MF008	2022	Bannockburn	Illinois St.	Local drainage problems	Create additional storage utilizing existing vacant land. Perform ditch and culvert monitoring and maintenance.	Low	Bannockburn				25-09	$30,000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	10-20 years	Possible technical or financial
2.2, 2.16	MF007	1003	Bannockburn	Meadow Lane & Aitken Dr.	Depressional storage flooding	May consider constructing swale to increase outlet capacity, improving internal drainage, provide additional storage.	Low	Bannockburn				25-10	$30,000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	10-20 years	Possible technical or financial

Notes

1 Perform low-entry elevation surveys, determine depth of damage per structure, consider all alternatives to include floodproofing (wet or dry), elevation, relocation, or acquisition or no action. Most cost-effective alternative should be implemented. Look at all listed repetitive loss structures.

2 All cost estimates are conceptual and may vary significantly as detailed scopes of work are developed.

3 All ranking for financial assistance needed were based on cost estimates; Low= less than 50, Medium= 50>100, and High= all cost estimates above 100.

Hydraulic Structures [See Hydraulic Structure Summary Appendix D.]

(Note: Location refers to the stream reach and hydraulic structure reference numbers. Only the most significant problems are listed in the Action Plan. Lower priority problems are noted in the complete summary in Appendix D.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																				

This Site Specific Action Plan includes recommendations for watershed improvement projects within Deerfield. Deerfield contributes 3,201 acres to the North Branch Chicago River Watershed making up 5.1% of the total watershed. Approximately 5.8 river miles are located within the municipal boundaries.

These site-specific recommendations are certainly not all-inclusive of the opportunities for best management practice projects in the watershed, they merely reflect the opportunity sites identified by stakeholders, stream and detention basin inventories, and other components of the assessment. The following grid is organized by type of project. Each recommended activity includes location information, priority ranking and the watershed stakeholders who will most likely be responsible for implementation.

Detention Basin Water Quality Retrofits *[See Detention Basin Inventory in Appendix G.]*

(Note: See Figure 5-3 for detention basin locations.
Dry-bottom and underground basins are designated "high" priority for retrofits. Opportunities for retrofitting other basins and maintenance needs are noted in the Detention Basin Inventory summary.)

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2, 3.3	26-21	1012	Deerfield	Caruso Jr. High	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Deerfield, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	26-23	1023	Deerfield	Shepard Jr. High	Inlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Deerfield, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	26-24	1011	Deerfield	1650 Lake Cook Road	Concrete bottom	Remove concrete bottom detention basin and convert to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Deerfield, SMC, HOA	$35,000-$45,000 per acre for native vegetation planting plus cost for removal of concrete.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	26-28	1024	Deerfield	Whitehall	Inlet/outlet orientation and rip rap side slopes	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Deerfield, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	26-29	1024	Deerfield	McDonalds	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Deerfield, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	26-30	1008	Deerfield	Laurel Hill North	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Deerfield, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	26-31	1024	Deerfield	Baker's Square	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Deerfield, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding

Detention Basin Water Quality Retrofits - Continued

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2, 3.3	26-32	1024	Deerfield	Renu Spa	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Deerfield, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	26-33	1025	Deerfield	Public Works Facility	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Deerfield, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	26-19	1011	Deerfield	Hyatt Hotel - west side	Inlet/outlet problems and orientation	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Deerfield, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $20,000-$30,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	26-27	1024	Deerfield	Corporate 500	Inlet/outlet problems and orientation; moderate shoreline erosion	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Deerfield, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $20,000-$30,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	26-34	1028	Deerfield	Flodstrom-Brickyards	Inlet/outlet problems and orientation; moderate algae	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Deerfield, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $20,000-$30,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	V3_26-19	1007	Deerfield	Lake Eleanor	Inlet/outlet orientation	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Deerfield, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $20,000-$30,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	Various		Deerfield			Replace turf and rip rap shorelines, bottoms, and buffers of all basins with native vegetation.	Low	Property Owner, Deerfield	SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	10-20 years	Possible Tech and Funding
1.4, 2.6	25-26	2046	Deerfield	Cadwell Corners	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Deerfield, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-27	3054	Deerfield	Kogen Projects - Deerfield Estates	Inlet/outlet orientation and outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Deerfield, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-28	2046	Deerfield	Deer Run	Outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Deerfield, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding

Detention Basin Water Quality Retrofits - Continued

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2, 3.3	25-29	2040	Deerfield	Kipling School	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Deerfield, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-30	2028	Deerfield	Summit Drive Extension	Inlet/outlet problems and rip rap side slopes	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Deerfield, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding

Outfall Retrofits/Repairs *[See Point Discharge Summary Appendix C.]*

(Note: Location refers to the stream reach and the point discharge reference numbers. See Figure 3-33 for stream reach location. Because of the large number of discharge points with associated problems, only the most significant are listed in this action plan. Lower priority problems that need to be corrected are found in the complete summary.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate ($/linear foot)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.5, 1.18	WF002	1027	Deerfield	190	Gravel underneath for erosion control; erosion problem	Stabilize erosion. Monitor and maintain.	Medium	UDDWF, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	WF002	1027	Deerfield	188	Soil eroding underneath pipe, erosion problem	Stabilize erosion. Monitor and maintain.	Medium	UDDWF, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5	WF002	1027	Deerfield	198	WWTP discharge; soapy smell, bubbles; potential water quality problem	Investigate whether discharge is permitted. Monitor and maintain.	High	UDDWF, Deerfield	IEPA, SMC	$500-$1,000 to investigate discharge.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	WF003	1028	Deerfield	205	This pipe is the upper one in photo 205; erosion problem, bank eroding	Stabilize erosion. Monitor and maintain.	Medium	UDDWF, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	WF004	1023	Deerfield	215	Sewer odor near pipe and sheen on water flowing from it; erosion problem below pipe	Identify source of discharge and disconnect/remove. Stabilize erosion. Monitor and maintain.	High	UDDWF, Deerfield	SMC	$100/lf to stabilize erosion. $500-$1,000 to investigate discharge.				High	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding

Outfall Retrofits/Repairs - Continued

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate ($/linear foot)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.5, 1.18	WF004	1023	Deerfield	219	Erosion occurring below pipe, erosion problem	Stabilize erosion. Monitor and maintain.	Medium	UDDWF, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	WF005	1021	Deerfield	245	Very eroded near pipe; part of pipe is broken; erosion problem	Stabilize erosion, repair outfall pipe Monitor and maintain.	High	UDDWF, Deerfield	SMC	$100/lf to stabilize erosion. $500-$1,000 to repair outfall pipe.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	WF005	1021	Deerfield	239	Leaky, broken pipe; unable to locate source to determine material and measure dimensions; eroded area surrounding pipe, erosion problem	Stabilize erosion, repair outfall pipe. Investigate water and look for illicit connections, disconnect. Monitor and maintain.	High	UDDWF, Deerfield	SMC	$100/lf to stabilize erosion. $500 - $1,000 to repair outfall pipe. $500-$1,000 to investigate discharge.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	WF006	1017	Deerfield	260	Concrete apron; erosion problem; three dead fish on opposite bank	Stabilize erosion, repair outfall pipe. Look for illicit discharges. Monitor and maintain.	High	UDDWF, Deerfield	SMC	$100/lf to stabilize erosion. $500 - $1,000 to repair outfall pipe. $500-$1,000 to investigate discharge.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5	WF007	1014	Deerfield	276	Small pool underneath pipe; streambed mucky in pool and whitish fog in pool water, potential water quality problem problem	Identify source of discharge and disconnect/remove. Monitor and maintain.	High	UDDWF, Deerfield	SMC	$500-$1,000 to investigate discharge.				High	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	WF007	1014	Deerfield	284	Erosion problem	Stabilize erosion. Monitor and maintain.	Medium	UDDWF, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	WF007	1014	Deerfield	286	Eroding underneath pipe down to streambed, erosion problem	Stabilize erosion. Monitor and maintain.	Medium	UDDWF, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	WF008	1014	Deerfield	292	Highly eroded, erosion problem	Stabilize erosion. Monitor and maintain.	High	UDDWF, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding

Outfall Retrofits/Repairs - Continued

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate ($/linear foot)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.5, 1.18	WF008	1013	Deerfield	298	Swale above pipe, eroded bank below; erosion problem	Stabilize erosion. Monitor and maintain.	Medium	UDDWF, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	WF008	1013	Deerfield	304	Erosion above and below, erosion problem	Stabilize erosion. Monitor and maintain.	Medium	UDDWF, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	WF008	1013	Deerfield	305	Erosion beneath, erosion problem	Stabilize erosion. Monitor and maintain.	Medium	UDDWF, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	WF008	1013	Deerfield	306	Concrete beneath; erosion problem	Stabilize erosion. Monitor and maintain.	Medium	UDDWF, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	WF008	1013	Deerfield	307	Severely eroded beneath, erosion problem	Stabilize erosion. Monitor and maintain.	High	UDDWF, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	WF009	1012	Deerfield	317	Eroding underneath, erosion problem; concrete block placed below to protect bank	Stabilize erosion. Monitor and maintain.	Medium	UDDWF, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	WF010	1003	Deerfield	341	Unable to measure, approximately 6" plastic pipe; severe erosion, erosion problem; swale leading to channel; see also photo 342	Stabilize erosion. Monitor and maintain.	High	UDDWF, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF004	2036	Deerfield	409	Severe erosion surrounding rusty and broken pipe; source: residential road	Stabilize erosion. Monitor and maintain.	High	WSDD, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF005	3050	Deerfield	5003	Erosion underneath pipe; source: residential	Stabilize erosion Monitor and maintain.	Medium	WSDD, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding

Outfall Retrofits/Repairs - Continued

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate ($/linear foot)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.5, 1.18	MF005	3050	Deerfield	5015	Opposite bank eroded; 1/3 of pipe filled with water	Stabilize erosion Monitor and maintain.	Medium	WSDD, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	MF005	3050	Deerfield	5020	Opposite bank eroded; 3/4 of pipe filled with water; storm drain	Stabilize erosion Monitor and maintain.	Medium	WSDD, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	MF005	3050	Deerfield	5021	Severely eroded bank above pipe	Stabilize erosion Monitor and maintain.	High	WSDD, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF005	3050	Deerfield	5024	Severely eroded banks within swale	Stabilize erosion Monitor and maintain.	High	WSDD, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF006	3050	Deerfield	420	Banks severely eroded within swale	Stabilize erosion Monitor and maintain.	High	WSDD, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF006	3047	Deerfield	424	Soil eroding around pipe and on opposite bank; somewhat filled with water	Stabilize erosion Monitor and maintain.	Medium	WSDD, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	MF006	3047	Deerfield	429	Rusted, broken pipe; bank severely eroded surrounding pipe	Stabilize erosion, repair outfall pipe Monitor and maintain.	High	WSDD, Deerfield	SMC	$100/lf to stabilize erosion. $500-$1,000 to repair outfall pipe.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF006	2028	Deerfield	430	Bank severely eroded underneath pipe; burlap mesh and tree revetments near pipe	Stabilize erosion Monitor and maintain.	High	WSDD, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF006	3047	Deerfield	437	Severely eroded	Stabilize erosion Monitor and maintain.	High	WSDD, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF007	3047	Deerfield	455	Severe erosion; several fallen trees span tributary	Stabilize erosion, clear fallen trees Monitor and maintain.	High	WSDD, Deerfield	SMC	$100/lf to stabilize erosion. $500-$1,000 to remove debris.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding

Outfall Retrofits/Repairs - Continued

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate ($/linear foot)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.5, 1.18	MF033	2043	Deerfield	2302	Pipe is failing	Repair or replace outfall pipe	High	WSDD, Deerfield	SMC	$500-$1000 to repair outfall pipe				Low	Medium	IEPA, SMC, SWCD, operations budget	n/a	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF034	2045	Deerfield	2276	Severe erosion	Stabilize erosion	High	WSDD, Deerfield	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding

Stream Restoration and Maintenance *[See Stream Inventory Summary in Appendix B.]*

(Note: See Figure 3-33 for stream reach locations. Only those stream reaches that are considered a high or medium priority are listed. Reaches with a low priority can be identified from the complete summary.)

Programatic Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Down-stream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.17, 2.14	WF001	193	Deerfield	149	High sediment accumulation and moderate bank erosion	Stabilize eroded streambanks and remove accumulated sediment in stream reach	High	UDDWF	Deerfield, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
1.17	WF002	199	Deerfield	183	Moderate bank erosion	Stabilize eroded streambanks	Medium	UDDWF	Deerfield, homeowners	$50-$250+ per linear foot				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	WF003	212	Deerfield	200	Moderate sediment accumulation and moderate	Stabilize eroded streambanks and remove accumulated sediment in stream	Medium	UDDWF	Deerfield, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
2.14	WF004	227	Deerfield	213	Moderate sediment accumulation	Remove accumulated sediment in stream reach	Medium	UDDWF	Deerfield, homeowners	site specific for sediment removal - varies based on amount of sediment				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial
2.14	WF005	252	Deerfield	228	High sediment accumulation	Remove accumulated sediment in stream reach	High	UDDWF	Deerfield, homeowners	site specific for sediment removal - varies based on amount of sediment				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	0-5 years	Possible financial
1.17, 2.14	WF006	266	Deerfield	253	Moderate sediment accumulation and moderate bank erosion	Stabilize eroded streambanks and remove accumulated sediment in stream reach	Medium	UDDWF	Deerfield, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	WF007	289	Deerfield	267	Moderate sediment accumulation and moderate bank erosion	Stabilize eroded streambanks and remove accumulated sediment in stream reach	Medium	UDDWF	Deerfield, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	WF008	314	Deerfield	290	Moderate sediment accumulation and moderate bank erosion	Stabilize eroded streambanks and remove accumulated sediment in stream reach	Medium	UDDWF	Deerfield, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial

Stream Restoration and Maintenance - Continued

Programatic Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Down-stream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.17	WF009	323	Deerfield	315	Moderate bank erosion	Stabilize eroded streambanks	Medium	UDDWF	Deerfield, homeowners	$50-$250+ per linear foot				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	WF010	349	Deerfield/ Unincorporate d Lake County	325	High sediment accumulation and moderate bank erosion	Stabilize eroded streambanks and remove accumulated sediment in stream reach	High	UDDWF	Deerfield, Lake County, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
1.17, 2.14	MF003	388	Deerfield	153	Moderate instream debris load, moderate bank erosion, and high sediment accumulation	Stabilize eroded streambanks and remove debris and accumulated sediment in stream reach	High	UDDMF	Deerfield, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
1.17, 2.14	MF004	5000	Highland Park/ Deerfield	390	Moderate instream debris load, moderate bank erosion, and moderate sediment accumulation	Stabilize eroded streambanks and remove debris and accumulated sediment in stream reach	Medium	WSDD	Highland Park, Deerfield, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	MF005	5027	Highland Park/ Deerfield	5001	Moderate bank erosion and high sediment accumulation	Stabilize eroded streambanks and remove accumulated sediment in stream reach	High	WSDD	Highland Park, Deerfield, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
1.17, 2.14	MF006	438	Highland Park/ Deerfield	5028	Moderate instream debris load with wood chips near banks, moderate bank erosion, and high sediment accumulation	Stabilize eroded streambanks and remove debris and accumulated sediment in stream reach	High	WSDD	Highland Park, Deerfield, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
1.17, 2.14	MF007	460	Highland Park/ Deerfield	439	Moderate bank erosion and moderate sediment accumulation	Stabilize eroded streambanks and remove accumulated sediment in stream reach	Medium	WSDD	Highland Park, Deerfield, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	MF033	2304	Deerfield	2295	High bank erosion and high instream debris load	Stabilize eroded streambanks and remove debris in stream reach	High	WSDD	Deerfield, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for debris removal - varies based on amount of debris				High	High	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
1.17	MF034	2276	Deerfield	2268	High bank erosion	Stabilize eroded streambanks	High	WSDD	Deerfield, homeowners	$50-$250+ per linear foot				High	High	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial

Potential Wetland Restoration Sites

(Note: See Figure 5-6 for locations. Potential wetland restoration sites were identified based on map analysis. Restoration feasibility still to be determined.)

Programatic Action Plan No.	ID	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
3.4 3.5	WL-32	3047	Deerfield	WL32: Lake Forest, Waukegan Rd.	Lake Forest HS owned with wetlands	Determine feasibility of wetland restoration.	Medium	SMC, *Lake Forest HS*	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	5-10 years	Possible technical or financial

Open Space Protection

(Note: See Figure 5-7 for locations. Potential open space protection sites were identified based on stakeholder recommendations and map analysis. Protection feasibility still to be determined.)

Programatic Action Plan No.	ID No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.14, 1.26, 3.15	OS33	1029	Deerfield	West Fork & Lake Cook Rd.	West Fork wetland/ floodplain	Establish conservation easement	Low	Municipality, Park District	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	10-20 years	Possible Financial
1.14, 1.26, 3.15	OS25	2024	Deerfield/ Highland Park/ Bannockburn	Middle Fork & Deerfield High School	Large wetland that follows Middle Fork south to Berkley Rd.	Permanent protection (Portions of this wetland may already be protected based on 2004 data from the NBOS plan.)	High	Municipality, Park District	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	0-5 years	Possible Financial
1.14, 1.26, 3.15	OS26	2038	Deerfield/ Highland Park	Deerfield High School to Lake Cook Rd.	Both sides of Middle Fork for riparian/ floodplain wetland.	Establish conservation easement and greenway	High	Municipality, Park District	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	0-5 years	Possible Financial

* Land acquisition costs will vary greatly throughout the watershed. Based on 2004 data from the North Branch Open Space Plan, the cost per acre (averaged throughout Lake County) is approximately $15,000.

Flood Mitigation Sites

(Note: Flood Problem Area reference numbers were developed for the Lake County Flood Hazard Mitigation Plan. Additional sites were identified during the watershed planning process. See Figure 3-52 for Mapped Locations.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies			Flood Problem Areas Inventory No.	Cost Estimate[2]	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.16	WF002	1027	Deerfield	Laurel Ave	Overbank flooding, storm and sanitary sewer backup	Refer to Village Department of Public Works for retrofits or maintenance to culverts	Low	Deerfield	UDDWF			26-01	$10,000/ structure	Low	Low			10-20 years	No
2.16	MF005	2032	Deerfield	Kenton Road	Overbank flooding, storm sewer backup	Analyze storm sewer for flap-gate or other means of backflow prevention, consider floodproofing alternatives to protect structures	Med	WSDD				25-08	50000	High	Medium	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial

Notes

1 Perform low-entry elevation surveys, determine depth of damage per structure, consider all alternatives to include floodproofing (wet or dry), elevation, relocation, or acquisition or no action. Most cost-effective alternative should be implemented. Look at all listed repetitive loss structures.

2 All cost estimates are conceptual and may vary significantly as detailed scopes of work are developed.

3 All ranking for financial assistance needed were based on cost estimates; Low= less than 50, Medium= 50>100, and High= all cost estimates above 100.

Hydraulic Structures [See Hydraulic Structure Summary Appendix D.]

(Note: Location refers to the stream reach and hydraulic structure reference numbers. Only the most significant problems are listed in the Action Plan. Lower priority problems are noted in the complete summary in Appendix D.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.18, 2.16	WF009	1012	12	Deerfield		Dam failing - spilled over top and through weir	Investigate alternatives for dam removal or dam repair/replacement. Implement recommended alternative.	Medium	UDDWF, property owner	Deerfield	Variable and potentially significant cost. $125/hr consulting fee to analyze and permit dam removal. Construction cost variable, potentially significant.				High	High	IEPA, USACE, SMC, IDNR	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
2.14, 2.16	WF008	1006	10	Deerfield	Wilmot	Sediment bars within and on both streambanks	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor and maintain.	Medium	UDDWF, Deerfield		$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding

Hydraulic Structures - Continued

Programatic Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.14, 2.16	WF007	1014	9	Deerfield	Hazel Rd	Sediment bars on either side under bridge	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor and maintain.	Medium	UDDWF, Deerfield		$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
2.14, 2.16	WF006	1016	8	Deerfield		Sediment accumulating on right (east) bank	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor and maintain.	Medium	UDDWF, property owner	Deerfield	$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
2.14, 2.16	WF005	1010	7	Deerfield	Deerfield Rd	Instream debris located upstream from bridge	Clean out debris and put structure on regular maintenance/monitoring schedule	Medium	UDDWF, Deerfield		1	LS	$500 - $1,000	$500 - $1,000	Low	Low	Operations Budget	n/a	5-10 years	No
2.14, 2.16	WF004	1021	6	Deerfield	Central Ave	Sandbars inside bridge and some debris accumulation	Clean out debris and put structure on regular maintenance/monitoring schedule	Medium	UDDWF, Deerfield		1	LS	$500 - $1,000	$500 - $1,000	Low	Low	Operations Budget	n/a	5-10 years	No
1.18, 2.16	WF		2	Deerfield		Eroding underneath green mat (see photo)	Investigate alternatives to reduce erosion and stabilize streambank. Implement recommended alternative. Monitor and maintain.	Medium	UDDWF, property owner	Deerfield	$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding

This Site Specific Action Plan includes recommendations for watershed improvement projects within Green Oaks. Green Oaks contributes 1,358 acres to the North Branch Chicago River Watershed making up 2.2% of the total watershed. Approximately 0.5 river miles are located within the municipal boundaries.

These site-specific recommendations are certainly not all-inclusive of the opportunities for best management practice projects in the watershed, they merely reflect the opportunity sites identified by stakeholders, stream and detention basin inventories, and other components of the assessment. The following grid is organized by type of project. Each recommended activity includes location information, priority ranking and the watershed stakeholders who will most likely be responsible for implementation.

Detention Basin Water Quality Retrofits *[See Detention Basin Inventory in Appendix G.]*

(Note: See Figure 5-3 for detention basin locations.
Dry-bottom and underground basins are designated "high" priority for retrofits. Opportunities for retrofitting other basins and maintenance needs are noted in the Detention Basin Inventory summary.)

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2	25-14	2054	Green Oaks	Green Oaks Distribution	Inlet problems; inlet/outlet orientation; high shoreline erosion	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Green Oaks, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $15,000-$20,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	V3_25-29	2002	Green Oaks		Inlet/outlet orientation and rip rap side slopes	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Green Oaks, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	Various		Green Oaks			Replace turf and rip rap shorelines, bottoms, and buffers of all basins with native vegetation.	Low	Property Owner, Green Oaks	SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	10-20 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	V3_25-37	2054	Uninc. Green Oaks		Inlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Green Oaks, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding

Outfall Retrofits/Repairs *[See Point Discharge Summary Appendix C.]*

(Note: Location refers to the stream reach and the point discharge reference numbers. See Figure 3-33 for stream reach location. Because of the large number of discharge points with associated problems, only the most significant are listed in this action plan. Lower priority problems that need to be corrected are found in the complete summary.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate ($/linear foot)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.5, 1.18	MF020	2002	Green Oaks	657	Severely eroded	Stabilize erosion Monitor and maintain.	High	WSDD, Green Oaks	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF021	2002	Green Oaks	676	Concrete apron broken (apron has fallen away from pipe); soil eroding where water flows from pipe; pool below	Stabilize erosion, repair outfall pipe. Investigate pool and look for illicit connections, disconnect. Monitor and maintain.	Medium	WSDD, Green Oaks	SMC	$100/lf to stabilize erosion. $500 - $1,000 to repair outfall pipe. $500-$1,000 to investigate discharge.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	MF023	2052	Green Oaks	700	Severe erosion on opposite bank; boulders below; source: railroad yard	Stabilize erosion Monitor and maintain.	High	WSDD, Green Oaks	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding

Stream Restoration and Maintenance *[See Stream Inventory Summary in Appendix B.]*

(Note: See Figure 3-33 for stream reach locations. Only those stream reaches that are considered a high or medium priority are listed. Reaches with a low priority can be identified from the complete summary.)

Programatic Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Down-stream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.17, 2.14	MF023	701	Unincorporated Lake County/ Green Oaks	692	High instream debris load with grass clippings and dead trees, moderate bank erosion, and moderate sediment accumulation	Stabilize eroded streambanks and remove debris and accumulated sediment in stream reach	High	WSDD	Lake County, Green Oaks, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
1.17, 2.14	MF024	159	Unincorporated Lake County/ Green Oaks	702	Moderate instream debris load and moderate bank erosion	Stabilize eroded streambanks and remove debris in stream reach	Medium	WSDD	Lake County, Green Oaks, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial

Potential Wetland Restoration Sites

(Note: See Figure 5-6 for locations. Potential wetland restoration sites were identified based on map analysis. Restoration feasibility still to be determined.)

Programatic Action Plan No.	ID	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
3.3 3.4 3.5	WL-41	2001	Green Oaks	WL-41: Green Oaks, Brookhaven Dr.	Brookhaven HOA, wetland/ detention basin.	Determine wetland restoration feasibility.	High	SMC, HOA	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5	WL-13	2001	Green Oaks	WL13: Green Oaks, Atkinson Rd.	Abbott Laboratories owned with wetlands.	Determine wetland restoration feasibility in floodplain of Middle Fork.	High	*S* MC, *Abbott*	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5	WL-14	2001	Green Oaks	WL14: Green Oaks, Irene Lane	Privately owned parcel with wetlands.	Determine wetland restoration feasibility in extensive floodplain of West Branch.	Low	SMC	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	10-20 years	Possible technical or financial

Open Space Protection

(Note: See Figure 5-7 for locations. Potential open space protection sites were identified based on stakeholder recommendations and map analysis. Protection feasibility still to be determined.)

Programatic Action Plan No.	ID No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.14, 1.26, 3.15	OS16	2001	Green Oaks	West side of I 94 between IL 137 & Atkinson Road	Wetland complex	Conservation easement. (May already be designated as local park.)	Medium	Municipality, Park District	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	5-10 years	Possible Financial

* Land acquisition costs will vary greatly throughout the watershed. Based on 2004 data from the North Branch Open Space Plan, the cost per acre (averaged throughout Lake County) is approximately $15,000.

Flood Mitigation Sites

(Note: Flood Problem Area reference numbers were developed for the Lake County Flood Hazard Mitigation Plan. Additional sites were identified during the watershed planning process. See Figure 3-52 for Mapped Locations.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies			Flood Problem Areas Inventory No.	Cost Estimate[2]	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.16	MF026	2001	Green Oaks	Kenton Lane	Overbank flooding (Doe Lake)	Refer to Action Recommendations of the "Mitigation Study within the Village of Green Oaks," September 1997. See Atkinson Reservoir comments below.	High	Green Oaks	WSDD			25-05	100000	High	Medium	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	0-5 years	Possible technical or financial
2.2, 2.16	MF024	2001	Green Oaks	Atkinson Rd., east of Crest Rd.	Depressional storage flooding	May consider constructing swale to increase outlet capacity, improving internal drainage, provide additional storage.	Med	Green Oaks	WSDD			25-06	30000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial

Notes

1 Perform low-entry elevation surveys, determine depth of damage per structure, consider all alternatives to include floodproofing (wet or dry), elevation, relocation, or acquisition or no action. Most cost-effective alternative should be implemented. Look at all listed repetitive loss structures.

2 All cost estimates are conceptual and may vary significantly as detailed scopes of work are developed.

3 All ranking for financial assistance needed were based on cost estimates; Low= less than 50, Medium= 50>100, and High= all cost estimates above 100.

Hydraulic Structures [See Hydraulic Structure Summary Appendix D.]

(Note: Location refers to the stream reach and hydraulic structure reference numbers. Only the most significant problems are listed in the Action Plan. Lower priority problems are noted in the complete summary in Appendix D.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.18, 2.16	MF022	2002	65	Green Oaks	RR	Channel downcuts downstream from culvert	Investigate alternatives to reduce erosion and stabilize streambank. Implement recommended alternative. Monitor and maintain.	Medium	WSDD, RR	Green Oaks	$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
2.14, 2.16	MF022	2002	66	Green Oaks	RR	Sediment bar on right bank under bridge	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor and maintain.	Medium	WSDD, RR	Green Oaks	$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding

Hydraulic Structures - Continued

Programatic Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.14, 2.16	MF022	2002	67	Green Oaks	Hwy 176	Culvert on left is filled with sediment and vegetation	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor and maintain.	High	WSDD, IDOT	Green Oaks	$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	0-5 years	Possible Tech & Funding
2.14, 2.16	MF020	2002	63	Green Oaks	RR	Sediment accumulating on right bank underneath tracks	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor and maintain.	Medium	WSDD, RR	Green Oaks	$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding

Gurnee

This Site Specific Action Plan includes recommendations for watershed improvement projects within Gurnee. Gurnee contributes 114 acres to the North Branch Chicago River Watershed making up 0.2% of the total watershed. Approximately 0 river miles are located within the municipal boundaries.

These site-specific recommendations are certainly not all-inclusive of the opportunities for best management practice projects in the watershed, they merely reflect the opportunity sites identified by stakeholders, stream and detention basin inventories, and other components of the assessment. The following grid is organized by type of project. Each recommended activity includes location information, priority ranking and the watershed stakeholders who will most likely be responsible for implementation.

Detention Basin Water Quality Retrofits *[See Detention Basin Inventory in Appendix G.]*

**(Note: See Figure 5-3 for detention basin locations.
Dry-bottom and underground basins are designated "high" priority for retrofits. Opportunities for retrofitting other basins and maintenance needs are noted in the Detention Basin Inventory summary.)**

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Outfall Retrofits/Repairs *[See Point Discharge Summary Appendix C.]*

(Note: Location refers to the stream reach and the point discharge reference numbers. See Figure 3-33 for stream reach location. Because of the large number of discharge points with associated problems, only the most significant are listed in this action plan. Lower priority problems that need to be corrected are found in the complete summary.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate ($/linear foot)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Stream Restoration and Maintenance *[See Stream Inventory Summary in Appendix B.]*

(Note: See Figure 3-33 for stream reach locations. Only those stream reaches that are considered a high or medium priority are listed. Reaches with a low priority can be identified from the complete summary.)

Programatic Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Down-stream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate ($/linear foot)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Potential Wetland Restoration Sites

(Note: See Figure 5-6 for locations. Potential wetland restoration sites were identified based on map analysis. Restoration feasibility still to be determined.)

Programatic Action Plan No.	ID	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Open Space Protection

(Note: See Figure 5-7 for locations. Potential open space protection sites were identified based on stakeholder recommendations and map analysis. Protection feasibility still to be determined.)

Programatic Action Plan No.	ID No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.14, 1.26, 3.15	OS1	3502	Gurnee	Between IL 132 & Washington / US 41 & US 131; Near Blackstone and Dorchester	One of 5 remaining wetlands in the urbanized headwaters of Skokie north of IL 120.	Permanent protection	Medium	Municipality, Park District	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	5-10 years	Possible Financial
1.14, 1.26, 3.15	OS3	3501	Gurnee	Between IL 120 & Washington / US 41 & US 131; Off of Washington between Betty and Teske	One of 5 remaining wetlands in the urbanized headwaters of Skokie north of IL 120.	Permanent protection	Medium	Municipality, Park District	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	5-10 years	Possible Financial

* Land acquisition costs will vary greatly throughout the watershed. Based on 2004 data from the North Branch Open Space Plan, the cost per acre (averaged throughout Lake County) is approximately $15,000.

Flood Mitigation Sites

(Note: Flood Problem Area reference numbers were developed for the Lake County Flood Hazard Mitigation Plan. Additional sites were identified during the watershed planning process. See Figure 3-52 for Mapped Locations.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies			Flood Problem Areas Inventory No.	Cost Estimate[2]	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Hydraulic Structures [See Hydraulic Structure Summary Appendix D.]

(Note: Location refers to the stream reach and hydraulic structure reference numbers. Only the most significant problems are listed in the Action Plan. Lower priority problems are noted in the complete summary in Appendix D.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																				

This Site Specific Action Plan includes recommendations for watershed improvement projects within Highland Park. Highland Park contributes 5,300 acres to the North Branch Chicago River Watershed making up 8.5% of the total watershed. Approximately 7.4 river miles are located within the municipal boundaries.

These site-specific recommendations are certainly not all-inclusive of the opportunities for best management practice projects in the watershed, they merely reflect the opportunity sites identified by stakeholders, stream and detention basin inventories, and other components of the assessment. The following grid is organized by type of project. Each recommended activity includes location information, priority ranking and the watershed stakeholders who will most likely be responsible for implementation.

Detention Basin Water Quality Retrofits *[See Detention Basin Inventory in Appendix G.]*

(Note: See Figure 5-3 for detention basin locations.
Dry-bottom and underground basins are designated "high" priority for retrofits. Opportunities for retrofitting other basins and maintenance needs are noted in the Detention Basin Inventory summary.)

Programation Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2	25-92	3054	Highland Park	2090 Windy Hill Lane	Outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2, 3.3	25-93	3052	Highland Park	2094 Windy Hill Lane	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2, 3.3	25-94	3052	Highland Park	2070 Clavey Road	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2, 3.3	25-95	3050	Highland Park	The Villas of Highland Park	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-96	3050	Highland Park	The Villas of Highland Park	Outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-97	3050	Highland Park	990 Coventry Lane	Outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding

Detention Basin Water Quality Retrofits - Continued

Programation Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2, 3.3	25-98	3050	Highland Park	2070 Hidden Ridge Lane	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-101	2017	Highland Park	2600 Kelly Road	Outlet problems; inlet/outlet orientation; geese; purple loosestrife	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Highland Park, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	Various		Highland Park			Replace turf and rip rap shorelines, bottoms, and buffers of all basins with native vegetation.	Low	Property Owner, Highland Park	SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	10-20 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-101	3049	Highland Park	Hidden Creek Aqua Park	Inlet/outlet problems and orientation	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-102	3049	Highland Park	Hidden Creek Aqua Park	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-103	3049	Highland Park	1000 Deerfield Road	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-104	3049	Highland Park	McDaniels Square	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-105	3049	Highland Park	Immaculate Conception Church	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-106	3049	Highland Park	Laurel Hill	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-107	3049	Highland Park	On the Go	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-108	3049	Highland Park	Ort	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-109	3049	Highland Park	First Midwest Bank	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding

Detention Basin Water Quality Retrofits - Continued

Programation Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.6	24-111	3049	Highland Park	Sunset Woods Park	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-112	3049	Highland Park	886 Central Ave	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-113	3049	Highland Park	900 Place	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-114	3049	Highland Park	949 Central Ave	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-117	3050	Highland Park	TCI	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-119	3047	Highland Park	Emerald Woods Subdivision	Inlet problems and inlet/outlet orientation	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-130	3047	Highland Park	2625 Bentley Road	Outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-132	3047	Highland Park		Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-133	3046	Highland Park	Highland Park Restaurant	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-134	3047	Highland Park	Boy Scouts of America	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-136	3046	Highland Park		Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-137	3047	Highland Park		Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding

Detention Basin Water Quality Retrofits - Continued

Programation Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2	24-138	3046	Highland Park	2895 Parkside Drive	Outlet problems and geese	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-139	3046	Highland Park		Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-140	2017	Highland Park		Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2, 3.3	24-141	3046	Highland Park	3167 Applewood Court	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2, 3.3	24-142	3046	Highland Park	3120 Cottonwood Court	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2, 3.3	24-144	3045	Highland Park	875 Greenwood Ave	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-145	3047	Highland Park		Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 pre manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-146	3047	Highland Park		Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-147	3047	Highland Park		Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-148	3047	Highland Park		Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-149	3047	Highland Park		Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding

Detention Basin Water Quality Retrofits - Continued

Programation Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.6	24-150	3047	Highland Park		Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-155	3048	Highland Park	Orthopedic Center	Outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-156	3049	Highland Park	Park Avenue West Medical Plaza	Outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-157	3049	Highland Park	Department of Youth Services	Inlet/outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-158	3049	Highland Park	Sunset Foods	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-72	3054	Highland Park	15 Hemlock Land	Outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2, 3.3	24-73	3054	Highland Park	Americana Apartments	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-76	3054	Highland Park	Highland Park Lincoln Mercury Dealer	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-78	3054	Highland Park		Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-79	3054	Highland Park		Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding

Detention Basin Water Quality Retrofits - Continued

Programation Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.6	24-80	3054	Highland Park	CarX Mufflers	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-81	3052	Highland Park	Anton's Fruit Ranch	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-82	3054	Highland Park	Fudd-ruckers	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-83	3052	Highland Park	Barberry Road	Inlet/outlet orientation	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-84	3052	Highland Park	Gregory Dodge	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-86	3053	Highland Park	740 Ravina Glen	Outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-87	3051	Highland Park	1111 Crofton Avenue South	Outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-88	3051	Highland Park	880 Great Elm Lane	Outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-90	3052	Highland Park	1670 Strath Erin	Outlet problems and rip rap side slopes	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-91	3052	Highland Park	685 Red Oak Terrace	Outlet problems and inlet/outlet orientation	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding

Detention Basin Water Quality Retrofits - Continued

Programation Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.6	24-94	3050	Highland Park	White Hen Pantry	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-95	3050	Highland Park	Amoco	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-97	3050	Highland Park	Jewel	Inlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.6	24-98	3050	Highland Park	Bishop Heating	Underground basin	Identify appropriate filtration system and retrofit underground detention basin.	High	Property Owner	Highland Park, SMC, HOA	Site specific; $5,000-$20,000 per manufactured unit. Varies for naturalized systems.				High	High	SMC, IEPA	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-99	3050	Highland Park		Inlet/outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Highland Park, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-100	3050	Highland Park	Opportunity	Inlet/outlet problems and orientation; purple loosestrife	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Highland Park, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-165	3047	Highland Park	Hybernia	Outlet problems; inlet/outlet orientation; rip rap side slopes	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Highland Park, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-75	3054	Highland Park	Erich Foreign Car Service	Outlet problems and inlet/outlet orientation	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Highland Park, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	Various		Highland Park			Replace turf and rip rap shorelines, bottoms, and buffers of all basins with native vegetation.	Low	Property Owner, Highland Park	SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	10-20 years	Possible Tech and Funding

Outfall Retrofits/Repairs *[See Point Discharge Summary Appendix C.]*

(Note: Location refers to the stream reach and the point discharge reference numbers. See Figure 3-33 for stream reach location. Because of the large number of discharge points with associated problems, only the most significant are listed in this action plan. Lower priority problems that need to be corrected are found in the complete summary.)

Programation Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate ($/linear foot)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.5, 1.18	MF032	2035	Highland Park	2281	Moderate bank erosion at outfall	Stabilize erosion. Monitor and maintain.	Medium	WSDD, Highland Park	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	SR008	3049	Highland Park	1069	Erosion surrounding concrete, pipe has broken and water is flowing behind concrete; concrete has cracked in 2 parts	Stabilize erosion, repair outfall pipe Monitor and maintain.	Medium	ESDD, Highland Park	SMC	$100/lf to stabilize erosion. $500-$1,000 to repair outfall pipe.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	SR008	3049	Highland Park	1070	Severe erosion; sedimentation occuring in swale that leads to channel	Stabilize erosion, remove sedimentation Monitor and maintain.	High	ESDD, Highland Park	SMC	$100/lf to stabilize erosion. $500-$1,000 to remove debris.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	SR008	3049	Highland Park	1073	Broken; erosion occuring and small swale to channel; source: residential	Stabilize erosion, repair outfall pipe Monitor and maintain.	Medium	ESDD, Highland Park	SMC	$100/lf to stabilize erosion. $500-$1,000 to repair outfall pipe.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	SR008	3048	Highland Park	1074	Concrete apron broken away from pipe; swale to channel; moderate erosion; source: residential	Stabilize erosion, repair outfall pipe Monitor and maintain.	Medium	ESDD, Highland Park	SMC	$100/lf to stabilize erosion. $500-$1,000 to repair outfall pipe.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	SR011	3048	Highland Park	1110	Pool below. Source: public works. Swale to stream; severe erosion	Stabilize erosion. Investigate pool and look for illicit connections, disconnect. Monitor and maintain.	High	ESDD, Highland Park	SMC	$100/lf to stabilize erosion. $500-$1,000 to investigate discharge.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding

Outfall Retrofits/Repairs - Continued

Programation Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate ($/linear foot)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.5, 1.18	SR011	3045	Highland Park	1117	Silty water coming from source. Significant erosion occuring. Chlorine smell. Sourcel: pool	Stabilize erosion. Identify pool and disconnect connection. Monitor and maintain.	High	ESDD, Highland Park	SMC	$100/lf to stabilize erosion. $500-$1,000 to investigate discharge.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	SR011	3045	Highland Park	1118	Source: storm drain, large swale to stream channel. Severe erosion (banks of swale covered w/ garlic mustard)	Stabilize erosion. Monitor and maintain.	High	ESDD, Highland Park	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	SR013	3045	Highland Park	1149	Severe erosion. Source: golf course	Stabilize erosion. Monitor and maintain.	High	ESDD, Golf Course	Highland Park, SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	SR014	3045	Highland Park	1153	Small pool below. Disconnected and eroding at point where dislocated. Source: Danny Cunniff Park	Stabilize erosion. Investigate pool and look for illicit connections, disconnect. Monitor and maintain.	High	ESDD, Highland Park	SMC	$100/lf to stabilize erosion. $500-$1,000 to investigate discharge.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	SR014	3046	Highland Park	1154	Severe erosion within swale. Source: old elm golf course	Stabilize erosion. Monitor and maintain.	High	ESDD, Old Elm Golf Course	Highland Park, SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	SR014	3045	Highland Park	1162	Oval.rusted. Severely eroded underneath pipe. Pool below. Source: Danny Cunniff Park	Stabilize erosion, repair outfall pipe. Investigate pool and look for illicit connections, disconnect. Monitor and maintain.	High	ESDD, Highland Park	SMC	$100/lf to stabilize erosion. $500 - $1,000 to repair outfall pipe. $500-$1,000 to investigate discharge.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding

Outfall Retrofits/Repairs - Continued

Programation Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.5, 1.18	SR015	3046	Highland Park	1171	Severely eroded throughout swale/ Footbridge extending across swale. Sediment accumulating near toe. Source: residential area	Stabilize erosion. Clear sediment. Monitor and maintain.	High	ESDD, Highland Park	SMC	$100/lf to stabilize erosion. $500 - $1,000 to remove sediment.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	SR015	3045	Highland Park	1175	Pipe is broken and is eroding at point of dislocation. Source: Danny Cunniff Park	Stabilize erosion, repair outfall pipe Monitor and maintain.	Medium	ESDD, Highland Park	SMC	$100/lf to stabilize erosion. $500-$1,000 to repair outfall pipe.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	SR039	3005	Highland Park	2393	Pipe is failing	Repair or replace outfall pipe	High	ESDD, Highland Park	SMC	$500-$1000 to repair outfall pipe				Low	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding

Stream Restoration and Maintenance *[See Stream Inventory Summary in Appendix B.]*

(Note: See Figure 3-33 for stream reach locations. Only those stream reaches that are considered a high or medium priority are listed. Reaches with a low priority can be identified from the complete summary.)

Programation Action Plan No.	Stream Reach No.	U/S GPS Ref No.	Municipality	D/S GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.17, 2.14	MF001	129	Highland Park	112	Moderate instream debris load with fallen debris near banks, moderate bank erosion, and moderate sediment accumulation	Stabilize eroded streambanks and remove debris and accumulated sediment in stream reach	High	UDDMF	Highland Park, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
1.17, 2.14	MF002	152	Highland Park/ Deerfield	130	Moderate instream debris load, moderate bank erosion, and moderate sediment accumulation	Stabilize eroded streambanks and remove debris and accumulated sediment in stream reach	Medium	UDDMF	Highland Park, Deerfield, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial

Stream Restoration and Maintenance - Continued

Programation Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Down-stream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.17, 2.14	MF004	5000	Highland Park/ Deerfield	390	Moderate instream debris load, moderate bank erosion, and moderate sediment accumulation	Stabilize eroded streambanks and remove debris and accumulated sediment in stream reach	Medium	WSDD	Highland Park, Deerfield, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	MF005	5027	Highland Park/ Deerfield	5001	Moderate bank erosion and high sediment accumulation	Stabilize eroded streambanks and remove accumulated sediment in stream	High	WSDD	Highland Park, Deerfield, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
1.17, 2.14	MF006	438	Highland Park/ Deerfield	5028	Moderate instream debris load with wood chips near	Stabilize eroded streambanks and remove debris and accumulated	High	WSDD	Highland Park, Deerfield, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
1.17, 2.14	MF007	460	Highland Park/ Deerfield	439	Moderate bank erosion and moderate sediment	Stabilize eroded streambanks and remove accumulated sediment in stream	Medium	WSDD	Highland Park, Deerfield, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	SR002	963	Highland Park	950	Moderate bank erosion and moderate sediment	Stabilize eroded streambanks and remove accumulated sediment in stream	Medium	ESDD	Highland Park, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17	SR005	1043	Highland Park	1022	Moderate bank erosion	Stabilize eroded streambanks	Medium	ESDD	Highland Park, homeowners	$50-$250+ per linear foot				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	SR006	1057	Highland Park	1044	Moderate bank erosion and moderate sediment	Stabilize eroded streambanks and remove accumulated sediment in stream	Medium	ESDD	Highland Park, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
2.14	SR007	1064	Highland Park	1058	Moderate sediment accumulation	Remove accumulated sediment in stream reach	Medium	ESDD	Highland Park, homeowners	site specific for sediment removal - varies based on amount of sediment				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial
2.14	SR008	1083	Highland Park	1059	Moderate sediment accumulation	Remove accumulated sediment in stream reach	Medium	ESDD	Highland Park, homeowners	site specific for sediment removal - varies based on amount of sediment				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial
1.17	SR009	1097	Highland Park	1084	Moderate bank erosion	Stabilize eroded streambanks	Medium	ESDD	Highland Park, homeowners	$50-$250+ per linear foot				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17	SR010	1105	Highland Park	1098	Moderate bank erosion	Stabilize eroded streambanks	Medium	ESDD	Highland Park, homeowners	$50-$250+ per linear foot				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17	SR011	1121	Highland Park	1106	Moderate bank erosion	Stabilize eroded streambanks	Medium	ESDD	Highland Park, homeowners	$50-$250+ per linear foot				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17	SR012	1136	Highland Park	1122	Moderate bank erosion	Stabilize eroded streambanks	Medium	ESDD	Highland Park, homeowners	$50-$250+ per linear foot				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial

Stream Restoration and Maintenance - Continued

Programation Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Down-stream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.17, 2.14	SR013	1149	Highland Park	1137	Moderate bank erosion and moderate sediment	Stabilize eroded streambanks and remove accumulated sediment in stream	Medium	ESDD	Highland Park, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17	SR014	1165	Highland Park	1150	Moderate bank erosion	Stabilize eroded streambanks	Medium	ESDD	Highland Park, homeowners	$50-$250+ per linear foot				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	SR015	1182	Highland Park	166	Moderate bank erosion and moderate sediment	Stabilize eroded streambanks and remove accumulated sediment in stream	Medium	ESDD	Highland Park, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	SR039	9	Highland Park	1	Moderate bank erosion and moderate instream debris load	Stabilize eroded streambanks and remove debris in stream reach	Medium	ESDD	Highland Park, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for debris removal - varies based on amount of debris				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
2.14	SR040	2403	Highland Park	2395	High sediment accumulation	Remove accumulated sediment in stream reach	High	ESDD	Highland Park, homeowners	site specific for sediment removal - varies based on amount of sediment				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	0-5 years	Possible financial

Potential Wetland Restoration Sites

(Note: See Figure 5-6 for locations. Potential wetland restoration sites were identified based on map analysis. Restoration feasibility still to be determined.)

Programation Action Plan No.	ID	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
3.4 3.5	WL-33	3051	Highland Park	WL33: Highland Park E of 41 S of Deerfield Rd.	Bob-O-Link Golf Club	Determine wetland restoration feasibility in extensive floodplain of Skokie River.	High	SMC, *Bob-O-Link Golf Club*	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5	WL-52	3053	Highland Park	WL52: Highland Park, Clavey Rd.	Northmoor Country Club	Determine wetland restoration feasibility.	High	SMC, Northmoor Country Club	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5	WL-53	3049	Highland Park	WL53: Highland Park, Vine Ave.	Exmoor Country Club	Determine wetland restoration feasibility.	High	SMC, Exmoor Country Club	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial

Potential Wetland Restoration Sites- Continued

Programation Action Plan No.	ID	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
3.4 3.5	WL-50	3045	Highland Park	WL50: Highland Park, Old Elm Rd.	Old Elm Club	Determine wetland restoration feasibility.	High	SMC, Old Elm Club	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5	WL-4	3052	Highland Park	WL4: Highland Park, Skokie Hwy.	Park District of Highland Park	Determine feasibility of wetland restoration in Skokie floodplain.	Low	SMC, *Highland Park PD*	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	10-20 years	Possible technical or financial
3.4 3.5 3.6	WL-5	3051	Highland Park	WL5: Highland Park, Clavey Ct.	Park District of Highland Park	Determine feasibility of small restoration.	Low	SMC, *Highland Park PD*	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	10-20 years	Possible technical or financial
3.4 3.5	WL-6	3046	Highland Park	WL6: Highland Park, Trail Way.	Park District of Highland Park	Determine feasibility of wetland restoration in floodplain of Skokie.	Med	SMC, *Highland Park PD*	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
3.4 3.5	WL-7	3048	Highland Park	WL7: Highland Park, Underwood Ave.	Publicly owned parcel with wetlands	Determine feasibility of wetland restoration in Skokie floodplain.	Med	SMC	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	5-10 years	Possible technical or financial

Open Space Protection

(Note: See Figure 5-7 for locations. Potential open space protection sites were identified based on stakeholder recommendations and map analysis. Protection feasibility still to be determined.)

Programation Action Plan No.	ID No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.14, 1.26, 3.15	OS24	3047	Highland Park/ Bannockburn	South of Half Day between Middle Fork & Tennyson	Wetland along Middle Fork. (May have already been added to Prairie Wolf Forest Preserve.)	Permanent protection	High	Municipality, Forest Preserve District	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	0-5 years	Possible Financial
1.14, 1.26, 3.15	OS25	2024	Deerfield/ Highland Park/ Bannockburn	Middle Fork & Deerfield High School	Large wetland that follows Middle Fork south to Berkley Rd.	Permanent protection (Portions of this wetland may already be protected based on 2004 data from the NBOS plan.)	High	Municipality, Park District	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	0-5 years	Possible Financial
1.14, 1.26, 3.15	OS26	2038	Deerfield/ Highland Park	Deerfield High School to Lake Cook Rd.	Both sides of Middle Fork for riparian/ floodplain wetland.	Establish conservation easement and greenway	High	Municipality, Park District	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	0-5 years	Possible Financial

* Land acquisition costs will vary greatly throughout the watershed. Based on 2004 data from the North Branch Open Space Plan, the cost per acre (averaged throughout Lake County) is approximately $15,000.

Flood Mitigation Sites

(Note: Flood Problem Area reference numbers were developed for the Lake County Flood Hazard Mitigation Plan. Additional sites were identified during the watershed planning process. See Figure 3-52 for Mapped Locations.)

Programation Action Plan No.	Stream Reach No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies			Flood Problem Areas Inventory No.	Cost Estimate[2]	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.16	MF006	3047	Highland Park	Painters Lake Rd.	Overbank flooding	Perform ditch and culvert monitoring and maintenance.	Low	Highland Park				25-11	10000	Low	Low			10-20 years	No
2.16	MF004	3050	Highland Park	Briargate Subdivision and Briargate Lane	Overbank flooding, structures in the floodplain & floodway	Perform flood mitigation alternatives analysis[1], review for NFIP compliance	High	Highland Park	WSDD, IDNR			25-12	$100,000	High	Medium	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	0-5 years	Possible technical or financial
2.16	MF001	3054	Highland Park	Tanglewood Court	Overbank flooding	Perform ditch and culvert monitoring and maintenance.	Low	Highland Park				25-13	$10,000	Low	Low			10-20 years	No
2.16	SR013, SR014	3045	Highland Park	Old Trail St. & University Ave.	Storm and sanitary sewer backup	Refer to Village Department of Public Works for retrofits or maintenance to culverts	Low	Highland Park	ESDD			24-20	$10,000/ structure	Low	Low			10-20 years	No

Flood Mitigation Sites -Continued

Programation Action Plan No.	Stream Reach No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies			Flood Problem Areas Inventory No.	Cost Estimate[2]	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.2, 2.16	SR011, SR012, SR013	3045	Highland Park	Trailways Subdivision, Trailway St., Parkside Dr. to Half Day Rd.	Overbank flooding, structures in the floodplain	2006 Funding received to design wetland restoration site at SE corner of Hwy 41 and Half Day Rd. Wetland restoration will also increase flood storage and reduce flood problems.	High	Highland Park	ESDD			24-08	50000	High	Medium	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	0-5 years	Possible technical or financial
2.16	SR007	3049	Highland Park	Taylor Ave.	Overbank flooding, structures in the floodplain & floodway	Perform flood mitigation alternatives analysis1, ensure NFIP compliance for new structures	High	Highland Park	ESDD, IDNR			24-09	100000	High	Medium	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	0-5 years	Possible technical or financial
2.16	SR006, SR007	3049	Highland Park	Central Ave. & Deerfield Rd.	Storm and sanitary sewer backup	Refer to Village Department of Public Works for retrofits or maintenance to culverts	Low	Highland Park	ESDD			24-21	$10,000/ structure	Low	Low			10-20 years	No
2.16	SR006	3050	Highland Park	Soutland Ave. & Cavell Ave.	Storm and sanitary sewer backup	Refer to Village Department of Public Works for retrofits or maintenance to culverts	Low	Highland Park				24-22	$10,000/ structure	Low	Low			10-20 years	No
2.2, 2.16	SR006	3050	Highland Park	Deerfield Villa, Sunset Manor	Overbank flooding, structures in the floodplain	Utilize existing open space area for overbank storage, perform flood mitigation alternatives	High	Highland Park	ESDD			24-10	100000	High	Medium	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	0-5 years	Possible technical or financial

Notes

1 Perform low-entry elevation surveys, determine depth of damage per structure, consider all alternatives to include floodproofing (wet or dry), elevation, relocation, or acquisition or no action. Most cost-effective alternative should be implemented. Look at all listed repetitive loss structures.

2 All cost estimates are conceptual and may vary significantly as detailed scopes of work are developed.

3 All ranking for financial assistance needed were based on cost estimates; Low= less than 50, Medium= 50>100, and High= all cost estimates above 100.

Hydraulic Structures [See Hydraulic Structure Summary Appendix D.]

(Note: Location refers to the stream reach and hydraulic structure reference numbers. Only the most significant problems are listed in the Action Plan. Lower priority problems are noted in the complete summary in Appendix D.)

Programation Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.14, 2.16	SR015	3046	121	Highland Park	Old Elm Rd	Sediment accumulating on both sides of bank	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor and maintain.	Medium	ESDD, Highland Park		$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
1.18, 2.16	SR012	3045	120	Highland Park		Erosion occuring under bridge	Investigate alternatives to reduce erosion and stabilize streambank. Implement recommended alternative. Monitor and maintain.	Medium	ESDD, Highland Park		$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
2.14, 2.16	SR011	3047	119	Highland Park	Half Day Rd	Sediment bar in center of bridge. Center support, midstream sand bar downstream bridge	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor and maintain.	Medium	ESDD, Highland Park		$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
1.18, 2.16	SR010	3048	118	Highland Park	HPGC	Some erosion underneath	Investigate alternatives to reduce erosion and stabilize streambank. Implement recommended alternative. Monitor and maintain.	Medium	ESDD, Highland Park		$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
2.14, 2.16	SR008	3048	115	Highland Park	Park Ave West	Sediment on both sides underneath	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor	Medium	ESDD, Highland Park		$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding

Hydraulic Structures - Continued

Programation Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.14, 2.16	SR006	3050	114	Highland Park	Central Ave	Log jam upstream from bridge	Remove log jam, put on regular maintenance/ inspection schedule Monitor and maintain.	Medium	ESDD, Highland Park		1	LS	$500 - $1,000	$500 - $1,000	Low	Low	Operations Budget	n/a	5-10 years	No
1.18, 2.16	SR004	3052	105	Highland Park		Some erosion underneath	Investigate alternatives to reduce erosion and stabilize streambank. Implement recommended alternative. Monitor and maintain.	Medium	ESDD, Highland Park		$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
1.18, 2.16	SR004	3052	107	Highland Park	Sunset Valley Golf Course	Some erosion underneath	Investigate alternatives to reduce erosion and stabilize streambank. Implement recommended alternative. Monitor and maintain.	Medium	ESDD, Highland Park		$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
1.18, 2.16	SR003	3051	100	Highland Park	Bob-o-Link Golf Course	Some erosion	Investigate alternatives to reduce erosion and stabilize streambank. Implement recommended alternative. Monitor and maintain.	Medium	ESDD, Highland Park		$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
2.14, 2.16	SR001	3054	94	Highland Park	Lake Cook Rd	Small amount of sediment on both banks underneath bridge	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor and maintain.	Medium	ESDD, Highland Park		$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding

Hydraulic Structures - Continued

Programation Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.14, 2.16	SR001	3053	95	Highland Park	Clavey Rd	Lots of sediment on left bank under bridge	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor and maintain.	High	ESDD, Highland Park		$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	0-5 years	Possible Tech & Funding
2.14, 2.16	SR001	3053	96	Highland Park	Clavey Rd	Sediment accumulating on both banks under bridge	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor and maintain.	Medium	ESDD, Highland Park		$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding

Highwood

This Site Specific Action Plan includes recommendations for watershed improvement projects within Highwood. Highwood contributes 145 acres to the North Branch Chicago River Watershed making up 0.2% of the total watershed. No river reaches are located within the municipal boundaries.

These site-specific recommendations are certainly not all-inclusive of the opportunities for best management practice projects in the watershed, they merely reflect the opportunity sites identified by stakeholders, stream and detention basin inventories, and other components of the assessment. The following grid is organized by type of project. Each recommended activity includes location information, priority ranking and the watershed stakeholders who will most likely be responsible for implementation.

Detention Basin Water Quality Retrofits *[See Detention Basin Inventory in Appendix G.]*

**(Note: See Figure 5-3 for detention basin locations.
Dry-bottom and underground basins are designated "high" priority for retrofits. Opportunities for retrofitting other basins and maintenance needs are noted in the Detention Basin Inventory summary.)**

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Outfall Retrofits/Repairs *[See Point Discharge Summary Appendix C.]*

(Note: Location refers to the stream reach and the point discharge reference numbers. See Figure 3-33 for stream reach location. Because of the large number of discharge points with associated problems, only the most significant are listed in this action plan. Lower priority problems that need to be corrected are found in the complete summary.)

Prograntic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit ($)	Unit Cost ($/linear foot)	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Stream Restoration and Maintenance *[See Stream Inventory Summary in Appendix B.]*

(Note: See Figure 3-33 for stream reach locations. Only those stream reaches that are considered a high or medium priority are listed. Reaches with a low priority can be identified from the complete summary.)

Programatic Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Down-stream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Potential Wetland Restoration Sites

(Note: See Figure 5-6 for locations. Potential wetland restoration sites were identified based on map analysis. Restoration feasibility still to be determined.)

Programatic Action Plan No.	ID	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Open Space Protection

(Note: See Figure 5-7 for locations. Potential open space protection sites were identified based on stakeholder recommendations and map analysis. Protection feasibility still to be determined.)

Programatic Action Plan No.	ID No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Flood Mitigation Sites

(Note: Flood Problem Area reference numbers were developed for the Lake County Flood Hazard Mitigation Plan. Additional sites were identified during the watershed planning process. See Figure 3-52 for Mapped Locations.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies			Flood Problem Areas Inventory No.	Cost Estimate[2]	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Hydraulic Structures [See Hydraulic Structure Summary Appendix D.]

(Note: Location refers to the stream reach and hydraulic structure reference numbers. Only the most significant problems are listed in the Action Plan. Lower priority problems are noted in the complete summary in Appendix D.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																				

This Site Specific Action Plan includes recommendations for watershed improvement projects within Lake Bluff. Lake Bluff contributes 909 acres to the North Branch Chicago River Watershed making up 1.4% of the total watershed. Approximately 1.5 river miles are located within the municipal boundaries.

These site-specific recommendations are certainly not all-inclusive of the opportunities for best management practice projects in the watershed, they merely reflect the opportunity sites identified by stakeholders, stream and detention basin inventories, and other components of the assessment. The following grid is organized by type of project. Each recommended activity includes location information, priority ranking and the watershed stakeholders who will most likely be responsible for implementation.

Detention Basin Water Quality Retrofits *[See Detention Basin Inventory in Appendix G.]*

(Note: See Figure 5-3 for detention basin locations.
Dry-bottom and underground basins are designated "high" priority for retrofits. Opportunities for retrofitting other basins and maintenance needs are noted in the Detention Basin Inventory summary.)

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2	24-10	3013	Lake Bluff	ELE International	Inlet/outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Bluff, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-11	3013	Lake Bluff	Assoc Research	Inlet/outlet problems and orientation	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Bluff, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-12	3013	Lake Bluff	Carriage Way Shopping Center	Inlet/outlet orientation	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Bluff, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-13	3013	Lake Bluff	Carriage Point	Outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Bluff, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-3	3015	Lake Bluff	Lundberg Enterprises	Inlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Bluff, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-4	3015	Lake Bluff	Office Building	Outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Bluff, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding

Detention Basin Water Quality Retrofits - Continued

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2	24-5	3013	Lake Bluff	Deer Path Medical	Inlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Bluff, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-6	3013	Lake Bluff	Profile Plastics	Inlet problems and inlet/outlet orientation	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Bluff, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-9	3013	Lake Bluff	U Line, Inc.	Outlet problems and inlet/outlet orientation	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Bluff, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-14	3013	Lake Bluff	Knauz Auto Park	Inlet/outlet problems and orientation; rip rap side slopes; high shoreline erosion; geese	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Bluff, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-15	3014	Lake Bluff	Central Lake County JAWA	Inlet problems; inlet/outlet orientation; rip rap side slopes; geese	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Bluff, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-18	3012	Lake Bluff	Continental Properties	Inlet problems; inlet/outlet orientation; high shoreline erosion	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Bluff, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-8	3013	Lake Bluff	Liquid Controls	Outlet problems; inlet/outlet orientation; rip rap side slopes; moderate shoreline erosion	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Bluff, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	Various		Lake Bluff			Replace turf and rip rap shorelines, bottoms, and buffers of all basins with native vegetation.	Low	Property Owner, Lake Bluff	SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	10-20 years	Possible Tech and Funding

Outfall Retrofits/Repairs *[See Point Discharge Summary Appendix C.]*

(Note: Location refers to the stream reach and the point discharge reference numbers. See Figure 3-33 for stream reach location. Because of the large number of discharge points with associated problems, only the most significant are listed in this action plan. Lower priority problems that need to be corrected are found in the complete summary.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate ($/linear foot)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.5, 1.18	SR028	3014	Lake Bluff	5058	Swale to channel. Severe erosion. Source: Mariani Landscaping.	Stabilize erosion. Monitor and maintain.	High	ESDD, Lake Bluff	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5	SR028	3014	Lake Bluff	5064	Discharge is milky white. Source: Mariani Landscaping. Someone was washing a truck.See also photo of discharge 5063	Recommend storm drain stenciling at street inlets. Monitor and maintain.	High	ESDD, Lake Bluff	SMC	1	event (multiple stencils/ event)	2,500	2,500	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding

Stream Restoration and Maintenance *[See Stream Inventory Summary in Appendix B.]*

(Note: See Figure 3-33 for stream reach locations. Only those stream reaches that are considered a high or medium priority are listed. Reaches with a low priority can be identified from the complete summary.)

Programatic Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Down-stream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.14	SR027	5052	Lake Bluff	5043	Moderate instream debris load and high sediment accumulation	Remove debris and accumulated sediment in stream reach	High	ESDD	Lake Bluff, homeowners	site specific for debris and sediment removal - varies based on type and amount				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	0-5 years	Possible financial
1.17, 2.14	SR028	5069	Lake Bluff	5053	Moderate instream debris load, moderate bank erosion, and high sediment accumulation	Stabilize eroded streambanks and remove debris and accumulated sediment in stream reach	High	ESDD	Lake Bluff, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
2.14	SR029	5079	Lake Bluff	5070	High sediment accumulation	Remove accumulated sediment in stream reach	High	ESDD	Lake Bluff, homeowners	site specific for sediment removal - varies based on amount of sediment				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	0-5 years	Possible financial

Stream Restoration and Maintenance - Continued

1.17, 2.14	SR030	5095	Lake Bluff	5080	Moderate instream debris load with several logjams, moderate bank erosion, and moderate sediment accumulation	Stabilize eroded streambanks and remove debris and accumulated sediment in stream reach	Medium	ESDD	Lake Bluff, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment	Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial

Potential Wetland Restoration Sites

(Note: See Figure 5-6 for locations. Potential wetland restoration sites were identified based on map analysis. Restoration feasibility still to be determined.)

Programatic Action Plan No.	ID	SSS ID		Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
3.4 3.5 3.6	WL-16	3012		Lake Bluff	WL16: Lake Bluff, Hwy 41	Privately owned parcel (Continental X Fund), with wetlands.	Determine feasibility of wetland restoration.	Med	SMC	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	5-10 years	Possible technical or financial

Open Space Protection

(Note: See Figure 5-7 for locations. Potential open space protection sites were identified based on stakeholder recommendations and map analysis. Protection feasibility still to be determined.)

Programatic Action Plan No.	ID No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Flood Mitigation Sites

(Note: Flood Problem Area reference numbers were developed for the Lake County Flood Hazard Mitigation Plan. Additional sites were identified during the watershed planning process. See Figure 3-52 for Mapped Locations.)

Programatic ActionPlan No.	Stream Reach No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies			Flood Problem Areas Inventory No.	Cost Estimate[2]	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.16	SR029	3012	Lake Bluff	Thornwood Lane at Skokie River	Overbank flooding	Perform ditch and culvert monitoring and maintenance.	Med	Lake Bluff	ESDD			24-17	$10,000	Low	Low			5-10 years	No

Notes

1 Perform low-entry elevation surveys, determine depth of damage per structure, consider all alternatives to include floodproofing (wet or dry), elevation, relocation, or acquisition or no action. Most cost-effective alternative should be implemented. Look at all listed repetitive loss structures.

2 All cost estimates are conceptual and may vary significantly as detailed scopes of work are developed.

3 All ranking for financial assistance needed were based on cost estimates; Low= less than 50, Medium= 50>100, and High= all cost estimates above 100.

Hydraulic Structures [See Hydraulic Structure Summary Appendix D.]

(Note: Location refers to the stream reach and hydraulic structure reference numbers. Only the most significant problems are listed in the Action Plan. Lower priority problems are noted in the complete summary in Appendix D.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.18, 2.16	SR028	3014	151	Lake Bluff	Mariani Property	Erosion under bridge (RB)	Investigate alteratives to reduce erosion and stabilize streambank, and implement recommended alternative. Monitor and maintain.	Medium	ESDD, Mariani	Lake Bluff	$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
2.14, 2.16	SR028	3014	153	Lake Bluff		Sediment bar underneath	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor and maintain.	Medium	ESDD, property owner	Lake Bluff	$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Low	Low	Operations Budget	n/a	5-10 years	No

This Site Specific Action Plan includes recommendations for watershed improvement projects within Lake Forest. Lake Forest contributes 7,843 acres to the North Branch Chicago River Watershed making up 12.5% of the total watershed. Approximately 9.1 river miles are located within the municipal boundaries.

These site-specific recommendations are certainly not all-inclusive of the opportunities for best management practice projects in the watershed, they merely reflect the opportunity sites identified by stakeholders, stream and detention basin inventories, and other components of the assessment. The following grid is organized by type of project. Each recommended activity includes location information, priority ranking and the watershed stakeholders who will most likely be responsible for implementation.

Detention Basin Water Quality Retrofits *[See Detention Basin Inventory in Appendix G.]*

(Note: See Figure 5-3 for detention basin locations.
Dry-bottom and underground basins are designated "high" priority for retrofits. Opportunities for retrofitting other basins and maintenance needs are noted in the Detention Basin Inventory summary.)

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2, 3.3	26-46	2002	Lake Forest	Littlefield Sub	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Forest, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	26-39	2002	Lake Forest	Conway Farms Phase 2B & 2C	Inlet problems; inlet/outlet orientation; rip rap side slopes	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Forest, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $20,000-$30,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	26-40	2002	Lake Forest	Conway Farms Phase 2B & 2C	Inlet/outlet problems and orientation; rip rap side slopes; moderate shoreline erosion	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Forest, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $20,000-$30,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	26-42	2015	Lake Forest	Villa's of the Trillium Sub	Outlet problems; inlet/outlet orientation; moderate algae	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Forest, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $20,000-$30,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	26-49	2002	Lake Forest	Conway Farms Golf Club	Inlet problems; inlet/outlet orientation; rip rap side slopes	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Forest, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $20,0 00-$30,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	Various		Lake Forest			Replace turf and rip rap shorelines, bottoms, and buffers of all basins with native vegetation.	Low	Property Owner, Lake Forest	SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	10-20 years	Possible Tech and Funding

Detention Basin Water Quality Retrofits - Continued

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2, 3.3	25-41	2009	Lake Forest	McIlvaine Meadows Sub	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Forest, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-50	2002	Lake Forest	Chicago Bears Training Facility	Inlet/outlet problems and orientation; rip rap side slopes	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Forest, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-51	2002	Lake Forest	Chicago Bears Training Facility	Inlet/outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Forest, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-52	2002	Lake Forest	Chicago Bears Training Facility	Inlet/outlet problems and orientation	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Forest, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-81	2015	Lake Forest	Palmer Woods	Outlet problems and inlet/outlet orientation	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Forest, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-85	2015	Lake Forest	Wood of the Estate Lane	Outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Forest, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-34	2002	Lake Forest	Meadowood	Inlet/outlet problems and orientation	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Forest, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-39	2002	Lake Forest	Lake Forest High School - West Campus	Inlet/outlet problems and orientation	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Forest, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-47	2057	Lake Forest	Conway Park	Inlet/outlet problems and orientation	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Forest, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding

Detention Basin Water Quality Retrofits - Continued

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2	25-55	2057	Lake Forest	Academy Woods Sub	Inlet/outlet problems and orientation; moderate algae	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Forest, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-58	2002	Lake Forest	Conway Farms 1B	Inlet/outlet problems and orientation; geese	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Forest, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-71	2059	Lake Forest	Woodland Creek	Inlet problems; inlet/outlet orientation; rip rap side slopes	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Forest, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-74	2059	Lake Forest	Lake Forest Chateau	Inlet/outlet problems and orientation; rip rap side slopes; geese	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Forest, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-75	2016	Lake Forest	Evergreen II	Inlet/outlet problems and orientation; rip rap side slopes; moderate algae; geese	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Forest, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-79	2016	Lake Forest	Evergreen II	Inlet/outlet problems and orientation; rip rap side slopes; moderate shoreline erosion	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Forest, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-86	2015	Lake Forest	Arbor Ridge	Inlet/outlet problems and orientation; rip rap side slopes	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Forest, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-87	2059	Lake Forest	Arbor Ridge	Outlet problems and inlet/outlet orientation	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Forest, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-90	2015	Lake Forest	Arbor Ridge	Outlet problems; inlet/outlet orientation; moderate algae	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Forest, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	Various		Lake Forest			Replace turf and rip rap shorelines, bottoms, and buffers of all basins with native vegetation.	Low	Property Owner, Lake Forest	SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	10-20 years	Possible Tech and Funding

Detention Basin Water Quality Retrofits - Continued

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2, 3.3	24-59	2002	Lake Forest	Lake Forest Place	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Forest, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2, 3.3	24-60	3058	Lake Forest	Lake Forest Place	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Forest, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2, 3.3	24-61	2002	Lake Forest	Lake Forest Place	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Forest, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-66	3030	Lake Forest	Onwentsia Gardens	Outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Forest, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-67	3046	Lake Forest	Lock-Up Storage	Inlet/outlet problems; concrete bottom	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Forest, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2, 3.3	24-68	3046	Lake Forest	Brit Carter Interior Design Group	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lake Forest, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-56	2002	Lake Forest	Park Lane Sub	Inlet/outlet problems and orientation; moderate shoreline erosion	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Forest, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-63	2002	Lake Forest	Lake Forest Hospital Fitness Center	Outlet problems and inlet/outlet orientation	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake Forest, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding

Detention Basin Water Quality Retrofits - Continued

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2	Various		Lake Forest			Replace turf and rip rap shorelines, bottoms, and buffers of all basins with native vegetation.	Low	Property Owner, Lake Forest	SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	10-20 years	Possible Tech and Funding

Outfall Retrofits/Repairs *[See Point Discharge Summary Appendix C.]*

(Note: Location refers to the stream reach and the point discharge reference numbers. See Figure 3-37 for stream reach location. Because of the large number of discharge points with associated problems, only the most significant are listed in this action plan. Lower priority problems that need to be corrected are found in the complete summary.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate ($/linear foot)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.5, 1.18	MF010	2017	Lake Forest	496	Highly eroded, swale above pipe; source: residential	Stabilize erosion Monitor and maintain.	High	WSDD, Lake Forest	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF011	2017	Lake Forest	513	Severely eroded swale leading to channel	Stabilize erosion Monitor and maintain.	High	WSDD, Lake Forest	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF012	2016	Lake Forest	526	Severely eroded downstream from pipe; 1/4 filled with water; storm drain	Stabilize erosion Monitor and maintain.	High	WSDD, Lake Forest	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF012	2059	Lake Forest	529	Eroded bank and pool below pipe	Stabilize erosion. Investigate pool and look for illicit connections, disconnect. Monitor and maintain.	High	WSDD, Lake Forest	SMC	$100/lf to stabilize erosion. $500-$1,000 to investigate discharge.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF013	2059	Lake Forest	549	Severe erosion above	Stabilize erosion Monitor and maintain.	High	WSDD, Lake Forest	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF013	2059	Lake Forest	550	Large swale leading from pipe to stream. Moderate erosion; severe erosion above pipe	Stabilize erosion Monitor and maintain.	High	WSDD, Lake Forest	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF013	2059	Lake Forest	894	Swale from old broken steel pipe; severely eroding banks	Stabilize erosion, repair outfall pipe Monitor and maintain.	High	WSDD, Lake Forest	SMC	$100/lf to stabilize erosion. $500-$1,000 to repair outfall pipe.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF013	2059	Lake Forest	898	Severely eroding banks	Stabilize erosion Monitor and maintain.	High	WSDD, Lake Forest	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding

Outfall Retrofits/Repairs - Continued

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate ($/linear foot)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.5	MF013	2059	Lake Forest	899	Large swale above pipe; sedimentation occuring within channel, water flowing between apron and pipe (concrete apron has broken away from pipe)	Stabilize erosion, repair outfall pipe Monitor and maintain.	High	WSDD, Lake Forest	SMC	$100/lf to stabilize erosion. $500-$1,000 to repair outfall pipe.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF015	2008	Lake Forest	575	Severely eroded bank	Stabilize erosion Monitor and maintain.	High	WSDD, Lake Forest	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF015	2002	Lake Forest	583	Concrete apron broken; severe erosion surrounding pipe	Stabilize erosion, repair outfall pipe Monitor and maintain.	High	WSDD, Lake Forest	SMC	$100/lf to stabilize erosion. $500-$1,000 to repair outfall pipe.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	MF016	2002	Lake Forest	593	Severely eroded	Stabilize erosion Monitor and maintain.	High	WSDD, Lake Forest	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	SR016	3042	Lake Forest	1188	Lawn clippings above. Eroded above and below. Pool below.	Stabilize erosion. Investigate pool and look for illicit connections, disconnect. Monitor and maintain.	High	ESDD, Lake Forest	SMC	$100/lf to stabilize erosion. $500-$1,000 to investigate discharge.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	SR016	3042	Lake Forest	1196	Severely eroded bank surrounding pipe. Source: res. Area	Stabilize erosion. Monitor and maintain.	High	ESDD, Lake Forest	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	SR018	3039	Lake Forest	1235	Sediment w/in pipe is broken/ dislocated and eroding at point where disconnected. Erosion under concrete apron. Source: residential area	Stabilize erosion, repair outfall pipe Monitor and maintain.	Medium	ESDD, Lake Forest	SMC	$100/lf to stabilize erosion. $500-$1,000 to repair outfall pipe.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding

Outfall Retrofits/Repairs - Continued

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate ($/linear foot)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.5, 1.18	SR018	3032	Lake Forest	1244	Severe erosion near channel. Erosion under liner near channel	Stabilize erosion. Monitor and maintain.	High	ESDD, Lake Forest	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	SR018	3032	Lake Forest	1245	Erosion around and under apron. Broken stromdrain. Water flowing from point of dislocation.	Stabilize erosion, repair outfall pipe. Investigate water and look for illicit connections, disconnect. Monitor and maintain.	High	ESDD, Lake Forest	SMC	$100/lf to stabilize erosion. $500 - $1,000 to repair outfall pipe. $500-$1,000 to investigate discharge.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	SR020	3031	Lake Forest	1269	Pool below. Eroding where broken. Swale leading to eroding stream. Source: stormdrain from residential area	Stabilize erosion, repair outfall pipe. Investigate pool and look for illicit connections, disconnect. Monitor and maintain.	High	ESDD, Lake Forest	SMC	$100/lf to stabilize erosion. $500 - $1,000 to repair outfall pipe. $500-$1,000 to investigate discharge.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	SR021	3027	Lake Forest	1280	Near Onwentsia Rd. Bridge. Concrete apron broken away from pipe. Erosion occuring where apron has been isolated. Stormdrain	Stabilize erosion, repair outfall pipe Monitor and maintain.	Medium	ESDD, Lake Forest	SMC	$100/lf to stabilize erosion. $500-$1,000 to repair outfall pipe.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5	SR021	3027	Lake Forest	1285	Lots of sediment near toe. Source: Onwentsia Club	Stabilize erosion. Monitor and maintain.	High	ESDD, Onwentsia Club	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	SR022	3026	Lake Forest	1299	Erosion underneath and downstream. Source: Onwentsia Club	Stabilize erosion. Monitor and maintain.	Medium	ESDD, Onwentsia Club	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding

Outfall Retrofits/Repairs - Continued

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.5, 1.18	SR022	3026	Lake Forest	1306	Erosion around concrete. Broken and water flowing from dislocation area. Source: Onwentsia Club	Stabilize erosion, repair outfall pipe Monitor and maintain.	Medium	ESDD, Onwentsia Club	Lake Forest, SMC	$100/lf to stabilize erosion. $500-$1,000 to repair outfall pipe.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	SR022	3026	Lake Forest	1310	Broken apron. Erosion underneath. Source: Deerpath Elementary School	Stabilize erosion, repair outfall pipe Monitor and maintain.	Medium	ESDD, Deerpath Elementary	Lake Forest, SMC	$100/lf to stabilize erosion. $500-$1,000 to repair outfall pipe.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	SR022	3023	Lake Forest	1328	Concrete apron broken away from pipe near Deerpath Rd.	Repair outfall pipe Monitor and maintain.	Medium	ESDD, Deerpath Elementary	Lake Forest, SMC	1	each	500 - 1000		Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	SR022	3022	Lake Forest	1322	Concrete apron broken and water flowing out of disconnected point. Source: stormdrain near Deerpath Elementary	Repair outfall pipe. Investigate water and look for illicit connections, disconnect. Monitor and maintain.	High	ESDD, Deerpath Elementary	Lake Forest, SMC	$100/lf to stabilize erosion. $500-$1,000 to investigate discharge.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding

Stream Restoration and Maintenance *[See Stream Inventory Summary in Appendix B.]*

(Note: See Figure 3-37 for stream reach locations. Only those stream reaches that are considered a high or medium priority are listed. Reaches with a low priority can be identified from the complete summary.)

Programatic Action Plan No.	Stream Reach No.	U/S GPS Ref No.	Municipality	D/S GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.17, 2.14	MF009	488	Lake Forest/ Unincorporate d Lake County	472	Moderate bank erosion and moderate sediment accumulation	Stabilize eroded streambanks and remove accumulated sediment in stream reach	Medium	WSDD	Lake Forest, Lake County, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	MF010	307	Lake Forest	489	Moderate bank erosion and moderate sediment accumulation	Stabilize eroded streambanks and remove accumulated sediment in stream reach	Medium	WSDD	Lake Forest, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	MF011	523	Lake Forest	508	High instream debris load, moderate bank erosion, and moderate sediment accumulation	Stabilize eroded streambanks and remove debris and accumulated sediment in stream reach	High	WSDD	Lake Forest, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
2.14	MF012	547	Lake Forest	524	Moderate instream debris load and moderate sediment accumulation	Remove debris and accumulated sediment in stream reach	Medium	WSDD	Lake Forest, homeowners	site specific for debris and sediment removal - varies based on type and amount				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial

Stream Restoration and Maintenance - Continued

Programatic Action Plan No.	Stream Reach No.	U/S GPS Ref No.	Municipality	D/S GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.17, 2.14	MF013	906	Lake Forest	548	High instream debris load, moderate bank erosion, and moderate sediment accumulation	Stabilize eroded streambanks and remove debris and accumulated sediment in stream reach	High	WSDD	Lake Forest, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
2.14	MF014	565	Lake Forest	907	Moderate instream debris load with grass clippings and tree branches and moderate sediment accumulation	Remove debris and accumulated sediment in stream reach	Medium	WSDD	Lake Forest, homeowners	site specific for debris and sediment removal - varies based on type and amount				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial
2.14	MF015	586	Lake Forest	566	Moderate sediment accumulation	Remove accumulated sediment in stream reach	Medium	WSDD	Lake Forest, homeowners	site specific for sediment removal - varies based on amount of sediment				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial
2.14	MF016	599	Lake Forest	587	Moderate sediment accumulation	Remove accumulated sediment in stream reach	Medium	WSDD	Lake Forest, homeowners	site specific for sediment removal - varies based on amount of sediment				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial
2.14	MF017	614	Lake Forest	603	High sediment accumulation	Remove accumulated sediment in stream reach	High	WSDD	Lake Forest, homeowners	site specific for sediment removal - varies based on amount of sediment				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	0-5 years	Possible financial
1.17, 2.14	MF018	634	Lake Forest	615	Moderate instream debris load, moderate bank erosion, and high sediment accumulation	Stabilize eroded streambanks and remove debris and accumulated sediment in stream reach	High	WSDD	Lake Forest, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
2.14	MF019	649	Lake Forest/ Unincorporated Lake County	635	High sediment accumulation	Remove accumulated sediment in stream reach	High	WSDD	Lake Forest, Lake County, homeowners	site specific for sediment removal - varies based on amount of sediment				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	0-5 years	Possible financial
1.17, 2.14	MF030	2265	Lake Forest	2251	Moderate instream debris load and moderate bank erosion	Stabilize eroded streambanks and remove debris in stream reach	Medium	WSDD	Lake Forest, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for debris removal - varies based on amount of debris				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	SR016	1205	Lake Forest	1183	High bank erosion and moderate sediment accumulation	Stabilize eroded streambanks and remove accumulated sediment in stream reach	High	ESDD	Lake Forest, homeowners	$50-$250+ per linear foot				High	High	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
1.17, 2.14	SR017	1227	Lake Forest	1206	Moderate instream debris load with woody debris and construction related debris and moderate bank erosion	Stabilize eroded streambanks and remove debris in stream reach	High	ESDD	Lake Forest, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial

Stream Restoration and Maintenance - Continued

Programatic Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Down-stream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.17, 2.14	SR018	1246	Lake Forest	1228	Moderate bank erosion and moderate sediment accumulation	Stabilize eroded streambanks and remove accumulated sediment in stream reach	Medium	ESDD	Lake Forest, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	SR019	1263	Lake Forest	1247	Moderate bank erosion and moderate sediment accumulation	Stabilize eroded streambanks and remove accumulated sediment in stream reach	Medium	ESDD	Lake Forest, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
2.14	SR020	1278	Lake Forest	1264	Moderate instream debris load with a logjam and moderate sediment accumulation	Remove debris and accumulated sediment in stream reach	Medium	ESDD	Lake Forest, homeowners	site specific for debris and sediment removal - varies based on type and amount				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial
1.17	SR022	1334	Lake Forest	1298	Moderate bank erosion	Stabilize eroded streambanks	Medium	ESDD	Lake Forest, homeowners	$50-$250+ per linear foot				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
2.14	SR023	1347	Lake Forest	1335	Moderate sediment accumulation	Remove accumulated sediment in stream reach	Medium	ESDD	Lake Forest, homeowners	site specific for sediment removal - varies based on amount of sediment				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial
2.14	SR024	1376	Lake Forest	1348	Moderate sediment accumulation	Remove accumulated sediment in stream reach	Medium	ESDD	Lake Forest, homeowners	site specific for sediment removal - varies based on amount of sediment				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial
1.17, 2.14	SR025	1500	Lake Forest	1377	Moderate instream debris load, moderate bank erosion, and moderate sediment accumulation	Stabilize eroded streambanks and remove debris and accumulated sediment in stream reach	Medium	ESDD	Lake Forest, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
2.14	SR026	5045	Lake Forest	1408	Moderate sediment accumulation	Remove accumulated sediment in stream reach	Medium	ESDD	Lake Forest, homeowners	site specific for sediment removal - varies based on amount of sediment				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial

Potential Wetland Restoration Sites

(Note: See Figure 5-6 for locations. Potential wetland restoration sites were identified based on map analysis. Restoration feasibility still to be determined.)

Programation Action Plan No.	ID	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
3.4 3.5	WL-27	2016	Lake Forest	WL27: Lake Forest, Old Mill Rd.	LCFPD owned with wetlands.	Determine feasibility of wetland restoration.	Med	SMC, *LCFPD*	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
3.4 3.5	WL-18	2002	Lake Forest	WL18: Lake Forest, Acorn Trail	Lake Forest Open Lands Associated with wetlands.	Determine feasibility of wetland restoration.	High	SMC, LFOLA	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5	WL-19	2002	Lake Forest	WL19: Lake Forest, Waukegan Rd.	Farmland owned by the Lake Forest Hospital	Determine feasibility of wetland restoration in floodplain of the Skokie.	Med	SMC	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
3.4 3.5	WL-20	2008	Lake Forest	WL20: Lake Forest, Townline Rd.	Farmland owned by Reilly Family Farm Limited Partnership.	Determine feasibility of wetland restoration in floodplain of the Middle Fork.	High	SMC	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5	WL-21	3020	Lake Forest	WL21: Lake Forest, Skokie Hwy.	Publicly owned parcel owned by the City of Lake Forest.	Determine feasibility of wetland restoration.	High	SMC, City of Lake Forest	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5	WL-22	3026	Lake Forest	WL22: Lake Forest, Green Bay Rd.	Onwentsia Club, golf course	Determine feasibility of wetland restoration.	High	SMC	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial

Potential Wetland Restoration Sites - Continued

Programation Action Plan No.	ID	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
3.4 3.5	WL-23	2002	Lake Forest	WL23: Lake Forest, Conway Farms Dr.	Conway Farm Golf Club.	Determine feasibility of wetland restoration.	Medium	SMC, Conway Farms	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
3.4 3.5	WL-2	3058	Lake Forest	WL2: Lake Forest, W of 41 E of Waukegan Rd.	Privately owned parcel located in subwatershed with <10% wetlands.	Determine wetland restoration feasibility in floodplain of Skokie River.	Medium	SMC	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
3.4 3.5	WL-48	2016	Lake Forest	WL48: Lake Forest, Old Elm Rd.	LCFPD owned with wetlands.	Determine wetland restoration feasibility.	High	SMC, LCFPD	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5	WL-47	2059	Lake Forest	WL47: Lake Forest, Everett Rd.	City of Lake Forest with wetlands.	Determine wetland restoration feasibility.	High	SMC, City of Lake Forest	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5	WL-46	2002	Lake Forest	WL46: Lake Forest, Kennedy Rd.	City of Lake Forest with wetlands.	Determine wetland restoration feasibility.	High	SMC, City of Lake Forest	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5	WL-45	2002	Lake Forest	WL45: Lake Forest, Symphony Rd.	City of Lake Forest with open water detention	Determine wetland restoration feasibility.	High	SMC, City of Lake Forest	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5	WL-44	3017	Lake Forest	WL44: Lake Forest, Skokie Hwy.	Forest Preserve District owned with wetlands	Determine wetland restoration feasibility.	High	SMC	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial

Open Space Protection

(Note: See Figure 5-7 for locations. Potential open space protection sites were identified based on stakeholder recommendations and map analysis. Protection feasibility still to be determined.)

Programation Action Plan No.	ID No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.14, 1.26, 3.15	OS30	1002	Lake Forest	East of I 94 between Everett & Half Day Rds.	Linear area of wetland	Establish conservation easement.	Medium	Municipality, Park District	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	5-10 years	Possible Financial
1.14, 1.26, 3.15	OS18	2057	Lake Forest/ Unincorporated Lake County	East of I 94 Oasis to Soo Line	ADID wetland #145 a high quality plant community that is part of a wetland complex including ADID sites #128-135.	Permanent protection	High	Municipality, Lake County, Forest Preserve District, LFOLA, Lake Forest Academy	USFWS, IDNR, Corlands, SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	0-5 years	Possible Financial
1.14, 1.26, 3.15	0S20	2002	Lake Forest	East of Middle Fork/ between Winwood & Whitmore/ West of US 43	ADID wetland # 135, a high quality plant community that is part of a large complex including sites 128-135 & 145.	Permanent protection (Portions of this wetland may already be protected based on 2004 data from the NBOS plan.)	High	Municipality, LFOLA, Forest Preserve District	USFWS, IDNR, Corlands, SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	0-5 years	Possible Financial
1.14, 1.26, 3.15	OS21	2002	Lake Forest	West of Middle Fork/ between IL 60 and Everett Rd.	Extensive area of wetland west of Middle Fork that includes Lake Forest High School property (has development around edges).	Permanent protection (Portions of this wetland may already be protected based on 2004 data from the NBOS plan.)	Medium	Municipality, LFOLA	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	5-10 years	Possible Financial
1.14, 1.26, 3.15	OS22	2018	Lake Forest	Between Telegraph & US 43/ North of Half Day/ South of Old Mill	Approximate 45 acre site with large wetland that extends to east side of US 43 on Prairie Wolf Slough Forest Preserve. Located in highly developed area.	Permanent protection (Portions of this wetland may already be protected based on 2004 data from the NBOS plan.)	Medium	Municipality, Forest Preserve District	LFOLA, SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	5-10 years	Possible Financial

* Land acquisition costs will vary greatly throughout the watershed. Based on 2004 data from the North Branch Open Space Plan, the cost per acre (averaged throughout Lake County) is approximately $15,000.

Flood Mitigation Sites

(Note: Flood Problem Area reference numbers were developed for the Lake County Flood Hazard Mitigation Plan. Additional sites were identified during the watershed planning process. See Figure 3-57 for Mapped Locations.)

Programation Action Plan No.	Stream Reach No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies			Flood Problem Areas Inventory No.	Cost Estimate[2] ($)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.2, 2.16	WF017, WF018	1030	Lake Forest	East of I-94, Everett Rd. to Old Mill Rd.	Overbank flooding, structures in the floodplain	Perform flood mitigation alternatives analysis1, Look at potential for LSA or wetland restoration sites north of Everett, or diversion to a potential lateral storage area south of Florsheim	Med	Lake Forest	UDDWF			26-02	150,000	High	High	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial
2.16	MF023	2053	Lake Forest	Hwy. 176 at Middle Fork	Overbank & road flooding, structures &scrapyard in floodway	Bring Area into NFIP compliance, re-study Atkinson Reservoir (lower in-channel control berm, bypass culvert)	Med	Green Oaks, USACE	WSDD, IDOT, IDNR			25-07	100,000	High	Medium	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial
2.2, 2.16	MF019	2056	Mettawa/ Lake Forest	Bradley Rd. & Forest Ave.	Local drainage problems	Coordinate interjurisdictional investigation of expanding storage. Perform flood mitigation alternatives analysis1.	Med	Mettawa, Lake Forest				25-21	150,000	High	High	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial
2.2, 2.16	MF018	2057	Lake Forest	Academy Woods Rd.	Local drainage problems	Create additional storage utilizing existing vacant land. Perform ditch and culvert monitoring and maintenance.	Med	Lake Forest				25-20	30,000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial
2.2, 2.16	MF018	2002	Lake Forest	Lexington Dr.	Overbank flooding, structures in the floodplain	Provide LSA storage or expand wetlands on adjacent (east bank) floodplain, perform flood mitigation alternatives analysis1	Med	Lake Forest, FPD	WSDD			25-04	150,000	High	High	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial
2.2, 2.16	MF016	2002	Lake Forest/ Unincorporate d Lake County	Conway Farms Dr.	Local drainage problems	Create additional storage utilizing existing vacant land. Perform ditch and culvert monitoring and maintenance.	High	Lake Forest	SMC			25-19	30,000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	0-5 years	Possible technical or financial

Flood Mitigation Sites - Continued

Programation Action Plan No.	Stream Reach No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies			Flood Problem Areas Inventory No.	Cost Estimate[2] ($)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.2, 2.16	MF014, MF0015	2008	Lake Forest	Ridge Rd. & Westleigh Rd.	Local drainage problems	Create additional storage utilizing existing vacant land. Perform ditch and culvert monitoring and maintenance.	Med	Lake Forest				25-15	30,000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial
2.2, 2.16	MF013, MF014	2059	Lake Forest	Conway Rd., Oak Knoll Dr. to Waukegan Rd.	Local drainage problems	Create additional storage utilizing existing vacant land. Perform ditch and culvert monitoring and maintenance.	High	Lake Forest				25-18	30,000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	0-5 years	Possible technical or financial
2.2, 2.16	MF012	2059	Lake Forest	Arcady Dr.	Local drainage problems	Create additional storage utilizing existing vacant land. Perform ditch and culvert monitoring and maintenance.	Med	Lake Forest				25-03	30,000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial
2.2, 2.16	MF010, MF011, MF012	2014	Lake Forest	Everett Rd. to Old Mill Rd., East of river	Overbank flooding & local drainage problems, structures in the floodplain	Investigate expansion of storage, For structures perform flood mitigation alternatives analysis1, review for NFIP compliance	High	Lake Forest				25-14	150,000	High	High	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	0-5 years	Possible technical or financial
2.2, 2.16	MF010, MF011, MF012	2015	Lake Forest	Telegraph Rd., Lawrence Ave. to James St.	Local drainage problems	Create additional storage utilizing existing vacant land. Perform ditch and culvert monitoring and maintenance.	High	Lake Forest				25-17	30,000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	0-5 years	Possible technical or financial
2.2, 2.16	MF010	2015	Lake Forest	West of Waukegan Rd., Aspen Dr.	Local drainage problems	Create additional storage utilizing existing vacant land. Perform ditch and culvert monitoring and maintenance.	Med	Lake Forest				25-16	30,000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial
2.2, 2.16	SR026	2002	Lake Forest	Waukegan Rd. & Regency Lane	Local drainage problems	Create additional storage utilizing existing vacant land. Perform ditch and culvert monitoring and maintenance.	Med	Lake Forest	ESDD			24-21	30,000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial
2.16	SR023	3018	Lake Forest	Golf Lane	Overbank flooding	Monitor for increased flooding to yards	Low	Lake Forest	ESDD			24-19	10,000	Low	Low			10-20 years	No
2.2, 2.16	SR023	3018	Lake Forest	Deerpath Rd. & Green Bay Rd.	Local drainage problems	Create additional storage utilizing existing vacant land. Perform ditch and culvert monitoring and maintenance.	Med	Lake Forest	ESDD			24-22	30,000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial

Flood Mitigation Sites - Continued

Programation Action Plan No.	Stream Reach No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies			Flood Problem Areas Inventory No.	Cost Estimate[2] ($)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.2, 2.16	SR022	3022	Lake Forest	Deerpath Rd. to south & Hwy. 41	Overbank flooding & local drainage problems, structures in the floodplain	NBWP funding was received in 2004 to create two ponds in the Lake Forest/Deerpath Golf Course to increase flood storage and reduce the rate and volume of water entering Skokie River, which may reduce flood damages in this area.	High	Lake Forest	ESDD			24-23	150,000	High	High	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	0-5 years	Possible technical or financial
2.2, 2.16	SR016, SR017, SR018	3038	Lake Forest	Westleigh Rd. to Old Elm Rd., east of the Skokie River	Overbank flooding & local drainage problems, structures in the floodplain	Investigate expansion of storage, For structures perform flood mitigation alternatives analysis1, review for NFIP compliance	High	Lake Forest	ESDD			24-24	150,000	High	High	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	0-5 years	Possible technical or financial
2.2, 2.16	SR016, SR017, SR018, SR019	3032	Lake Forest	Westleigh Rd. to Old Elm Rd., west of the Skokie River	Overbank flooding & local drainage problems, structures in the floodplain	Investigate expansion of storage, For structures perform flood mitigation alternatives analysis1, review for NFIP compliance	High	Lake Forest	ESDD			24-25	150,000	High	High	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	0-5 years	Possible technical or financial

Notes

1 Perform low-entry elevation surveys, determine depth of damage per structure, consider all alternatives to include floodproofing (wet or dry), elevation, relocation, or acquisition or no action. Most cost-effective alternative should be implemented. Look at all listed repetitive loss structures.

2 All cost estimates are conceptual and may vary significantly as detailed scopes of work are developed.

3 All ranking for financial assistance needed were based on cost estimates; Low= less than 50, Medium= 50>100, and High= all cost estimates above 100.

Hydraulic Structures [See Hydraulic Structure Summary Appendix D.]

(Note: Location refers to the stream reach and hydraulic structure reference numbers. Only the most significant problems are listed in the Action Plan. Lower priority problems are noted in the complete summary in Appendix D.)

Programation Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.14, 2.16	MF030	2019	85	Lake Forest		Debris clog at upstream end of culvert	Clean out debris and put structure on regular maintenance/monitoring schedule	High	WSDD, Lake Forest		1	LS	$500 - $1000	$500 - $1000	Low	Low	Operations Budget	n/a	0-5 years	No
2.14, 2.16	MF017	2002	57	Lake Forest	Melody Ln	Sediment bars on both banks under bridge; severe erosion on right bank upstream from bridge	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor and maintain.	High	WSDD, Lake Forest		$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	0-5 years	Possible Tech & Funding
2.14, 2.16	MF017	2002	58	Lake Forest		Left bank: crumbling asphalt; right bank: sediment bar	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor and maintain.	Medium	WSDD, property owner	Lake Forest	$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
2.14, 2.16	MF016	2002	56	Lake Forest	Route 60	Sediment accumulating on both banks	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor and maintain.	Medium	WSDD, Lake Forest		$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
2.14, 2.16	MF012	2046	51	Lake Forest	Old Elm Rd	Severe logjam	Remove log jam, put on regular maintenance/ inspection schedule Monitor and maintain.	High	WSDD, Lake Forest		1	LS	$500 - $1,000	$500 - $1,000	Low	Low	Operations Budget	n/a	0-5 years	No

Hydraulic Structures - Continued

Programation Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.14, 2.16	MF012	2043	52	Lake Forest	Evertt Rd	Sediment bar on left bank under bridge	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor and maintain.	Medium	WSDD, Lake Forest		$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
1.18, 2.16	MF011	2016	50	Lake Forest		Eroded banks underneath bridge; old car on bridge	Investigate alternatives to reduce erosion and stabilize streambank. Implement recommended alternative. Remove car. Monitor and maintain.	Medium	WSDD, Lake Forest		$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
1.18, 2.16	MF010	2016	49	Lake Forest		Both banks eroding underneath bridge, no vegetation present	Investigate alternatives to reduce erosion and stabilize streambank. Implement recommended alternative. Monitor and maintain.	Medium	WSDD, Lake Forest		$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
1.18, 2.16	SR041	3032	191	Lake Forest		Structure possibly failing	Investigate alternatives to replace or repair existing structure. Implement recommended alternative. Monitor and maintain.	Medium	ESDD, property owner	Lake Forest	Cost to replace structure variable depending on road closure requirements and engineering design requirements, range from $1,000 for simple culvert to $1,000,000+ for complex designs.				High	High	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
1.18, 2.16	SR026	3016	145	Lake Forest		Eroding underneath (on left bank)	Investigate alteratives to reduce erosion and stabilize streambank, and implement recommended alternative. Monitor and maintain.	Medium	ESDD, property owner	Lake Forest	$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
1.18, 2.16	SR026	3016	149	Lake Forest		Eroding underneath (on left bank)	Investigate alteratives to reduce erosion and stabilize streambank, and implement recommended alternative. Monitor and maintain.	Medium	ESDD, property owner	Lake Forest	$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding

Hydraulic Structures - Continued

Programation Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.18, 2.16	SR025	3017	140	Lake Forest		Concrete supports eroding. Severely eroded bank.	Investigate alternatives to replace or repair existing structure and stabilize eroded streambank. Implement recommended alternative. Monitor and maintain.	High	ESDD, property owner	Lake Forest	Cost to replace structure variable depending on road closure requirements and engineering design requirements, range from $1,000 for simple culvert to $1,000,000+ for complex designs. $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				High	High	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	0-5 years	Possible Tech & Funding
1.18, 2.16	SR025	3017	141	Lake Forest		Concrete supports eroding. Severely flooded bank	Investigate alternatives to replace or repair existing structure and stabilize eroded streambank. Implement recommended alternative. Monitor and maintain.	High	ESDD, property owner	Lake Forest	Cost to replace structure variable depending on road closure requirements and engineering design requirements, range from $1,000 for simple culvert to $1,000,000+ for complex designs. $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				High	High	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	0-5 years	Possible Tech & Funding
1.18, 2.16	SR024	3018	135	Lake Forest	Deerpath GC	Lots of erosion underneath	Investigate alteratives to reduce erosion and stabilize streambank, and implement recommended alternative. Monitor and maintain.	High	ESDD, Deerpath GC	Lake Forest	$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	0-5 years	Possible Tech & Funding
1.18, 2.16	SR022	3026	132	Lake Forest	Onwentsia Club	Erosion under concrete on RB	Investigate alteratives to reduce erosion and stabilize streambank, and implement recommended alternative. Monitor and maintain.	Medium	ESDD, Onwentsia Club	Lake Forest	$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
1.18, 2.16	SR021	3026	127	Lake Forest	Onwentsia Club	Erosion around bridge structure	Investigate alteratives to reduce erosion and stabilize streambank, and implement recommended alternative. Monitor and maintain.	Medium	ESDD, Onwentsia Club	Lake Forest	$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
1.18, 2.16	SR021	3026	129	Lake Forest	Onwentsia Club	Erosion under concrete on LB	Investigate alteratives to reduce erosion and stabilize streambank, and implement recommended alternative. Monitor and maintain.	Medium	ESDD, Onwentsia Club	Lake Forest	$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding

Hydraulic Structures - Continued

Programation Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.18, 2.16	SR021	3026	130	Lake Forest	Onwentsia Club	Concrete broken. Erosion occuring underneath RB	Investigate alteratives to reduce erosion and stabilize streambank, and implement recommended alternative. Monitor and maintain.	Medium	ESDD, Onwentsia Club	Lake Forest	$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
2.14, 2.16	SR019	3032	125	Lake Forest	Westleigh Rd	Woody debris accumulating at riffle under bridge	Clean out debris and put structure on regular maintenance/monitoring schedule Monitor and maintain.	Medium	ESDD, Lake Forest		1	LS	$500 - $1,000	$500 - $1,000	Low	Low	Operations Budget	n/a	5-10 years	No
1.18, 2.16	SR018	3039	123	Lake Forest		Some erosion upstream and downstream from bridge and underneath concrete armoring upstream and downstream from bridge	Investigate alteratives to reduce erosion and stabilize streambank, and implement recommended alternative. Monitor and maintain.	Medium	ESDD, Lake Forest		$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
1.18, 2.14, 2.16	SR018	3032	124	Lake Forest		RB eroding underneath bridge. Sedimentation under LB	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor and maintain.	Medium	ESDD, Lake Forest		$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding

This Site Specific Action Plan includes recommendations for watershed improvement projects within Lincolnshire. Lincolnshire contributes 572 acres to the North Branch Chicago River Watershed making up 0.9% of the total watershed. Approximately 1.0 river mile is located within the municipal boundaries.

These site-specific recommendations are certainly not all-inclusive of the opportunities for best management practice projects in the watershed, they merely reflect the opportunity sites identified by stakeholders, stream and detention basin inventories, and other components of the assessment. The following grid is organized by type of project. Each recommended activity includes location information, priority ranking and the watershed stakeholders who will most likely be responsible for implementation.

Detention Basin Water Quality Retrofits *[See Detention Basin Inventory in Appendix G.]*

(Note: See Figure 5-3 for detention basin locations.
Dry-bottom and underground basins are designated "high" priority for retrofits. Opportunities for retrofitting other basins and maintenance needs are noted in the Detention Basin Inventory summary.)

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2	26-10	1001	Lincolnshire	Whytegate III Sub	Outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lincolnshire, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	26-11	1001	Lincolnshire	Whytegate Park Sub	Outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lincolnshire, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2, 3.3	26-12	1001	Lincolnshire	Sherwood Forest Sub	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lincolnshire, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2, 3.3	26-13	1001	Lincolnshire	Sherwood Forest Sub	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lincolnshire, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	26-14	1001	Lincolnshire	Sherwood Sub	Inlet/outlet problems and orientation	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lincolnshire, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	26-15	1001	Lincolnshire	Sherwood II Sub	Outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lincolnshire, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding

Detention Basin Water Quality Retrofits - Continued

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2, 3.3	26-18	1001	Lincolnshire	Lincolnshire Woods	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lincolnshire, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2, 3.3	26-3	2002	Lincolnshire	Brampton Woods Sub	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lincolnshire, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2, 3.3	26-4	1001	Lincolnshire	Briarwoods Sub	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Lincolnshire, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	26-1	2002	Lincolnshire	Anvil Farms Sub	Inlet/outlet orientation; rip rap side slopes; moderate algae; geese	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lincolnshire, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	26-2	2002	Lincolnshire	Bishop's Gate Sub	Inlet/outlet orientation	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lincolnshire, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	V3_26-12	1001	Lincolnshire	Hewitt Associates	Inlet problems; inlet/outlet orientation; rip rap side slopes; high shoreline erosion; moderate algae	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lincolnshire, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	Various		Lincolnshire			Replace turf and rip rap shorelines, bottoms, and buffers of all basins with native vegetation.	Low	Property Owner, Lincolnshire	SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	10-20 years	Possible Tech and Funding

Outfall Retrofits/Repairs *[See Point Discharge Summary Appendix C.]*

(Note: Location refers to the stream reach and the point discharge reference numbers. See Figure 3-33 for stream reach location. Because of the large number of discharge points with associated problems, only the most significant are listed in this action plan. Lower priority problems that need to be corrected are found in the complete summary.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate ($/linear foot)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.5, 1.18	WF014	1002	Lincolnshire	36	Severely eroded; source: 94	Stabilize erosion. Monitor and maintain.	High	UDDWF, Lincolnshire	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	WF014	1002	Lincolnshire	47	Severely eroded area across bank from pipe; midstream bar immediately downstream from pipe; algae on water surface	Stabilize erosion. Monitor and maintain.	High	UDDWF, Lincolnshire	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding

Stream Restoration and Maintenance *[See Stream Inventory Summary in Appendix B.]*

(Note: See Figure 3-33 for stream reach locations. Only those stream reaches that are considered a high or medium priority are listed. Reaches with a low priority can be identified from the complete summary.)

Programatic Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Down-stream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.17	WF014	52	Lincolnshire	35	Moderate bank erosion	Stabilize eroded streambanks	Medium	UDDWF	Lincolnshire, homeowners	$50-$250+ per linear foot				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	WF016	84	Lincolnshire/ Unincorporated Lake County	65	High instream debris load and moderate bank erosion	Stabilize eroded streambanks and remove debris in stream reach	High	UDDWF	Lincolnshire, Lake County, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible financial

Potential Wetland Restoration Sites

(Note: See Figure 5-6 for locations. Potential wetland restoration sites were identified based on map analysis. Restoration feasibility still to be determined.)

Programatic Action Plan No.	ID	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Open Space Protection

(Note: See Figure 5-7 for locations. Potential open space protection sites were identified based on stakeholder recommendations and map analysis. Protection feasibility still to be determined.)

Programatic Action Plan No.	ID No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Flood Mitigation Sites

(Note: Flood Problem Area reference numbers were developed for the Lake County Flood Hazard Mitigation Plan. Additional sites were identified during the watershed planning process. See Figure 3-52 for Mapped Locations.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies			Flood Problem Areas Inventory No.	Cost Estimate[2]	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Hydraulic Structures [See Hydraulic Structure Summary Appendix D.]

(Note: Location refers to the stream reach and hydraulic structure reference numbers. Only the most significant problems are listed in the Action Plan. Lower priority problems are noted in the complete summary in Appendix D.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																				

This Site Specific Action Plan includes recommendations for watershed improvement projects within Mettawa. Mettawa contributes 409 acres to the North Branch Chicago River Watershed making up 0.7% of the total watershed. Approximately 0.2 river miles are located within the municipal boundaries.

These site-specific recommendations are certainly not all-inclusive of the opportunities for best management practice projects in the watershed, they merely reflect the opportunity sites identified by stakeholders, stream and detention basin inventories, and other components of the assessment. The following grid is organized by type of project. Each recommended activity includes location information, priority ranking and the watershed stakeholders who will most likely be responsible for implementation.

Detention Basin Water Quality Retrofits *[See Detention Basin Inventory in Appendix G.]*

**(Note: See Figure 5-3 for detention basin locations.
Dry-bottom and underground basins are designated "high" priority for retrofits. Opportunities for retrofitting other basins and maintenance needs are noted in the Detention Basin Inventory summary.)**

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Outfall Retrofits/Repairs *[See Point Discharge Summary Appendix C.]*

(Note: Location refers to the stream reach and the point discharge reference numbers. See Figure 3-33 for stream reach location. Because of the large number of discharge points with associated problems, only the most significant are listed in this action plan. Lower priority problems that need to be corrected are found in the complete summary.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate ($/linear foot)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Stream Restoration and Maintenance *[See Stream Inventory Summary in Appendix B.]*

(Note: See Figure 3-33 for stream reach locations. Only those stream reaches that are considered a high or medium priority are listed. Reaches with a low priority can be identified from the complete summary.)

Programatic Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Down-stream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.17, 2.14	MF029	2250	Mettawa	2237	High sediment accumulation, moderate instream debris load, and moderate bank erosion	Remove accumulated sediment, stabilize eroded streambanks and remove debris in stream reach	High	WSDD	Mettawa, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal and debris removal- varies based on amount of sediment and debris				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial

Potential Wetland Restoration Sites

(Note: See Figure 5-6 for locations. Potential wetland restoration sites were identified based on map analysis. Restoration feasibility still to be determined.)

Programatic Action Plan No.	ID	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
3.4, 3.5	WL-24	2002	Mettawa	WL24: Mettawa, Riverwoods Rd.	Farmland Parcel with wetlands.	Determine feasibility or wetland restoration.	High	SMC, Grainger, American National Bank.	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4, 3.5	WL-43	2055	Mettawa	WL43: Deerfield, Riverwoods Rd.	Farmland Parcel with wetlands.	Determine feasibility or wetland restoration.	High	SMC, Grainger, American National Bank.	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial

Open Space Protection

(Note: See Figure 5-7 for locations. Potential open space protection sites were identified based on stakeholder recommendations and map analysis. Protection feasibility still to be determined.)

Programatic Action Plan No.	ID No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.14, 1.26, 3.15	OS27	2002	Mettawa/ Unincorporated Lake County	Northwest and northeast corners of I-94 & Everett Rd.	Headwaters of West Fork, north of Everett Rd. Includes ADID wetland #163 with high quality plant community. Parcels north & south of Everett have extensive areas of drained hydric soils for wetland restoration and existing wetland.	Expand Daniel Wright Forest Preserve to include this area	High	Municipality, Lake County, Forest Preserve District	USFWS, IDNR, Corlands, SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	0-5 years	Possible Financial

* Land acquisition costs will vary greatly throughout the watershed. Based on 2004 data from the North Branch Open Space Plan, the cost per acre (averaged throughout Lake County) is approximately $15,000.

Flood Mitigation Sites

(Note: Flood Problem Area reference numbers were developed for the Lake County Flood Hazard Mitigation Plan. Additional sites were identified during the watershed planning process. See Figure 3-52 for Mapped Locations.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies			Flood Problem Areas Inventory No.	Cost Estimate[2]	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.2, 2.16	MF019	2056	Mettawa/ Lake Forest	Bradley Rd. & Forest Ave.	Local drainage problems	Coordinate interjurisdictional investigation of expanding storage. Perform flood mitigation alternatives analysis1.	Med	Mettawa, Lake Forest				25-21	$150,000	High	High	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial

Notes

1 Perform low-entry elevation surveys, determine depth of damage per structure, consider all alternatives to include floodproofing (wet or dry), elevation, relocation, or acquisition or no action. Most cost-effective alternative should be implemented. Look at all listed repetitive loss structures.

2 All cost estimates are conceptual and may vary significantly as detailed scopes of work are developed.

3 All ranking for financial assistance needed were based on cost estimates; Low= less than 50, Medium= 50>100, and High= all cost estimates above 100.

Hydraulic Structures [See Hydraulic Structure Summary Appendix D.]

(Note: Location refers to the stream reach and hydraulic structure reference numbers. Only the most significant problems are listed in the Action Plan. Lower priority problems are noted in the complete summary in Appendix D.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.18, 2.16	MF029	2002	82	Mettawa		Severe erosion on left bank downstream	Investigate alternatives to reduce erosion and stabilize streambank. Implement recommended alternative. Monitor and maintain.	High	WSDD, Mettawa		$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	0-5 years	Possible Tech & Funding
1.18, 2.16	MF029	2002	81	Mettawa		Severe bank erosion on right bank downstream	Investigate alternatives to reduce erosion and stabilize streambank. Implement recommended alternative. Monitor and maintain.	High	WSDD, Mettawa		$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	0-5 years	Possible Tech & Funding
2.14, 2.16	MF029	2002	80	Mettawa		Significant debris blockage and bank erosion	Clean out debris and put structure on regular maintenance/monitoring schedule. Investigate alternatives to reduce erosion and stabilize streambank.	High	WSDD, Mettawa		$500 - $1,000+ LS for debris removal, $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	Operations Budget	Municipality, SMC, Consultant	0-5 years	Possible Tech & Funding

This Site Specific Action Plan includes recommendations for watershed improvement projects within North Chicago. North Chicago contributes 1,839 acres to the North Branch Chicago River Watershed making up 3.0% of the total watershed. Approximately 3.8 river miles are located within the municipal boundaries.

These site-specific recommendations are certainly not all-inclusive of the opportunities for best management practice projects in the watershed, they merely reflect the opportunity sites identified by stakeholders, stream and detention basin inventories, and other components of the assessment. The following grid is organized by type of project. Each recommended activity includes location information, priority ranking and the watershed stakeholders who will most likely be responsible for implementation.

Detention Basin Water Quality Retrofits *[See Detention Basin Inventory in Appendix G.]*

(Note: See Figure 5-3 for detention basin locations.
Dry-bottom and underground basins are designated "high" priority for retrofits. Opportunities for retrofitting other basins and maintenance needs are noted in the Detention Basin Inventory summary.)

Programatic ActionPlan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2	V3_24-07	3009	North Chicago	Naval Base Food Mart	Outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	North Chicago, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-43	3056	North Chicago	Hamptons	Inlet/outlet problems and orientation; rip rap side slopes	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	North Chicago, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-46	2002	North Chicago	Flanagans	Inlet/outlet orientation and outlet problems	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	North Chicago, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	Various		North Chicago			Replace turf and rip rap shorelines, bottoms, and buffers of all basins with native vegetation.	Low	Property Owner, North Chicago	SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	10-20 years	Possible Tech and Funding

Outfall Retrofits/Repairs *[See Point Discharge Summary Appendix C.]*

(Note: Location refers to the stream reach and the point discharge reference numbers. See Figure 3-33 for stream reach location. Because of the large number of discharge points with associated problems, only the most significant are listed in this action plan. Lower priority problems that need to be corrected are found in the complete summary.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate ($/linear foot)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.5, 1.18	SR032	3010	North Chicago	5143	Broken. Apron has broken away from pipe. Pool below. Eroded above pipe.	Stabilize erosion, repair outfall pipe. Investigate pool and look for illicit connections, disconnect. Monitor and maintain.	High	ESDD, North Chicago	SMC	$100/lf to stabilize erosion. $500 - $1,000 to repair outfall pipe. $500-$1,000 to investigate discharge.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	SR034	3010	North Chicago	1413	Rusty, broken, very large pool below. Debris in pipe (near 137). Source: WGGC	Stabilize erosion, repair outfall pipe. Investigate pool and look for illicit connections, disconnect. Monitor and maintain.	High	ESDD, WGGC	North Chicago, SMC	$100/lf to stabilize erosion. $500 - $1,000 to repair outfall pipe. $500-$1,000 to investigate discharge.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	SR036	3008	North Chicago	1458	Large swell to channel. Severe erosion. Source:FPGC	Stabilize erosion. Monitor and maintain.	High	ESDD, FPGC	North Chicago, SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding

Stream Restoration and Maintenance *[See Stream Inventory Summary in Appendix B.]*

(Note: See Figure 3-33 for stream reach locations. Only those stream reaches that are considered a high or medium priority are listed. Reaches with a low priority can be identified from the complete summary.)

Programatic Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Down-stream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.14	SR031	5120	North Chicago	5096	Moderate sediment accumulation	Remove accumulated sediment in stream reach	Medium	ESDD	North Chicago, homeowners	site specific for sediment removal - varies based on amount of sediment				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial
1.17, 2.14	SR032	5150	North Chicago	5119	Moderate bank erosion and moderate sediment accumulation	Stabilize eroded streambanks and remove accumulated sediment in stream reach	Medium	ESDD	North Chicago, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	High	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17	SR033	5169	North Chicago	5151	Moderate bank erosion	Stabilize eroded streambanks	Medium	ESDD	North Chicago, homeowners	$50-$250+ per linear foot				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	SR034	1427	North Chicago	1411	Moderate bank erosion and moderate sediment accumulation	Stabilize eroded streambanks and remove accumulated sediment in stream reach	Medium	ESDD	North Chicago, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	SR035	1447	North Chicago	1428	Moderate bank erosion and high sediment accumulation	Stabilize eroded streambanks and remove accumulated sediment in stream reach	High	ESDD	North Chicago, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial

Stream Restoration and Maintenance - Continued

Programatic Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Down-stream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.17, 2.14	SR036	1471	North Chicago	1448	Moderate bank erosion and moderate sediment accumulation	Stabilize eroded streambanks and remove accumulated sediment in stream reach	Medium	ESDD	North Chicago, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
2.14	SR037	1491	North Chicago/ Park City/ Waukegan	1472	Moderate instream debris load with yard waste	Remove debris in stream reach	Medium	ESDD	North Chicago, Park City, homeowners	site specific for debris removal - varies based on type and amount				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial

Potential Wetland Restoration Sites

(Note: See Figure 5-6 for locations. Potential wetland restoration sites were identified based on map analysis. Restoration feasibility still to be determined.)

Programatic Action Plan No.	ID	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
3.4 3.5 3.6	WL-9	3501	North Chicago	WL9: North Chicago, S. Casimer Pulaski Rd.	Farmland with drained hydric soils.	Determine wetland restoration feasibility.	Medium	SMC	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
3.4 3.5	WL-10	3008	North Chicago	WL10: North Chicago, 16th St.	Barlett's North Shore Park.	Determine wetland restoration feasibility in floodplain of Skokie.	Medium	SMC, Foss PD	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
3.4 3.5	WL-11	3009	North Chicago	WL11: North Chicago, Buckley Rd.	Great Lakes Naval Training Center.	Determine wetland restoration feasibility in floodplain of Skokie River.	Medium	SMC, GLNTC	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
3.4 3.5	WL-12	3010	North Chicago	WL12: North Chicago, Skokie Hwy.	IDOT owned parcel containing wetland.	Determine wetland restoration feasibility in extensive floodplain of Skokie River.	High	SMC, IDOT	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial

Potential Wetland Restoration Sites- Continued

Programatic Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Down-stream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
3.4 3.5	WL-15	2002	North Chicago	WL15: North Chicago, Skokie Hwy.	Lorrell Ltd. Partnership owned parcel with wetlands	Determine wetland restoration feasibility in floodplain of West Fork.	Medium	SMC, *Lorrell Ltd. Partnership*	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
3.4 3.5 3.6	WL-39	3501	North Chicago	WL39: Waukegan Chestnut Ave.	Forest Preserve District owned with wetlands	Determine wetland restoration feasibility.	High	SMC, LCFPD	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial

Open Space Protection

(Note: See Figure 5-7 for locations. Potential open space protection sites were identified based on stakeholder recommendations and map analysis. Protection feasibility still to be determined.)

Programatic Action Plan No.	ID No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.14, 1.26, 3.15	OS6	3501	North Chicago	East of US 41 between 14th & 16th Streets; Between Greenbelt Forest Preserve and Foss Park Golf Club	Floodplain/wetl and corridor	Permanent protection	Medium	Municipality, Foss Park District	Forest Preserve District, SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	5-10 years	Possible Financial
1.14, 1.26, 3.15	OS7	2002	North Chicago	Between US 41 & 43/ IL 137 & Atkinson Rd.	Large wetland complex including ADID wetland #110 that provides high hydrology and water quality values. Site is primarily owned by the Illinois Dept. of Transportation.	Permanent protection	High	Forest Preserve District, IDOT, Municipality	Foss Park District, SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	0-5 years	Possible Financial

* Land acquisition costs will vary greatly throughout the watershed. Based on 2004 data from the North Branch Open Space Plan, the cost per acre (averaged throughout Lake County) is approximately $15,000.

Flood Mitigation Sites

(Note: Flood Problem Area reference numbers were developed for the Lake County Flood Hazard Mitigation Plan. Additional sites were identified during the watershed planning process. See Figure 3-52 for Mapped Locations.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies			Flood Problem Areas Inventory No.	Cost Estimate[2]	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.2, 2.16	SR035	3009	North Chicago	North & south of MLK, Jr. Dr., East of Hwy. 41 to Northern Ave.	Local drainage problems	In 2006 WMB funding was provided to restore a detention pond on the Foss Park Golf Course to alleviate flooding.	High	North Chicago, Foss Park District	Gillette, LCFPD, ESDD, Abbott, ComED, GLNTC			24-03	$80,000	High	Medium	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	0-5 years	Possible technical or financial
2.16	SR032	2002	North Chicago	Hwy. 41 & Bonaparte Ave.	Local drainage problems	Monitor and maintain culvert system to RR, provide detention in open space west of Hwy. 41, monitor new commercial development	Med	North Chicago				24-04	$30,000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial
2.2, 2.16	SR032, SR034	3010/ 3009	Great Lakes Naval Training Command	Great Lakes Naval Training Center	Overbank flooding on golf course, housing in the floodplain	Continue to provide civilian personnel with technical assistance and map products. Perform stream maintenance activities on an annual basis to include debris and sediment removal. Provide additional depressional storage north of Hwy. 137 on golf course. The Skokie Headwaters and North Chicago Flood Damage Reduction Feasibility Study provided a list of alternatives to reduce flooding in this area.	Low	GLNTC	DD			24-15, 24-16	$25,000/yr	High	Low	SMC, PB&D, IEMA, NFIP, EPA, SWCD	SMC/ Municipality/ Consultant	10-20 years	Possible technical or financial

Notes

1 Perform low-entry elevation surveys, determine depth of damage per structure, consider all alternatives to include floodproofing (wet or dry), elevation, relocation, or acquisition or no action. Most cost-effective alternative should be implemented. Look at all listed repetitive loss structures.

2 All cost estimates are conceptual and may vary significantly as detailed scopes of work are developed.

3 All ranking for financial assistance needed were based on cost estimates; Low= less than 50, Medium= 50>100, and High= all cost estimates above 100.

Hydraulic Structures [See Hydraulic Structure Summary Appendix D.]

(Note: Location refers to the stream reach and hydraulic structure reference numbers. Only the most significant problems are listed in the Action Plan. Lower priority problems are noted in the complete summary in Appendix D.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.18, 2.16	SR036	3008	177	North Chicago	FPGC	Some erosion under bridge	Investigate alteratives to reduce erosion and stabilize streambank, and implement recommended alternative. Monitor and maintain.	Medium	ESDD, property owner	North Chicago	$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
1.18, 2.14, 2.16	SR034	3009	173	North Chicago	WGGC	Severely eroded above pipe. Lots of sediment below.	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor and maintain.	High	ESDD, FPGC	North Chicago	$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD, Operations Budget	Municipality, SMC, Consultant	0-5 years	Possible Tech & Funding
2.14, 2.16	SR034	3009	167	North Chicago		Some sediment inside. Bridge leaking from underneath in culvert near right bank	Clean out sediment and put structure on regular maintenance/monitoring schedule	Medium	ESDD, property owner	North Chicago	1	LS	$500 - $1,000	$500 - $1,000	Low	Low	Operations Budget	n/a	5-10 years	No
1.18, 2.16	SR034	3009	171	North Chicago	WGGC	Some erosion	Investigate alteratives to reduce erosion and stabilize streambank, and implement recommended alternative. Monitor and maintain.	Medium	ESDD, WGGC	North Chicago	$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
1.18, 2.16	SR034	3009	172	North Chicago	WGGC	Some erosion	Investigate alteratives to reduce erosion and stabilize streambank, and implement recommended alternative. Monitor and maintain.	Medium	ESDD, WGGC	North Chicago	$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
1.18, 2.16	SR033	3010	163	North Chicago	GLNTC	Almost completely caved in; eroded around entire pipe at clinic	Investigate alternatives to replace or repair existing structure and stabilize eroded streambank. Implement recommended alternative. Monitor and maintain.	High	ESDD, GLNTC	North Chicago	Cost to replace structure variable depending on road closure requirements and engineering design requirements, range from $1,000 for simple culvert to $1,000,000+ for complex designs. $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				High	High	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	0-5 years	Possible Tech & Funding

Hydraulic Structures - Continued

Programatic Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.18, 2.16	SR033	3010	164	North Chicago	GLNTC, W. Colorado Ave	Caving near steel pipe. Soil is coming through pipe.	Investigate alternatives to replace or repair existing structure and stabilize eroded streambank. Implement recommended alternative. Monitor and maintain.	High	ESDD, GLNTC	North Chicago	Cost to replace structure variable depending on road closure requirements and engineering design requirements, range from $1,000 for simple culvert to $1,000,000+ for complex designs. $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				High	High	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	0-5 years	Possible Tech & Funding
2.14, 2.16	SR033	3010	165	North Chicago	GLNTC at Connecticut Ave	Lots of sediment w/in culvert	Clean out sediment and put structure on regular maintenance/monitoring schedule	High	ESDD, GLNTC	North Chicago	1	LS	$500 - $1,000	$500 - $1,000	Low	Low	Operations Budget	n/a	0-5 years	No
1.18, 2.16	SR032	3010	161	North Chicago	Near Wyoming Ave in GLNTC	Top is caving in	Investigate alternatives to replace or repair existing structure. Implement recommended alternative. Monitor and maintain.	High	ESDD, GLNTC	North Chicago	Cost to replace structure variable depending on road closure requirements and engineering design requirements, range from $1,000 for simple culvert to $1,000,000+ for complex designs.				High	High	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	0-5 years	Possible Tech & Funding

This Site Specific Action Plan includes recommendations for watershed improvement projects within Park City. Park City contributes 491 acres to the North Branch Chicago River Watershed making up 0.8% of the total watershed. Approximately 1.0 river mile is located within the municipal boundaries.

These site-specific recommendations are certainly not all-inclusive of the opportunities for best management practice projects in the watershed, they merely reflect the opportunity sites identified by stakeholders, stream and detention basin inventories, and other components of the assessment. The following grid is organized by type of project. Each recommended activity includes location information, priority ranking and the watershed stakeholders who will most likely be responsible for implementation.

Detention Basin Water Quality Retrofits *[See Detention Basin Inventory in Appendix G.]*

**(Note: See Figure 5-3 for detention basin locations.
Dry-bottom and underground basins are designated "high" priority for retrofits. Opportunities for retrofitting other basins and maintenance needs are noted in the Detention Basin Inventory summary.)**

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2	24-1	3005	Park City	Aldi Grocery Store	Inlet/outlet problems and orientation; geese	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Park City, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	Various		Park City			Replace turf and rip rap shorelines, bottoms, and buffers of all basins with native vegetation.	Low	Property Owner, Park City	SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	10-20 years	Possible Tech and Funding

Outfall Retrofits/Repairs *[See Point Discharge Summary Appendix C.]*

(Note: Location refers to the stream reach and the point discharge reference numbers. See Figure 3-33 for stream reach location. Because of the large number of discharge points with associated problems, only the most significant are listed in this action plan. Lower priority problems that need to be corrected are found in the complete summary.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.5	SR038	3501	Park City	1483	Strong gasoline smell. Source: Penske Truck Rental. Sheen on water and sediment. Brown bubbles forming below pipe	Confirm source of discharge. Disconnect illicit connection and/or stencil storm drain. Monitor and maintain.	High	ESDD, Park City	SMC	$500-$1,000 to investigate discharge. $2,500 per stenciling event (multiple inlets stenciled per event.)				High	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5	SR038	3503	Park City	1485	Strong gasoline smell. Source: Penske Truck Rental. Sheen on water. Pipe has broken.	Confirm source of discharge. Disconnect illicit connection and/or stencil storm drain. Repair outfall pipe. Monitor and maintain.	High	ESDD, Park City	SMC	$500-$1,000 to repair outfall pipe. $500-$1,000 to investigate discharge. $2,500 per stenciling event (multiple inlets stenciled per event.)				High	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding

Stream Restoration and Maintenance *[See Stream Inventory Summary in Appendix B.]*

(Note: See Figure 3-33 for stream reach locations. Only those stream reaches that are considered a high or medium priority are listed. Reaches with a low priority can be identified from the complete summary.)

Programatic Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Down-stream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.14	SR038	1489	Park City	1481	Moderate instream debris load with woody debris	Remove debris in stream reach	Medium	ESDD	Park City, homeowners	site specific for debris removal - varies based on type and amount				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial

Potential Wetland Restoration Sites

(Note: See Figure 5-6 for locations. Potential wetland restoration sites were identified based on map analysis. Restoration feasibility still to be determined.)

Programatic Action Plan No.	ID	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Open Space Protection

(Note: See Figure 5-7 for locations. Potential open space protection sites were identified based on stakeholder recommendations and map analysis. Protection feasibility still to be determined.)

Programatic Action Plan No.	ID No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.14, 1.26, 3.15	OS4	3501	Park City	Between IL 120 & Washington / US 41 & US 131; Off of Washington near Teske and Susan Circle North	One of 5 remaining wetlands in the urbanized headwaters of Skokie north of IL 120.	Permanent protection	Medium	Municipality, Park District	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	5-10 years	Possible Financial

* Land acquisition costs will vary greatly throughout the watershed. Based on 2004 data from the North Branch Open Space Plan, the cost per acre (averaged throughout Lake County) is approximately $15,000.

Flood Mitigation Sites

(Note: Flood Problem Area reference numbers were developed for the Lake County Flood Hazard Mitigation Plan. Additional sites were identified during the watershed planning process. See Figure 3-52 for Mapped Locations.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies			Flood Problem Areas Inventory No.	Cost Estimate[2]	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.2, 2.10, 2.16	SR037	3004	Waukegan/ Park City	Trailer Park & Radio Station, Hwy. 120 to north & Dixie Ave.	Depressional storage flooding and overbank flooding, loss of access and damage to critical facility (radio station)	See above. Coordinate interjurisdictional investigation of expanding storage in the wetland complex located north of 120 (primarily in Waukegan). For structures, perform flood mitigation alternatives analysis1. May recommend relocation of radio station.	High	SMC, Waukegan, Park City	WKRS			24-02, 24-05	150000	High	High	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	0-5 years	Possible technical or financial

Notes

1 Perform low-entry elevation surveys, determine depth of damage per structure, consider all alternatives to include floodproofing (wet or dry), elevation, relocation, or acquisition or no action. Most cost-effective alternative should be implemented. Look at all listed repetitive loss structures.

2 All cost estimates are conceptual and may vary significantly as detailed scopes of work are developed.

3 All ranking for financial assistance needed were based on cost estimates; Low= less than 50, Medium= 50>100, and High= all cost estimates above 100.

Hydraulic Structures [See Hydraulic Structure Summary Appendix D.]

(Note: Location refers to the stream reach and hydraulic structure reference numbers. Only the most significant problems are listed in the Action Plan. Lower priority problems are noted in the complete summary in Appendix D.)

Programmatic Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																				

This Site Specific Action Plan includes recommendations for watershed improvement projects within Riverwoods. Riverwoods contributes 947 acres to the North Branch Chicago River Watershed making up 1.5% of the total watershed. Approximately 1.6 river miles are located within the municipal boundaries.

These site-specific recommendations are certainly not all-inclusive of the opportunities for best management practice projects in the watershed, they merely reflect the opportunity sites identified by stakeholders, stream and detention basin inventories, and other components of the assessment. The following grid is organized by type of project. Each recommended activity includes location information, priority ranking and the watershed stakeholders who will most likely be responsible for implementation.

Detention Basin Water Quality Retrofits *[See Detention Basin Inventory in Appendix G.]*

**(Note: See Figure 5-3 for detention basin locations.
Dry-bottom and underground basins are designated "high" priority for retrofits. Opportunities for retrofitting other basins and maintenance needs are noted in the Detention Basin Inventory summary.)**

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Outfall Retrofits/Repairs *[See Point Discharge Summary Appendix C.]*

(Note: Location refers to the stream reach and the point discharge reference numbers. See Figure 3-33 for stream reach location. Because of the large number of discharge points with associated problems, only the most significant are listed in this action plan. Lower priority problems that need to be corrected are found in the complete summary.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate ($/linear foot)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.5, 1.18	WF013	1002	Riverwoods	24	Sediment accumulating where swale reaches the west fork; eroded bank within swale; source: 94	Stabilize erosion. Monitor and maintain.	Medium	UDDWF, Riverwoods	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	WF013	1002	Riverwoods	28	Severely eroded banks; source: 94	Stabilize erosion. Monitor and maintain.	High	UDDWF, Riverwoods	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	WF013	1002	Riverwoods	31	Severely eroded; source: 94	Stabilize erosion. Monitor and maintain.	High	UDDWF, Riverwoods	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	WF019	2049	Riverwoods	2308	Moderate bank erosion at outfall	Stabilize erosion	Medium	UDDWF, Riverwoods	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding
1.5, 1.18	WF019	2049	Riverwoods	2310	Moderate bank erosion at outfall	Stabilize erosion	Medium	UDDWF, Riverwoods	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding

Stream Restoration and Maintenance *[See Stream Inventory Summary in Appendix B.]*

(Note: See Figure 3-33 for stream reach locations. Only those stream reaches that are considered a high or medium priority are listed. Reaches with a low priority can be identified from the complete summary.)

Programatic Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Down-stream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.17, 2.14	WF012	17	Riverwoods	358	High bank erosion, high sediment accumulation, and moderate instream debris load with grass clippings	Stabilize eroded streambanks and remove debris and accumulated sediment in stream reach	High	UDDWF	Riverwoods, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				High	High	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
2.14	WF013	34	Riverwoods	19	High sediment accumulation	Remove accumulated sediment in stream reach	High	UDDWF	Riverwoods, homeowners	site specific for sediment removal - varies based on amount of sediment				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	0-5 years	Possible financial

Potential Wetland Restoration Sites

(Note: See Figure 5-6 for locations. Potential wetland restoration sites were identified based on map analysis. Restoration feasibility still to be determined.)

Programatic Action Plan No.	ID	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
3.4 3.5	WL-30	1011	Riverwoods	WL30: Riverwoods, Oakhurst Ln.	Deerfield Park District owned golf course with wetlands	Determine feasibility of wetland restoration.	High	SMC, Deerfield PD	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5	WL-3	1004	Riverwoods	WL3: Riverwoods, Sauders Rd.	Ravinia Green Country Club.	Determine wetland restoration feasibility in floodplain of West Fork.	High	SMC, Ravinia Green Country Club	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.3 3.4 3.5	WL-54	1004	Riverwoods	WL54: Riverwoods, West of I-94/South of Duffy Lane/East of East Course Drive		Determine feasibility of wetland restoration.	High	SMC	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial

Open Space Protection

(Note: See Figure 5-7 for locations. Potential open space protection sites were identified based on stakeholder recommendations and map analysis. Protection feasibility still to be determined.)

Programatic Action Plan No.	ID No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.14, 1.26, 3.15	OS31	1001	Riverwoods	West of I 94/ South of Duffy Lane/ North of West Course Dr.		Establish conservation easement or expand Forest Preserve Bannockburn reservoir site west to include wetland.	Medium	Municipality, Forest Preserve District, UDDWF	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	5-10 years	Possible Financial

* Land acquisition costs will vary greatly throughout the watershed. Based on 2004 data from the North Branch Open Space Plan, the cost per acre (averaged throughout Lake County) is approximately $15,000.

Flood Mitigation Sites

(Note: Flood Problem Area reference numbers were developed for the Lake County Flood Hazard Mitigation Plan. Additional sites were identified during the watershed planning process. See Figure 3-52 for Mapped Locations.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies			Flood Problem Areas Inventory No.	Cost Estimate[2]	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.2, 2.16	WF013	1001	Riverwoods	Duffy Lane	Local drainage problems	Create additional storage utilizing existing vacant land. Perform ditch and culvert monitoring and maintenance.	Med	Riverwoods				26-03	$30,000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial
2.2, 2.16	WF011	1003	Riverwoods	Reservoir 27	Backwater flooding from Reservoir 27	Perform a complete review of operations of Reservoir 27.	Med	Riverwoods				26-03	$100,000	High	High	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial

Notes

1 Perform low-entry elevation surveys, determine depth of damage per structure, consider all alternatives to include floodproofing (wet or dry), elevation, relocation, or acquisition or no action. Most cost-effective alternative should be implemented. Look at all listed repetitive loss structures.

2 All cost estimates are conceptual and may vary significantly as detailed scopes of work are developed.

3 All ranking for financial assistance needed were based on cost estimates; Low= less than 50, Medium= 50>100, and High= all cost estimates above 100.

Hydraulic Structures [See Hydraulic Structure Summary Appendix D.]

(Note: Location refers to the stream reach and hydraulic structure reference numbers. Only the most significant problems are listed in the Action Plan. Lower priority problems are noted in the complete summary in Appendix D.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.14, 2.16	WF012	1001	21	Riverwoods	Duffy Rd	Support beam in culvert causing debris to accumulate at upstream end of bridge	Clean out debris and put structure on regular maintenance/monitoring schedule.	Medium	UDDWF, LCDOT	Riverwoods	1	LS	$500 - $1,000	$500 - $1,000	Medium	Medium	Operations Budget	n/a	5-10 years	No

This Site Specific Action Plan includes recommendations for watershed improvement projects within Unincorporated Lake County. Unincorporated Lake County contributes 7,815 acres to the North Branch Chicago River Watershed making up 12.5% of the total watershed. Approximately 8.1 river miles are located in Unincorporated Lake County.

These site-specific recommendations are certainly not all-inclusive of the opportunities for best management practice projects in the watershed, they merely reflect the opportunity sites identified by stakeholders, stream and detention basin inventories, and other components of the assessment. The following grid is organized by type of project. Each recommended activity includes location information, priority ranking and the watershed stakeholders who will most likely be responsible for implementation.

Detention Basin Water Quality Retrofits *[See Detention Basin Inventory in Appendix G.]*

**(Note: See Figure 5-3 for detention basin locations.
Dry-bottom and underground basins are designated "high" priority for retrofits. Opportunities for retrofitting other basins and maintenance needs are noted in the Detention Basin Inventory summary.)**

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2	V3_24-09	3055	Uninc.	Whispering Lakes	Outlet problems; inlet/outlet orientation; rip rap side slopes	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Lake County, SMC, HOA	$100/linear foot of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding

Outfall Retrofits/Repairs *[See Point Discharge Summary Appendix C.]*

(Note: Location refers to the stream reach and the point discharge reference numbers. See Figure 3-33 for stream reach location. Because of the large number of discharge points with associated problems, only the most significant are listed in this action plan. Lower priority problems that need to be corrected are found in the complete summary.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost ($)	Cost Estimate ($/linear foot)	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.5, 1.18	WF016	1002	Unincorporated Lake Co	74	Severe erosion	Stabilize erosion. Monitor and maintain.	High	UDDWF, Lake County	SMC		linear foot	100	100	Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	0-5 yrs	Possible Technical and Funding
1.5, 1.18	WF018	2002	Unincorporated Lake Co	378	Broken and partly underground; moderate erosion	Stabilize erosion, repair outfall pipe Monitor and maintain.	Medium	UDDWF, Lake County	SMC	$100/lf to stabilize erosion. $500-$1,000 to repair outfall pipe.				Medium	Medium	IEPA, SMC, SWCD, operations budget	SMC, SWCD, Municipality, Consultant	5-10 yrs	Possible Technical and Funding

Stream Restoration and Maintenance *[See Stream Inventory Summary in Appendix B.]*

(Note: See Figure 3-33 for stream reach locations. Only those stream reaches that are considered a high or medium priority are listed. Reaches with a low priority can be identified from the complete summary.)

Programatic Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Down-stream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.17, 2.14	WF016	84	Lincolnshire/ Unincorporated Lake County	65	High instream debris load and moderate bank erosion	Stabilize eroded streambanks and remove debris in stream reach	High	UDDWF	Lincolnshire, Lake County, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible financial
1.17, 2.14	WF017	98	Unincorporated Lake County	85	Moderate instream debris load and moderate bank erosion	Stabilize eroded streambanks and remove debris in stream reach	Medium	UDDWF	Lake County, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible financial

Stream Restoration and Maintenance - Continued

Programatic Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Down-stream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.14	WF018	111	Unincorporated Lake County	370	Moderate sediment accumulation	Remove accumulated sediment in stream reach	Medium	UDDWF	Lake County, homeowners	site specific for sediment removal - varies based on amount of sediment				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial
2.14	WF020	2334	Unincorporated Lake County	2330	Moderate instream debris load	Remove debris in stream reach	Medium	UDDWF	Lake County, homeowners	site specific for debris removal - varies based on type and amount				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial
1.17, 2.14	MF008	474	Bannockburn/ Unincorporated Lake County	461	Moderate bank erosion and moderate sediment accumulation	Stabilize eroded streambanks and remove accumulated sediment in stream reach	Medium	WSDD	Bannockburn, Lake County, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
1.17, 2.14	MF009	488	Lake Forest/ Unincorporated Lake County	472	Moderate bank erosion and moderate sediment accumulation	Stabilize eroded streambanks and remove accumulated sediment in stream reach	Medium	WSDD	Lake Forest, Lake County, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
2.14	MF019	649	Lake Forest/ Unincorporated Lake County	635	High sediment accumulation	Remove accumulated sediment in stream reach	High	WSDD	Lake Forest, Lake County, homeowners	site specific for sediment removal - varies based on amount of sediment				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	0-5 years	Possible financial
2.14	MF020	669	Unincorporated Lake County	650	Moderate instream debris load, high sediment accumulation	Remove debris and accumulated sediment in stream reach	High	WSDD	Lake County, homeowners	site specific for debris and sediment removal - varies based on type and amount				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	0-5 years	Possible financial
2.14	MF021	677	Unincorporated Lake County	670	High instream debris load and moderate sediment accumulation	Remove debris and accumulated sediment in stream reach	High	WSDD	Lake County, homeowners	site specific for debris and sediment removal - varies based on type and amount				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	0-5 years	Possible financial
1.17, 2.14	MF022	691	Unincorporated Lake County	678	High instream debris load, moderate bank erosion, and moderate sediment accumulation	Stabilize eroded streambanks and remove debris and accumulated sediment in stream reach	High	WSDD	Lake County, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
1.17, 2.14	MF023	701	Unincorporated Lake County/ Green Oaks	692	High instream debris load with grass clippings and dead trees, moderate bank erosion, and moderate sediment accumulation	Stabilize eroded streambanks and remove debris and accumulated sediment in stream reach	High	WSDD	Lake County, Green Oaks, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	0-5 years	Possible technical or financial

Stream Restoration and Maintenance - Continued

Programatic Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Downstream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.17, 2.14	MF024	159	Unincorporated Lake County/ Green Oaks	702	Moderate instream debris load and moderate bank erosion	Stabilize eroded streambanks and remove debris in stream reach	Medium	WSDD	Lake County, Green Oaks, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
2.14	MF025	917	Unincorporated Lake County	714	Moderate sediment accumulation	Remove accumulated sediment in stream reach	Medium	WSDD	Lake County, homeowners	site specific for sediment removal - varies based on amount of sediment				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial
1.17, 2.14	MF027	933	Unincorporated Lake County	925	Moderate instream debris load, moderate bank erosion, and moderate sediment accumulation	Stabilize eroded streambanks and remove debris and accumulated sediment in stream reach	Medium	WSDD	Lake County, homeowners	$50-$250+ per linear foot for streambank stabilization, site specific for sediment removal - varies based on amount of sediment				Medium	Medium	SMC, IEPA, SWCD, operations budget	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
2.14	MF028	2236	Unincorporated Lake County	2335	Moderate instream debris load	Remove debris in stream reach	Medium	WSDD	Lake County, homeowners	site specific for debris removal - varies based on type and amount				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial

Potential Wetland Restoration Sites

(Note: See Figure 5-6 for locations. Potential wetland restoration sites were identified based on map analysis. Restoration feasibility still to be determined.)

Programatic Action Plan No.	ID	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
3.4 3.5	WL-26	2019	Unincorporated Lake County	WL26: Deerfield, Hwy 22	Farmland owned by LCFPD	Determine feasibility of wetland restoration.	High	SMC, *LCFPD*	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5	WL-49	2002	Unincorporated Lake County	WL-49: Unincorporated, Hwy 60	Lake County Forest Preserve District owned with wetlands	Determine feasibility of wetland restoration.	High	SMC, LCFPD	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5 3.6	WL-40	2002	Unincorporated Lake County	WL-40: Mettawa, Bradley Rd.	Privately owned with ADID wetlands	Determine feasibility of wetland restoration.	High	SMC	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5	WL-42	2002	Unincorporated Lake County	WL-42: Unincorporated, Arcadia Rd.	Knollwood Club Golf Course	Determine feasibility of wetland restoration.	High	SMC, Knollwood Club	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5	WL-37	2501	Unincorporated Lake County	WL-37: Lake Bluff, Waukegan Rd.	Abbott Laboratories owned with wetlands.	Determine feasibility of wetland restoration.	High	SMC, Abbott Laboratories	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5 3.6	WL-36	2501	Unincorporated Lake County	WL-36: Lake Bluff, Buckley Rd.	Privately owned with ADID wetlands	Determine feasibility of wetland restoration.	High	SMC	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial

Potential Wetland Restoration Sites- Continued

Programatic Action Plan No.	ID	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
3.4 3.5	WL-31	1011	Unincorporated Lake County	WL31: Riverwoods, Deerfield, Countyline Rd.	Baxter owned parcel with wetlands	Determine feasibility of wetland restoration.	High	SMC, Baxter	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5	WL-17	2002	Unincorporated Lake County	WL17: Unincorporated, Arcadia Rd.	Lake County Forest Preserve District owned with wetlands	Determine feasibility of wetland restoration.	Medium	SMC, LCFPD	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
3.4 3.5	WL-25	2002	Unincorporated Lake County	WL25: Unincorporated/Lake Forest, Riverwoods Rd.	Lake County Forest Preserve District owned with wetlands	Determine feasibility of small wetland restoration.	Medium	SMC, LCFPD	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
3.4 3.5	WL-1	2506	Unincorporated Lake Co	WL1: Unincorporated/ Waukegan, E of I 94 W of Waukegan Rd.	Business park with wetlands	Determine wetland restoration feasibility.	Medium	SMC	USFWS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	5-10 years	Possible technical or financial
3.4 3.5	WL-8	3009	Unincorporated Lake County	WL8: North Chicago, Skokie Hwy.	Abbott Laboratories owned with wetlands.	Determine feasibility of wetland restoration.	Medium	SMC, *Abbott Laboratories*	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	SMC, Chicago Wilderness, IEPA, USACE, IDNR, NEIWCA, WRF	SMC, Consultant, Municipality	5-10 years	Possible technical or financial

Open Space Protection

(Note: See Figure 5-7 for locations. Potential open space protection sites were identified based on stakeholder recommendations and map analysis. Protection feasibility still to be determined.)

Programatic Action Plan No.	ID No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.14, 1.26, 3.15	OS27	2002	Mettawa/ Unincorporated Lake County	Northwest and northeast corners of I 94 & Everett Rd.	Headwaters of West Fork north of Everett Rd. Includes ADID wetland #163 with high quality plant community. Parcels north & south of Everett have extensive areas of drained hydric soils for wetland restoration and existing wetland.	Expand Daniel Wright Forest Preserve to include this area	High	Municipality, Lake County, Forest Preserve District	USFWS, IDNR, Corlands, SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	0-5 years	Possible Financial
1.14, 1.26, 3.15	OS29	1001	Unincorporated Lake County	West of I 94 between Florsheim Park and Half Day Rd.	Open space includes extensive wetlands on large parcel that covers both sides of Old Mill Road.	Consider expansion of Forest Preserve to include rest of this area.	High	Lake County, Forest Preserve District	USFWS, IDNR, Corlands, SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	0-5 years	Possible Financial
1.14, 1.26, 3.15	OS12	2501	Waukegan/ Unincorporated Lake County	Between I 94 & Soo Line/ IL 137 & 120	Large wetland complex including ADID wetlands # 91, 98 & 99 in headwaters of Middle Fork. Site #91 is a high quality plant community, while sites #98 & 99 are high quality wildlife habitat.	Permanent protection. (Portions of this wetland may already be protected based on 2004 data from the NBOS plan.)	High	Forest Preserve District, Municipality, Lake County	IDNR, USFWS, Corlands, SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	0-5 years	Possible Financial

Open Space Protection - Continued

Programatic Action Plan No.	ID No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.14, 1.26, 3.15	OS14	2501	Unincorporated Lake County	Buckley Road (137) & I-94	High quality wildlife habitat site with ADID wetland #97. Part of the large wetland complex that includes ADID sites # 98 and 99.	Permanent protection	High	Lake County, Forest Preserve District, Abbott Labs	USFWS, IDNR, Corlands, SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	0-5 years	Possible Financial
1.14, 1.26, 3.15	OS15	2003	Unincorporated Lake County	Buckley Road (137) & I-94	ADID wetland #109, which is designated as an Illinois Natural Area Inventory Site that includes a State listed T&E species.	Permanent protection	High	Lake County, Forest Preserve District, Abbott Labs	USFWS, IDNR, Corlands, SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	0-5 years	Possible Financial
1.14, 1.26, 3.15	OS17	2002	Unincorporated Lake County	Northeast of I 94 Lake Forest Oasis to Soo Line.	ADID wetland # 128 a high quality plant community that is part of a wetland complex including ADID sites #128-135 and 145 including Middlefork Savanna.	Permanent protection. Determine feasibility of adding to Middlefork Savanna or Libertyville Township Open Space. (Portions of this wetland may already be protected based on 2004 data from the NBOS plan.)	High	Lake County, Forest Preserve District, LFOLA	USFWS, IDNR, Corlands, SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	0-5 years	Possible Financial
1.14, 1.26, 3.15	OS18	2057	Lake Forest/ Unincorporated Lake County	East of I 94 Oasis to Soo Line	ADID wetland #145 a high quality plant community that is part of a wetland complex including ADID sites #128-135.	Permanent protection	High	Municipality, Lake County, Forest Preserve District, LFOLA, Lake Forest Academy	USFWS, IDNR, Corlands, SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	0-5 years	Possible Financial
1.14, 1.26, 3.15	OS19	2002	Unincorporated Lake County	East of Middle Fork/ West of US 43/ between IL 176 S & Winwood; Extending from IL 176 south to approximately Winwood	Unprotected part of large wetland complex.	Conservation easement (Portions of this wetland may already be protected based on 2004 data from the NBOS plan.)	Medium	Lake County, LFOLA	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	5-10 years	Possible Financial

* Land acquisition costs will vary greatly throughout the watershed. Based on 2004 data from the North Branch Open Space Plan, the cost per acre (averaged throughout Lake County) is approximately $15,000.

Flood Mitigation Sites

(Note: Flood Problem Area reference numbers were developed for the Lake County Flood Hazard Mitigation Plan. Additional sites were identified during the watershed planning process. See Figure 3-52 for Mapped Locations.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies			Flood Problem Areas Inventory No.	Cost Estimate[2]	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.2, 2.16	MF016	2002	Lake Forest/ Unincorporated Lake County	Conway Farms Dr.	Local drainage problems	Create additional storage utilizing existing vacant land. Perform ditch and culvert monitoring and maintenance.	High	Lake Forest	SMC			25-19	$30,000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	0-5 years	Possible technical or financial
2.2, 2.16	MF009	2019	Unincorporated Lake County	Del Mar Woods Subdivision, Half Day Road to north, Birchwood Lane to Wildwood Lane	Depressional storage flooding and internal drainage	Complete sub-basin study and plan. May consider constructing swale to increase outlet capacity, improving internal drainage, using wetland restoration to provide additional storage.	High	West Deerfield Township, homeowner association, SMC, FPD	WSDD, IDOT			25-01	$100,000	High	Medium	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	0-5 years	Possible technical or financial
2.2, 2.16	SR031	3057	Unincorporated Lake County	Talbot Ave., east of Illinois	Depressional storage flooding	May consider constructing swale to increase outlet capacity, improving internal drainage, provide additional storage.	Med	Shields Township, Lake County	ESDD			24-11	30000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial
2.2, 2.16	SR030	3057	Unincorporated Lake County	Muir Ave.	Local drainage problems	Create additional storage utilizing existing vacant land. Perform ditch and culvert monitoring and maintenance.	Med	Shields Township, Lake County	ESDD			24-12	30000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial
2.2, 2.16	SR030	3057	Unincorporated Lake County	Jenkisson Ave. & Birch Ave.	Local drainage problems	Create additional storage utilizing existing vacant land. Perform ditch and culvert monitoring and maintenance.	Med	Shields Township, Lake County	ESDD			24-13	30000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial

Flood Mitigation Sites - Continued

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies			Flood Problem Areas Inventory No.	Cost Estimate[2]	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.2, 2.16	SR030	3057	Unincorporated Lake County	Knollwood Subdivision, Skokie Hwy. (Hwy. 41) & Smith Ave.	Overbank flooding & local drainage problems	Funding was received in 2005 to study this area and develop alternatives to reduce flooding. The alternatives may include improve/maintain internal drainage system, expand existing detention, maintain/provide drainage along Hwy 41 ROW.	High	Shields Township, Lake County	ESDD			24-14	30000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	0-5 years	Possible technical or financial

Notes
1 Perform low-entry elevation surveys, determine depth of damage per structure, consider all alternatives to include floodproofing (wet or dry), elevation, relocation, or acquisition or no action. Most cost-effective alternative should be implemented. Look at all listed repetitive loss structures.
2 All cost estimates are conceptual and may vary significantly as detailed scopes of work are developed.
3 All ranking for financial assistance needed were based on cost estimates; Low= less than 50, Medium= 50>100, and High= all cost estimates above 100.

Hydraulic Structures [See Hydraulic Structure Summary Appendix D.]

(Note: Location refers to the stream reach and hydraulic structure reference numbers. Only the most significant problems are listed in the Action Plan. Lower priority problems are noted in the complete summary in Appendix D.)

Programmatic Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.14, 2.16	WF016	1002	25	Unincorporated Lake Co		Log jam; water stagnent upstream from debris pile	Remove log jam, put on regular maintenance/ inspection schedule	High	UDDWF, property owner	Lake County	1	LS	$500 - $1,000	$500 - $1,000	Medium	Medium	Operations Budget	n/a	0-5 years	No
2.14, 2.16	WF010	1007	13	Unincorporated Lake Co		Sedimentation on both sides of bank under bridge	Remove Sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation). Implement recommended alternative. Monitor and maintain.	Medium	UDDWF, property owner	Lake County	$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	SMC, Consultant	5-10 years	Possible Tech & Funding
1.18, 2.16	WF010	1004	15	Unincorporated Lake Co		Eroding underneath green mat	Investigate alternatives to reduce erosion and stabilize streambank. Implement recommended alternative. Monitor and maintain.	Medium	UDDWF, property owner	Lake County	$50 - $500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	IEPA, SMC, LCSWCD	SMC, Consultant	5-10 years	Possible Tech & Funding

Hydraulic Structures- Continued

Programmatic Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.18, 2.16	MF028	2002	77	Unincorporated Lake Co		Ends collapsed, erosion over top of berm	Investigate alternatives to replace or repair existing structure and stabilize eroded streambank. Implement recommended alternative. Monitor and maintain.	High	WSDD, property owner	Lake County	Cost to replace structure variable depending on road closure requirements and engineering design requirements, range from $1,000 for simple culvert to $1,000,000+ for complex designs. $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				High	High	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	0-5 years	Possible Tech & Funding
1.18,2.16	MF028	2002	76	Unincorporated Lake Co		Ends of culvert collapsed	Investigate alternatives to replace or repair existing structure. Implement recommended alternative. Monitor and maintain.	High	WSDD, property owner	Lake County	Cost to replace structure variable depending on road closure requirements and engineering design requirements, range from $1,000 for simple culvert to $1,000,000+ for complex designs.				High	High	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	0-5 years	Possible Tech & Funding
1.18, 2.16	MF028	2002	75	Unincorporated Lake Co		Culvert has separated in places	Investigate alternatives to replace or repair existing structure. Implement recommended alternative. Monitor and maintain.	Medium	WSDD, property owner	Lake County	Cost to replace structure variable depending on road closure requirements and engineering design requirements, range from $1,000 for simple culvert to $1,000,000+ for complex designs.				High	High	IEPA, SMC, LCSWCD	Municipality, SMC, Consultant	5-10 years	Possible Tech & Funding
2.14, 2.16	MF028	2002	74	Unincorporated Lake Co		2 ft. of sediment on bottom	Remove sediment. Investigate source of sediment and investigate alternatives to reduce erosion and stabilize streambank (if source of sedimentation.) Implement recommended alternative. Monitor and maintain.	Medium	WSDD, property owner	Lake County	$500 - $1,000+ LS for sediment removal (varies based on amount of sediment), $50-$500+/LF for streambank stabilization (varies based on type of stabilization used)				Medium	Medium	Operations Budget	n/a	5-10 years	No
2.14, 2.16	MF008	2017	48	Unincorporated Lake Co	Half Day Rd	Currently a construction site, piles of sediment and debris; west section of bridge is filled with debris, but appears that will be removed in future	Remove debris, require construction site operator to maintain open waterway. Monitor and maintain.	High	WSDD, IDOT	Lake County	1	LS	$500 - $1,000	$500 - $1,000	Low	Low	Operations Budget	n/a	0-5 years	No

This Site Specific Action Plan includes recommendations for watershed improvement projects within Waukegan. Waukegan contributes 1,822 acres to the North Branch Chicago River Watershed making up 2.9% of the total watershed. Approximately 0.7 river miles are located within the municipal boundaries.

These site-specific recommendations are certainly not all-inclusive of the opportunities for best management practice projects in the watershed, they merely reflect the opportunity sites identified by stakeholders, stream and detention basin inventories, and other components of the assessment. The following grid is organized by type of project. Each recommended activity includes location information, priority ranking and the watershed stakeholders who will most likely be responsible for implementation.

Detention Basin Water Quality Retrofits *[See Detention Basin Inventory in Appendix G.]*

(Note: See Figure 5-3 for detention basin locations.
Dry-bottom and underground basins are designated "high" priority for retrofits. Opportunities for retrofitting other basins and maintenance needs are noted in the Detention Basin Inventory summary.)

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2	25-18	2502	Waukegan	Windwood Sub	Inlet/outlet problems and orientation; moderate shoreline erosion	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Waukegan, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	25-25	2506	Waukegan	United Center for Commerce	Inlet/outlet problems and orientation; moderate shoreline erosion; geese	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Waukegan, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	Various		Waukegan			Replace turf and rip rap shorelines, bottoms, and buffers of all basins with native vegetation.	Low	Property Owner, Waukegan	SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	10-20 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-36	3501	Waukegan	Buckingham Place	Inlet/outlet problems	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Waukegan, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2, 3.3	V3_24-02	3507	Waukegan	Northpoint Business Center	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Waukegan, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2, 3.3	V3_24-03	3507	Waukegan	Northpoint Business Center	Dry bottom basin	Convert dry-bottom detention basin to wet-bottom basin or wetland with stilling basin. Replace turf grass with native vegetation.	High	Property Owner	Waukegan, SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	0-5 years	Possible Tech and Funding

Detention Basin Water Quality Retrofits - Continued

Programatic Action Plan No.	Basin No.	SSS ID	Municipality	Basin Name	Existing Condition	Action Recommendation	Priority	Lead Agencies	Supporting Agencies	Quantity	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.4, 2.3, 2.6, 3.2	24-24	3508	Waukegan	Amhurst Business Park	Outlet problems; inlet/outlet orientation; rip rap side slopes	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Waukegan, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-25	3508	Waukegan	Amhurst Business Park	Inlet problems; inlet/outlet orientation; rip rap side slopes; geese	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Waukegan, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-28	3508	Waukegan	Amhurst Business Park	Inlet/outlet problems and orientation; geese	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Waukegan, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-29	3508	Waukegan	Amhurst Business Park	Inlet/outlet problems and orientation	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Waukegan, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-31	3508	Waukegan	Northern Crossings	Inlet problems; inlet/outlet orientation; rip rap side slopes	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Waukegan, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-34	3507	Waukegan	Northpoint Business Center	Inlet problems; inlet/outlet orientation; moderate shoreline erosion	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Waukegan, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	24-37	3008	Waukegan	Amhurst Business Park	Inlet problems; inlet/outlet orientation; rip rap side slopes; geese	Correct short-circuiting problem and replace turf grass with native vegetation.	Medium	Property Owner	Waukegan, SMC, HOA	$100/LF of relocated storm sewer plus site specific costs. $30,000-$40,000 per acre for native vegetation enhancement.				High	High	SMC, IEPA, IDNR	SMC, Consultant, Municipality	5-10 years	Possible Tech and Funding
1.4, 2.3, 2.6, 3.2	Various		Waukegan			Replace turf and rip rap shorelines, bottoms, and buffers of all basins with native vegetation.	Low	Property Owner, Waukegan	SMC, HOA	$30,000-$40,000 per acre for native vegetation planting.				Medium	Medium	SMC, IEPA, IDNR	SMC, Consultant, Municipality	10-20 years	Possible Tech and Funding

Outfall Retrofits/Repairs *[See Point Discharge Summary Appendix C.]*

(Note: Location refers to the stream reach and the point discharge reference numbers. See Figure 3-33 for stream reach location. Because of the large number of discharge points with associated problems, only the most significant are listed in this action plan. Lower priority problems that need to be corrected are found in the complete summary.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	SMC GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit ($)	Unit Cost ($/linear foot)	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																			

Stream Restoration and Maintenance *[See Stream Inventory Summary in Appendix B.]*

(Note: See Figure 3-33 for stream reach locations. Only those stream reaches that are considered a high or medium priority are listed. Reaches with a low priority can be identified from the complete summary.)

Programatic Action Plan No.	Stream Reach No.	Upstream GPS Ref No.	Municipality	Downstream GPS Ref No.	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.14	SR037	1491	North Chicago/ Park City/ Waukegan	1472	Moderate instream debris load with yard waste	Remove debris in stream reach	Medium	ESDD	North Chicago, Park City, homeowners	Site specific for debris removal - varies based on type and amount				Low	Medium	SMC, IEPA, SWCD, operations budget	n/a	5-10 years	Possible financial

Potential Wetland Restoration Sites

(Note: See Figure 5-6 for locations. Potential wetland restoration sites were identified based on map analysis. Restoration feasibility still to be determined.)

Programatic Action Plan No.	ID	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
3.4 3.5	WL-34	3502	Waukegan	WL-34: Park City, Washington St.	Privately owned with wetlands.	Determine feasibility of wetland restoration.	High	SMC	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	Chicago Wilderness, IEPA, USACE	SMC, Consultant, Municipality	0-5 years	Possible technical or financial
3.4 3.5	WL-35	3002	Waukegan	WL-35: Waukegan, Staben Ave.	Privately owned with wetlands.	Determine feasibility of wetland restoration.	High	SMC	USFWS, NRCS	$4,000-30,000/acre for native vegetation planting.				High	High	Chicago Wilderness, IEPA, USACE	SMC, Consultant, Municipality	0-5 years	Possible technical or financial

Open Space Protection

(Note: See Figure 5-7 for locations. Potential open space protection sites were identified based on stakeholder recommendations and map analysis. Protection feasibility still to be determined.)

Programatic Action Plan No.	ID No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
1.14, 1.26, 3.15	OS12	2501	Waukegan/ Unincorporated Lake County	Between I 94 & Soo Line/ IL 137 & 120	Large wetland complex including ADID wetlands # 91, 98 & 99 in headwaters of Middle Fork. Site #91 is a high quality plant community, while sites #98 & 99 are high quality wildlife habitat.	Permanent protection. (Portions of this wetland may already be protected based on 2004 data from the NBOS plan.)	High	Forest Preserve District, Municipality, Lake County	IDNR, USFWS, Corlands, SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	0-5 years	Possible Financial
1.14, 1.26, 3.15	OS2	3502	Waukegan	Between IL 132 & Washington/ US 41 & US 131; Near Lakewood and US 131	One of 5 remaining wetlands in the urbanized headwaters of Skokie north of IL 120.	Permanent protection	Medium	Municipality, Park District	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	5-10 years	Possible Financial
1.14, 1.26, 3.15	OS5	3504	Waukegan	Between IL 120 & Washington/ US 41 & US 131; Between Knight Avenue and US 131	One of 5 remaining wetlands in the urbanized headwaters of Skokie north of IL 120.	Permanent protection	Medium	Municipality, Park District	SMC, FOCR	Varies significantly based on location.*				Low	High	Public Referenda, IDNR, NRCS, USFWS	n/a	5-10 years	Possible Financial

* Land acquisition costs will vary greatly throughout the watershed. Based on 2004 data from the North Branch Open Space Plan, the cost per acre (averaged throughout Lake County) is approximately $15,000.

Flood Mitigation Sites

(Note: Flood Problem Area reference numbers were developed for the Lake County Flood Hazard Mitigation Plan. Additional sites were identified during the watershed planning process. See Figure 3-52 for Mapped Locations.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies			Flood Problem Areas Inventory No.	Cost Estimate[2]	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
2.2, 2.16	SR037	3502	Waukegan	Washington Street to Monroe Street	Local drainage problems	The Skokie Headwaters and North Chicago Flood Damage Reduction Feasibility Study provided a list of alternatives to reduce flooding in this area, including creation of additional storage utilizing existing vacant land. Perform ditch and culvert monitoring and maintenance.	High	Waukegan				24-01	$30,000	High	Low	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	5-10 years	Possible technical or financial
2.2, 2.10, 2.16	SR037	3004	Waukegan/ Park City	Trailer Park & Radio Station, Hwy. 120 to north & Dixie Ave.	Depressional storage flooding and overbank flooding, loss of access and damage to critical facility (radio station)	See above. Coordinate interjurisdictional investigation of expanding storage in the wetland complex located north of 120 (primarily in Waukegan). For structures, perform flood mitigation alternatives analysis[1]. May recommend relocation of radio station.	High	SMC, Waukegan, Park City	*WKRS*			24-02, 24-05	$150,000	High	High	SMC, PB&D, IEMA, NFIP	SMC/ Municipality/ Consultant	0-5 years	Possible technical or financial

Notes

1 Perform low-entry elevation surveys, determine depth of damage per structure, consider all alternatives to include floodproofing (wet or dry), elevation, relocation, or acquisition or no action. Most cost-effective alternative should be implemented. Look at all listed repetitive loss structures.

2 All cost estimates are conceptual and may vary significantly as detailed scopes of work are developed.

3 All ranking for financial assistance needed were based on cost estimates; Low= less than 50, Medium= 50>100, and High= all cost estimates above 100.

Hydraulic Structures [See Hydraulic Structure Summary Appendix D.]

(Note: Location refers to the stream reach and hydraulic structure reference numbers. Only the most significant problems are listed in the Action Plan. Lower priority problems are noted in the complete summary in Appendix D.)

Programatic Action Plan No.	Stream Reach No.	SSS ID	HS No	Municipality	Location	Existing Condition	Action Recommendation	Priority	Lead Agencies (including Owner)	Supporting Agencies	Quan	Unit	Unit Cost	Cost Estimate	Technical Assistance Needs	Financial Assistance Needs	Sources of Funding	Sources of Technical Assistance	Imple-mentation Schedule	Local Short-comings Identified
none																				

CHAPTER 6 : FROM PLAN TO PERFORMANCE

6.1 Getting Projects Done

The success of a management plan can be measured by how readily it is used by its intended audience and how well it is implemented. The IEPA and project partners have completed over 45 BMP projects in the North Branch watershed. For more information regarding completed projects, see www.co.lake.il.us/smc/planning/northbranch/default.asp. The North Branch Watershed Plan is very ambitious and continued implementation of the plan will require an even greater degree of cooperation and coordination among partners - and funding for projects.

6.1.1 Coordination and Cooperation

As can be seen within the Action Plan (Chapter 5) there are numerous named (and yet to be named) stakeholders in the North Branch watershed. The watershed is large and there are many groups, municipalities, districts and agencies that will have to coordinate and cooperate to implement many of the recommended projects to improve the quality of the watershed. No one village, city, business, organization or government agency has the resources to do it all – so pooling resources for worthwhile projects provides the most effective means to improve the watershed and river.

It will take both coordination on the part of project leaders and cooperation on the part of watershed stakeholders to make the implementation of the North Branch Chicago River watershed management plan an effective tool. Friends and SMC have stepped forward as project leaders for coordinating plan implementation. Both administrative and project coordination are part of the implementation package. Coordination of the watershed Planning Committee and soliciting the cooperation of stakeholders to get projects implemented along with policies and programs in place are all included within Friend's and SMC's commitment.

Improvements to water quality within the watershed would be limited if it weren't for the dedicated participation of the North Branch stakeholders on the Planning Committee. The Planning Committee will continue to function as the stakeholder forum for both counties. Quarterly meetings of the committee and special workshops, field trips and conferences will continue to bring the watershed stakeholders and multiple units of government together to discuss watershed issues and opportunities. The Planning Committee also supports the coordinating staff by providing guidance for both the watershed plan and projects.

The cooperation of watershed stakeholders in getting projects done within and outside of their individual jurisdictions is also an essential component for the success of this plan. There are a variety of site and municipal specific recommended actions in the Chapter 5 Action Plan. Some recommendations are related to maintenance at discreet locations. They might include repair of a failing outfall structure or detention basin outlet. These types of projects can be added to municipal or drainage district maintenance schedules and should be remedied fairly easily. The key to successfully implementing these projects is incorporating them into the municipal or drainage district's schedules and budgets.

Other action recommendations may require a considerable amount of inter-jurisdictional coordination. Examples range from establishing a greenway and trail along the river through several municipalities and forest preserve properties to locating a regional wetland restoration or detention facility. These types of projects will require more coordination and cooperation as well as a longer period of time for completion. North Branch Planning Committee members have committed to continuing and stepping up efforts to get more community stakeholders involved. There is an additional commitment to the North Branch Chicago River through sponsoring (or participating in) efforts to get projects implemented. Stakeholder cooperation is anticipated to increase as more projects are completed and additional stakeholders see the positive recreational, aesthetic and other quality of life benefits these projects and activities provide their constituents. Cost-share funding support is also expected to provide a strong cooperative incentive for some stakeholders.

6.1.2 Funding

Identifying a source (or sources) of funding is key to getting new projects or new types of projects completed. Fortunately, the IEPA has provided financial support by providing 50 percent cost-share to implement the North Branch Chicago River watershed plan. Almost $4 million from IEPA has been matched with a minimum of 50 percent contribution by locals and used for watershed improvement coordination, outreach and project implementations.

There are numerous other sources of funds available to help support additional projects or provide cost-share for IEPA funds. A list of numerous local, regional and state funding sources is provided in Appendix J of the plan. The North Branch Open Space Plan (NBOSP) also developed lists of existing and potential funding sources, which are also included in Appendix J. Both Friends and SMC are committed to working with other watershed stakeholders to identify and package funds for new projects that improve the watershed.

6.2 Evaluating Plan Performance

The North Branch Chicago River Watershed Management Plan is considered to be a living document that will change as issues and opportunities in the watershed change. The plan is scheduled for official evaluation and update every five years. Completed projects will come off of the North Branch Action Plan and new projects will be added.

In addition to the official 5-year plan evaluation and update, the North Branch Planning Committee (NBPC) in conjunction with project staff will have a key role in evaluating implementation progress on an annual basis. The NBPC and SMC staff will review the status of actions recommended in the action plan at least once per year. The NBPC will then identify the top priority actions for the following year's focus. After a project or action has been selected for implementation, the NBPC can refer to the matrix included in Table 6.1 to measure interim milestones and measure the success of the implemented project or action over time.

In order to evaluate implementation progress of the 5-year plan, scorecards (located at the end of this chapter) were created for each of the five goals. Each scorecard has a goal and the tasks needed to complete the specific objective. Scoring is based on a points scale for each of the recommended tasks and ranges from 0 to 2. Ranking each task is based on actions taken to complete the overall objective. Scoring is as follows: 0 indicates no action attempted, 1 implies some effort to complete the task, and 2 the task is completed. Once an overall score is obtained an evaluation of progress can be interpreted. The scale for overall evaluation is based on the maximum points available. Effort is considered poor if a quarter of the maximum number of points are received. Effort is considered good if half of the maximum number of points are received. Effort is considered excellent if more than half of the maximum number of points are received. Report cards are enclosed at the end of Chapter 6.

Other opportunities for evaluating the status of plan implementation by project staff include the completion of quarterly project reports and staff work plans. Project staff will continue to submit quarterly status reports to the IEPA throughout the funded implementation phase of the North Branch Chicago River Watershed-Based Plan. SMC staff will also be informally reviewing and considering the status of the Action Plan's implementation in the development of their annual work plans and within the context of their performance evaluations.

6.3 Updating the Plan

As an officially adopted plan for Lake County, the North Branch Chicago River Watershed-Based Plan serves as an amendment to the Lake County Comprehensive Stormwater Management Plan. For this reason, SMC will serve as the coordinator and administrator for plan revisions. SMC will review and update the North Branch Chicago River Watershed-Based Plan with the assistance of the North Branch Planning Committee.

GOAL 1: IMPROVE WATER QUALITY IN THE NORTH BRANCH CHICAGO RIVER

Objective 1: Reduce nonpoint and point source pollutant loadings from runoff by some measurable standard. • Develop recommendations for planting native vegetation. • Educate landowners. • Replace turf in road R-O-Ws. • Retrofit detention basins. • Prioritize and retrofit outfalls. • Identify demonstration sites for application of water quality filters. • Develop a non-point source reduction program. • Encourage stringent review during renewal of NPDES permits. • Determine sources of high fecal coliform. • Institute a community program to inspect stormsewer outfalls. • Provide required training for enforcement officers and field staff to improve enforcement of SE/SC and other water quality provisions of WDO in certified communities. • Encourage uniform applications of water quality treatment requirements in WDO by certified communities. • Maintain open space and install BMPS. • Require that all detention basins for new development be wet-bottom/wetland basins.	**Scale**		
	Poor	**Good**	**Excellent**
Short Term Milestones and Measurable Goals (0-5 years)			
1. Research native vegetation limitations and begin developing recommendations.	0	1	2
2. Compile a list of education tools and locations for distribution.	0	1	2
3. Identify high priority areas for native vegetation.	0	1	2
4. Identify basins and determine feasibility for retrofits.	0	1	2
5. Identify outfalls and determine feasibility for retrofits.	0	1	2
6. Construct or identify at least one demonstration site for each type of filtration BMP.	0	1	2
7. Compile a list of NPDES permits that are in the process of renewal.	0	1	2
8. Investigate probable sources of high fecal coliform and begin identifying solutions.	0	1	2
9. Compile a list of certified communities in recertification review.	0	1	2
10. Identify open space parcels suitable for infiltration BMPs.	0	1	2
11. Write new ordinance language and adopt ordinance requiring wet-bottom/wetland detention basins for new development.	0	1	2
Poor: Have not attempted **Good: Some effort** **Excellent: Task completed**	**Poor: 0-5** **Good: 6-11** **Excellent: >11**		

GOAL 1: IMPROVE WATER QUALITY IN THE NORTH BRANCH CHICAGO RIVER

Objective 2: Reduce streambank and stream bed erosion. • Organize public demonstration on native streambank vegetation, restoration, and management. • Stabilize eroded streambanks and tributary swales. • Replace and stabilize erosive/failed outfalls and hydraulic structures. • Develop stream maintenance standards for streambank stabilization and riparian buffer vegetation.	**Scale** **Poor**	**Good**	**Excellent**
Short Term Milestones and Measurable Goals (0-5 years)			
1. Construct or identify a demonstration site.	0	1	2
2. Compile a list of education tools and locations for distribution.	0	1	2
3. Conduct bi-annual seminars to educate public, consultants, developers and municipalities.	0	1	2
4. Prioritize areas based on erosion and identify techniques for repair.	0	1	2
5. Develop standards for inspection maintenance of hydraulic structures and outfalls.	0	1	2
6. Develop standards for stream maintenance and perform annual audit.	0	1	2
Poor: Have not attempted **Poor: 0-3** **Good: Some effort** **Good: 4-6** **Excellent: Task completed** **Excellent: >6**			

GOAL 1: IMPROVE WATER QUALITY IN THE NORTH BRANCH CHICAGO RIVER

Objective 3: Correct wastewater overflow conditions that have a significant impact on water quality. • Assess WWTP at Clavey Rd. and determine whether maximum treatment capacity should be modified. • Conduct first flush analysis and convert to composite sampling at Deerfield WWTP excess flow facilities. • Remedy incomplete treatment problems for Deerfield. • Identify areas of high inflow/infiltration and target high priority areas for evaluating seals on sanitary manhole lids. • Identify and eliminate illicit downspout, stormdrain, and/or sump pump hookups in areas of high inflow. Implement IDDE program. • Educate homeowners and businesses concerning illicit hookups and identify cost-share and other incentives.	**Scale**		
	Poor	**Good**	**Excellent**
Short Term Milestones and Measurable Goals (0-5 years)			
1. Determine current capacity of WWTP at Clavey Rd. and implications of future development.	0	1	2
2. Conduct and analyze first flush analysis at Deerfield WWTP.	0	1	2
3. Identify causes and solutions for incomplete treatment problems. Prioritize solutions and begin implementation.	0	1	2
4. Evaluate seals on sanitary sewer manholes and replace if needed.	0	1	2
5. Visually inspect stormsewers to determine source of illicit connection. Remove 50% of high priority connections.	0	1	2
6. Compile a list of educational tools and locations for distribution. Research cost share and other incentives.	0	1	2
Poor: Have not attempted **Good: Some effort** **Excellent: Task completed**	**Poor: 0-3** **Good: 4-6** **Excellent: >6**		

GOAL 1: IMPROVE WATER QUALITY IN THE NORTH BRANCH CHICAGO RIVER

Objective 4: Protect and restore riparian greenways and buffers along and around all water resources. • Identify open space parcels in proximity to water resources that are suitable for BMPs to infiltrate or filter stormwater runoff. • Install BMPs on parcels with open space that include or are adjacent to non-point source pollution areas or pollution point sources (NPDES permitted facilities.	**Scale**		
	Poor	**Good**	**Excellent**
Short Term Milestones and Measurable Goals (0-5 years)			
1. Review condition and ownership of open space parcels suitable for BMPs.	0	1	2
2. Prioritize protection and implementation.	0	1	2
3. Identify suitable BMPs for parcels adjacent to pollution sources.	0	1	2
Poor: Have not attempted **Poor: 0-1** **Good: Some effort** **Good: 2-3** **Excellent: Task completed** **Excellent: >3**			

GOAL 2: REDUCE FLOOD DAMAGE IN THE NORTH BRANCH CHICAGO RIVER WATERSHED

Objective 1: Reduce flow rates and volumes from existing developed areas and prevent increases from new development. • Reduce allowable release rates from new and redeveloped sites to 0.10 cfs per acre for the 100 year 24 hour storm event. • Identify sites for installing new multi-objective detention basins. • Identify older detention ponds where smaller restrictors could be installed and assess feasibility of increasing existing volume. • Disconnect rooftop runoff from the storm sewer system. • Create floodplain zoning regulations. • Retrofit existing sites to include infiltration devices. • Perform detailed hydrology and hydraulics modeling. • Educate residents and businesses and provide cost-share incentives to install BMPs. • Encourage alternative site designs to use runoff reduction hierarchy and reduce impervious surfaces.	**Scale** **Poor**	**Good**	**Excellent**
Short Term Milestones and Measurable Goals (0-5 years)			
1. Perform study to determine effects of reducing the allowable waste. Write and adopt a new ordinance language. Plan and hold seminar within first year of newly adopted ordinance.	0	1	2
2. Identify and acquire sites for multi-objective detention basins. Perform modeling and construct 50% of identified sites.	0	1	2
3. Identify older ponds and determine feasibility of retrofits. Perform modeling and construct 50% of identified sites.	0	1	2
4. Identify properties with connected downspouts. Disconnect 50% of existing properties.	0	1	2
5. Write and adopt floodplain zoning regulations. Plan seminars and hold three meeting within first year of newly adopted regulations.	0	1	2
6. Construct or identify at least one demonstration site for each type of BMP. Develop cost sharing program and distribute public education materials. Target 10 retrofits in first five years.	0	1	2
7. Estimate build-out land use conditions and perform modeling. Adopt new ordinance reflecting new release rate recommendations.	0	1	2
8. Target 25% of new development sites to use infiltration BMPs.	0	1	2
Poor: Have not attempted **Good: Some effort** **Excellent: Task completed** **Poor: 0-4** **Good: 5-8** **Excellent: >8**			

GOAL 2: REDUCE FLOOD DAMAGE IN THE NORTH BRANCH CHICAGO RIVER WATERSHED

Objective 2: Protect and restore floodplain functions. • Buyout repetitively flooded properties and relocate or demolish buildings to restore floodplain function. • Identify opportunity areas and funding partners for wetland and floodplain restoration. • Identify and acquire remaining undeveloped wetlands and floodplains and maintain as open space. • Protect wetlands and floodplains using land use management techniques.	**Scale**		
	Poor	**Good**	**Excellent**
Short Term Milestones and Measurable Goals (0-5 years)			
1. Identify repetitive loss structures. Buyout or relocate 50% of repeat loss structures.	0	1	2
2. Identify opportunity areas and funding partners. Perform annual review of funding list and update as needed.	0	1	2
3. Inventory undeveloped floodplain that isn't protected from development. Acquire 50% of parcels during first 5 years.	0	1	2
4. Evaluate options for new language (ordinance, zoning classification, etc.) Write and adopt. Plan three seminars in first year to educate public of new language.	0	1	2
Poor: Have not attempted **Poor: 0-2** **Good: Some effort** **Good: 3-4** **Excellent: Task completed** **Excellent: >4**			

GOAL 2: REDUCE FLOOD DAMAGE IN THE NORTH BRANCH CHICAGO RIVER WATERSHED

Objective 3: Maintain and manage the river corridor and other drainageways to preserve conveyance of stormwater. • Remove large debris blockages that are obstructing drainageways. • Review environmentally sound standards and procedures for regular channel maintenance. • Adopt a schedule for regular maintenance of hydraulic structures such as bridge culverts to prevent sediment and debris blockages.	**Scale** **Poor**	**Good**	**Excellent**
Short Term Milestones and Measurable Goals (0-5 years)			
1. Remove debris. Perform quarterly monitoring and remove if observed. If more than two blockages per year, investigate and consider removing source.	0	1	2
2. Review and perform regular stream maintenance schedule. Perform annual audit to ensure maintenance is being performed.	0	1	2
3. Develop and implement standards for inspection of hydraulic structures. Perform annual audits.	0	1	2
Poor: Have not attempted **Poor: 0-1** **Good: Some effort** **Good: 2-3** **Excellent: Task completed** **Excellent: >3**			

GOAL 2: REDUCE FLOOD DAMAGE IN THE NORTH BRANCH CHICAGO RIVER WATERSHED

Objective 4: Mitigate flood damages using both remedial and preventative measures including property protection. • Sanitary sewer infiltration problems that result in flood damage from backups should be targeted for repair. • Identify individual addresses of buildings at risk of flooding and prioritize buildings at greatest risk. • Provide technical assistance to property owners in high priority flood prone areas to use wet/dry flood proofing, building elevation and other approved measures to reduce flood losses. • Develop sources for combined county and municipal cost share fund to meet local match requirements for acquisition or relocation of flood prone buildings. • Sponsor flood proofing workshops in areas of high risk. • Provide flood hazard area maps and data to agencies involved in flood mitigation.	**Scale**		
	Poor	**Good**	**Excellent**
Short Term Milestones and Measurable Goals (0-5 years)			
1. Televise sewer system in flood problem areas. Identify illegal connections and sources of significant infiltration. Develop plan to disconnect or repair and complete 50% of system.	0	1	2
2. Identify individual addresses of buildings at risk and prioritize high risk buildings. Target 10% participation rate by property owners.	0	1	2
3. Identify cost-share funds. Coordinate bi-annual flood hazard notification program include survey.	0	1	2
4. Identify funding sources. Develop list. Review and revise annually.	0	1	2
5. Sponsor and coordinate flood proofing workshops. Conduct one workshop within one month of notifying property owners.	0	1	2
6. Develop flood hazard area map. Provide to 100% of municipalities and agencies involved in flood mitigation.	0	1	2
Poor: Have not attempted **Good: Some effort** **Excellent: Task completed** **Poor: 0-3** **Good: 4-6** **Excellent: >6**			

GOAL 2: REDUCE FLOOD DAMAGE IN THE NORTH BRANCH CHICAGO RIVER WATERSHED

Objective 5: Determine potential locations and feasibility of regional stormwater detention sites. • Secure funding for study. • Determine need for new flood detention reservoirs. • Locate potential sites for multi-objective and environmentally sensitive regional flood detention in addition to existing in-holdings if need is determined.	**Scale** **Poor**	**Good**	**Excellent**
Short Term Milestones and Measurable Goals (0-5 years)			
1. Research possible funding for study and secure funds.			
2. Determine need for new flood detention reservoirs in the watershed.	0	1	2
3. Locate potential sites for multi-objective and environmentally sensitive regional flood detention in addition to existing in-holdings.	0	1	2
4. Complete feasibility study for recommended regional detention studies and construct 50% of identified projects.	0	1	2
Poor: Have not attempted **Good: Some effort** **Excellent: Task completed** **Poor: 0-2** **Good: 3-4** **Excellent: >4**			

GOAL 3: PROTECT AND ENHANCE NATURAL RESOURCES AND PROVIDE ASSOCIATED RECREATIONAL OPPORTUNITIES

Objective 1: Protect and restore wetlands and streams to improve water quality and aquatic habitat. • Restore stream and aquatic habitat. • Replace turf grass around detention ponds and other wetlands with native plant buffers. • Convert dry bottom into wetland designed detention ponds. • Prioritize potential wetland restoration sites based on benefits derived from location, land owner cooperation and fundability. • Initiate private/public partnership and identify cost-share funding for wetland restoration projects. • Develop management plans for ADID wetlands. • Identify sites and pursue development of wetland mitigation bank. • Develop a communication system between USACE, SMC, and communities as a follow-up monitoring and enforcement of wetland permit requirements. • Increase buffer width requirements in WDO. • Where possible re-meander stream under baseflow conditions to aerate water and improve aquatic habitat. • Use native vegetation extensively in BMPs to enhance habitat.	**Scale**		
	Poor	**Good**	**Excellent**
Short Term Milestones and Measurable Goals (0-5 years)			
1. Establish a plan for restoration including the addition of pool/riffle complexes, planting emergent vegetation, and re-meandering. Identify potential sites for restoration.	0	1	2
2. Use detention basin inventory to determine areas where turf grass needs to be replaced.	0	1	2
3. Meet with land owners and visit locations.	0	1	2
4. Create a list of wetland sites that should be restored first.	0	1	2
5. Initiate meetings with interested organizations to discuss wetland restoration and cost-share funding.	0	1	2
6. Compile a list of ADID wetlands.	0	1	2
7. Identify sites in the watershed for the wetland mitigation bank.	0	1	2
8. Meet with USACE and local communities about enforcing wetland permit requirements.	0	1	2
9. Change the WDO to increase the buffer width requirements for streams, wetlands, lakes, and ADID wetlands.	0	1	2
10. Determine areas that it is possible to re-meander streams.	0	1	2
11. Review management plans for use of native vegetation and increase the amount used.	0	1	2
Poor: Have not attempted **Poor: 0-5** **Good: Some effort** **Good: 6-11** **Excellent: Task completed** **Excellent: >11**			

GOAL 3: PROTECT AND ENHANCE NATURAL RESOURCES AND PROVIDE ASSOCIATED RECREATIONAL OPPORTUNITIES

Objective 2: Protect and enhance plant communities and wildlife habitats. • Identify opportunities for habitat improvement on existing open and partially open space parcels. • Work with municipalities and county agencies • Connect open space areas with conservation corridors. • Develop coordinated program to protect remaining high quality natural sites through public or conservation organization acquisition or conservation easements.	**Scale** **Poor**	**Good**	**Excellent**
Short Term Milestones and Measurable Goals (0-5 years)			
1. Meet with municipalities and county agencies and show them an open space network map and explain benefits.	0	1	2
2. Discuss separate zoning class on maps.	0	1	2
3. Determine areas available for habitat improvement.	0	1	2
4. Identify the most important open spaces to connect.	0	1	2
5. Meet with conservation groups and other agencies about protecting high quality habitat in the area.	0	1	2
Poor: Have not attempted **Good: Some effort** **Excellent: Task completed** **Poor: 0-2** **Good: 3-5** **Excellent: >5**			

GOAL 3: PROTECT AND ENHANCE NATURAL RESOURCES AND PROVIDE ASSOCIATED RECREATIONAL OPPORTUNITIES

Objective 3: Identify and develop potential areas for river-based recreational opportunities such as hiking, fishing, canoeing, running, and biking. • Develop partnership with municipalities, park districts, schools, and forest preserve district to prioritize and coordinate implementation of northeastern Illinois greenways and trails and NBOSP recommendations. • Sponsor recreational programs in North Branch watershed. • Increase public access to river with canoe launches, fishing sites and trails where appropriate. • Provide east-west and north-south trail connections within and between communities and regional trails. • Identify current and future active and passive recreation needs and match with appropriate open space.	**Scale** **Poor**	**Good**	**Excellent**
Short Term Milestones and Measurable Goals (0-5 years)			
1. Meet with appropriate agencies to discuss addition of northeastern Illinois greenways and trails and NBOSP.	0	1	2
2. Create recreational programs for the public throughout the year.	0	1	2
3. Determine appropriate areas for increase public river access. Create and inform the public of new access.	0	1	2
4. Work with communities to identify locations where trail connections can be made.	0	1	2
5. Work with communities to determine recreation needs. Determine the number of communities participating.	0	1	2
Poor: Have not attempted **Good: Some effort** **Excellent: Task completed** **Poor: 0-2** **Good: 3-5** **Excellent: >5**			

GOAL 4: DEVELOP A PUBLIC INFORMATION AND EDUCATION PROGRAM WITHIN THE WATERSHED COMMUNITIES

Objective 1: Develop and implement a schools-based river curriculum. • Target teachers in Lake and Northern Cook counties for CRSN workshops. • Conduct annual "Rivers Project" teacher training program. • Hold annual Chicago River Student Congress. • Publish "CRSN Notes", a network newsletter. • Develop and institute a corporate adopt-a-school program that would enlist corporate financial support and classroom mentors. • Put Chicago River Educator's Resource Guide on the Friends web page.	**Scale**		
	Poor	**Good**	**Excellent**
Short Term Milestones and Measurable Goals (0-5 years)			
1. Compile a list of schools and teachers in Lake and northern Cook counties.	0	1	2
2. Compile a list of target schools, student groups, and volunteer organizations with an interest in the Chicago River Student Congress. Develop a list of possible topics and presenters.	0	1	2
3. Identify target audience for "CRSN Notes".	0	1	2
4. Develop and distribute information packets and other publicity tools.	0	1	2
5. Create a list of target schools and corporate sponsors. Research financial support needs and educational programs to be implemented. Match participating schools with sponsors.	0	1	2
6. Add the Chicago River Educator's Resource Guide to the Friends website.	0	1	2
Poor: Have not attempted **Poor: 0-3** **Good: Some effort** **Good: 4-6** **Excellent: Task completed** **Excellent: >6**			

GOAL 4: DEVELOP A PUBLIC INFORMATION AND EDUCATION PROGRAM WITHIN THE WATERSHED COMMUNITIES

Objective 2: Provide watershed public information and education for community leaders and the public. • Make slide show presentations. • Conduct topic workshops for targeted groups and organize field trip series to demonstrate BMPs. • Coordinate annual watershed workshop for municipalities and other watershed partners to evaluate progress on plan implementation and update. • Create brochures and fact sheets with information such as recreation opportunities, ordinance summaries, and education opportunities. • Create newsletter or newspaper articles to inform the public of various watershed issues including meetings and events. • Use media outlets to circulate watershed information focusing on public service announcements or local event advertisements.	**Scale**		
	Poor	**Good**	**Excellent**
Short Term Milestones and Measurable Goals (0-5 years)			
1. Compile a list of possible topics and target audiences.	0	1	2
2. Organize at least one workshop or field tour to demonstrate BMPs.	0	1	2
3. Create a list of target schools and corporate sponsors. Research financial support needs and educational programs to be implemented. Match participating schools with sponsors.	0	1	2
4. Compile a list of publicity tools and locations for distribution. Create at least one for distribution to residents within the watershed.	0	1	2
5. Compile a list of publications willing to feature watershed articles.	0	1	2
6. Compile a list of the agencies willing to partner with and to develop cost-share public service announcements and event advertisements.	0	1	2
Poor: Have not attempted **Poor: 0-3** **Good: Some effort** **Good: 4-6** **Excellent: Task completed** **Excellent: >6**			

GOAL 4: DEVELOP A PUBLIC INFORMATION AND EDUCATION PROGRAM WITHIN THE WATERSHED COMMUNITIES

Objective 3: Improve stewardship of the North Branch Chicago River and its aquatic resources by increasing public participation in the upkeep of the River. • Promote high profile watershed projects that include hands on public participation in restoration activities. • Develop stormsewer marker program in watershed. • Research need and feasibility of expanding the Friends clean-up day to 2 days per year. • Reinstate funding for RiverWatch program in watershed by targeting high schools, college, and other volunteer organizations.	**Scale** **Poor**	**Good**	**Excellent**
Short Term Milestones and Measurable Goals (0-5 years)			
1. Compile a list of future watershed projects that could include public participation.	0	1	2
2. Identify marker locations suitable for the safety of all volunteers.	0	1	2
3. Research need and interest in expanding the current river clean-up day from one day in the spring to include one day in the fall.	0	1	2
4. Compile list of interested parties and provide with RiverWatch materials and kits for testing.	0	1	2
5. Create a list of target schools and corporate sponsors. Research financial support needs and educational programs to be implemented. Match participating schools with sponsors.	0	1	2
Poor: Have not attempted **Poor: 0-2** **Good: Some effort** **Good: 3-5** **Excellent: Task completed** **Excellent: >5**			

GOAL 4: DEVELOP A PUBLIC INFORMATION AND EDUCATION PROGRAM WITHIN THE WATERSHED COMMUNITIES

Objective 4: Identify open space parcels adjacent to or near schools or existing public facilities that would be appropriate for outdoor education. • Review open space parcels adjacent to and near schools identified in the NBOSP. • Prioritize protection and restoration of open space parcels identified for education and recreation. • Identify cost-share opportunities to create education and recreation areas. • Develop outdoor recreation and education areas.	**Scale**		
	Poor	**Good**	**Excellent**
Short Term Milestones and Measurable Goals (0-5 years)			
1. Compile a list of open space parcels near schools or other public properties from the NBOSP.	0	1	2
2. Review condition and ownership of open space parcels identified as appropriate for educational needs. Prioritize protection and restoration based on these characteristics.	0	1	2
3. Identify interested parties in cost-share opportunities to purchase and restore open space parcels for educational needs.	0	1	2
4. Determine parcels to be purchased and restored for educational purposes within the next 5 years.	0	1	2
Poor: Have not attempted **Poor: 0-2** **Good: Some effort** **Good: 3-4** **Excellent: Task completed** **Excellent: >4**			

GOAL 5: IMPROVE PARTICIPATION AND COORDINATION IN WATERSHED IMPROVEMENT ACTIVITIES

Objective 1: Coordinate North Branch Chicago River Watershed Plan implementation activities. • Establish criteria for objectively ranking watershed projects for funding recommendations. • Evaluate and update watershed plan. • Offer technical expertise and assistance to watershed stakeholders. • Incorporate North Branch watershed plan recommendations into regional, county, and municipal plans.	**Scale**		
	Poor	**Good**	**Excellent**
Short Term Milestones and Measurable Goals (0-5 years)			
1. Create objective criteria to apply to ranking watershed projects and funding recommendations.	0	1	2
2. Identify problems within the watershed plan. Also determine which parts of the plan are effective and ineffective.	0	1	2
3. Identify a plan of action on how assistance will be provided to watershed stakeholders.	0	1	2
4. Compile a list of all regional plans targeted for incorporation.	0	1	2
Poor: Have not attempted **Poor: 0-2** **Good: Some effort** **Good: 3-4** **Excellent: Task completed** **Excellent: >4**			

GOAL 5: IMPROVE PARTICIPATION AND COORDINATION IN WATERSHED IMPROVEMENT ACTIVITIES

Objective 2: Educate and encourage public and private landowners to increase their involvement in implementing best management practices. • Coordinate watershed restoration projects and develop cost-share funding for BMPs. • Work with communities to review municipal ordinances and procedures to determine their impact on watershed protection. • Establish cooperative working relationship with municipal and county inspectors and enforcement to monitor wetland mitigation. • SMC will lead in developing a MOA with drainage districts that formalizes what practices can or cannot be done in easement. • SMC will lead in establishing a funding partnership between drainage districts and outfall owners for maintenance and repair. • Coordinate with Great Lakes Naval Training Center on developing BMP projects on GLNTC properties. • Institute annual policy and legislative meetings in the watershed.	**Scale** **Poor**	**Good**	**Excellent**
Short Term Milestones and Measurable Goals (0-5 years)			
1. Begin to develop a cost-share funding program and set up and carry out watershed restoration projects.	0	1	2
2. Set up workshops/ meetings with communities to review ordinances and procedures. Establish a website for ordinance review.	0	1	2
3. Prepare a list of individuals willing to cooperation would be critical to monitoring wetland mitigation.	0	1	2
4. Hold meetings with drainage district to determine appropriate restoration/ stabilization practices.	0	1	2
5. Coordinate meetings for drainage districts and outfall owners to establish funding partnership for outfall maintenance.	0	1	2
6. Meet with officials from GLNTC to discuss property and BMPs.	0	1	2
7. Determine who should be involved in the policy meeting and where and when it should be held.	0	1	2
Poor: Have not attempted **Good: Some effort** **Excellent: Task completed** **Poor: 0-3** **Good: 4-7** **Excellent: >7**			

GOAL 5: IMPROVE PARTICIPATION AND COORDINATION IN WATERSHED IMPROVEMENT ACTIVITIES

Objective 3: Increase river and watershed monitoring efforts and coordinate data sharing. • Develop and implement procedure and schedule for stream condition monitoring. • Establish a regular monitoring program using hand held equipment that is designed to assess known problem areas. • Monitor one watershed project that includes several BMPs as a demonstration project. • Promote expansion of RiverWatch, ForestWatch, and WetlandWatch sites for volunteer monitoring. • Form a watershed subcommittee to develop collection and reporting standards for monitoring, expand the number of sites and share data at quarterly meetings. • Adopt water quality testing protocols and establish the Chicago River Data Base to contain data.	**Scale**		
	Poor	**Good**	**Excellent**
Short Term Milestones and Measurable Goals (0-5 years)			
1. Develop procedures and schedule for stream monitoring and establish procedures for notifying municipalities and private landowners if there is a reduction in stream condition.	0	1	2
2. Create and implement a monitoring program that assesses water quality. Purchase all hand held equipment necessary.	0	1	2
3. Compile a list of ongoing and planned watershed projects with BMPs.	0	1	2
4. Provide more workshops promoting RiverWatch, ForestWatch, and WetlandWatch to increase awareness and interest.	0	1	2
5. Compile a list of people to form a watershed subcommittee.	0	1	2
6. Research water quality testing procedures and protocols.	0	1	2
Poor: Have not attempted **Good: Some effort** **Excellent: Task completed**	**Poor: 0-3** **Good: 4-6** **Excellent: >6**		

SHORT TERM MILESTONE SCORECARD TOTALS

Milestone and Measurable Goals	**Score**
Goal 1: Improve Water Quality in the North Branch Chicago River.	
Medium Range Extra Credit: # of Medium Range Goals completed x 1.0 = extra credit score	
Long Term Extra Credit: # of Long Term Goals completed x 1.0 = extra credit score	
Goal 2: Reduce flood damage in the North Branch Chicago River watershed.	
Medium Range Extra Credit: # of Medium Range Goals completed x 1.0 = extra credit score	
Long Term Extra Credit: # of Long Term Goals completed x 1.0 = extra credit score	
Goal 3: Protect and enhance natural resources and provide associated recreational opportunities.	
Medium Range Extra Credit: # of Medium Range Goals completed x 1.0 = extra credit score	
Long Term Extra Credit: # of Long Term Goals completed x 1.0 = extra credit score	
Goal 4: Develop a public information and education program within the watershed communities.	
Medium Range Extra Credit: # of Medium Range Goals completed x 1.0 = extra credit score	
Long Term Extra Credit: # of Long Term Goals completed x 1.0 = extra credit score	
Goal 5: Improve participation and coordination in watershed improvement activities.	
Medium Range Extra Credit: # of Medium Range Goals completed x 1.0 = extra credit score	
Long Term Extra Credit: # of Long Term Goals completed x 1.0 = extra credit score	
Poor: Have not attempted **Poor: 0-55** **Good: Some effort** **Good: 56-110** **Excellent: Task completed** **Excellent: >110**	**Grand Total:**

*Extra credit is given when Medium and Long Term Milestones and Measurable Goals have been achieved. For every Medium Range Goal achieved, a credit value of 1.0 points is given. For every Long Term Goal achieved, a credit value of 1.0 point is given.

Goal 1: Improve Water Quality in the North Branch Chicago River.

Objective 1: Reduce nonpoint and point source pollutant loadings from runoff by some measurable standard.

Programmatic Action Plan No.	Action Recommendation	Short Term Milestone and Measurable Goals (0-5 years)	Medium Range Milestone and Measurable Goals (5-10 years)	Long Term Milestones and Measurable Goals (10-20 yrs)
1.1	Develop recommendations for planting native vegetation that increases stormwater infiltration and reduces pollution. Review and update landscaping recommendations/requirements in local ordinances to provide regulatory incentives that encourage native landscapes.	Research native vegetation limitations and begin developing recommendations on the type of vegetation that will best meet the goals of a stormwater infiltration and pollution reduction.	Implement recommendations in local ordinances. Coordinate public awareness information packets. Track and record the number of ordinance changes.	Review and revise recommendations and ordinance requirements. Update as necessary.
1.2	Educate landowners in the watershedto the benefits of replacing turf lawns with native landscaping to infiltrate and filter runoff and provide habitat benefits. Identify corporate campus, industrial park, institution or other large sites to act as native vegetation retrofit demonstration sites for runoff reduction and water quality improvement.	Compile a list of education tools (i.e. brochures, posters, magnets, workshops, etc.) and locations for distribution.	Create and distribute tools to educate homeowners and businesses about the benefits of native landscaping. Track and record the number and type of education told implemented, locations of distribution, and estimated circulation.	Revise type and distribution of education tools based on information tracked and recorded.
1.3	Replace turf in road R-O-Ws with native vegetation to reduce and filter runoff and provide habitat benefits.	Identify high priority areas for native vegetation replacement.	Work with the DOT to begin replacing turfgrass in the high priority areas with native vegetation. Track and record all project areas.	Same as medium range.
1.4	Retrofit detention basins for improved water quality, to restrict flow rate (to reduce in channel erosion), for increased storage and for habitat and aesthetic benefits. Develop incentive program and funding sources to support retrofits.	Determine which are feasible for retrofits. Perform modeling and prepare construction plans to retrofit outlets. Construct new outlet for 50% of identified ponds.	Manage and maintain basin according to maintenance and monitoring plan in Appendix K. Evaluate flood complaints and compare against complaints from past storms of similar magnitude to see whether complaints and flood levels have decreased or remained steady. Also, begin process for the next 50% of retrofit basins.	Same as medium range. If flooding has increased, consider expanding basin or constructing additional basins in watershed.
1.5	Prioritize and retrofit outfalls to add water quality treatment through created wetland pockets or appropriate filters (vegetative, sand or others).	Determine which are feasible for retrofits. Perform modeling and prepare construction plans to retrofit outfalls.	Manage and maintain outfalls according to maintenance and monitoring plan in Appendix K. Evaluate effectiveness of filters based on water quality comparisons.	If water quality has not changed, consider use of different types of filters.
1.6	Identify demonstration sites for application of water quality filters (sand or otherwise).	Construct or identify at least one demonstration site for each type of filtration BMP. Develop and distribute public education materials. Educate public, consultants, developers, and municipalities about each types of filtration BMP.	Continue an annual seminar. Determine need for new demonstration sites.	Same as medium range.
1.7	Develop a non-point source reduction program for commercial facilities and homeowners and pilot test it in a targeted sub-basin or neighborhood.	Compile a list of training tools (i.e. brochures, posters, magnets, workshops, etc.) and locations for distribution. Educate commercial facilities and homeowners about the non-point source reduction program.	Evaluate the effectiveness of the program. Record the number of homeowners and commercial facilities participating in the program.	Same as medium range.
1.8	Encourage stringent review during renewal of NPDES permits to ensure that IEPA water quality standards are being met. Contributions of phosphorus and other pollutants of concern also need to be addressed in NPDES permits.	Compile a list of all NPDES permits that are in the process of renewal. Encourage IEPA to apply more stringent water quality standards.	Same as short term.	Same as short term.
1.9	Determine source(s) of high fecal coliform found throughout the river and make recommendations for source reduction.	Investigate probable sources of high fecal coliform. When the cause is located, begin identifying solutions.	Implement solutions and recommendations for fecal coliform source reduction.	Same as medium range.
1.10	Institute a community program to inspect stormsewer outfalls to identify and test potential inflow/infiltration of wastewater and contaminant discharges into the stormsewer system consistent with NPDES Phase II requirements.	Compile a list of training tools (i.e. brochures, posters, magnets, workshops, etc.) and locations for distribution. Educate community members on the outfall inspection program.	Evaluate the effectiveness of the program. Record the number of homeowners and commercial facilities participating in the program.	Same as medium range.
1.11	Provide required training for enforcement officers and field staff to improve enforcement of SE/SC and other water quality provisions of WDO in certified communities.	Compile a list of training tools (i.e. brochures, posters, magnets, workshops, etc.) and locations for distribution.	Conduct annual seminars to train field staff and enforcement officers. Track the number of staff participating and the number of seminars held and tools distributed.	Revise type and distribution of education tools based on information tracked and recorded.
1.12	Encourage uniform application of water quality treatment requirements in WDO by certified communities by focusing on water quality in recertification review.	Compile a list of all certified communities in recertification review.	Focus on water quality during review process. Encourage uniform application of requirements.	Same as medium range.
1.13	Maintain open space and install best management practices that infiltrate and treat all stormwater runoff on-site. Use voluntary incentives or regulatory requirements for implementation.	Identify open space parcels suitable for infiltration BMPs and development. Review condition and ownership of open space parcels. Prioritize and implementation based on these characteristics.	Implement BMPs in open space parcels identified. Record the number of BMPs and the results of treatment.	Same as medium range.
1.14	Require that all detention basins for new development be wet-bottom/wetland basins that provide water quality treatment (WDO amendment).	Write new ordinance language. Adopt ordinance. Plan seminars to educate developers, engineers, communities. Hold seminar in first year of newly adopted ordinance.	Audit all certified communities once during 5-yr period to confirm conformance with new ordinance.	Same as medium range.

[1] See Table 5-1 for a list of organization abbreviations.

Programmatic Action Plan No.	Action Recommendation	Short Term Milestone and Measurable Goals (0-5 years)	Medium Range Milestone and Measurable Goals (5-10 years)	Long Term Milestones and Measurable Goals (10-20 yrs)
Objective 2: Reduce streambank and stream bed erosion.				
1.15	Set up one or more public demonstration sites for native streambank vegetation restoration and management, and where feasible, replace non-native invasive plan species along stream channels and banks with deep-rooted native plants.	Construct or identify at least one demonstration site. Develop and distribute public education materials. One-on-one meeting on site with public, consultants, developers, and municipalities to educate.	Continue an annual seminar. Determine need for new demonstration sites.	Same as medium range.
1.16	Stabilize eroded streambanks and tributary swale/gullies using appropriate soil bio-engineering techniques.	Identify bio-engineering techniques appropriate for the sites. Prioritize areas based on degree of erosion. Begin stabilizing high priority areas.	Continue stabilizing areas based on prioritization. Record the type of stabilization methods used and the number of stream reaches stabilized.	Same as medium range.
1.17	Replace and stabilize erosive/failed outfalls and hydraulic structures.	Develop and implement standards for inspection and maintenance of hydraulic structures and outfalls. Prioritize outfall/hydraulic structure replacement and repair. Begin repairing/replacing high priority structures.	Perform annual audit to insure maintenance and replacement is occurring as scheduled. Record the number of structures repaired and replaced.	Same as medium range.
1.18	Review stream maintenance standards developed in Appendix K for streambank stabilization and riparian zone/buffer vegetation maintenance that include soil bio-engineering techniques and vegetation appropriate to North Branch conditions.	Develop and implement standards. Develop and implement regular stream maintenance schedule. Conduct seminar to educate maintenance workers on best practices and schedule. Perform annual audit to insure maintenance is occurring as scheduled. If maintenance is not being performed according to procedure or schedule, conduct additional seminars and/or revisit procedure/schedule and revise as necessary.	Perform annual audit to insure maintenance is occurring as scheduled. If maintenance is not being performed according to procedure or schedule, conduct additional seminars and/or revisit procedure/schedule and revise as necessary. Record the feet of streambank stabilized.	Same as medium range.
Objective 3: Correct wastewater overflow conditions that have a significant impact on water quality.				
1.19	Assess wastewater treatment plant capacity at Clavey Road and determine whether maximum treatment capacity should be expanded to double the daily average flow per IEPA inspection report.	Determine the current capacity of the treatment plant and the implications of future development on the plant.	Determine if the treatment plant should be expanded. If so, begin engineering process to design the expansion.	Re-evaluate the capacity of the treatment plant and determine if future development will require an increase in plant capacity.
1.20	Conduct first flush analysis and convert to composite sampling at Deerfield WWTP excess flow facilities.	Conduct and analyze first flush analysis.	Evaluate results from the analysis.	Same as medium range.
1.21	Remedy incomplete treatment problems identified in IEPA inspection reports for Deerfield excess flow facilities.	Identify causes and solutions for the incomplete treatment problems. Prioritize solutions and begin implementation.	Evaluate results from implementation. Determine if problems have been corrected.	Same as medium range.
1.22	Based on NSSD I&I study, identify areas of high inflow/infiltration and target as high priority areas for evaluating seals on sanitary sewer manhole lids. Replace with watertight seals/lids.	Identify areas of high priority based on NSSD I&I study. Evaluate seals on sanitary sewer manholes and replace if necessary.	Re-evaluate high priority areas and continue inspections and replacement of sanitary manhole lids.	Same as medium range.
1.23	Based on NSSD I&I study, identify and eliminate illicit downspout, storm drain and/or sump pump hookups in areas of high inflow. Implement IDDE program	Identify areas of high priority based on NSSD I&I study. Visually inspect stormsewers to determine source of illicit connection. Remove 50% of high priority illicit connection.	Re-evaluate high priority areas and continue inspections for illicit connections.	Same as medium range.
1.24	Educate homeowners and businesses concerning the problems with illicit hookups and identify cost-share and other incentives to reduce/eliminate illicit hookups on private property.	Compile a list of education tools (i.e. brochures, posters, magnets, workshops, etc.) and locations for distribution.	Create and distribute tools to educate homeowners and businesses about the problems with illicit connections. Track and record the number and type of education told implemented, locations of distribution, and estimated circulation.	Revise type and distribution of education tools based on information tracked and recorded.
Objective 4: Protect and restore riparian greenways and buffers along and around all water resources.				
1.25	Identify open space parcels in proximity to water resources that are suitable for best management practices to infiltrate or filter stormwater runoff.	Review condition and ownership of open space parcels suitable for Best Management Practices. Prioritize protection and implementation based on these characteristics.	Begin working with landowners to protect and install BMPs on open space parcels indentified. Record the number of sites with BMPs and type of BMP installed.	Same as medium range.
1.26	Install best management practices on parcels with open space that include or are adjacent to non-point source pollution hotspots or pollution point sources (National Pollutant Discharge Elimination System permitted facilities).	Review condition and ownership of open space parcels suitable for Best Management Practices. Prioritize protection and implementation based on these characteristics.	Begin purchasing and installing BMPs on open space parcels identified. Record the number of sites with BMPs and type of BMP installed.	Same as medium range.

[1] See Table 5-1 for a list of organization abbreviations.

Goal 2: Reduce flood damage in the North Branch Chicago River watershed.

Programmatic Action Plan No.	Action Recommendation	Short Term Milestone and Measurable Goals (0-5 years)	Medium Range Milestone and Measurable Goals (5-10 years)	Long Term Milestones and Measurable Goals (10-20 yrs)
Objective 1: Reduce flow rates and volumes from existing developed areas and prevent increases in flow rates and volumes from new development.				
2.1	Perform more detailed hydrology and hydraulics modeling on the watershed using up-to-date topography to provide a rigorous assessment of release rate alternatives. Include build out land use conditions with existing WDO detention requirements compared to other release rates.	Estimate build-out land use conditions. Perform modeling. Perform rigorous assessment of release rate alternatives. Adopt new ordinance reflecting new release rate recommendation.	Ordinance adopted and enforced.	Ordinance adopted and enforced.
2.2	Reduce allowable release rates from new developments and redeveloped sites in the North Branch Watershed to .10 cfs per acre for the 100 year 24 hour storm event.	Perform study to determine effects of reducing the allowable release rates. Write new ordinance language. Adopt ordinance. Plan seminars to educate developers, engineers, communities. Hold three seminars in first year of newly adopted ordinance.	Audit all certified communities once during 5-yr period to confirm conformance with new release rate. Perform annual evaluation of flood complaints and compare against complaints from past storms of similar magnitude to see whether complaints and flood levels have decreased or remained steady. If flooding has increased, re-evaluate release rate and consider revising ordinance to stricter standards.	Evaluate landscape requirements changes.
2.3	Identify opportunity sites for installing new multi-objective detention basins on vacant lots or in parks (Target Flood Problem Areas).	Identify sites. Acquire sites. Perform modeling and prepare construction plans to create new basin. Construct basin in 50% of identified sites.	Manage and maintain basin according to maintenance and monitoring plan in Appendix K. Evaluate flood complaints and compare against complaints from past storms of similar magnitude to see whether complaints and flood levels have decreased or remained steady. Also, begin process for next 50% of identified sites.	Same as medium range. If flooding has increased, consider expanding basin or constructing additional basins in watershed.
2.4	Identify older detention ponds where smaller restrictors could be installed to better control flows from more frequent rain events and reduce in-stream erosion. Assess feasibility of increasing volume of existing detention ponds.	Identify ponds. Determine which are feasible for retrofits. Perform modeling and prepare construction plans to retrofit outlets. Construct new outlets for 50% of identified ponds.	Manage and maintain basin according to maintenance and monitoring plan in Appendix K. Evaluate flood complaints and compare against complaints from past storms of similar magnitude to see whether complaints and flood levels have decreased or remained steady. Also, begin process for the next 50% of retrofit basins.	Same as medium range. If flooding has increased, consider expanding basin or constructing additional basins in watershed.
2.5	Disconnect roof-top runoff from the storm sewer system wherever possible in new developments and in existing developed areas. Reduce drainage assessment or offer rebate for properties with disconnected rooftops.	Identify existing properties with connected downspouts. Offer rebate or reduce drainage assessment for properties that disconnect. Disconnect 50% of existing properties. Revise ordinance to prohibit direct connections in new developments.	Disconnect next 25% of existing properties.	Disconnect final 25% of existing properties.
2.6	Create floodplain zoning regulations to protect floodplain areas and wetland areas from development.	Write new language. Adopt language. Plan seminars to educate developers, engineers, communities. Hold three seminars in first year of newly adopted language.	Manage and maintain outfalls according to maintenance and monitoring plan in Appendix K. Evaluate effectiveness of filters based on water quality comparisons.	Same as medium range.
2.7	Retrofit existing sites to include infiltration devices.	Construct or identify at least one demonstration site for each type of BMP. Develop and implement cost sharing program. Develop and distribute public education materials. Conduct an annual seminar to educate public, consultants, developers, and municipalities. Target 10 retrofits in first five years.	Continue annual seminar. Target 25 sites retrofit to include infiltration BMPs.	Continue annual seminar. Target additional 25 sites to retrofit site to include infiltration BMPs.
2.8	Educate residents and businesses and provide cost-share incentives to install infiltration trenches or basins, rain barrels, or rain gardens where soil conditions are favorable to collect rooftop, driveway and parking lot runoff. Identify demonstration sites appropriate for application of infiltration devices, and permeable paving block or porous pavement. Encourage preventative actions.	Construct or identify at least one demonstration site for each type of BMP. Develop and implement cost sharing program. Develop and distribute public education materials. Conduct annual seminars to educate public, consultants, developers, and municipalities. Target 25% of new development sites to use infiltration BMPs (if soils are appropriate).	Continue annual seminar. Target 33% of new development sites to use infiltration BMPs where soils support such BMPs. Target 25 sites and retrofit to include infiltration BMPs.	Continue annual seminar. Target 50% of new development sites to use infiltration BMPs where soils support such BMPs. Target additional 25 sites to retrofit site to include infiltration BMPs. Record the number of rain barrels sold, the number of rain garden projects, the amount of money spent on rain gardens, and the number of brochures given to the public regarding infiltration.
2.9	Encourage alternative site designs to use runoff reduction hierarchy and reduce impervious areas, preserve natural features, use alternative streetscapes and use natural drainage measures. Attach detention reduction and density incentives to installation of BMP treatment trains and application of the runoff volume reduction hierarchy in the WDO.	Write new ordinance language. Adopt ordinance. Plan seminars to educate developers, engineers, communities. Hold three seminars in first year of newly adopted ordinance.	Audit all certified communities once during 5-yr period to confirm conformance with new ordinance changes. Perform annual evaluation of flood complaints and compare against complaints from past storms of similar magnitude to see whether complaints and flood levels have decreased or remained steady. Target 33% of new development sites using infiltration BMPs (where soils allow.)	Same as medium range. Increase target to 50% of new developments, where soils permit infiltration.

[1] See Table 5-1 for a list of organization abbreviations.

Programmatic Action Plan No.	Action Recommendation	Short Term Milestone and Measurable Goals (0-5 years)	Medium Range Milestone and Measurable Goals (5-10 years)	Long Term Milestones and Measurable Goals (10-20 yrs)
Objective 2: Protect and restore floodplain functions.				
2.10	Buyout repetitively flooded properties in floodplains and relocate or demolish buildings to restore floodplain function.	Identify repetitive loss structures. Buyout or relocate 50% of repeat loss structures.	Buyout or relocate remaining 50% of structures. Develop plans to restore natural floodplain functions to 50% of buyout sites.	Develop plans to restore natural floodplain functions to remaining 50% of sites.
2.11	Identify opportunity areas and funding partners for wetland and floodplain restoration.	Identify opportunity areas and funding partners. Engage partners in projects and apply for funding where possible. Perform annual review of funding list and update as needed. Educate public (developers, consultants, municipalities) about funding and cost sharing opportunities in annual meeting.	Same as short term.	Same as short term.
2.12	Identify and acquire (purchase, donation or conservation easements) remaining undeveloped wetlands and floodplains and maintain as open space. Identify and acquire open parcels identified in the NBOS plan as suitable for wetland restoration, detention basins and/or flood storage that are located near flood problem areas.	Inventory undeveloped floodplain that is not currently protected from development. Acquire 50% of parcels during first 5 years. Perform annual inventory of sites to insure no development has occurred. If development has occurred on protected property, determine the means of protection (conservation easement, land trust, etc) and evaluate whether that means is appropriate for other protected sites.	Acquire next 50% of parcels during second five years. Perform annual inventory of parcels to insure no development has occurred. If development has occurred on protected property, determine the means of protection (conservation easement, land trust, etc) and evaluate whether that means is appropriate for other protected sites.	Perform annual inventory of parcels to insure no development has occurred. If development has occurred on protected property, determine the means of protection (conservation easement, land trust, etc) and evaluate whether that means is appropriate for other protected sites.
2.13	Protect wetlands and floodplains using land use management techniques such as a special zoning classification and/or more stringent restrictions on floodplain development in the WDO.	Evaluate options for new language (ordinance, zoning classification, etc). Write new language. Adopt language. Plan seminars to educate developers, engineers, communities. Hold seminar in first year of new language.	Audit all certified communities once during 5-yr period to confirm conformance with new language changes. Perform annual inventory of parcels to insure new development meets objective of new language. If development does not meet objective then consider revisions to language or additional educational seminars.	Same as medium range.
Objective 3: Maintain and manage the river corridor and other drainageways to preserve conveyance of stormwater in an environmentally-friendly manner.				
2.14	Remove large debris blockages that are obstructing drainage ways.	Remove debris. Perform annual monitoring of debris blockages and remove debris if observed. If more than two blockages occur in a single year, identify source of debris and analyze whether actions can be taken to minimize introduction of debris into waterway. Implement actions to minimize debris.	Evaluate the number of clean-up events, the number of people involved, and take photos of trash removed.	Same as short term.
2.15	Review environmentally sound standards and procedures for regular channel maintenance developed in Appendix K to preserve conveyance and adopt a schedule for regular stream maintenance in the North Branch.	Develop and implement standards. Develop and implement regular stream maintenance schedule. Conduct seminar to educate maintenance workers on best practices and schedule. Perform annual audit to insure maintenance is occurring as scheduled. maintenance is not being performed according to procedure or schedule, revisit procedure/schedule and revise as necessary.	Perform annual audit to insure maintenance is occurring as scheduled. If maintenance is not being performed according to procedure or schedule, conduct additional seminars and/or revisit procedure/schedule and revise as necessary. Record the feet of streambank stabilized.	Perform annual audit to insure maintenance is occurring as scheduled. If maintenance is not being performed according to procedure or schedule, conduct additional seminars and/or revisit procedure/schedule and revise as necessary.
2.16	Adopt a schedule for regular maintenance of hydraulic structures such as bridges and culverts to prevent sediment and debris blockages.	Develop and implement standards for inspection of hydraulic structures. Develop and implement regular hydraulic structure maintenance schedule. Conduct seminar to educate maintenance workers on best practices and schedule. Perform annual audit to insure maintenance is occurring as scheduled. If maintenance is not being performed according to procedure or schedule, conduct additional seminars and/or revisit procedure/schedule and revise as necessary.	Perform annual audit to ensure maintenance is occurring as scheduled. If maintenance is not being performed according to procedure or schedule, conduct additional seminars and/or revisit procedure/schedule and revise as necessary.	Perform annual audit to insure maintenance is occurring as scheduled. If maintenance is not being performed according to procedure or schedule, conduct additional seminars and/or revisit procedure/schedule and revise as necessary.

[1] See Table 5-1 for a list of organization abbreviations.

Programmatic Action Plan No.	Action Recommendation	Short Term Milestone and Measurable Goals (0-5 years)	Medium Range Milestone and Measurable Goals (5-10 years)	Long Term Milestones and Measurable Goals (10-20 yrs)
Objective 4: Mitigate flood damages using both remedial and preventive measures including property protection.				
2.17	Sanitary sewer infiltration problems that result in flood damage from sanitary sewer backup should be targeted for repair.	Televise sewer system in flood problem areas. Identify illegal connections and sources of significant infiltration. Develop plan to disconnect illegal connections and repair pipes with significant infiltration. Perform disconnections or repairs to 50% of system. Evaluate flood damage complaints.	Perform disconnections and repairs to remaining 50% of system. Evaluate flood damage complaints.	Continue to perform disconnections and repairs to reduce infiltration as problems arise.
2.18	Identify individual addresses of buildings at risk of flooding (located within the 100 year floodplain and/or in flood hazard areas identified in the Lake County Flood Hazard Mitigation Plan). Survey buildings to determine first floor and adjacent grade elevations to identify the actual structures at risk of flooding. Prioritize buildings at greatest risk of flood damage. Coordinate an annual flood hazard notification program for owners of buildings at risk of flooding that includes information on flood hazard mitigation with a survey to identify candidates for flood mitigation activities.	Identify individual addresses of buildings at risk of flooding. Survey buildings to determine first floor and adjacent grade elevations. Prioritize buildings at greatest risk of flood damage. Coordinate and implement an annual flood hazard notification program. Include survey. Follow-up with 100% of property owners willing to implement flood hazard mitigation activities on their properties and put property owners in touch with appropriate agency/entity to assist in developing and implementing mitigation activity. Target 10% participation rate by property owners.	Continue annual survey. Target 25% participation rate by property owners. Follow-up with 100% of property owners willing to implement flood hazard mitigation activities on their properties and put property owners in touch with appropriate agency/entity to assist in developing and implementing mitigation activity.	Continue annual survey. Target 50% participation rate by property owners. Follow-up with 100% of property owners willing to implement flood hazard mitigation activities on their properties and put property owners in touch with appropriate agency/entity to assist in developing and implementing mitigation activity.
2.19	Provide technical assistance to property owners in high priority flood prone areas to use wet/dry flood proofing, building elevation and other approved measures to reduce flood losses. Identify cost-share funds for these practices.	Identify cost-share funds. Identify individual addresses of buildings at risk of flooding. Coordinate and implement an annual flood hazard notification program. Include survey. Follow-up with 100% of property owners willing to implement flood hazard mitigation activities on their properties and put property owners in touch with appropriate agency/entity to assist in developing and implementing mitigation activity. Target 10% participation rate by property owners.	Annual revision of cost-share fund list. Continue annual survey. Target 25% participation rate by property owners. Follow-up with 100% of property owners willing to implement flood hazard mitigation activities on their properties and put property owners in touch with appropriate agency/entity to assist in developing and implementing mitigation activity.	Annual revision of cost-share fund list. Continue annual survey. Target 50% participation rate by property owners. Follow-up with 100% of property owners willing to implement flood hazard mitigation activities on their properties and put property owners in touch with appropriate agency/entity to assist in developing and implementing mitigation activity.
2.20	Develop sources for combined county and municipal cost share fund to meet local match requirements for acquisition or relocation of flood prone buildings.	Identify funding sources. Develop list. Review and revise list annually.	Review and revise list annually.	Review and revise list annually.
2.21	Sponsor flood proofing workshops in neighborhoods and municipalities with greatest flood risk.	Sponsor and coordinate flood proofing workshops. Coordinate timing to coincide with mailing to property owners. Conduct one workshops within one month of each mailing.	Same as short term.	Same as short term.
2.22	Provide flood hazard area maps and data to municipalities and other county agencies involved in flood mitigation.	Develop map. Provide to 100% of municipalities and agencies involved in flood mitigation.	Update map once every 5 years to reflect new topography, studies, developments, population/land use changes, or projects. Provide map revision to 100% of municipalities and agencies involved in flood mitigation.	Update map once every 5 years to reflect new topography, studies, or projects. Provide map revision to 100% of municipalities and agencies involved in flood mitigation.
Objective 5: Determine potential locations and feasibility of regional stormwater detention sites.				
2.23	Determine need for new flood detention reservoirs in the watershed. Review appropriateness of IDNR in-holdings in Lake Bluff and Lake Forest for flood detention. Flood control measures proposed for the Lake Bluff site must be compatible with the ecological benefits of the site. Locate potential sites for multi-objective and environmentally sensitive regional flood detention in addition to existing in-holdings if need is determined. Complete feasibility study for recommended regional detention facilities.	Secure money for funding. Determine need for new flood detention reservoirs in the watershed. Review appropriateness of IDNR in-holdings in Lake Bluff and Lake Forest for flood detention. Locate potential sites for multi-objective and environmentally sensitive regional flood detention in addition to existing in-holdings if need is determined. Complete feasibility study for recommended regional detention facilities. Prepare construction plans and construct 50% of identified projects.	Construct remaining 50% of projects. Perform maintenance on all constructed sites according to maintenance plan in Appendix K. Perform annual evaluation of flood complaints and compare against complaints from past storms of similar magnitude to see whether complaints and flood levels have decreased or remained steady with construction of new projects. If flooding has increased, evaluate need for modifications to constructed basins or need for additional basins. Construct/implement recommended changes.	Perform maintenance on all constructed sites according to maintenance plan in Appendix K. Perform annual evaluation of flood complaints and compare against complaints from past storms of similar magnitude to see whether complaints and flood levels have decreased or remained steady with construction of new projects. If flooding has increased, evaluate need for modifications to constructed basins or need for additional basins. Construct/implement recommended changes.

[1] See Table 5-1 for a list of organization abbreviations.

Goal 3:	Protect and enhance natural resources and provide associated recreational opportunities.			
Programmatic Action Plan No.	**Action Recommendation**	**Short Term Milestone and Measurable Goals (0-5 years)**	**Medium Range Milestone and Measurable Goals (5-10 years)**	**Long Term Milestones and Measurable Goals (10-20 yrs)**
Objective 1: Protect and restore wetlands and streams to improve water quality and aquatic habitat.				
3.1	Restore stream and aquatic habitat using created pool/riffle complexes; planting emergent vegetation in the channel; and re-meandering channel where feasible.	Establish a plan for restoration including the addition of pool/riffle complexes, planting emergent vegetation, and re-meandering.	Implement restoration plan in the highest priority areas first. Record number of stream reaches improved.	Monitor sites which have been restored to ensure success and continue restoration on more wetlands and streams as established in the plan.
3.2	Replace turf grass around detention ponds and other wetlands with native plant buffers to provide wildlife habitat and discourage nuisance geese.	Use Detention Basin Inventory to determine areas where turf grass needs to be replaced.	Replace turf grass with native plant buffers.	Monitor planted sites and implement control measures to maintain native vegetation.
3.3	Convert dry bottom detention ponds into wetland design detention ponds.	Use Detention Basin Inventory to locate dry bottom detention ponds and create plans for changing them to wetland design detention ponds.	Convert the detention ponds to wetland design detention ponds.	Monitor sites and carry out any control measures necessary to maintain planted vegetation and water level and quality.
3.4	Prioritize potential wetland restoration sites based on benefits derived from location, land owner cooperation and fundability.	Meet with land owners and visit locations and create a list of which wetland sites should be restored first.	Restore the top priority sites identified. Modify the list as land use changes. Record the number of wetland acres restored.	Same as medium range.
3.5	Initiate private/public partnerships and identify applicable cost-share funding for wetland restoration projects.	Initiate meetings with interested organizations to discuss wetland restoration projects and discuss cost-share funding.	Manage and maintain outfalls according to maintenance and monitoring plan in Appendix K. Evaluate effectiveness of filters based on water quality comparisons.	Same as medium range.
3.6	Develop management plans for ADID wetlands.	Compile a list of ADID wetlands.	Create management plans for each wetland.	Implement the plans and create new plans for any new ADID wetlands.
3.7	Identify sites and pursue development of wetland mitigation bank within the North Branch watershed (to mitigate for small wetland losses that are unavoidable).	Identify sites in the watershed for the wetland mitigation bank. Have discussions with landowners holding desirable sites.	Construct wetland mitigation bank on sites identified and purchased.	Continue to identify new sites for the wetland mitigation bank.
3.8	Develop a communication system between USACE, SMC and communities as a follow-up for monitoring and enforcement of wetland permit requirements.	Meet with USACE and local communities about enforcing wetland permit requirements.	Continue meetings to determine effectiveness of monitoring and enforcement of permit requirements and make any necessary adjustments. Determine the number of municipalities and MWRDs enacting ordinances.	Same as medium range.
3.9	Increase buffer width requirements in WDO for minimum 50-foot natural vegetative buffers for streams, 100-foot for wetlands and lakes, and 150-feet for ADID wetlands.	Change the WDO to increase the buffer width requirements for streams, wetlands, lakes, and ADID wetlands.	Monitor these changes to see if any further changes are necessary. Record the number of municipalities enforcing these changes.	Same as medium range.
3.10	Where possible re-meander stream under baseflow conditions to aerate water and improve aquatic habitat.	Determine areas that it is possible to re-meander streams to improve habitat quality.	Re-meander the streams in possible areas.	Continue to monitor for streams which may be possible to re-meander.
3.11	Use native vegetation extensively in BMPs to enhance wildlife habitat.	Review management plans for use of native vegetation and increase the amount used if possible.	Use native vegetation in plantings and new management plans.	Same as medium range.
Objective 2: Protect and enhance plant communities and wildlife habitats.				
3.12	Work with municipalities and county agencies to adopt and incorporate the open space network in municipal and county land use plans and maps. Encourage separate zoning class for land in open space network, or develop open space zoning overlay that requires conservation developments.	Meet with municipalities and county agencies and show them an open space network map/plan and explain the benefits of the plan. Discuss a separate zoning class.	Continue to meet with the people involved to establish the open space network.	Same as medium range.
3.13	Identify opportunities for habitat improvement on existing open and partially open space parcels such as business parks, schools and other institutions, forest preserves, parks, and golf courses.	Determine areas available for habitat improvement.	Discuss in meetings with municipalities and county agencies opportunities to improve existing and partially open space.	Continue to look for open spaces to improve or expand.
3.14	Connect open space areas with conservation corridors.	Identify the most important open spaces to connect.	Begin connecting open spaces starting with the highest priority. Monitor for diversity before and after corridor connections are made.	Continue to connect open spaces.
3.15	Develop coordinated program to protect remaining high quality natural sites through public or conservation organization acquisition or conservation easements.	Meet with conservation groups, counties, and other agencies about protecting high quality habitat in the area.	Begin purchasing land for protection as funds are available. Record the amount of money spent and the number of acres protected/enhances/restored.	Continue to purchase high quality natural sites as availability and money allow.

[1] See Table 5-1 for a list of organization abbreviations.

Programmatic Action Plan No.	Action Recommendation	Short Term Milestone and Measurable Goals (0-5 years)	Medium Range Milestone and Measurable Goals (5-10 years)	Long Term Milestones and Measurable Goals (10-20 yrs)
Objective 3: Identify and develop potential areas for river-based recreational opportunities such as hiking, fishing, canoeing, running, and biking.				
3.16	Develop partnership with municipalities, park districts, schools and forest preserve district to prioritize and coordinate implementation of northeastern Illinois greenways and trails and NBOSP recommendations.	Meet with municipalities, park districts, schools, and forest preserve districts to discuss addition of northeastern Illinois greenways and trails and NBOSP.	Continue meetings as plans for greenways and trails develop and are constructed.	Same as medium range.
3.17	Sponsor recreational programs in North Branch watershed such as river walks, bike rides, river trail theme race, and canoe outings.	Create programs for the public throughout the year within the North Branch watershed.	Promote and implement programs. Change programs or add programs based on feedback from the public. Determine the number of communities participating.	Same as medium range.
3.18	Increase public access to river with canoe launches, fishing sites and trails where appropriate based on Northeastern Illinois Water Trails Plan and NBOSP.	Determine appropriate areas for more public river access and create that access. Inform the public of the new access.	Add more public access if necessary or change access locations for better use and record the number of river access points added.	Same as medium range.
3.19	Provide east-west and north-south trail connections within and between communities and institutions, and connecting to established regional trails.	Work with communities to identify locations where trail connections can be made.	Put connections in place and monitor use. Record the number of trail miles added, the number of communities participating and the amount of money spent.	Same as medium range.
3.20	Identify current and future active and passive recreation needs and match with appropriate open space.	Work with communities to determine recreation needs. Determine the number of communities participating.	Provide open space for the identified recreation needs and monitor use of the land.	Provide more or alternate open space depending on use.

[1] See Table 5-1 for a list of organization abbreviations.

Goal 4: Develop a public information and education program within the watershed communities.

Programmatic Action Plan No.	Action Recommendation	Short Term Milestone and Measurable Goals (0-5 years)	Medium Range Milestones and Measurable Goals (5-10 years)	Long Term Milestones and Measurable Goals (10-20 yrs)
Objective 1: Develop and implement a schools-based river curriculum.				
4.1	Target teachers in Lake and northern Cook counties for CRSN workshops.	Compile a list of schools and teachers in Lake and northern Cook counties.	Create information and sign-up sheet for CRSN workshops. Distribute information sheet to all teachers and schools identified previously. Track and record number of teachers targeted, number of information sheets distributed, and workshop attendance. Also track the number of schools with river curriculum, the number of students participating in the curriculum, and how many river sites are monitored by students for class projects.	Update list of target schools and teachers. Re-evaluate effectiveness and need of information sheets based on information tracked and recorded.
4.2	Conduct annual "Rivers Project" teacher training program.	Compile a list of schools and teachers in Lake and northern Cook counties.	Create information and sign-up sheet for "Rivers Program" training program. Distribute information sheet to all teachers and schools identified previously. Track and record number of teachers targeted, number of information sheets distributed, and training program attendance.	Update list of target schools and teachers. Re-evaluate effectiveness and need of information sheets based on information tracked and recorded.
4.3	Hold annual Chicago River Student Congress.	Compile a list of target schools, student groups, and volunteer organizations with an interest in the Chicago River Student Congress. Develop a list of possible topics and presenters. Develop and distribute information packets and other publicity tools.	Track number of information packets distribute, attendance at the Chicago River Student Congress, and topics covered. Revise list of student groups and topics based on information tracked and recorded.	Same as medium range.
4.4	Publish "CRSN Notes", a network newsletter.	Identify target audience for "CRSN Notes".	Create and publish "CRSN Notes". Distribute to target audience. Track and record the number of newsletters distributed of each publication, the topics covered, and the number of newsletters published in a year.	Revise target audience, topics covered, or other aspects of newsletter based on information tracked and recorded.
4.5	Develop and institute a corporate adopt-a-school program that would enlist corporate financial support and classroom mentors.	Compile a list of target schools and corporate sponsors. Research financial support needs and educational programs to be implemented. Distribute information packets to target sponsors and schools. Match participating schools with sponsors.	Manage and maintain outfalls according to maintenance and monitoring plan in Appendix K. Evaluate effectiveness of filters based on water quality comparisons.	Same as medium range.
4.6	Put Chicago River Educator's Resource Guide on the Friends web page.	Add the Chicago River Educator's Resource Guide to the Friends website.	Track and record the number of visitors to the webpage and the number of inquires about the Chicago River Educator's Resource Guide.	Same as medium range.
Objective 2: Provide watershed public information and education for community leaders and the public.				
4.7	Make slide show presentations for community groups, environmental organizations and local government audiences.	Compile a list of possible topics and target audiences. Organize at least one presentation.	Produce a slideshow presentation based on topics and audiences identified previously. Track and record topic of presentations and estimated number of audience members.	Revise of expand topics and target audiences based on information tracked and recorded.
4.8	Conduct topic workshops for targeted groups such as developers/builders, corporate facility managers, municipal planners, landscape businesses, golf course superintendents, park and forest preserve districts and organize field trip series for engineering and planning staff to demonstrate BMPs.	Compile a list of possible topics and presenters. Organize at least one workshop or field tour to demonstrate BMPs.	Track and record number of workshops conducted, attendance at each presentation, and presentation topics. Evaluate the need for additional workshops or new topics and speakers. Determine if information provided changed the way these groups conducted business.	Same as medium range.
4.9	Coordinate annual watershed workshop for municipalities and other watershed partners to evaluate progress on plan implementation and update.	Compile a list of possible topics and presenters. Organize at least one workshop to evaluate the progress on plan implementation and update.	Track and record number of workshops conducted, attendance at each presentation, and presentation topics. Evaluate the need for additional workshops or new topics and speakers. Determine if information provided changed the way these groups conducted business.	Same as medium range.
4.10	Develop publicity tools for the North Branch project.	Compile a list of publicity tools (i.e. brochures, posters, magnets, etc.) and locations for distribution. Create at least one publicity tool for distribution to residents within the watershed.	Track and record number and type of publicity tools implemented, locations of distribution, and estimated circulation of each tool. Revise type and distribution of publicity tools based on information tracked and recorded.	Same as medium range.
4.11	Create brochures and fact sheets with information such as recreation opportunities, ordinance summaries, and education opportunities	Identify events and locations where brochures and fact sheets can be distributed to the public. Identify information to be contained on brochures and fact sheets.	Produce brochures and fact sheets and distribute at events and locations previously identified. Track and record the list of target audiences and the number of brochures and fact sheets produced and distributed.	Review the distribution of the brochures and fact sheets from previous years and revise as necessary.
4.12	Create newsletter or newspaper articles to inform the public of various watershed issues including meetings and events	Compile a list of possible publications willing to feature watershed articles including the number of publications per year and circulation of the publication. Publish articles, placing them in as many different publications as possible.	Track and record the number of publications featuring each article, dates of publications, number of articles written/topics covered, and circulation for each article. Revise target list of publications based on information tracked and recorded.	Same as medium range.

[1] See Table 5-1 for a list of organization abbreviations.

Programmatic Action Plan No.	Action Recommendation	Short Term Milestone and Measurable Goals (0-5 years)	Medium Range Milestones and Measurable Goals (5-10 years)	Long Term Milestones and Measurable Goals (10-20 yrs)
4.13	Use media outlets such as cable and public access television, radio, and newspapers to circulate watershed information focusing on public service announcements or local event advertisements.	Compile a list of the agencies, municipalities, and groups to partner with to develop and cost-share public service announcements and event advertisements.	Air or publish public service announcements and event advertisements throughout the year. Track and record the number of public service announcements and advertisements aired or published, the medium used to publish or air information, and the number of viewers, listeners, and readers for each announcement. Use this outlet to determine if changes were made in the community or in businesses based on information provided through various outlets (workshops, brochures, newsletters, newspaper articles, etc.).	Update medium used for announcements and advertisements based on information tracked and recorded.
Objective 3: Improve stewardship of the North Branch Chicago River and its aquatic resources by increasing public participation in the upkeep of the River.				
4.14	Promote high profile watershed projects that include hands on public participation in restoration activities.	Compile a list of future watershed projects that could include public participation. Prioritize projects based on degree of participation needed, need for project, and volunteer groups willing and able to participate. Begin promoting projects with brochures, articles, advertisements, etc.	Track and record the number of projects completed with public participation, the number of participants involved, the number of communites, the number of community groups, and the amount of promotion for each project. Update promotion methods based on information tracked and recorded. Determine if stewardship of the North Branch Chicago River and the quality of aquatic resources have improved with beofre and after questionairres.	Same as medium range.
4.15	Develop stormsewer marker program in North Branch watershed.	Compile a list of community groups, service organizations, homeowner organizations and youth groups willing to conduct marking projects. Identify marking locations suitable for the safety of all volunteers.	Create storm drain stenciling kits and pollutant tracing forms. Begin a training program for volunteer group leaders. Stencil a defined portion of the watershed storm drains (i.e. 25%) each year. Track and record the number of drains stenciled, the number of stenciling events, the number of volunteer groups participating, and the number of locations suspected of dumping or littering.	If necessary, re-stencil drains stenciled previously. Track and record the number of drains stenciled, the number of volunteer groups participating, and the number of locations suspected of dumping or littering.
4.16	Research need and feasibility of expanding the Friends clean-up day to 2 days per year.	Research need and interest in expanding the current Friends River clean-up day from one day in the spring to include one day in the fall.	If interest and need exists, conduct 2 stream-side and litter clean-up days per year. Track and record the estimated number of new and returning participants and the number of roll off bins used. Also determine the number of communities and comunity groups involved.	Re-evaluate the need for more or less clean-up days.
4.17	Expand RiverWatch program in watershed by targeting high schools, college groups, and other volunteer organizations.	Compile a list of interested parties and provide them with a list of protocol to assess identified stream segments and a list of target pollutant sources. Provide each party with RiverWatch materials and kits for testing.	Monitor stream sites utilizing multiple groups and classes at least once in the fall and once in the spring. Track and record the number of classes and groups involved and monitoring locations.	Update and expand list of interested parties and monitoring locations targeted based on information tracked and recorded.
Objective 4: Identify open space parcels adjacent to or near schools or existing public facilities that would be appropriate for outdoor education.				
4.18	Review open space parcels adjacent to and near schools identified in the NBOS plan.	Compile a list of open space parcels near schools or other public properties from the NBOS plan.	Based on the open space parcels identified in the NBOS and reviewed previously, identify the parcels most appropriate to meet the outdoor education needs.	Review list of parcels identified appropriate for education and update as open space is developed or preserved.
4.19	Prioritize protection and restoration of open space parcels identified for education and recreation.	Review condition and ownership of open space parcels identified as appropriate for educational needs. Prioritize protection and restoration based on these characteristics.	Review prioritized purchase and restoration list and update as needed.	Same as medium range.
4.20	Identify cost-share opportunities to create education and recreation areas.	Compile a list of interested parties such as municipalities, watershed organizations, and school districts that may be interested in cost-share opportunities to purchase and restore open space parcels for educational needs. Determine the number of requests for more information.	Match cost-share opportunities with available open space parcels. Identify funding sources for restoration of open spaces if required. Purchase and restore open space parcels for educational purposes.	Same as medium range.
4.21	Develop outdoor recreation and education areas.	Based on the identified open space parcels and cost-share opportunities, determine parcels to be purchased and restored for educational purposes within the next 5 years. Determine the number of requests for more information, the number of projects/parcesl identified, and the number of field tour participants.	Purchase open space parcels identified previously. Develop outdoor recreation areas on purchased open space parcels.	Same as medium range.

[1] See Table 5-1 for a list of organization abbreviations.

Goal 5: Improve participation and coordination in watershed improvement activities.

Programmatic Action Plan No.	Action Recommendation	Short Term Milestone and Measurable Goals (0-5 years)	Medium Range Milestones and Measurable Goals (5-10 years)	Long Term Milestones and Measurable Goals (10-20 yrs)
Objective 1: Coordinate North Branch Chicago River Watershed Plan implementation activities.				
5.1	Evaluate and update watershed plan.	Identify problems within the watershed plan. Also determine which parts of the plan are effective. Consider why each aspect in the plan works or does not work and revise as necessary.	Continue to evaluate and update the plan as changes occur in the watershed.	Same as medium range.
5.2	Offer technical expertise and assistance to watershed stakeholders.	Identify a plan of action on how assistance will be provided to watershed stakeholders and who will be responsible for taking requests and working with the stakeholders. Determine how to inform stakeholders of this program.	Inform watershed stakeholders that technical expertise and assistance is available and how to access it. Begin taking requests and helping stakeholders as required. Track the number of requests.	Same as medium range.
5.3	Incorporate North Branch watershed plan recommendations into: regional plans (public works, greenways/trails, water resources, roads etc.); county plans (Framework, Forest Preserve, Capital Improvements, roads etc.); and municipal plans (land use, capital, storm water, roads etc.).	Compile a list of all regional plans targeted for incorporation.	Begin working with stakeholders and plan controllers to incorporate the North Branch watershed plan recommendations. Track and record the number of plans with incorporation and revisions.	Continue to incorporate recommendations or make revisions based on changes in the watershed plan.
Objective 2: Educate and encourage public and private landowners to increase their involvement in implementing best management practices.				
5.4	Coordinate watershed restoration projects and develop cost-share funding for best management practices.	Set up and carry out watershed restorations projects on public lands encouraging public involvement. Offer ways for private landowners to learn about restoration and best management practices and how to apply that to their property. Begin to develop a cost-share funding program .	Manage and maintain outfalls according to maintenance and monitoring plan in Appendix K. Evaluate effectiveness of filters based on water quality comparisons.	Same as medium range.
5.5	Work with communities individually or in workshop setting to review municipal ordinances and procedures to determine their impact on watershed protection. Make recommendations for changes needed to support watershed best management practices.	Set up workshops and meetings with communities to review ordinances and procedures. Establish a website "clearinghouse" for ordinance review. Determine current management practices in each area and provide immediate information on how to begin improving the watershed and best management practices.	Evaluate changes in management practices over time and continue to provide information on best management practices. Record the number of worshops held and the number of website hits.	Same as medium range.
5.6	Establish cooperative working relationship with municipal and county inspectors and enforcement officers to monitor wetland mitigation.	Prepare a list of individuals whose cooperation would be critical to monitoring wetlands mitigation.	Meet with municipal and county inspectors and enforcement officers to discuss wetland mitigation monitoring programs.	Same as medium range.
5.7	SMC will take lead in: developing a MOA with drainage districts that formalizes what stream restoration/stabilization practices can or cannot be done in easement; and in establishing a funding partnership between drainage districts and outfall owners (municipalities and others) for outfall maintenance and repair.	Hold meetings with the responsible people from each drainage district to determine the appropriate restoration/stabilization practices. Coordinate other meetings for drainage districts and outfall owners to establish a funding partnership for outfall maintenance and repair.	Same as short term.	Same as short term.
5.8	Coordinate with Great Lakes Naval Training Center on developing best management practice projects on GLNTC properties.	Meet with officials from GLNTC to go over property and begin discussing best management practices.	Create a guide of best management practices for projects on site.	Re-evaluate the best management practices if necessary as the watershed changes over time.
5.9	Institute annual policy and legislative meetings in the watershed.	Create a list of the people that should be involved in the meetings and determine when and where these meetings should be held.	Have legislative meetings, discuss semi-annual policy, and begin making any changes as a result of the meeting's discussions.	Same as medium range.
Objective 3: Increase river and watershed monitoring efforts and coordinate data sharing.				
5.10	Develop and implement procedures and schedule for regular monitoring of stream condition for erosion, sedimentation and debris blockages. Establish a system (follow-up on monitoring program) for notifying municipalities and private landowners of erosion associated with municipal discharge points or individual property (sump & gutter) discharges into the river.	Develop procedures and schedule for regular monitoring of stream condition specifically noting erosion, sedimentation, and debris blockages. Also establish procedures for notifying municipalities and private landowners of reduction in stream condition due (erosion, increase in sedimentation, etc.) to discharge into the river. Notify municipalities and private landowners of procedure and schedule.	Implement procedures and schedule for stream condition monitoring.	Re-evaluate procedures.
5.11	Establish a regular monitoring program using hand-held equipment that is designed to assess known problem areas for water quality that incorporates diurnal dissolved oxygen, macroinvertebrates and fisheries.	Create and implement a regular monitoring program that assesses water quality with emphasis on diurnal dissolved oxygen, macroinvertebrates, and fisheries. Purchase all hand held equipment necessary to carryout the program.	Continue monitoring program. Record areas monitored and re-evaluate program if necessary.	Same as medium range.
5.12	Monitor one watershed project that includes several BMPs as a demonstration project. Monitoring should conform with USEPA standards where practicable.	Compile a list of ongoing and planned watershed projects including BMPs associated with the project.	Familiarize monitoring staff with USEPA standards. Identify one project from compiled list to be monitored as a demonstration project. Monitor project using USEPA standards.	Identify forum to present the results of the monitoring. (workshop, Watershed Management Board meeting, etc.) Present results. Evaluate the need for another monitoring demonstration site.

[1] See Table 5-1 for a list of organization abbreviations.

Programmatic Action Plan No.	Action Recommendation	Short Term Milestone and Measurable Goals (0-5 years)	Medium Range Milestones and Measurable Goals (5-10 years)	Long Term Milestones and Measurable Goals (10-20 yrs)
5.13	Promote expansion of RiverWatch, ForestWatch, and WetlandWatch sites for volunteer monitoring of the river and other natural resources in the North Branch watershed.	Provide more workshops, training sessions, informational sessions, and brochures promoting RiverWatch, Forest watch, and WetlandWatch programs to increase awareness and interest among the public and concerned organizations.	Determine number of projects, number of sites being monitored, number of volunteers, and number of organizations and communities involved. Determine amount of money received and spent on RiverWatch and what is needed to re-fund the project from year to year.	Continue to promote RiverWatch, ForestWatch, and WetlandWatch programs and evaluate participation, money use, and data.
5.14	Form a watershed subcommittee to develop collection and reporting standards for biological, chemical and physical monitoring, expand the number of monitoring sites and share data at meeting.	Compile a list of people to form a watershed subcommittee and determine the number to be on the committee and who is available.	Hold subcommittee meetings to develop collection and reporting standards for biological, chemical, and physical monitoring. Create a plan then expand the number of monitoring sites and share data from monitoring sites at meeting.	Assess quality of data and make any necessary adjustments to the standards. Determine the number of sites monitored and money received and spent on the projects. Continue to expand the number of sites monitored.
5.15	Adopt water quality testing protocols and establish the Chicago River Data Base to contain student and volunteer generated data.	Research water quality testing procedures and protocols.	Adopt water quality testing protocols based on research completed. Research methods and location to establish Chicago River Data Base for student and volunteer data. Create Chicago River Data Base.	Create information brochures and public announcements advertising the location of the Chicago River Data Base. Update and maintain database.

[1] See Table 5-1 for a list of organization abbreviations.

APPENDIX A : MEETING SUMMARIES

A.1 North Branch Planning Committee Minutes

The North Branch Planning Committee was formed when Lake County Stormwater Management Commission (SMC) and Northeastern Illinois University (NEIU) began work on watershed assessment and planning tasks, an Assessment and Strategy (A&S) work group was formed to provide technical and planning guidance and support for project staff and the steering committee. This technical group was made up of federal, state and local government and agency representatives. When project assessment and planning needs declined after the first year of project activity, the A&S work group and steering committee were combined in October 1997 into a North Branch Planning Committee that continues to meet on a quarterly basis. Attached are meeting minutes from the North Branch Planning Committee meetings from March 2006 to March 2007.

North Branch Chicago River WATERSHED PROJECT

MEMORANDUM

To: North Branch Planning Committee (NBPC)

From: Sean Wiedel, Lake County Stormwater Management Commission (SMC)

Subject: March 8, 2006 Planning Committee Meeting Notes

Date: April 25, 2006

Notes from the March 8, 2006 NBPC meeting are below. The next meeting of the NBPC will be held from 1:30 to 3:30 PM on May 10th at the West Ridge Center in Highland Park (636 Ridge Road). Please mark your calendars and plan to attend. NBPC meetings are held on the second Wednesday of every other month. Following the May 10th meeting, the remaining 2006 NBPC meetings are tentatively scheduled for July 12th, September 13th and November 8th. Agendas for upcoming meetings will be sent out via email closer to the meeting dates.

March 8, 2006 Planning Committee Meeting Notes

1. North Branch Stream Inventory Browser Demonstration: Jeff Laramy

During summer 2005, SMC had interns redo the North Branch stream inventory in Lake County that was originally completed in 1997. Amongst other uses, the new stream inventory data will be used to make recommendations in the watershed-based plan update discussed below. The Lake County North Branch stream inventory is now available as a clickable map with links to inventory datasheets and digital photos. Jeff Laramy, SMC's GIS specialist, demonstrated the stream inventory browser that SMC created using the free ArcReader software. The handout that Jeff provided is attached; it gives an overview of the stream inventory browser and the data that's available. Please email Sean Wiedel (swiedel@co.lake.il.us) if you would like to receive a free CD containing the 2005 North Branch stream inventory browser.

2. North Branch Watershed-Based Plan Update: Sean Wiedel

Sean provided an update on the North Branch Chicago River (NBCR) watershed-based plan (WBP) upgrade. In January, the scope of services for the upgrade and update of the NBCR watershed plan was provided to NIPC and the North Branch Planning Committee for comments. SMC revised and completed the scope based on those comments in February. SMC put the NBCR WBP upgrade and plan update request for proposals and scope of services out for competitive bids to over 50 consulting firms during the March 2006. Proposals were due from consultant on March 31st. After the NBPC meeting, SMC received proposals from five consulting firms (Bonestroo Devery, V3, Christopher Burke, Tetratech and FluidClarity). The

North Branch plan upgrade will be kicked-off and the selected consultant introduced at the May 10th NBPC meeting.

3. Announcements

- Funding applications for North Branch 319 funds were due on December 1, 2005. Two applications were received from the Village of Green Oaks and the Forest Preserve District of Cook County. The Green Oaks project will restore the banks of a tributary to the Middle Fork and the CCFPD's project will restore two eroded gullies along the North Branch near Golf, Illinois. The North Branch BMP Selection Team met on February 1, 2006 and recommended funding for both projects. The IEPA agreed with the BST's funding recommendations. These grants exhausted our current funding from the IEPA. However, SMC and Friends expect to have additional Section 319 funding from a new grant available for the June 1, 2006 funding deadline.
- Conservation 2000 pre-proposals to the North Branch Watershed Project were due on Friday, January 13, 2006. On February 1st, the North Branch BMP Selection Team considered preliminary C2000 proposals from four applicants. The Lake County Forest Preserve District proposed to restore a portion of its Old School preserve; the Society of the Divine Word proposed to restore a degraded woodland on its campus near Glenview; the Lake Forest Open Lands Association sought acquisition funds for a property near the Middlefork Savanna; and the City of Lake Forest sought funding for its Wildlife Discovery Center. The Lake Forest Open Lands Association withdrew its proposal before the final funding deadline. The BST met prior to the March 8th NBPC meeting and ranked the three remaining proposal in the following priority order: Lake County Forest Preserve District, City of Lake Forest and Society of the Divine Word.

North Branch Chicago River WATERSHED PROJECT

MEMORANDUM

To: North Branch Planning Committee (NBPC)

From: Sean Wiedel, Lake County Stormwater Management Commission (SMC)

Subject: May 10, 2006 Planning Committee Meeting Notes

Date: May 4, 2007

Notes from the May 10, 2006 NBPC meeting are below. The next meeting of the NBPC will be held from 1:30 to 3:30 PM on July 12th at the West Ridge Center in Highland Park (636 Ridge Road). Please mark your calendars and plan to attend. NBPC meetings are held on the second Wednesday of every other month. Following the July 12th meeting, the remaining 2006 NBPC meetings are tentatively scheduled for September 13th and November 8th. Agendas for upcoming meetings will be sent out via email closer to the meeting dates.

May 10, 2006 Planning Committee Meeting Notes

1. North Branch Fisheries (2001 Basin Survey Summary & 2006 Sampling Sites): Steve Pescitelli (IDNR)

Steve Pescitelli presented a summary of the 2001 Basin Survey completed by the Illinois Department of Natural Resources (IDNR) and Illinois Environmental Protection Agency (IEPA). The IDNR collaborates with the IEPA on a 5-year cycle and samples macroinvertebrates for the Macroinvertebrate Biotic Index (MBI) and fisheries for the Index of Biotic Integrity (IBI). The sampling found IBIs that ranged from 14-23 indicating poor (D stream) to very poor (E stream) stream quality in the North Branch Chicago River. The best sampling results and the most species were found at West River Park, near Foster Avenue in Chicago. Overall, the North Branch was rated as very poor quality based on the 2001 sampling efforts. Several factors have a significant impact on the stream ecosystem of the North Branch including water quality, habitat availability, flow alterations, food sources and connectivity. In particular, the North Branch species diversity is impacted by the presence of dams. For example, there were only 22 fish species upstream of West River Park (site of a large dam) while there were 44 species downstream on the dam. Friends of the Chicago River is working with MWRD and the City of Chicago to study several options for reducging the impacts of the West River Park dam. These options include adding a fish ladder, a natural fish way with a meandering channel and/or dam removal.

The IDNR and IEPA will be sampling in the North Branch this summer at up to 12 sites. Steve sought the Planning Committee's input and ideas for potential sampling sites. The Planning Committee suggested a number of sites including:

- Tam O'Shanter dam at Howard Street on the Middle Fork;
- Northbrook Court Mall at Lake-Cook Road on the Middle Fork;
- Middlefork Savanna or Lake Forest Open Lands Association property at Deerpath Avenue on the Middle Fork;
- Deerfield High School on the Middle Fork;
- Lake Bluff Forest Preserve at IL 176 on the Skokie River; and
- Deerpath Golf Course at Deerpath Avenue on the Skokie River.

Steve is planning on beginning the North Branch sampling in late July. If you are interested in volunteering on the fish sampling crew or have additional suggestions for sampling sites, please email me (swiedel@co.lake.il.us) and I will forward the information on to Steve. Steve expects the results from this summer's sampling to be available in winter 2007.

Formatted: Bullets and Numbering

2. Watershed-Based Plan Kick-Off & NBPC Input: Sean Wiedel & Ed Belmonte (V3)

Following a competitive RFP process, V3 was selected as the consultant to work on the North Branch watershed-based plan upgrade and 5-year plan update. Sean introduced Ed Belmonte who will be the project manager for V3 Consultants. At this first meeting, V3 sought input from the NBPC on how to combine the goals of the North Branch open space plan and the North Branch watershed plan. The discussion was organized based on the general goal categories from the original watershed plan: water quality, flooding, natural resources, education and participation. Based on our discussion, V3 has created the attached unified goal document for the North Branch. We will discuss it further at our July 12th meeting. A summary of the May 10th discussion by goal follows:

Water Quality

- Need to improve water quality from up to 12 outfalls at IDOT pumping stations along I-94. Need more information on locations and flows from outfalls.
- Need to focus on managing stormwater on sites through the use of rain gardens, BMPs and other retrofits, and zero discharge regulations.
- Need to characterize impacts of state and county roads in terms of runoff volume and water quality.
- Want to improve North Branch from a D/E stream to a C/D quality stream.
    - Would like to improve water quality to be delisted from 303(d) impaired waters list.
    - Would like to move up from medium priority to high priority on 303(d) list for total maximum daily load (TMDL) development.

Flooding

- Need to address 2001 flooding in Highland Park and Lake Forest (primarily due to sewer back-ups).
- Need more specific recommendations for flood damage reduction.
- SMC and partners are or will be addressing potential flood storage and other options at the Skokie Headwaters/North Chicago and Lake Bluff/Prairie Wolf sites.
- Since original plan was completed, there has been no county-level coordination in Cook County. MWRD will address the North Branch in Cook County beginning in 2008.

Natural Resources

- Need to retrofit rain gardens in developed areas for habitat, water quality and runoff reduction. Need to address redevelopment in watershed.

- Need more and innovative funding sources for:
    - BMPs;
    - Natural areas protection and restoration;
    - Invasive species control;
    - Sharing of equipment; and
    - Homeland security and FEMA issues.
- Need more recreational opportunities in watershed.

Education

- Need more clear and consistent signage in North Branch watershed.
- Need to work with Debra Shore and others to pursue Chicago Wilderness water series.

Participation

- NBPC – need more Cook County coordination with MWRD.
- Need to get more delegates to participate on North Branch open space coordinators council.
- Need to focus on measurable outcome-based goals & objectives.

3. Announcements

- **North Branch 319 Funding**

North Branch 319 funding applications were due on June 1st. The North Branch Watershed Project has approximately $250,000 available this funding round.

- **North Branch Open Space Plan**

In April, Patty Werner (SMC) and Dave Bier (Futurity Inc.) presented the North Branch Open Space plan at the American Planning Association's national conference in San Antonio. Patty and Jeff Laramy (SMC) will be presenting the plan at the StormCon conference this summer. Patty has only received 6 appointee nominations for the North Branch open space coordinators council. If your community or park district has not designated a North Branch open space coordinator, please follow up with your village manager, mayor or executive director and ask them to assign an open space coordinator.

- **Chicago River Day**

Chicago River Day was held on Saturday, May 13th. Lt. Gov. Pat Quinn's office has funded the RiverWatch program for 2006. Funding for RiverWatch has been cut from the State of Illinois' budget for the past several years. Chris Parson, formerly of Friends of the Chicago River, performed RiverWatch sampling at 5 sites during the month of June.

North Branch Chicago River WATERSHED PROJECT

MEMORANDUM

To: North Branch Planning Committee (NBPC)

From: Sean Wiedel, Lake County Stormwater Management Commission (SMC)

Subject: July 12, 2006 Planning Committee Meeting Notes

Date: September 1, 2006

Notes from the July 12, 2006 NBPC meeting are below. The next meeting of the NBPC will be held from 1:30 to 3:30 PM on September 13th at the West Ridge Center in Highland Park (636 Ridge Road). Please mark your calendars and plan to attend. NBPC meetings are held on the second Wednesday of every other month. Following the September 13th meeting, the remaining 2006 NBPC meeting is tentatively scheduled for November 8th. Agendas for upcoming meetings will be sent out via email closer to the meeting dates.

July 12, 2006 Planning Committee Meeting Notes

1. Tollway Expansion in North Branch Watershed: Lien Bui

Lien Bui provided an update on the Illinois State Toll Highway (Tollway) expansion plans. Lien announced that she will be leaving the Tollway; Rocco Zucchero will be the new contact. Lien was asked to speak because a significant portion of the area to be impacted by the expansion project is in the North Branch Chicago River watershed. The expansion project will add lanes and reconstruct the Tollway from Balmoral Avenue (near O'Hare) to the Wisconsin state line. In 2006 and 2007, the Tollway will work on the northbound lanes from Balmoral to Dempster and the southbound lanes from Half Day Road to Wisconsin. In 2008, the southbound lanes from Balmoral to Lake-Cook will be worked on as well as the northbound lanes from Half Day to Wisconsin.

The Illinois Natural History Survey (INHS) completed an environmental resource survey along the Tollway in 2005. In 2006, the INHS will complete additional reconnaissance and an Indiana bat survey. The Tollway completed two US Army Corps of Engineers Section 404 permit applications. The permit for Balmoral to Dempster was submitted in December 2005 and the permit for Dempster to Wisconsin was submitted in June 2006.

The Tollway has been coordinating with a number of agencies. For example, they are working with the Forest Preserve District of Cook County on BMPs such as bioswales and bike path enhancements. They are working with the Lake County Forest Preserve District on threatened and endangered species transplants and wetland mitigation. The Tollway is working with SMC on permit review as well as siting of multipurpose detention and mitigation.

The preliminary impact of the Tollway expansion is 4.69 acres of jurisdictional wetlands and 3.88 acres of non-jurisdictional wetlands (isolated wetlands). These impacts will require 15.31 acres of mitigation in the North Branch watershed and 15.81 acres of mitigation in the Des Plaines River watershed. The Tollway will also have stream crossing impacts on 204 feet of the North Branch and 96 feet of the Des Plaines. To mitigate these impacts, the Tollway has worked with SMC to identify potential mitigation sites at seven sites in the North Branch and 3 potential sites in the Des Plaines River watersheds.

The North Branch Planning Committee had a few questions for the Tollway. The NBPC wondered if transit had been considered for the Tollway expansion. The Tollway is considering public transit for Interstate 90 but is not considering it for Interstate 94/294.

2. Watershed-Based Plan Input: Ed Belmonte (V3)

Ed Belmonte from V3 Consultants spoke about the North Branch watershed-based plan (WBP) upgrade. Ed provided a handout of the combined goals from the North Branch Watershed Plan and the North Branch Open Space Plan; this handout is attached to the end of these notes. If you have any comments or suggestions for the combined goals, email them to me at swiedel@co.lake.il.us.

Ed then made a presentation about the WBP upgrade. Ed has begun to review both plans to identify action items that require education to complete an education needs summary. Over the next several months, Ed will be looking into educational techniques that have been used in the North Branch and other watersheds. Education is a key component of the WBP upgrade as defined by the USEPA. John Quail mentioned that Friends had good success with the riparian residents program. Last year Friends mailed a series of postcards to riparian landowners that covered such topics as habitat, water quality, native plants, etc. The NBPC felt one educational technique we should focus on is highlighting existing projects in the North Branch. Friends and SMC will be planning a North Branch bus tour this fall. We will attempt to target our invitations to large corporate landowners, developers and municipalities.

Another technique that was discussed was to put descriptions of existing projects on the web. SMC has a webpage devoted to North Branch projects in both Lake and Cook Counties (http://www.co.lake.il.us/smc/planning/northbranch/NB%20BMP%20Projects.asp). At present, this site only includes projects that have been completed; it will be updated this fall. The NBPC also suggested that the website could be used as a self-guided watershed tour to view the projects. The NBPC also suggested that maybe the North Branch Watershed Project should establish its own website outside of SMC & Friends.

Finally, the NBPC talked about other topics and potential educational tools including:

- The need to “put a face on improvements”;
- BMP & other techniques that minimize impacts on the watershed;
- How native plants infiltrate and filter runoff; and
- Production of a video with project highlights for cable access.

3. North Park Village: Sean Wiedel & John Quail

The North Park Village Nature Center (NPV) is located near Peterson Avenue and Pulaski Road in the City of Chicago. NPV has attempted to get Section 319 funding several times over the past few years. They have been unsuccessful primarily because the proposed project area is not included in a watershed plan. At the suggestion of the IEPA, SMC and Friends discussed whether we could include the NPV project in our August 1, 2006 Section 319 proposal to the IEPA. Although NPV is outside of the North Branch Watershed Project area, the NBPC felt that the project would incorporate many of the BMPs recommended in the North Branch watershed plan. It would also provide a high-visibility location to demonstrate various BMPs that could be used throughout the North Branch watershed. The NBPC agreed to work with the North Park

Village Nature Center and include their funding request in our larger Section 319 proposal. However, if the 319 funding is limited this year, the NBPC agreed that projects within the North Branch Watershed Project (NBWP) area should be given precedence over the NPV project. The NBPC decided that they would consider future requests for funding outside the NBWP area on a case-by-case basis. The NBPC declined to permanently expand the boundary of the NBWP area for two reasons:

- CSOs: The southern boundary of the NBWP (Dempster Street) was chosen because the area south of Dempster is served by combined sewers. The NBWP project area does not include any combined sewers.
- Funding Constraints: The NBWP has experienced significant interest in undertaking Section 319 funded projects. Changing the boundary would increase the competition for already limited funding.

4. Announcements

- **Friends of the Chicago River's Flatwater Classic**

FOCR's flatwater classic was held on August 13th.

- **Annual Mussel Survey**

Friends is hoping to continue the mussel survey this summer. If you are interested in volunteering or would like more information, please contact John Quail (jquail@chicagoriver.org).

- **Equipment Sharing**

Both the IEPA and IDNR have suggested that it may be possible to obtain equipment that is used for restoration work. The equipment would then be made available for any partner in the watershed who needs to use it. Both agencies have funded equipment for these purposes in the past in other watersheds. We would need an idea of what equipment might be needed and who might be willing to store the equipment. If you would like to discuss your ideas for shared equipment needs or would be willing to house the equipment, please email me at swiedel@co.lake.il.us.

- **North Branch 319 Funding**

The North Branch has $250,000 in IEPA 319 funding available. Funding proposals were solicited and seven were received at the June 1, 2006 deadline. A full report on the funding requested and recommended to the IEPA will be given at the September 2006 NBPC meeting.

- **Friends of the Chicago River's Website**

Friends of the Chicago River have a new website (www.chicagoriver.org/).

Combined Goals for North Branch Chicago River Watershed-Based Plan

Plan Goals	Description	Number in Open Space	Letter in Watershed Plan
I	Preserve open space in the North Branch Chicago River watershed	1	-
II	Reduce flood damage	2	B
III	Improve water quality	3	A
IV	Protect high quality natural areas as open space	4	-
V	Protect & Enhance habitat and natural resources	5	C
VI	Improve recreation and develop watershed-based public information and education opportunities in the communities	6	D
VII	Integrate and coordinate open space protection at the watershed scale	7	-
VIII	Improve participation and coordination of watershed jurisdiction in watershed improvement activities	-	E

This is a merged list of the goals from both the North Branch of the Chicago River Open (Green Infrastructure) Plan and the North Branch of the Chicago River Watershed Assessment and Management Plan.

North Branch Chicago River WATERSHED PROJECT

MEMORANDUM

To: North Branch Planning Committee (NBPC)

From: Sean Wiedel, Lake County Stormwater Management Commission

Subject: September 13, 2006 Planning Committee Meeting Notes

Date: November 2, 2006

Notes from the September 13, 2006 NBPC meeting are below. The next meeting of the NBPC will be held from 1:30 to 3:30 PM on November 8th at the West Ridge Center in Highland Park (636 Ridge Road). Please mark your calendars and plan to attend. NBPC meetings are held on the second Wednesday of every other month. Agendas for upcoming meetings are sent out via email about a week before the meeting.

September 13th NBPC Meeting Notes

1. Review North Branch Watershed Plan Priorities: Sean Wiedel

Sean Wiedel provided a status report on the NBPC's watershed plan implementation priorities. At its May 2005 meeting, the NBPC prioritized the action items from the North Branch Programmatic Action Plan to focus our implementation efforts for the following year. Because of a large number of tied votes, at the September 2005 NBPC meeting, the Planning Committee voted again to break the ties on several action items. The attached table is an update on the implementation status of our top priorities and includes discussion notes from the September 13, 2006 NBPC meeting.

2. North Branch Open Space Plan Priorities: Patty Werner

Patty discussed the status of the North Branch Open Space (NBOS) plan. Over the past several months, Patty made presentations to the Village of Northbrook and the Glenview environmental commission on the NBOS plan. She also provided a summary to Abbott Laboratories of their ownership parcels that were shown in the plan. Patty provided a number of handouts for the discussion (attached).

The North Branch municipalities and unincorporated areas were place in 4 priority categories based on their remaining unprotected open space as shown on the attachment. The NBPC's top priority is to get open space coordinators for all communities on the list through the Village of Golf. These communities all have larger unprotected parcels or significant acres of unprotected open space. Patty stressed the need to get commitments for the open space coordinators. A number of potential coordinators were identified and have been added to the attached document. Patty sent letter to the mayors and park district directors in each of the North Branch communities several months ago. Several NBPC members asked for a better definition of the open space coordinators' roles. Patty is developing an open space coordinator "job description" to better explain what might be expected from those who volunteer (to be sent separately). At the November 8th NBPC meeting, we will continue discussing the NBOS plan, in particular looking at short term, high priority

items and necessary prerequisite steps to achieve these items. Please review the attached NBOS handouts prior to the November 8th NBPC meeting.

3. Input and Update on North Branch Watershed-Based Plan: Ed Belmonte

Ed provided a brief status report on V3's efforts on the watershed-based plan (WBP) upgrade and update. During the summer, V3 identified all of the detention basins constructed in the watershed since 1997. The post-1997 Lake County basins were inventoried by an SMC intern to identify maintenance issues and retrofit opportunities.

4. Announcements

- **Chicago River Summit on October 20th**

  Lieutenant Governor Pat Quinn and Friends of the Chicago River sponsored the 4th Annual Chicago River Summit on Friday, October 20th. John Quail from Friends will provide a brief overview of the summit at the November 8th NBPC meeting.

- **North Branch Funding Update**

  At the June 1, 2006, the North Branch Watershed Project (NBWP) had $250,000 in Section 319 funding available. The NBWP received seven funding application requesting a total of $475,707 in North Branch 319 funding. After meeting on June 21st and August 2nd, the BMP Selection Team (BST) recommended funding five of the projects for a total of $142,875 and the IEPA approved the five projects. The funding recommendations to the IEPA, including project descriptions, are attached. If you have any questions about any of the projects or funding recommendations, please contact Sean Wiedel (swiedel@co.lake.il.us).

- **North Branch Watershed Tour**

  Friends of the Chicago River and Lake County Stormwater Management Commission are planning a North Branch Chicago River watershed tour for next year. The tour is tentatively being planned for May 9th or July 11th (in lieu of our regular meeting). More details will be made available as tour planning moves forward.

NORTH BRANCH PLANNING COMMITTEE
Action Plan Priorities Update with Discussion Notes from September 13, 2006

At its May 2005 meeting, the NBPC prioritized the action items from the North Branch Programmatic Action Plan to focus our implementation efforts over the next year. At the end of each action item, the first number indicates the total number of points each action item received and the second number indicates the number of people who voted for that action item. Because of a large number of tied votes, at the September 2005 NBPC meeting, the Planning Committee voted again to break the ties on several action items. The tie-breaking votes are indicated as TB. The priority rankings below reflect the items in order after the ties were broken. The table below is an update on the implementation status of our top priorities and includes discussion points from the September 13, 2006 NBPC meeting.

Action Item	Status	Discussion at September 13, 2006 NBPC Meeting	Staff Lead	Target Date
1. Programmatic Action Items # 60 & # 91 Combined Work with municipalities and county agencies to adopt and incorporate the open space network in municipal and county land use plans and maps. Encourage separate zoning class for land in open space network, or develop open space zoning overlay that requires conservation developments. Incorporate North Branch watershed plan recommendations into: regional plans (public works, greenways/trails, water resources, roads etc.); county plans (Framework, Forest Preserve, Capital Improvements, roads etc.); and municipal plans (land use, capital, stormwater, roads etc.). [21/5 (11 TB)]	• Currently working on North Branch watershed plan update. • Work with stakeholders and responsible parties to incorporate North Branch Watershed Plan and North Branch Open Space Plan recommendations into other relevant plans.	• NBPC should strive for plan adoption by all watershed communities. The NBPC felt that an internal community contact would be more effective for pushing adoption. Work with staff, political or citizen committees in communities to get plan adopted. • Coordinate Cook County adoption efforts with the MWRD's North Branch watershed council. • Need to remove distinctions between the watershed & open space plans. The open space plan should be amended to the updated watershed plan prior to adoption.	PW JQ	2007 for strategy development; 2010 for incorporation into other plans
2. Programmatic Action Item # 35 Acquire (purchase, donation or conservation easements) remaining undeveloped wetlands and floodplains. [21/5 (3 TB)]	• Item is addressed by the Open Space/Green Infrastructure plan.	• No additional discussion.	PW JQ	2020 for protection
3. Programmatic Action Items # 24 & # 29 Combined Based on North Shore Sanitary District inflow & infiltration study, identify and eliminate illicit downspout, stormdrain and/or sump pump hookups in areas of high inflow. Disconnect rooftop runoff from the stormsewer system where possible in new developments and existing developed areas. Reduce drainage assessment or offer rebate for properties with disconnected rooftops. [19/5]	• Issue has been addressed by the MAC in Lake County. SMC is developing IDDE (illicit discharge detection & elimination) guide for Lake County municipalities. • Used NB 319 funding for several projects that include raingardens, bioswales and other infiltration techniques. • Funding for infiltration projects included in North Branch green infrastructure (319) program.	• Inflow & infiltration (I&I) issues are the responsibility of individual municipalities. • The Municipal Advisory Committee in Lake County discussed and adopted IDDE guidelines at its October 11 meeting. The IDDE guide will be made available to North Branch communities early next year. • The "rebate" language (final sentence of #29) will be dropped from the updated plan as it is not relevant.	SP	2015 for I&I; Infiltration BMPs implementation ongoing.
4. Programmatic Action Item # 5 Prioritize and retrofit outfalls to add water quality treatment through created wetland pockets or appropriate filters (vegetative, sand or others). [8/2]	• North Branch BST funded installation of 3 water quality filters by the Village of Northbrook and 1 by the City of Highland Park. • A proposal was submitted to IEPA Section 319 program to repair 284 eroded outfalls and retrofit 10 outfalls for water quality in Lake County. IEPA did not fund proposal for failing outfalls as they felt repairs would be required by NPDES Phase 2.	• The NBPC stressed the importance of cost-share $ to completing outfall retrofits. • Will continue to seek out and fund outfall retrofits with NB BST support.	SW TW JQ	2010
5. Programmatic Action Item # 61 Develop coordinated program to protect remaining high	• Addressed by NB Open Space/Green Infrastructure Plan.	• No additional discussion.	PW JQ	2007 for strategy

quality natural sites through public or conservation organization acquisition or conservation easements. [7/3 (10 TB)]				development
6. Programmatic Action Item # 2 Educate landowners in watershed to the benefits of replacing turf lawns with native landscaping to infiltrate and filter runoff and provide habitat benefits. Identify corporate campus, industrial park, institution or other large site to act as native vegetation retrofit demonstration site for runoff reduction and water quality improvement. [7/3 (1 TB)]	• Work with large corporate landowners to encourage participation in CorporateLands program (developed by Open Lands). • Invite CorporateLands coordinator to speak at future NBPC meeting.	• Work with CorporateLands and target invites to corporations and business parks. CorporateLands to present at November 2006 NBPC meeting. • Plan tour for corporate landscapers. • ID existing educational program on benefits of native landscaping. Contact Danielle Green @ USEPA to do presentation.	SW JQ	2008 for demonstration site
7. Programmatic Action Item # 1 Develop recommendations for planting native vegetation that increases stormwater infiltration and reduces pollution. Review and update landscaping recommendations/ requirements in local ordinances to provide regulatory incentives that encourage native landscapes. [7/2 (6 TB)]	• Friends will work with individual municipalities on case-by-case basis.	• Todd Main @ FOCR is working on model ordinances. • Coordinate efforts/get input from open space advocates group. • Consider attaching native plant maintenance restrictions to title or other means. • Develop database with municipalities to track where they are with implementing these ordinances/practices.	JQ	2010
8. Programmatic Action Item # 4 Retrofit detention basins for improved water quality, to restrict flow rate (to reduce in-channel erosion), for increased storage and for habitat and aesthetic benefits. Develop incentive program and funding sources to support retrofits. [7/2 (4 TB)]	• Detention basin retrofit program funding requested in 319 application to IEPA; $100,000 awarded. • Detention retrofit program and request for proposals developed. • 7+ detention retrofit projects completed or underway.	• Track #, year and detention basins retrofitted. Already tracking North Branch funding (319 & C2000). • MWRD had detention database that includes some basins in Cook County North Branch. Follow up with MWRD.	SW JQ	2015 for retrofits
9. Programmatic Action Item # 16 Set up one or more public demonstration sites for native streambank vegetation restoration and management, and where feasible, replace non-native invasive plant species along stream channels and banks with deep-rooted native plants. [7/2 (2 TB)]	• Completed native (bioengineering) streambank restoration projects at several publicly-accessible sites including Deerpath Golf Course, Fink Park, Loyola Academy, Deerfield High School and Lincolnshire North Park.	• North Branch watershed tour in 2007 will highlight several streambank restoration projects.	SW JQ	Ongoing
10. Programmatic Action Item # 48 Restore stream and aquatic habitat using created pool/riffle complexes; planting emergent vegetation in the channel; and re-meandering channel where feasible. [7/2 (0 TB - voice vote priority)]	• Working with local partners and Section 319 funding, have completed 15+ stream restoration projects. Most projects include pool/riffle complexes and native vegetation. • Green Oaks project (underway) includes meandering low flow channel.	• North Branch watershed tour in 2007 will highlight several streambank restoration projects.	SW JQ	Ongoing
11. Programmatic Action Item # 8 Encourage stringent review during renewal of NPDES permits to insure that IEPA water quality standards are being met. Contributions of phosphorus and other pollutants of concern also need to be addressed in NPDES permits. [7/2 (0 TB - voice vote priority)]	• SMC & FOCR commented to IEPA on proposed phosphorous rule on behalf of NBWP. • SMC & FOCR will continue to review and comment on NPDES permits where applicable.	• No additional discussion.	SW JQ	Ongoing
12. Programmatic Action Item # 38	• SMC regulatory staff in Lake County has worked with	• No additional discussion.	TW	2007 for

Develop environmentally sound standards and procedures for regular channel maintenance to preserve conveyance and adopt a schedule for regular stream maintenance in the North Branch. [6/3]	drainage districts and other local partners on numerous channel maintenance and restoration projects to date. • SMC will review success of existing local projects and research other organization's standards to develop local standards. • Subcommittee needs to be established to develop standards.			research; 2008 for program development
13. Programmatic Action Item # 36 Protect wetlands and floodplains using land use management techniques such as a special zoning classification and/or more stringent restrictions on floodplain development in the WDO. [6/2 (8 TB)]	• Work with SMC regulatory staff and forward recommendations to TAC for consideration in next update to WDO. • Friends will work with individual municipalities on case-by-case basis to incorporate into action plans in Cook County.	• Separate zoning and WDO changes and suggestions. Zoning is a local issue whereas WDO is countywide. • Glenview Environmentally Sensitive Area (ESA) zoning could be used as model. • Consider working with assessors to reduce assessments on floodplain land and thereby reduce motivation to develop. Potentially tie to WDO.	TW JH JQ	2008 for consideration by TAC
14. Programmatic Action Item # 14 Maintain open space and install best management practices that infiltrate and treat all stormwater runoff on-site. Use voluntary incentives or regulatory requirements for implementation. [6/2 (5 TB)]	• Work with SMC regulatory staff and forward recommendations to TAC for consideration in next update to WDO. • Friends will work with individual municipalities on case-by-case basis to incorporate into action plans in Cook County.	• Work with MWRD watershed planning councils to incorporate into Cook County watershed ordinance. • Reword to clarify "Maximize open space on new developments…." • Reword to include "runoff volume reduction hierarchy (RVRH)" as potential incentive.	SW JQ	

North Branch Chicago River
Priority Watershed Communities for Open Space Protection
(Revised based on September 13, 2006 NBPC meeting)

Community	Watershed Area (Ac)	Protected Open Space (Ac)	Unprotected Open Space (Ac)	Potential OS Coordinator or Follow-Up Contact
1st PRIORITY				
Unincorp. Lake Co.	4289	786	1203	Talk to LCFPD property acquisition/planning department
Lake Forest	8166	1505	1108	Talk to Peter Gordon (City Forester)
Highland Park	5334	604	1009	Lee Smith Rick Stumpf (PD)
Glenview	7338	439	872	Talk to Robyn Flakne
Northbrook	7251	737	688	Phil Yoder
GROUP TOTAL	32,378	4071	4880	
2nd PRIORITY				
North Chicago	2020	326	424	Talk to Mayor Rockingham
Waukegan	2087	265	376	Talk to Greg Petry at Park District
Green Oaks	1775	233	375	John Wagener
Unincorp. Cook	3194	1198	284	John Quail will contact Comm. Suffredin; Bob Mack (Cook Co Hwy Dept); Chris Merenowicz (FPDCC)
Skokie	967	69	277	
Mettawa	716	165	267	Jack Tindall
Glencoe	1499	468	238	
Deerfield	3481	169	233	Talk to Barb Little
GROUP TOTAL	15,739	2893	2474	

Community	Watershed Area (Ac)	Protected Open Space (Ac)	Unprotected Open Space (Ac)	OS Coordinator
3rd PRIORITY				
Riverwoods	943	151	188	Lydia Scott will follow-up
Golf	285	2	188	Talk to Glenview Club
Bannockburn	1309	105	175	
Northfield	1885	167	138	John Birkinbine
GROUP TOTAL	4422	425	689	
4th PRIORITY				
Lincolnshire	710	87	97	
Park City	487	0	81	
Lake Bluff	980	247	77	
Winnetka	1581	293	54	
Wilmette	1962	151	38	
Morton Grove	1987	361	21	
Gurnee	111	0	18	
Highwood	147	0	6	
Niles	103	0	0	
Kenilworth	42	0	0	
Evanston	9	0	0	
GROUP TOTAL	8119	1139	392	

Watershed-Level Open Space Action Plan

The following multi-part action plan includes both general and specific programmatic recommendations for the watershed (Green Infrastructure Action Plan), and contains parcel-specific recommendations for each stakeholder community that are mapped and presented by Planning Area (see the parcel-level open space action plan on page 97).

The Green Infrastructure Action Plan (Action Plan) is a summary of watershed-level programmatic action recommendations that integrate project findings with goals and objectives for plan implementation. Table 4.4 at the end of this section presents the watershed Action Plan for preserving and enhancing open space. Within the Action Plan table, the action steps are organized by plan goal. (Note, the plan goals are numbered 1 through 7 for reference purposes only and do not reflect a prioritization.) The table also presents the stakeholder(s) responsible for taking the lead to implement the action item, a target date for implementation and the relative priority of each action.

While there are a number of action steps in the Action Plan that speak to the need and opportunity to restore and enhance existing open land that is held by the forest preserve and park districts, golf clubs, the Great Lakes Naval Base, schools, and others in the watershed - **protecting high priority unprotected open space parcels is the highest priority of this Action Plan**. Protecting open space to meet the 25% watershed goal set out in the 2000 watershed plan is the most important goal of this watershed-based open space planning effort. As a result, most of the action recommendations are geared toward meeting this land protection goal.

The high priority action steps that make up the core of a successful open space protection program in the watershed are as follows:

1. **Identify those open space parcels that are at greatest risk - i.e. those that absent action are expected to be developed by 2010.** Watershed municipalities, Lake and Cook County will review their comprehensive land use plans and zoning maps and compare to the parcel-level open space recommendations in the appropriate Planning Areas section of this plan.

2. **Acquire high priority properties for conservation purposes.** The Lake County Forest Preserve District will add one new forest preserve in the northern portion of the Middle Fork subwatershed, and acquire a West Fork subwatershed headwaters property to add to and connect with existing forest preserve properties in the Des Plaines watershed.

3. **Protect all medium and high priority parcels of undeveloped floodplain as open space.** Drainage Districts, Park Districts and Municipalities will work together to protect floodplain by outright acquisition or through purchase or donation of drainage or conservation easements.

4. **Municipalities, county, and forest preserve and park districts will actively use the open space plan.** The North Branch Plan Committee will work with municipalities individually to determine how the open space plan fits into other community plans and their land development approval process, and will encourage incorporation of open space protection recommendations in these community plans and processes.

5. **Watershed municipalities will develop and map a green infrastructure plan for their communities using the watershed open space plan as their basis.** Communities will incorporate the green infrastructure plan into their comprehensive land use plan; they will identify the highest priority parcels for protection; develop associated community action recommendations; and will include green infrastructure implementation projects in their annual budget.

6. **Watershed municipalities and counties will protect high quality wetlands, nature preserves and natural areas from the impacts of on-site or nearby development by using a conservation/green infrastructure overlay zone.** Communities will develop and implement a conservation/green infrastructure overlay zone that includes minimum open space requirements and alternative development practices that apply to all high quality natural areas and water resources. Once developed, the community will add the overlay zone onto local land use zoning maps, comprehensive land use plan maps, and will include the overlay development requirements in their review processes.

7. **Determine the feasibility of creating additional runoff storage on open space parcels adjacent to or near existing flood problem areas.** Municipalities will take the lead on identifying potential local detention projects where additional storage would reduce flood damage in their jurisdiction.

8. **Determine the feasibility of using Prairie Wolf and the Lake Bluff Forest Preserves for flood storage.** Lake County Stormwater Management Commission (SMC), the Drainage Districts and Illinois Department of Natural Resources–Office of Water Resources will determine whether additional storage is feasible, cost-effective and will significantly reduce flood damage.

9. **Install best management practices (BMPs) to improve water quality in the North Branch of the Chicago River.** SMC, Friends of Chicago River (Friends) and the BMP Selection Team will work cooperatively to identify open and partially open parcels along the river that are high priority for water quality BMPS and will contact landowners and the corresponding municipality to inform them of cost-share funding opportunities and determine interest in BMP projects.

10. **The North Branch Plan Committee will provide key land acquisition organizations with a map of high quality areas that should be**

protected in order to sustain biodiversity in the watershed. The Plan Committee will identify and map unprotected open space parcels with high biodiversity, or potential for high biodiversity, and provide information to land acquisition organizations such as Forest Preserves and Park Districts.

11. **Organize a cooperative effort to protect greenway corridors throughout the watershed.** The North Branch Plan Committee will convene a meeting of park, forest preserve and drainage districts and private clubs and land trust property owners that fall within the prospective greenway to brainstorm, identify opportunities and develop a strategy for cooperative ventures to protect and connect the greenway corridors within each tributary subwatershed.

12. **Develop a land preservation resource center that is available to the North Branch Plan Committee and watershed communities.** The North Branch Planning Committee, SMC and Friends will cooperate to research potential open space preservation strategies and fund sources. They will identify those that are applicable in the North Branch watershed and disseminate information to appropriate lead stakeholders.

13. **Identify funding mechanisms and work cooperatively to provide cost-share funding for protecting open space included within a community's green infrastructure plan.** The North Branch Planning Committee will facilitate multi-partner open space funding proposals and provide an entrée for cooperative multi-jurisdiction projects.

Top 5 Next Steps for Watershed Communities (Incl. Districts & Other Organizations)

1. Assess where your community currently stands relative to meeting the watershed goal of preserving 25% of land area as open space.
2. Review the Action Plan recommendations for your community in concert with your existing long range land use plan.
3. Present your findings/recommendations on necessary changes to your community's land use plan that will be needed to preserve open space to your community leaders (ex. Director, Mayor and Board or Council).
4. Incorporate open space preservation changes into the long-range land use plan and associated land development maps (zoning, open space etc.) for your community or organization, and include green infrastructure project needs in your long range and annual capital budgets.
5. Designate an appropriate community/organization representative to the North Branch Plan Committee as your open space "Coordinator" to coordinate and collaborate with other watershed stakeholders on open space projects in the watershed.

Short Term High Priority Actions

ACTION	LEAD	TARGET DATE	PREREQUISITE STEP(S)	NBPC LEAD
2A. Review community comprehensive land use plans and zoning maps and compare to parcel recommendations in the appropriate planning areas section of the open space plan. Identify those parcels at greatest risk - i.e. those that are expected to be developed by 2010.	Area 1: Waukegan, Park City, Gurnee Area 2: Lake County Area 3: N. Chicago, Lake Bluff, GLNTC Area 4: Green Oaks Mettawa Area 5: Lake Forest Area 6: Highland Park Area 7: Lincolnshire Bannockburn Riverwoods Area 8: Deerfield Area 9: Northbrook Area 10: Glencoe, Winnetka Area 11: Morton Grove, Golf Area 12: Glenview Area 13: Skokie, Wilmette Area 14: Northfield	8/2005		
3A. Work with municipalities, county, and forest preserve and park districts to actively use (and eventually adopt) the open space plan.	NBPC	2006		
4A. Incorporate open space areas with parcels of high natural resource value for conservation protection into Forest Preserve and Park District land acquisition plans.	Cook & Lake Co. Forest Preserve Districts, Park Districts	2006		

ACTION	LEAD	TARGET DATE	PREREQUISITE STEP(S)	NBPC LEAD
8A. Recommend communities adopt floodplain overlay zoning that prohibits development in the 100-year floodplain. If strict prohibition is considered too restrictive, at minimum any new development should meet "no adverse impact" standards.	Municipalities	2005		
8D. Determine the feasibility of using Prairie Wolf and the Lake Bluff Forest Preserves for flood storage.	SMC, East Skokie DD, West Skokie DD, IDNR-OWR	2006		
13B. Identify and map unprotected open space parcels with high biodiversity or potential for high biodiversity and provide information to land acquisition organizations such as Forest Preserves and Park Districts, and to municipalities and counties for land planning purposes.	NBPC, SMC	2006		
15A. Develop and recommend implementation of a conservation/green infrastructure zone overlay that includes all high quality natural areas and incorporate into local land use zoning maps, comprehensive land use plans and proposed development review processes.	Municipalities, Counties	2006		

ACTION	LEAD	TARGET DATE	PREREQUISITE STEP(S)	NBPC LEAD
18A. Convene a meeting of park, forest preserve and drainage districts, and private club and land trust properties that fall within the prospective greenway to brainstorm, identify opportunities and a strategy for cooperative ventures to protect and connect the greenway corridors within each tributary subwatershed.	NBPC	2006		
21A. Identify recreation needs based on projected 2030 population in the watershed and assess land protection needs to meet the desired level of service for active and passive recreation in 2030.	Park Districts, Municipalities	2006		
23B. Identify and designate a lead person from each municipality, park district, county, forest preserve district, drainage district and conservation organization to serve as the watershed open space plan "Coordinator" for each group along with a representative of the naval base and key private landowners.	NBPC	2005		

ACTION	LEAD	TARGET DATE	PREREQUISITE STEP(S)	NBPC LEAD
23C. Develop and map a green infrastructure plan for each community based on open space plan findings and incorporate into community comprehensive land use plan. Identify highest priority parcels for protection with associated community action recommendations.	Municipalities, Counties	2006		
23D. Prioritize green infrastructure actions annually for implementation and include funding for green infrastructure needs in municipal and county budgets.	Municipalities, Counties	2007		
23E. Identify funding mechanisms and work cooperatively to provide cost-share funding for protecting open space included within a community's green infrastructure plan.	NBPC, Coordinators	2006		
24B. Hold a kick-off meeting for all key stakeholders incl. municipalities, forest preserve districts and park districts as soon as plan is complete. Final open space plan will be distributed at the meeting.	NBPC	2005		

ACTION	LEAD	TARGET DATE	PREREQUISITE STEP(S)	NBPC LEAD
24C. Approach municipalities individually to determine how the open space plan fits into their comprehensive land use plans and proposed development review process, and to encourage incorporation of open space protection into comprehensive plans.	NBPC	2006		
24F. Champion watershed open space implementation within your community and coordinate with other jurisdictions on open space protection/ restoration projects.	Coordinators	Ongoing		
27A. Convene meeting of North Branch open space planning committee with stakeholders representing LCFPD, CCFPD, park districts, municipalities and conservation organizations to form a working subcommittee to develop an implementation strategy and potential management vehicles (including evaluating implementation and updating the plan). (Will include the formation of this subcommittee as an agenda item for the kick-off meeting - 24B above).	NBPC, Coordinators	2005		

Long Term High Priority Actions

ACTION	LEAD	TARGET DATE	PREREQUISITE STEP(S)	NBPC LEAD
5B. Acquire property to add one new forest preserve in the northern portion of the Middle Fork subwatershed.	LC Forest Preserve District	2009		
5C. Acquire West Fork subwatershed headwaters property to add to and connect with existing forest preserve properties in the Des Plaines watershed.	LC Forest Preserve District	2009		
8B. Protect all medium and high priority parcels of undeveloped floodplain as open space by outright acquisition or through purchase or donation of drainage or conservation easements.	Drainage Districts, Municipalities, Park Districts	2010		
9B. Determine the feasibility of additional storage on nearby open space parcels for flood problem areas where storage would reduce flood damage.	Municipalities, GLNTC	2010		
16A. Acquire or protect with land preservation agreements the 1,323 acres identified as having high biodiversity.	Forest Preserves, Park Districts, Conservation Organizations	2010		

	Decision Rules	Definitions	Range
1	Is it a primary action?	Does something else need to happen before something else? Value added creates the potential for any other action to be accomplished. Value added includes satisfying data gaps.	Value added independent (high) Independent (medium) or dependent (low) variable.
2	How many planning categories does the action meet?	Accomplishes one or more of the six goal categories (FD=flood damage reduction, WQ=water quality, NA=natural areas, H=habitat, ER=education/recreation, WC=watershed coordination)	1-6 weighting (1 pt each)
3	Is the action time sensitive (deadline)?	Does this have to be done within a specific or critical time period? Each item can have its own critical time period based on experience.	Short term (3 years or less) – long term
4	How achievable is the action?	Do we know the resources (people, data, public support, and money) are available to do it?	High-Medium-Low
5	Is it a long term or short term benefit to the watershed's health?	Limited resources	No long term or unknown benefit (0)
6	Required by local, state, or federal law or other agreements.		Yes (1) or No (0)

North Branch Chicago River WATERSHED PROJECT

MEMORANDUM

To: Chris Davis, Illinois Environmental Protection Agency

From: Sean Wiedel, Lake County Stormwater Management Commission

Subject: North Branch BMP Selection Team –
Funding Recommendations for June 1, 2006 Funding Deadline

Date: August 18, 2006

The North Branch BMP Selection Team (BST) met on June 21, 2006 to review initial funding proposals from seven Section 319 applicants. Based on the comments and concerns expressed at the June 21st BST meeting, the applicants were sent letters summarizing the issues and questions raised by the BMP Selection Team. Each of the funding applicants was asked to address the BST's questions and concerns in writing. After receiving the applicants' responses, the BST met a second time on August 2, 2006 to evaluate the revised funding requests. After reviewing the revised funding proposals, the BMP Selection Team reached a consensus on the funding recommendations in the table below. Each of the funding recommendations is discussed in detail on the following pages. The North Branch Watershed Project has $150,000 available for general water quality BMPs and $100,000 available for green building projects.

Project Applicant - Project Name	**Total Project Cost ($)**	**Funding Sought ($)**	**Funding Recommended**
Lake Forest – Dalitsch Pond Conversion	351,719	120,034	0
Green Oaks – South Branch of Middle Fork Tributary Enhancement Project Phase 2	373,200	178,650	0
Glenview – West Fork Stabilization at Glenview Road	186,600	93,300	60,000
Divine Word – Tributary Stream Restoration	45,450	10,000	10,000
Park Dist. of Highland Park – Fink Pond Green Retrofit	15,585	7,775	7,775
Northfield Park Dist. – Willow Park Restoration	123,400	58,700	58,700
Lake Forest Open Lands – Skokie Nature Preserve Riverbank Buffer	14,496	7,248	6,400
Total 319 Funding Requested	**$1,110,450**	**$475,707**	**$142,875**

City of Lake Forest – Dalitsch Pond Conversion

Project Description

The Dalitsch property is located south of the Middlefork Savanna Forest Preserve and east of Interstate 94 on the western edge of Lake Forest. Middlefork Savanna is home to a rare tallgrass savanna, and features a mix of oak savanna and woodlands, wet and mesic prairies, sedge meadows and marshes. The approximately 40-acre Dalitsch property was purchased by the City of Lake Forest in 2005 and contains a 3.62 acre excavated pond/borrow pit. The remaining 36.28 acres of the Dalitsch property drains into this pond, along with 250 acres of off-site land. The pond discharges water into the Middlefork Savanna wetland to the north via an excavated ditch.

V3 Consultants conducted water quality sampling in 2005 that indicated that the pond is contributing to lower water quality entering the Middlefork Savanna wetland and the Middle Fork. However, based on its location, it has the potential to filter and improve water quality entering the Middlefork Savanna wetland from upstream areas including Interstate 94. The objective of this project is to preserve and protect the high quality Middlefork Savanna wetland by improving water quality entering the wetland and ultimately the Middle Fork. The proposed project includes converting the existing pond into an emergent wetland complex. This will be accomplished by raising the bottom elevation of the pond and planting resulting areas with shallow inundation with emergent wetland plants. Additionally, the slopes of the pond will be planted with native wet-mesic prairie species. The wetland complex will remove pollutants via settling, attenuation, and vegetative filtration. The City of Lake Forest requested $120,034 in North Branch 319 funding for the project (34% of the total project cost).

BST Recommendation

The City of Lake Forest is planning to develop a portion of the Dalitsch property as a municipal services facility in the next year. This development could impact the pond project. The BST felt that there were several unanswered questions including:

- Support and agreement from the Lake County Forest Preserve District;
- Sources of match funding;
- Building layouts and site configuration for the new facility (design is underway); and
- Water quality protection for the pond and Middlefork Savanna from the new building facility.

The BST is not recommending funding for this project because of these unanswered questions. However, the BST felt that the project has a lot of potential especially if green building techniques (permeable pavement, rain gardens, green roof, etc.) are incorporated into the design for the new facility. The City of Lake Forest will be encouraged to submit a funding request for both the pond improvements and green building project components at the December 1st funding deadline. This will allow the BST to view both the pond water quality improvements and building design within a unified context.

Village of Green Oaks – South Branch of Middle Fork Tributary Enhancement Project Phase 2

Project Description

The Village of Green Oaks is seeking funding for a stream maintenance and restoration project along a tributary to the Middle Fork. Green Oaks proposed to stabilize 950 feet of stream on which both banks will be restored (1,900 feet of streambank). This project feeds into another tributary of the Middle Fork that Green Oaks has received IEPA 319 funds to stabilize. With this proposed and two previous projects, Green Oaks will stabilize nearly 5,100 feet of stream along

tributaries in the headwaters of the Middle Fork. The proposed project will re-grade and reshape the existing channel and remove large amounts of vegetative debris within the channel and along the banks to reduce streambank erosion caused by the debris and to reduce the effects of nuisance flooding on local properties. This project will include the removal of invasive, non-native species and the restoration and stabilization with appropriate native plant species. The restored channel will be designed with wetland shelves on alternating banks to mimic a naturally-formed, meandering stream channel. The project also will enhance a 3-acre wetland that currently provides some nuisance flood relief by removing all non-native vegetation and planting new native wetland species. Green Oaks proposes to re-grade and reshape the wetland bottom to provide compensatory storage for low frequency events that will help to recharge the wetland and enhance the stormwater carrying characteristics of the drainageway. The Village of Green Oaks requested $178,650 in North Branch 319 funding (48% of the total project cost).

BST Recommendation

The BST does not recommend funding for the Green Oaks project. The BST felt that the water quality benefits of the project were less prevalent than the flood damage reduction benefits. The BST was also concerned with the potential for negative wetlands impact associated with the wetland reshaping/enhancement component. The BST felt that the purpose of this wetland excavation was to create floodwater storage rather than improve water quality. If the Village of Green Oaks decides to re-submit the project proposal, the BST will request a wetland restoration plan and more information on the proposed water quality benefits of the wetland component. Finally, the BST felt that Libertyville Township on whose property the work would occur and the West Skokie Drainage District (chartered with maintaining conveyance in the Middle Fork) should take on at least partial financial responsibility for this project.

Village of Glenview – West Fork Stabilization at Glenview Road

Project Description

The Village of Glenview is proposing to stabilize 400 linear feet of the east bank of the West Fork in downtown Glenview. The banks in the area show significant signs of erosion such as undermined turf grass and bank soil settlement. The use of the native plants will enhance stabilization and contribute to the control of invasive species. The project's downtown location, along with future improvements related to upcoming downtown redevelopment, will allow Glenview to highlight the aesthetic and habitat benefits of replacing turf grass and stabilizing streambanks with diverse native plants. This riverside public open space area offers excellent opportunities for water quality improvement and habitat restoration. The Village of Glenview Natural Resources Commission has sponsored ecological assessments of the West Fork and tributary detention areas and is in the process of creating a comprehensive plan for Glenview's natural areas, centered on the West Fork. The Village of Glenview requested $93,300 in North Branch 319 funds to complete the streambank stabilization (50% of the total project cost).

BST Recommendation

The BST recommends funding the Glenview project at the $60,000 level. While the BST supports the project, the committee felt that the cost per linear foot of $233 was high because of the boulder toe protection method chosen. The BST is recommending funding at $60,000 which works out to $150 per linear foot, the approximate average linear foot rate for the projects we have funded to date.

Divine Word – Tributary Stream Restoration

Project Description
Divine Word has over 34 acres of fragment oak-hickory forest that have remained untouched for over 100 years. The woodland sits halfway between the Middle Fork and the West Fork of the North Branch of the Chicago River. Hydrologically, the Mission's soils slowly absorb and filter upstream flow from the neighbors before whisking it away through the stream that runs adjacent to the woods. The stream is intermittent, though without the forest to intervene it would probably run more steadily.

This funding request is to support the protection of the stream area by clearing the exotic species to provide better stormwater filtering, and to protect the stream from non-point source pollution. By removing the buckthorn, garlic mustard, honeysuckle and other invasives that have encroached in the woodland, the original hydrology of this 'flat forest' will be restored, and more beneficial native vegetation can be re-established. The green infrastructure will improve the natural storage ability of this fragment, keep runoff from flooding nearby homes, and reduce the amount of runoff to the river during storm events. Divine Word requested $10,000 in North Branch 319 funds (22% of the total project cost).

BST Recommendation
Given the potential influence of Divine Word, the BST recommends full funding for the Divine Word project at $10,000. The Divine Word owns over 900 acres in the project vicinity including the woodland. Their participation in this and other watershed projects could have far-reaching positive implications.

Park District of Highland Park – Fink Pond Green Retrofit

Project Description
The Park District of Highland Park (PDHP) wishes to retrofit a one-acre floodplain storage area along the Skokie River with native plantings. The area is now maintained as mown turf grass. At the same time, the District plans to construct a 250 linear foot vegetated swale along the existing walking path and make three curb cuts to divert stormwater runoff from the adjacent roadway into the newly planted storage area. Stormwater from Deer Creek Parkway currently flows immediately into the storm system (and subsequently into the Skokie River). The proposed project will improve water quality by filtering overland flow from adjacent soccer fields and runoff from adjacent roads and parking lots. The Park District has also agreed to switch to no phosphorous fertilizer in all PDHP properties. The PDHP requested $7,775 in North Branch 319 funds (50% of total project cost).

BST Recommendation
The BST agreed that the PDHP's proposal is a low cost, high quality project. SMC staff worked with the PDHP to optimize the layout of the swale and other project components. The BST recommends full funding ($7,775) for the PDHP Fink Park project.

Northfield Park District – Willow Park Restoration

Project Description
The Northfield Park District (NPD) proposes to include three high-visibility project areas that will showcase BMP practices in the North Branch Chicago River watershed at their Willow Park. Willow Park is located along the Middle Fork in Cook County. The proposed project includes construction of the new bio-swale to filter runoff from play fields and other park facilities; Middle Fork riverbank restoration; and native habitat restoration. NPD is committed to improving water quality through innovative BMP practices and providing enhancement to natural resources. NPD will create a 315 linear foot bioswale planted with native vegetation, stabilize 200 linear feet of the Middle Fork streambanks and install 2 pool riffle complexes. The NPD will fund additional habitat restoration out of their pockets but will use it as match. The Northfield Park District requested $58,700 of North Branch 319 funds (48% of total project cost).

BST Recommendation
The BST felt that the NPD project was a high quality project and appreciated that they limited their funding request based on meeting with SMC and Friends. The BST is excited to be working with the NPD, a stakeholder that we have not worked with before. The BST recommends full funding for the NPD project ($58,700).

Lake Forest Open Lands Association– Skokie Nature Preserve Riverbank Buffer

Project Description
Lake Forest Open Lands Association (LFOLA) requested funding to restore and stabilize a buffer strip of riverbank directly “upslope” from the project limits of the recently completed East Skokie Drainage District streambank stabilization at Deerpath Golf Course. LFOLA wants to replant portions of the northern half of the Skokie River streambank with native herbaceous plants, shrubs and trees. This section of the streambank is part of LFOLA’s Skokie River Nature Preserve. The planting area would be confined to a buffer section extending 25 feet east from the top of the re-graded streambank slope. Currently this area exists as mostly exposed soil and a sparse covering of non-native vegetation. Where it is necessary the area will be covered with erosion control material to prevent soil loss while the new plantings take root. The proposed buffer planting will help reduce streambank erosion and sediment deposition into the river. LFOLA will actively manage the area as part of its regular land stewardship practices. Lake Forest Open Lands Association requested $7,248 of North Branch 319 funds (50% of total project cost).

BST Recommendation
The BST recommends funding the LFOLA project for $6,400. This amount will cover the cost of the buffer plants materials; installation by LFOLA staff can be used as match.

North Branch Chicago River WATERSHED PROJECT

MEMORANDUM

To: North Branch Planning Committee

From: Sean Wiedel, Lake County Stormwater Management Commission

Subject: November 8, 2006 Planning Committee Meeting Notes

Date: December 29, 2006

Meeting notes from the November 8, 2006 North Branch Planning Committee (NBPC) meeting are below. NBPC meeting are held on the second Wednesday of every other month from 1:30 to 3:30 PM at the West Ridge Center (636 Ridge Road) in Highland Park. . In 2007, NBPC meetings will be held on January 10th, March 14th, May 9th, July 11th, September 12th and November 14th. Please add these dates to your calendar and plan to attend. If you have any questions or suggestions for future agenda items, please contact me at 847-918-7693 or swiedel@co.lake.il.us.

November 8th NBPC Meeting Notes

1. Clean Air Counts and the CorporateLands Programs: John Golec and Shirlee Hoffman

Clean Air Counts is a northeastern Illinois regional initiative to reduce ozone-causing emissions, thereby improving air quality and enabling economic development. This multi-year initiative seeks to achieve specific and significant reductions in targeted smog-forming pollutants and major reductions in energy consumption by obtaining voluntary commitments from organizations and individual households to implement a number of clean air strategies. Openlands' Corporatelands Program provides support to organizations interested in implementing one of the strategies, landscaping with native plants.

John Golec spoke about the Clean Air Counts (CAC) program. CAC is a voluntary program that began in 2004 and covers the 6 county northeastern Illinois region. CAC focuses on facilities rather than processes and is particularly concerned with ozone-forming pollutants such as nitrous oxides and volatile organic carbons. CAC encourages interested parties to look at their website (http://www.cleanaircounts.org/) for more information. CAC's goal is to remove 5 tons per day of emissions. As of September 2006, the CAC campaign had removed 3 tons per day of emissions. John's PowerPoint presentation is attached for more information or you can contact John at jgolec@cleanairlakecook.com.

Shirlee Hoffman is the Corporatelands project manager at Openlands. Corporatelands is a part of the CAC whose main idea is that no mowing of turf grass means no emissions of pollutants. The Corporatelands program provides input on three things:

- Guide you through deciding where, when, and how to install natural landscaping;
- Assist you in involving your employees in your natural landscaping; and
- Suggest how to explain the benefits of your natural landscaping to your many audiences.

Corporatelands also provides input on a number of other important topics such as:

- What to do about neighbors;
- Cost estimates for installing native vegetation; and
- Estimators for cost savings over turf grass.

The Corporatelands program has generally had better success on greenfield sites rather than converting existing corporate campuses to native vegetation. To succeed, Corporatelands really needs a champion within the company. They also think they may be more successful if they approach the corporations through their public information and public relations programs to increase the use of natives. They also need to begin tying in the water supply issue since once established, native landscaping requires much less water. Unfortunately, CAC is mostly focused on not mowing at the current time. More information about the Corporatelands program can be found at http://www.openlands.org/corporatelands.asp or by contacting Shirlee (shoffman@openlands.org). Shirlee also prepared a handout (attached) with a variety of websites and links that contain information about native landscaping.

2. Review North Branch Open Space Plan Priorities: Patty Werner

Patty discussed the status of the North Branch Open Space (NBOS) plan. Patty provided a number of handouts for the discussion (attached). The North Branch municipalities and unincorporated areas were place in 4 priority categories based on their remaining unprotected open space as shown on the attachment. The NBPC's top priority is to get open space coordinators for all communities on the list through the Village of Golf. These communities all have larger unprotected parcels or significant acres of unprotected open space.

Patty stressed the need to get commitments for the open space coordinators. A number of potential coordinators were identified and have been added to the list. Patty sent a letter to the mayors and park district directors in each of the North Branch communities several months ago. Several NBPC members asked for a better definition of the open space coordinators' roles. Patty developed the open space coordinator role description that is attached for your information.

At the November 8th NBPC meeting, we continued discussing the NBOS plan, in particular looking at high priority items and necessary prerequisite steps to achieve these items. At the September NBPC meeting, we broke into groups and used the attached evaluation criteria to score the short and long term high priority action items. The list of high priority action items along with the NBPC's evaluation scores is attached. If you have any questions or comments, please contact Patty (pwerner@co.lake.il.us).

3. North Branch 319 Short Application: Sean Wiedel

Sean recently had a discussion with the IEPA about developing a short-form application for North Branch 319 funds. This application would be available for North Branch 319 projects that request $20,000 or less in funding. Given the amount of funding requested, IEPA, SMC and Friends felt that it would be advantageous to make the application process easier for smaller projects. Sean discussed this idea with the NBPC. The NBPC supported the idea of creating an easier application process for smaller North Branch 319 projects (<$20,000). Sean will develop the short form application in time for the June 1, 2007 funding deadline.

4. Announcements

North Branch Funding Update

At the June 1, 2006, the North Branch Watershed Project (NBWP) had $250,000 in Section 319 funding available. The NBWP received seven funding application requesting a total of $475,707 in North Branch 319 funding. After meeting on June 21st and August 2nd, the BMP Selection Team (BST) recommended funding five of the projects for a total of $142,875 and the IEPA approved the five projects. Given the approved projects, the NBWP had ~ $105,000 available at the December 1st funding deadline. Sean will provide an update on the December 2006 funding applications at the January 10th NBPC meeting. The December 2006 applications are available on SMC's website at http://www.co.lake.il.us/smc/planning/northbranch/BMPdefault.asp. If you have any questions about any of the projects or funding recommendations, please contact Sean Wiedel (swiedel@co.lake.il.us).

Update/Report on Chicago River Summit

Lieutenant Governor Pat Quinn and Friends of the Chicago River sponsored the 4th Annual Chicago River Summit on Friday, October 20th. More than fifty stakeholders, representing a wide variety of interest groups, attended the Summit.

CLEAN AIR COUNTS

Make A Visible Difference

Clean Air Counts Campaign for Clean Air and Development

Who We Are

- Northeastern Illinois regional initiative
- Partners include: Metropolitan Mayors Caucus, US EPA—Region 5, City of Chicago, and Illinois EPA
- Funded in part through grants from private foundations
- Outreach contracted through regional non-profit organizations

  --LEED Council, Delta Institute, Waste Management Research Center, Chicagoland Chamber of Commerce, Center for Neighborhood Technology, Openlands and the Lake Cook Partnership (a consortium of the Buffalo Grove, Deerfield/Bannockburn/Riverwoods, Northbrook, Wheeling/Prospect Heights Area Chambers and the Transportation Management Assoc. of Lake Cook

Why Are We Here ?

Because of the health effects related to the pollutant ozone such as ……

- Difficulty in breathing and shortness of breath
- Aggravated and prolonged coughing and chest pain
- Increased aggravation of asthma, susceptibility to respiratory infection resulting in increased hospital admissions and ER visits
- Repeated exposures could result in chronic inflammation and irreversible structural changes in the lungs, that can lead to premature aging of the lungs and illness such as bronchitis and emphysema
- Growing evidence suggests association with premature death

A Brief History

- Many sources of air pollution are now tightly regulated (i.e. power plants, industrial facilities, automobiles, etc.)
- Further regulation is costly and potentially harmful to the economy
- The Clean Air Counts campaign looks for alternate means of cleaning air.
- 2004 was first active year, with focus on target corridors
- More than 400 organizations signing on.

Clean Air Counts

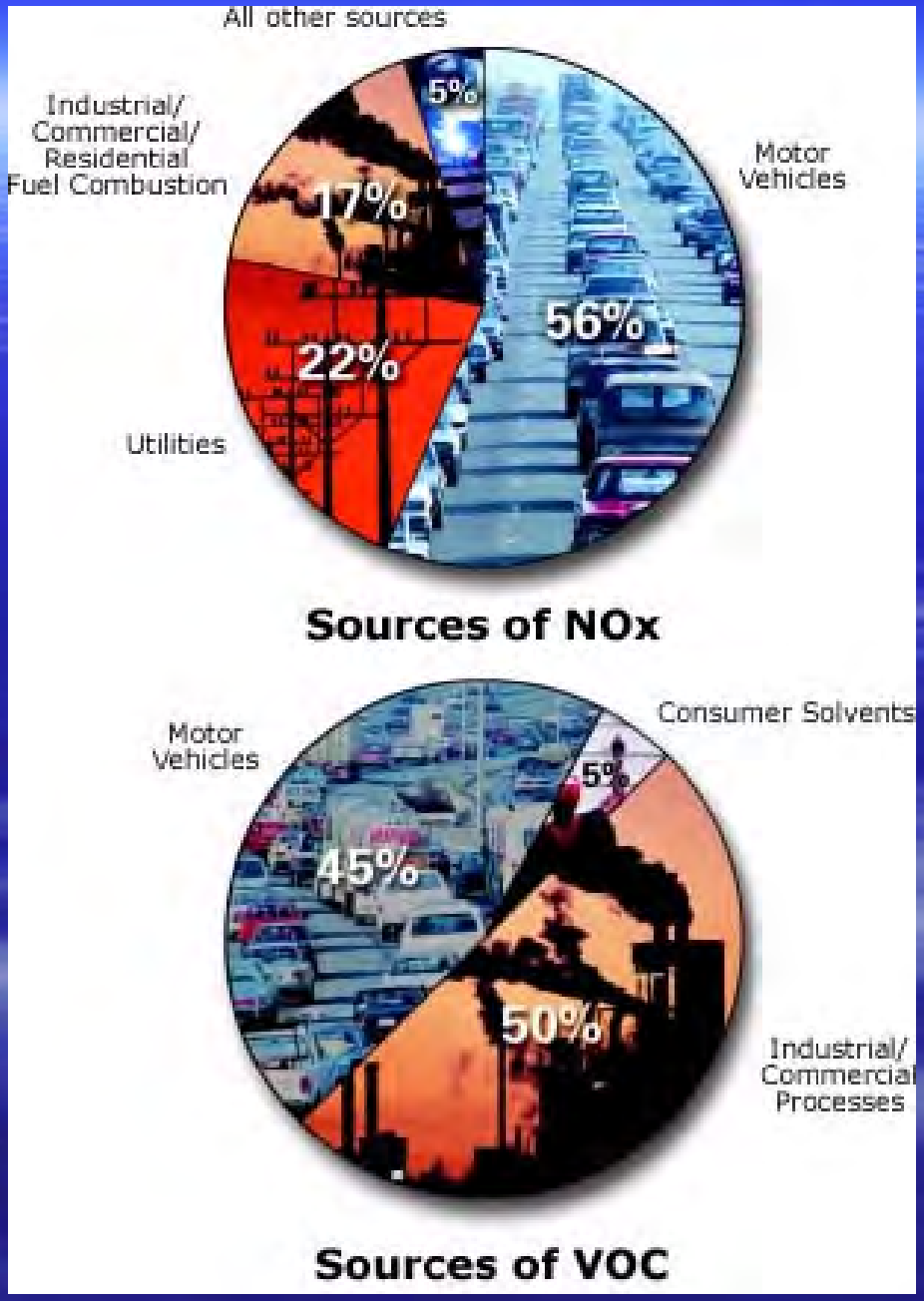
Targets Ozone

NOx + VOCs + = Ozone

And ozone is bad for you

Where do NOx and VOCs come from?

- Volunteer efforts are especially helpful with ozone during summer months



Why We Need YOU

- Many significant sources of pollution are not easily regulated
- Some can best be controlled through voluntarily measures

What Can You Do?

You can implement sensible techniques that are within your reach and appropriate to your business needs and your company's mission

Clean Air Strategies

- Energy efficient lighting
- Energy Star office equipment
- Energy efficient buildings
- Low VOC paints, cleaning products and building materials
- Natural landscaping
- Workforce transportation options

Making A Difference

Joining CAC can have a big impact on the region:

- Avoids tighter regulation later
- Improves public health (asthma and other lung diseases)
- Betters the quality of life for people and makes the region more aesthetically pleasing
- Helps to set this campaign as a national model for success

What's In it for YOU?

Signing on to the Campaign has a number of benefits:

- Saves you money
- Improves the air quality of the workplace and surrounding areas
- Shows your customers, employees, community and business partners that you care
- The Visible Difference “Certified Participant” is a new badge of honor. Customers will notice it on websites, store fronts, and lobbies.
- Positive publicity with local leaders and the media

This ad was made possible by the Searle Funds at The Chicago Community Trust.
Jones Lang LaSalle & Hewitt Associates
Reduced Air Pollution
by 15,526 lbs.
Metropolitan Mayors Caucus
www.CleanAirCounts.org
Clean Air Counts is made possible through the support of the Grand Victoria Foundation, The John D. and Catherine T. MacArthur Foundation, Gaylord and Dorothy Donnelley Foundation, The Chicago Community Trust, and the United States Environmental Protection Agency.

This ad was made possible by the Seeds Fund at The Chicago Community Trust.

Jones Lang LaSalle & Hewitt Associates

Reduced Air Pollution by 15,526 lbs.

www.CleanAirCounts.org

Current Lake Cook Corridor Adopters

Abbott Laboratories
Addolorata Villa
Advocate Health Care
Allstate
American Hotel Register Company
ASAP Software
Astellas US LLC
Baxter Credit Union
Baxter Health Care Corp.
Bell Flavors & Fragrances
Bernhard Woodwork
BKA
Bob Chinn's Crab House
Brentwood North
Buffalo Grove Chamber of Commerce
Buffalo Grove Bank and Trust
Buffalo Grove Park District
Carr America
CB Richard Ellis
CDW
CHEMCO
Chicago Marriott Suites Deerfield
Condell Health Network
Covenant Village of Northbrook

Current Lake Cook Corridor Adopters

Crate & Barrel
DBR Chamber of Commerce
Discover Financial Services
Earth Friendly Products
Embassy Suites Hotel – Deerfield
Evanston Hospital
Fisher Container Corp.
Glenbrook Hospital
Glenview State Bank
Grainger
Hewitt Associates
Highland Park Hospital
Holy Family Medical Center
Hospira
HSBC North America
HydraForce Inc.
IDEX Corp.
Jones Lang LaSalle
Korman/Lederer Associates
Lake Cook Rehab Center
Lake Forest College
Leica Microsystems

Current Lake Cook Corridor Adopters

LifeWatch Inc.
Marriott International
Medline Industries
Midtown Athletic Clubs
Mitsubishi Electric Automation
North American Jet
Northbrook Bank & Trust
Northbrook Chamber of Commerce
Northbrook Park District
Old World Industries
Opto Technologies
PACTIV
Paint JAR Inc.
Palwaukee Airport
Patten Industries
Pioneer Press
Precision Resource
Prentiss Properties
Prospect Heights Park District
Reinhold Environmental
Renaissance North Shore Hotel
Revell Monogram
Rosenthal Manufacturing
Serena Sturm Architects
Signature Flight Support

Current Lake Cook Corridor Adopters

Slide Products
Sunnyside Corp.
Sunset Foods
Takeda Pharmaceuticals
TAP Pharmaceutical Products
Technotrans America
Tenneco
The ABL Group
TMA of Lake Cook
Transwestern Investment Company
Underwriters Laboratories
Valspar
Vapor Bus International
Vulcanium Metals
Westin North Shore
Wheeling/Prospect Heights Chamber of Commerce
Whole Foods Market
Yaskawa Electric America
ZF Industries

Emissions Reduction Results to Date

- The CAC Campaign goal is to remove 5 tons per day of emissions

- As of September 30, 2006, the CAC Campaign has removed 3 tons per day of emissions in the Chicago Metro Area

Annual Reporting

- Reporting is equally as important as joining
- Demonstrated progress can only be achieved by quantifying adopter strategies
- The reporting cycle is March through July
- Can be accomplished on-line or by using formatted Excel spreadsheets

How to Join

Clean Air Counts-Registration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://www.cleanaircounts.org/registration/registration.aspx?typ=business Go Links

REGISTRATION PROCESS

1. Provide Member Info
2. Select Strategies
3. Select Login

ALREADY A MEMBER?

» If you have already registered please click the following link to login:

Member login

Member Registration

Please provide the following information. ***Please Note:*** Required fields are denoted with an asterisk "*".

Step 1. Provide Member Information

Organization Name and Address

* Organization Name:
* Address:
* City:
State: IL
* Zip Code:

Primary Contact

* First Name:
* Last Name:
* Title:
* Phone: (999-9999 or 999-999-9999)
Fax: (999-9999 or 999-999-9999)
* Email:

Organization Information

Done Internet

start Fund Raising Concept... Microsoft PowerPoint ... Inbox - Microsoft Out... Clean Air Counts-Reg...

How to Join

Clean Air Counts-Registration - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://www.cleanaircounts.org/registration/registration_strategy.aspx Go Links

Member Registration

REGISTRATION PROCESS

1. Provide Member Info
2. Select Strategies
3. Select Login

ALREADY A MEMBER?

» If you have already registered please click the following link to login:

Member login

Step 2. Select Strategies

☐ **Clean Fuel Fleet**
This helps prevent air pollution through the use of Low Emission Vehicles (LEVs) powered by conventional or alternate fuels and certified to Clean Fuel Fleets Program requirements.

☐ **Energy Efficient Lighting**
This can involve a combination of strategies such as using more natural daylight, using energy efficient light bulbs that operate at a lower wattage, improving lighting controls and adjusting light to appropriate task levels, and performing basic maintenance on light fixtures to keep them running longer.

☐ **Energy Star Building**
The Energy Star Buildings strategy encourages participants to reduce energy consumption and air pollution resulting from the generation of energy.

☐ **Energy Star Homes**
This encourages reduction in energy consumption and air pollution resulting from new residential construction.

☐ **Energy Star Office Equipment**
This is a voluntary labeling program designed to identify and promote energy-efficient products.

☐ **Gas Can Replacement**
This strategy informs citizens of the benefits of using more

Done Internet

start Microsoft PowerPoint ... Inbox - Microsoft Out... Clean Air Counts-Reg...

Clean Air Counts is made possible through the support of The Chicago Community Trust, Grand Victoria Foundation, John D. and Catherine T. McArthur Foundation, Gaylord and Dorothy Donnelley Foundation, and the United States Environmental Protection Agency.

For More Information

Visit the website at:

www.clearnaircounts.org

There you'll find:

* Links to other helpful websites

* Information about participating

* The reporting requirements for each CAC initiative.

Make A Visible Difference

You can also contact:

John Golec

Project Manager, Clean Air Counts

Lake Cook Partnership

847.541.0170

jgolec@cleanairlakecook.com

North Branch Chicago River Watershed Planning Committee Meeting

November 8, 2006

NATIVE LANDSCAPING FOR WATER CONSERVATION: RESOURCES

1. Clean Air Counts: www.cleanaircounts.org

2. Openlands Corporatelands Program: www.openlands.org/corporatelands.asp

3. Green Infrastructure Valuation Calculator http://greenvalues.cnt.org
   --Developed for use by planners, engineers, and other munIcipal staff.

4. Illinois Native Plant Guide: Native Plant Applications for Streams and Stormwater Facilities www.il.nrcs.usda.gove/technical/plants/npg/NPG-plntapps.html

5. U.S. Environmental Protection Agency Green Landscaping with Native Plants, Overview www.epa.gov/greenacres.index.html

6. U.S. Environmental Protection Agency Green Landscaping with Native Plants, Landscape Water Conservation www.epa.gov/greenacres/water.html

7. American Water Works Association Publication: Water Conservation Programs—A Planning Manual www.awwa.org/bookstore/product.cfm?id=30052

8. Landscape Design for Water Conservation, University of Florida IFAS Extension http://edis.ifas.ufl.edu/MG027

Prepared by:

Shirlee Hoffman
Corporatelands Project Manager
Clean Air Counts Initiative www.cleanaircounts.org
Openlands
www.openlands.org/corporatelands.asp

shoffman@openlands.org
312.863.6257
marketscope@shoffman.com
312-842-3845

North Branch Chicago River
Priority Watershed Communities for Open Space Protection
(Revised based on September 13, 2006 NBPC meeting)

Community	Watershed Area (Ac)	Protected Open Space (Ac)	Unprotected Open Space (Ac)	Potential OS Coordinator or Follow-Up Contact
1st PRIORITY				
Unincorp. Lake Co.	4289	786	1203	Talk to LCFPD property acquisition/planning department
Lake Forest	8166	1505	1108	Talk to Peter Gordon (City Forester)
Highland Park	5334	604	1009	Lee Smith Rick Stumpf (PD)
Glenview	7338	439	872	Talk to Robyn Flakne
Northbrook	7251	737	688	Phil Yoder
GROUP TOTAL	32,378	4071	4880	
2nd PRIORITY				
North Chicago	2020	326	424	Talk to Mayor Rockingham
Waukegan	2087	265	376	Talk to Greg Petry at Park District
Green Oaks	1775	233	375	John Wagener
Unincorp. Cook	3194	1198	284	John Quail will contact Comm. Suffredin; Bob Mack (Cook Co Hwy Dept); Chris Merenowicz (FPDCC)
Skokie	967	69	277	
Mettawa	716	165	267	Jack Tindall
Glencoe	1499	468	238	
Deerfield	3481	169	233	Talk to Barb Little
GROUP TOTAL	15,739	2893	2474	

Community	Watershed Area (Ac)	Protected Open Space (Ac)	Unprotected Open Space (Ac)	OS Coordinator
3rd PRIORITY				
Riverwoods	943	151	188	Lydia Scott will follow-up
Golf	285	2	188	Talk to Glenview Club
Bannockburn	1309	105	175	
Northfield	1885	167	138	John Birkinbine
GROUP TOTAL	4422	425	689	
4th PRIORITY				
Lincolnshire	710	87	97	
Park City	487	0	81	
Lake Bluff	980	247	77	
Winnetka	1581	293	54	
Wilmette	1962	151	38	
Morton Grove	1987	361	21	
Gurnee	111	0	18	
Highwood	147	0	6	
Niles	103	0	0	
Kenilworth	42	0	0	
Evanston	9	0	0	
GROUP TOTAL	8119	1139	392	

North Branch Chicago River WATERSHED PROJECT

NORTH BRANCH CHICAGO RIVER
OPEN SPACE COORDINATOR ROLE DESCRIPTION

The designated Open Space Coordinator (OS Coordinator) for each community stakeholder organization (municipality, park district, forest preserve district etc.) will champion watershed open space plan voluntary implementation within their community. They will also serve as the "point of contact" and coordinator with other communities throughout the watershed.

The OS Coordinator will:

1. Attend up to four meetings per year with the North Branch Project Team* and other watershed OS Coordinators to report on community voluntary implementation efforts and discuss and participate in the coordination of multi-partner/jurisdiction open space projects. Meeting times and places will be determined by the OS Coordinator group.

2. Communicate watershed-wide open space plan voluntary implementation activities to community staff, boards, councils and other community influentials.

3. Work with the North Branch Project team and Plan Committee to introduce the North Branch open space plan to his or her community, and help coordinate the voluntary implementation of the plan within his or her community.

   Types of voluntary implementation activities the OS Coordinator may choose to help with:

   - Assist with the introduction of the open space plan to his or her respective community or organization by helping the Project Team schedule meeting presentations for the governing staff, council and other relevant boards and commissions. The OS Coordinator may also highlight the community's position relative to meeting the watershed goal of preserving 25% of land area as open space via community communications.

   - Promote or coordinate the review of the Open Space Plan Action Plan recommendations for his or her community relative to the community's comprehensive plan.

   - Facilitate a presentation to community leaders (ex. Director, Mayor, Board or Council) of the comprehensive plan/open space plan review findings that indicate where changes to the community's land use plan may be needed in order to preserve open space.

   - Coordinate the open space changes that are supported by community leaders into the community's comprehensive plans and land development maps/plans (zoning, open space etc.). The OS Coordinator may facilitate the community's use of the GIS open space

* Friends of Chicago River and Lake County Stormwater Management Commission project staff and interested Plan Committee members.

inventory data in community planning activities and on appropriate development review maps.

- Where/If appropriate, coordinate community adoption of the North Branch Open Space Plan.
- Identify funding mechanisms and coordinate the inclusion of green infrastructure project needs into long range and annual capital budgets.
- Participate in a watershed-wide meeting with representatives of land trusts, park and forest preserve districts, drainage districts, private clubs, municipalities, and county and regional transportation agencies to pursue and coordinate greenway protection and look for opportunities for trail connections in the watershed.
- Work on development of a multi-organization/jurisdiction partnership to develop funding packages and grant proposals to implement watershed greenway protection/connection strategies.
- Participate in co-sponsored training workshops with municipalities, districts, conservation organizations, private clubs and other interested stakeholders on how to develop a land preservation agreement program to protect private properties as conservation open space.
- Work with the North Branch Project Team* to develop conservation development standards for distribution and promotion to watershed municipalities.

* Friends of Chicago River and Lake County Stormwater Management Commission project staff and interested Plan Committee members.

EVALUATION CRITERIA NORTH BRANCH OPEN SPACE PLAN IMPLEMENTATION

	Decision Rules	Definitions	Range
1	Is it a primary action?	Does something else need to happen before something else? Value added creates the potential for any other action to be accomplished. Value added includes satisfying data gaps.	Value added independent (3 High) Independent (2 Medium) Value added dependent (2 Medium) Dependent (1 Low)
2	How many planning categories does the action meet?	Accomplishes one or more of the six goal categories (FD=flood damage reduction; WQ=water quality; NA=natural areas; H=habitat; ER=education/recreation; WC=watershed coordination)	1-6 weighting (1 pt each)
3	Is the action time sensitive (deadline)?	Does this have to be done within a specific or critical time period? Each item can have its own critical time period based on experience.	3 Short term (≤ 3 years); 2 Medium term (4-7 yrs.) 1 Long term (≥ 8 yrs.)
4	How achievable is the action?	Do we know the resources (people, data, public support, and money) are available to do it?	3 High 2 Medium 1 Low
~~5~~	~~Is it a long term or short term benefit to the watershed's health?~~	~~Limited resources~~	~~No long term or unknown benefit (0)~~
~~6~~	~~Required by local, state, or federal law or other agreements.~~		~~Yes (1) or No (0)~~

Short Term High Priority Actions

ACTION	LEAD	TARGET DATE	PREREQUISITE STEP(S)	NBPC LEAD	EVALUATION CRITERIA 1	2	3	4	TOTAL
2A. Review community comprehensive land use plans and zoning maps and compare to parcel recommendations in the appropriate planning areas section of the open space plan. Identify those parcels at greatest risk - i.e. those that are expected to be developed by 2010.	Area 1: Waukegan, Park City, Gurnee Area 2: Lake County Area 3: N. Chicago, Lake Bluff, GLNTC Area 4: Green Oaks Mettawa Area 5: Lake Forest Area 6: Highland Park Area 7: Lincolnshire Bannockburn Riverwoods Area 8: Deerfield Area 9: Northbrook Area 10: Glencoe, Winnetka Area 11: Morton Grove, Golf Area 12: Glenview Area 13: Skokie, Wilmette Area 14: Northfield	8/2005			2	4 FD WQ NA H	2	3	11
3A. Work with municipalities, county, and forest preserve and park districts to actively use (and eventually adopt) the open space plan.	NBPC	2006			3	2 ER WC	3	2	10
4A. Incorporate open space areas with parcels of high natural resource value for conservation protection into Forest Preserve and Park District land acquisition plans.	Cook & Lake Co. Forest Preserve Districts, Park Districts	2006			3	3 NA H ER	3	2?	11

ACTION	LEAD	TARGET DATE	PREREQUISITE STEP(S)	NBPC LEAD	EVALUATION CRITERIA 1	2	3	4	TOTAL
8A. Recommend communities adopt floodplain overlay zoning that prohibits development in the 100-year floodplain. If strict prohibition is considered too restrictive, at minimum any new development should meet "no adverse impact" standards.	Municipalities	2005			2?	3 FD WQ H	2	2?	9
8D. Determine the feasibility of using Prairie Wolf and the Lake Bluff Forest Preserves for flood storage.	SMC, East Skokie DD, West Skokie DD, IDNR-OWR	2006			1	2 FD WC	2?	2	7
13B. Identify and map unprotected open space parcels with high biodiversity or potential for high biodiversity and provide information to land acquisition organizations such as Forest Preserves and Park Districts, and to municipalities and counties for land planning purposes.	NBPC, SMC	2006			3	2 NA H	3	1	9
15A. Develop and recommend implementation of a conservation/green infrastructure zone overlay that includes all high quality natural areas and incorporate into local land use zoning maps, comprehensive land use plans and proposed development review processes.	Municipalities, Counties	2006			1	3 WQ NA H	3	2?	9

ACTION	LEAD	TARGET DATE	PREREQUISITE STEP(S)	NBPC LEAD	EVALUATION CRITERIA 1	2	3	4	TOTAL
18A. Convene a meeting of park, forest preserve and drainage districts, and private club and land trust properties that fall within the prospective greenway to brainstorm, identify opportunities and a strategy for cooperative ventures to protect and connect the greenway corridors within each tributary subwatershed.	NBPC	2006			3	6 All	3?	1?	13
21A. Identify recreation needs based on projected 2030 population in the watershed and assess land protection needs to meet the desired level of service for active and passive recreation in 2030.	Park Districts, Municipalities	2006			1	2 ER WC	2?	1	6
23B. Identify and designate a lead person from each municipality, park district, county, forest preserve district, drainage district and conservation organization to serve as the watershed open space plan "Coordinator" for each group along with a representative of the naval base and key private landowners.	NBPC	2005			3	6 All	3	2?	14

ACTION	LEAD	TARGET DATE	PREREQUISITE STEP(S)	NBPC LEAD	EVALUATION CRITERIA 1	2	3	4	TOTAL
23C. Develop and map a green infrastructure plan for each community based on open space plan findings and incorporate into community comprehensive land use plan. Identify highest priority parcels for protection with associated community action recommendations.	Municipalities, Counties	2006			3	5 FD WQ NA H ER	3?	1?	12
23D. Prioritize green infrastructure actions annually for implementation and include funding for green infrastructure needs in municipal and county budgets.	Municipalities, Counties	2007			1	5 FD WQ NA H ER	2?	1?	9
23E. Identify funding mechanisms and work cooperatively to provide cost-share funding for protecting open space included within a community's green infrastructure plan.	NBPC, Coordinators	2006			1	1? WC	2?	1?	5
24B. Hold a kick-off meeting for all key stakeholders incl. municipalities, forest preserve districts and park districts as soon as plan is complete. Final open space plan will be distributed at the meeting.	NBPC	2005	COMPLETED JAN '06						

ACTION	LEAD	TARGET DATE	PREREQUISITE STEP(S)	NBPC LEAD	EVALUATION CRITERIA 1	2	3	4	TOTAL
24C. Approach municipalities individually to determine how the open space plan fits into their comprehensive land use plans and proposed development review process, and to encourage incorporation of open space protection into comprehensive plans.	NBPC	2006			3	2? WC ER	3?[1]	1?	9
24F. Champion watershed open space implementation within your community and coordinate with other jurisdictions on open space protection/ restoration projects.	Coordinators	Ongoing			3	6? All?	3	1?	13
27A. Convene meeting of North Branch open space planning committee with stakeholders representing LCFPD, CCFPD, park districts, municipalities and conservation organizations to form a working subcommittee to develop an implementation strategy and potential management vehicles (including evaluating implementation and updating the plan). (Will include the formation of this subcommittee as an agenda item for the kick-off meeting – 24B above).	NBPC, Coordinators	2005	WORK THROUGH NBPC '06?						

[1] Hi Priority Communities?

Long Term High Priority Actions

ACTION	LEAD	TARGET DATE	PREREQUISITE STEP(S)	NBPC LEAD	EVALUATION CRITERIA 1	2	3	4	TOTAL
5B. Acquire property to add one new forest preserve in the northern portion of the Middle Fork subwatershed.	LC Forest Preserve District	2009			3	5 FD WQ NA H ER	2?	2?	12
5C. Acquire West Fork subwatershed headwaters property to add to and connect with existing forest preserve properties in the Des Plaines watershed.	LC Forest Preserve District	2009			3	5 FD WQ NA H ER	2?	1?	11
8B. Protect all medium and high priority parcels of undeveloped floodplain as open space by outright acquisition or through purchase or donation of drainage or conservation easements.	Drainage Districts, Municipalities, Park Districts	2010			2[2]	6 All	1	1?	10
9B. Determine the feasibility of additional storage on nearby open space parcels for flood problem areas where storage would reduce flood damage.	Municipalities, GLNTC	2010			2	2 FD WQ	2	1?	7
16A. Acquire or protect with land preservation agreements the 1,323 acres identified as having high biodiversity.	Forest Preserves, Park Districts, Conservation Organizations	2010			3	3 NA H ER	1?	1?	8

[2] This action will require an outreach/education effort.

North Branch Chicago River WATERSHED PROJECT

MEMORANDUM

To: North Branch Planning Committee (NBPC)

From: Sean Wiedel, Lake County Stormwater Management Commission

Subject: May 9, 2007 Planning Committee Meeting Notes

Date: July 31, 2007

Meeting notes from the May 9, 2007 North Branch Planning Committee (NBPC) meeting are below. Regular NBPC meetings are held quarterly at 1:30 PM on the 2nd Wednesday of the month in February, May, August and November. The next North Branch Planning Committee meeting is scheduled for Wednesday, August 8th from 1:30 to 3:30 PM at the West Ridge Center (636 Ridge Road) in Highland Park. Please mark your calendar and plan to attend. The draft agenda for the August meeting will be sent out closer to the meeting date. The final NBPC meetings in 2007 will be November 14th. If you have any questions or suggestions for future agenda items, please contact me at 847-918-7693 or swiedel@co.lake.il.us.

MARCH 14TH NBPC MEETING

Meeting Attendees

Name	Representing
Sean Wiedel	Lake County Stormwater Management
John Quail	Friends of the Chicago River
Steve Mandel	Highland Park/Lake MI Ecosystem Partnership
Loren Dixon	Lake Forest Open Lands Association
Lydia Scott	Lincolnshire
Cindy Skrukrud	Sierra Club
Rob Flood	North Shore Sanitary District
Rebecca Grill	Park District of Highland Park
Roberto Rodriguez	LC Planning
Ken Gardner	Northbrook Public Works
Robyn Flakne	Glenview

Meeting Notes

1. **Organic Lawn Care & Integrated Pest Management: Kim Stone (Safer Pest Control Project)**

Kim Stone from the Safer Pest Control Project (http://spcpweb.org/) presented information on their organic lawn care program. The SPCP focuses on childrens' exposure to pesticide because pesticides are everywhere and children are particularly at risk. Pesticides can lead to

health problems such as immune system damage, poisoning, asthma, nerve damage and cancer. They can impact not just people but also our pets and wildlife. Pesticide use increased 24% between 1992 and 2001. According to the USGS, 100% of surface waters and 33% of groundwater aquifers contain at least one pesticide.

SPCP is working to train lawn care providers in natural lawn care and educate service providers. There is a growing demand for organics to create safer environments and reduce the impact of lawn chemicals on our waters. An organic lawn provides the following benefits:

- Naturally healthy soil & turf;
- Resists pest & disease;
- Withstands drought; and
- Safe for people.

To get started, you need to select the right grass for the conditions in your yard. Rye and fescue are often good choices for this area. Soil testing is also useful to determine the amount and type of nutrients available, the soil pH and organic matter content. For maintenance, water deeply and mow high (3-3.5 inches). For weeds, a pre-emergent such as corn gluten can be used and supplemented with hand weeding and spot treatment. Other helpful treatments include thatching, aeration and over-seeding. For pests, a healthy lawn is the best defense. The SPCP website has more information on their organic lawn care and other programs. Kim Stone's PowerPoint presentation is available on request.

2. Sierra Club Water Sentinels: Cindy Skrukrud (Sierra Club)

Cindy Skrukrud from the Sierra Club spoke to the NBPC about the Water Sentinels (WS) program. The WS program has the potential to fill the gap left when RiverWatch program was discontinued. In the WS program, monitoring is done by Sierra Club members. The data collected can be analyzed in the field or by a water quality lab. The Woods & Wetlands group (Lake County) is currently sampling in Sequoit Creek watershed and the Greater Chicago group is currently sampling at Lake Michigan beaches.

The Greater Chicago group may be interested in doing monitoring in the Chicago River watershed. The WS program may be one way to help us fulfill monitoring recommendations in the watershed-based plan (WBP). Sean will send the draft monitoring section from the WBP to Cindy once it is available. Sean will continue to work with Cindy to see how we might be able to take advantage of this program in the North Branch Chicago River watershed.

3. Watershed-Based Plan Input & Update: Ed Belmonte (V3)

The NBPC discussed the WBP upgrades that V3 is working on. We discussed how to identify hotspots to target resources such as funding. The NBPC decided that we preferred the term "critical areas" rather than "hotspots".

Ed Belmonte from V3 provided a draft of the watershed-based plan (WBP) to the Lake County Stormwater Management Commission and Friends of the Chicago River in mid-May. SMC provided comments to V3 in late-June; John Quail from Friends is currently reviewing the draft plan. V3 will incorporate SMC's and Friends' comments and the plan will be made available for review by the NBPC and the general public. The North Branch WBP will be subjected to a formal 60-day public review and comment period prior to adoption by the SMC and the Lake County Board.

4. Announcements & Discussion

- North Branch Funding Update (C2000 & 319)

Friends of the Chicago River and Lake County Stormwater Management Commission are currently working with the IEPA to obtain additional Section 319 grant funding. Contingent on successful negotiations between SMC, Friends and IEPA, we expected to have up to $1 million available at our June 1, 2007 funding deadline. Please see http://www.co.lake.il.us/smc/planning/northbranch/BMPdefault.asp for more information.

- Consider Switch to Quarterly Meetings

At the May 9th NBPC, the Planning Committee decided to switch to quarterly meetings to accommodate our ever busier schedules. In addition to NBPC meetings, many of the regular NBPC participants are on the North Branch BMP Selection Team (BST), our grant review team that meets an additional four times per year (mid-December, late-January, mid-June & late-July/early-August). The change to quarterly meetings will also provide us more flexibility to accommodate meetings on special topics such as meetings of the North Branch open space coordinators group or field tours. Based on the input received at the NBPC and via email, future NBPC meetings will be held at 1:30 PM on the second Wednesday in February, May, August and November.

- Chicago River Day on May 12th

Friends of the Chicago River held its 15th annual Chicago River Day on Saturday, May 12th. Volunteers participated on river-related activities at 60 sites throughout the Chicago River watershed.

North Branch Chicago River WATERSHED PROJECT

MEMORANDUM

To: North Branch Planning Committee (NBPC)

Subject: January 10, 2007 Planning Committee Meeting Notes

Notes from the January 10, 2007 NBPC meeting are below. The next meeting of the NBPC will be held from 1:30 to 3:30 PM on February 14th at the West Ridge Center in Highland Park (636 Ridge Road). Please mark your calendars and plan to attend. NBPC regularly scheduled meetings are held on the second Wednesday of every other month. Agendas for upcoming meetings will be sent out via email closer to the meeting dates.

Due to the need for further interaction with the Planning Committee regarding the North Branch Watershed Based Plan, this additional NBPC meeting will be held on February 14, 2007. Further discussion of the materials presented during the January 10th meeting is warranted. An email distribution of materials from the January 10th meeting will encourage participation before the February 14th meeting, at which time the collaborative efforts will be finalized for inclusion in the plan. Eleven people were in attendance.

January 10, 2007 Planning Committee Meeting Notes

1. Announcements

C2000 funding applications are due January 17.

319 funding recommendations will take place on January 31.

Rain barrel sale will continue through April 12th.

2. North Branch Watershed-Based Plan Update

The first five of the nine elements required by USEPA for all watershed plans funded by 319 were discussed. The last four will be discussed during the February 14th meeting.

The Goals and Objectives statement was finalized for inclusion in the plan.

Programmatic Action Plans and Site Specific Action Plans were distributed and reviewed.

Sub-set of plan exhibits were distributed for review and comment.

Pollution load reduction spreadsheets were discussed for applicable criteria.

North Branch Chicago River WATERSHED PROJECT

MEMORANDUM

To: North Branch Planning Committee (NBPC)

Subject: February 14, 2007 Additional Planning Committee Meeting to Discuss North Branch Watershed Based Plan

---

Notes from the February 14, 2007 NBPC meeting are below. The next regularly scheduled meeting of the NBPC will be held from 1:30 to 3:30 PM on March 14th at the West Ridge Center in Highland Park (636 Ridge Road). Please mark your calendars and plan to attend. NBPC meetings are held on the second Wednesday of every other month. Agendas for upcoming meetings will be sent out via email closer to the meeting dates.

Two hours of this meeting were dedicated to discussion of the North Branch Watershed Based Plan. This meeting was scheduled specifically for the interaction and participation of the NBPC on the North Branch Watershed Based Plan.

February 14, 2007 Planning Committee Meeting Notes

1. Announcements

Discussion of 500 Hyacinth Place. This is an affordable housing project located in Highland Park. The applicants were directed to the North Branch Watershed Project by the IEPA. Upon investigation, the site is actually located in the Lake Michigan watershed. After much discussion, the NBPC decided not to accept a funding application from Hyacinth Place because of its location outside the NB watershed. The NBPC was concerned about setting a precedent that could open up North Branch funds to other watersheds. SMC will work with the applicant to help them submit directly to the IEPA on August 1st.

Rain barrel sale will continue through April 12th.

2. North Branch Watershed-Based Plan Update

The remaining four of the nine elements required by USEPA for all watershed plans funded by 319 were discussed. The first five elements had been discussed at the January 10th meeting.

The five goals and their corresponding objectives were outlined in the Building Blocks Worksheet (from the USEPA's publication "*Getting In Step, A Guide for Conducting Watershed Outreach Campaigns*") and distributed for review, discussion and input. Discussion of the first two goals were completed during the February 14 meeting. The remaining three goals were partcially completed before being distributed by email for review and comment. It is intended that the March 14 NBPC meeting will conclude the discussion of the Building Blocks Worksheet.

North Branch Chicago River WATERSHED PROJECT

MEMORANDUM

To: North Branch Planning Committee (NBPC)

From: Sean Wiedel, Lake County Stormwater Management Commission

Subject: March 14, 2007 Planning Committee Meeting Notes

Date: April 25, 2007

Meeting notes from the March 14, 2007 North Branch Planning Committee (NBPC) meeting are below. Regular NBPC meetings are held at 1:30 PM on the 2nd Wednesday of every other month. The next North Branch Planning Committee meeting is scheduled for Wednesday, May 9th from 1:30 to 3:30 PM at the West Ridge Center (636 Ridge Road) in Highland Park. Please mark your calendar and plan to attend. The draft agenda for the May meeting will be sent out closer to the meeting date. Upcoming NBPC meetings for the remainder of 2007 are July 11th, September 12th and November 14th. If you have any questions or suggestions for future agenda items, please contact me at 847-918-7693 or swiedel@co.lake.il.us.

March 14th NBPC Meeting Notes

1. Strategies for a Clean Chicago River: Todd Main (Friends of the Chicago River)

Todd Main from Friends of the Chicago River presented Friends' Strategies for a Clean Chicago River (SCCR). The SCCR is summarized in the attached file called the "12 Guiding Principles". You can show your support for a clean Chicago River by having your organization support and approve the resolution included in the 12 Guiding Principles. Todd's full PowerPoint presentation is available upon request (it is too large to email). The SCCR has two main goals: zero tolerance for combined sewer overflows and disinfection of effluent from the wastewater treatment plants. Friends hopes that the SCCR will result in a public investment of $66 million to complete the tunnel & reservoir plan (TARP) and $50 million for disinfection over the next 20 years. Friends feel that right now is a "once-in-a-generation" opportunity for change because of a favorable political climate (local leadership in Chicago and at the MWRD) and because of regulatory changes such as the Chicago River Use Attainability Analysis and stormwater control ordinances. A primary result of the SCCR will be to improve the quality of life in the Chicago River watershed.

Todd stressed a number of other key points:

- TARP is 40 years behind schedule and federal funding is unlikely. To complete TARP, projects and programs will need to be funded locally.

- Biodiversity in the Chicago River has increased markedly with only 10 fish species found in 1970; there are currently 60+ species that have been identified in the river.

Todd also addressed the direct economic benefits of a clean Chicago River and the key premise that a clean Chicago River can equal a stronger economy. The SCCR will help reduce flooding (a $150 million annual problem) because once complete, the TARP reservoirs will provide a $130 million annual benefit. A cleaner Chicago River has also led to increased property values based on assessed property values along the Chicago River in the City of Chicago. Historically (1960s), properties closer to the river had lower property values. That trend is now reversed with riverside investments spreading into areas further and further away from the river.

Finally, Todd addressed the recreational benefits of the river. In the Chicago metro area, birding is estimated to result in $257 million of annual economic activity. Fishing is estimated to generate $94 million annually and paddling is estimated to generate $7 million through 10,000 canoe trips on the Chicago River system. As mentioned above, you can support the SCCR by having your organization support and sign the attached resolution containing the "12 Guiding Principles".

2. Watershed-Based Plan Input & Update: Ed Belmonte (V3)

The NBPC reviewed and commented on the natural resources, information & education, and participation & coordination portions of the goals & objectives worksheets. The final version of the worksheets is attached and incorporates comments from the March NBPC meeting.

Ed Belmonte from V3 is planning to have a draft of the watershed-based plan (WBP) to the Lake County Stormwater Management Commission and Friends of the Chicago River by May 15th. SMC and Friends will review the plan and provide comments to V3 by mid-June. V3 will then incorporate SMC's and Friends' comments and the plan will be made available for review by the NBPC and the general public. The North Branch WBP will be subjected to a formal 60-day public review and comment period prior to adoption by the SMC and the Lake County Board.

3. Announcements

- North Branch funding update (C2000 & 319)

Friends of the Chicago River and Lake County Stormwater Management Commission are currently working with the IEPA to obtain additional Section 319 grant funding. Contingent on successful negotiations between SMC, Friends and IEPA, we expect to have up to $1 million available at our June 1, 2007 funding deadline. Please see http://www.co.lake.il.us/smc/planning/northbranch/BMPdefault.asp for more information. If you are considering submitting a grant application, please contact Sean Wiedel before you begin.

As described in the attached memo, the North Branch Watershed Project (NBWP) had $107,125 available for water quality BMPs at the December 1, 2006 funding deadline. The North Branch BMP Selection Team (BST) met on December 13, 2006 to review initial funding proposals from seven Section 319 applicants. After receiving the applicants' revised proposals, the BST met a second time on January 31, 2007 to review them and make funding recommendations to the IEPA. The BMP Selection Team reached a consensus on the funding recommendations summarized in the attached memo to the IEPA. Given the funding availability, the BST only recommended funding for one project out of the current grant. Four

projects were recommended for funding contingent on receipt and successful negotiation of a new grant between the IEPA and SMC. Two projects were not recommended for funding at this time. If you have any questions on any of the Section 319 projects, please contact Sean Wiedel (847-918-7693 or swiedel@co.lake.il.us).

The NBWP also received three Conservation 2000 grant applications at its January 16th deadline. After further review, one of the proposals (Riverwoods Preservation Council) decided to submit through the Upper DesPlaines Ecosystem Partnership since most of the proposed project sites were in the DesPlaines watershed rather than the North Branch. The second project, from Lake Forest, sought match funds for the planting of the pond conversion project described in the attached Section 319 funding recommendation memo. This project received our highest ranking (50 points) and top priority from the NB BST. The second project, Team Green Rangers, is an environmental education and rain garden project located near the Techny Basin in Glenview. The Team Green Rangers proposal received a "high quality project" designation (45 points) and second priority from the NB BST at its March 8th meeting. For more information on the C2000 proposals or if you would like to receive the proposals via email, please contact Sean Wiedel.

- Northbrook Earth Day Festival on April 28th

The Village of Northbrook will be holding its Earth Day and Arbor Day celebration on Saturday, April 28th from 8:30 AM to 2:30 PM on the Village Green. For more information and a detailed schedule, please see http://www.northbrook.il.us/news/_files/File/Apr07newsltr.pdf

- Chicago River Day on May 12th

Friends of the Chicago River will be holding its 15th annual Chicago River Day on Saturday, May 12th. Volunteers are needed at sites throughout the watershed in Lake and Cook Counties. Please see http://chicagoriver.org/events/chicago_river_day/index.php for more information.

Friends of the Chicago River

Clean Water for the Chicago River
12 GUIDING PRINCIPLES

1. WHEREAS clean water is everyone's right and responsibility, we support collaborations between government, business, and individuals to achieve the goal of a clean, healthy Chicago River.

2. WHEREAS the Chicago River system is a combination of natural and man-made channels and canals, we support working to preserve and enhance the character of the Chicago River and its uses for plants, animals and humans.

3. WHEREAS the Chicago River is impacted by any action taken within its watershed, we support efforts to improve the health of the Chicago River undertaken from a watershed perspective.

4. WHEREAS the Chicago River is affected by all land use in its watershed and the retention of open space is crucial, we support protecting and maintaining the current amount of open space within the watershed.

5. WHEREAS stormwater is a valuable natural resource, we support preserving, protecting, and utilizing the stormwater that falls within the Chicago River watershed.

6. WHEREAS there are numerous methods for controlling stormwater, which is integral to the improved health of the Chicago River, we support the development and use of green infrastructure to protect stormwater and the Chicago River.

7. WHEREAS it is critical to employ a fiscally responsible approach to clean water infrastructure, we support developing local financial incentives for funding clean water initiatives especially for updating aging sewage infrastructure, utilizing bioengineering techniques along riverbanks, and installing green infrastructure throughout the watershed.

8. WHEREAS Phase One of the TARP has dramatically improved the health of the Chicago River, and completing the Phase Two reservoirs is a critical component in an overall strategy to restore the aquatic health of the river, we support developing additional (non-federal) financing mechanisms to ensure TARP is completed as soon as possible.

9. WHEREAS Combined Sewer Overflows (CSOs) are the remnants of an outdated infrastructure system and a major impairment to the aquatic health of the Chicago River, we support developing a timeline for the total elimination of CSOs on the Chicago River through effective stormwater management and completing TARP.

10. WHEREAS the Illinois EPA is currently conducting a Use Attainability Analysis (UAA) on the Chicago River Waterway System to assess if the Chicago River has appropriate water quality standards to protect people and wildlife, we support an upgrade in water quality standards and the implementation of methods to meet them.

11. WHEREAS public use of the Chicago River for paddling, fishing, and other recreational activities is growing, and effluent from water reclamation facilities on the Chicago River contains levels of bacteria and other pathogens that are incompatible with this increasing use, we support cost effective disinfection of all effluent from water reclamation facilities on the Chicago River to protect public health.

12. WHEREAS community support through individual efforts contribute to the health and future of the Chicago River, we encourage citizens to participate in river improvement activities at a local level, including involvement in Friends of the Chicago River's annual stewardship event, Chicago River Day.

_____	_____	_____
Name	Affiliation	Date

Friends of the Chicago River

Building Blocks Worksheet

Driving Force: Poor water quality due to nonpoint and point source pollution.

Goal: Improve water quality in the North Branch Chicago River.

Objective:	Target Audience	Message	Format	Distribution	Evaluation
Reduce nonpoint and point source pollutant loadings from runoff by some measurable standard.	Landowners, Pet & Car Owners, Landscape Contractors, Public Works Dept, Waste Haulers, Developers	Native vegetation, reduce salt use, organic fertilizers, no/low/slow release P fertilizers, fertilize in fall only, proper wast mgmt.	Flyers and educational information, workshops, ordinance amendments, signage, provide more trash recepticals.	Municipal newsletters, cable access tv, signs at parks, stormsewer markers.	# flyers distributed, # signs posted, # stormsewers marked, # new trash recept., sampling/monitoring.
Reduce streambank and streambed erosion.	Municipalities, Outfall PRP, HOA, Drainage Dist, Cook Co & Lake Co	Decrease sediment load, improve water quality, improve habitat	Educational information	Mailings, phone contact	# restoration projects, linear feet restored, $ spent on projects, decrease in turbidity/TSS
Correct wastewater overflow conditions that have a significant impact on water quality.	Deerfield WWTP, NSSD Clavey Rd Plant, Municipalities and Public Works Departments	Municipal IDDE, reduce illegal sumppump hookups, year-round disinfection	Discussions with WWTP's, NPDES permit renewal process	Phone contact, meetings	Track plant data, # of overflow events
Protect and restore riparian greenways and buffers along and around all water resources.	Municipalities, Landowners, Drainage Districts, County Agencies, Land Conservation Organizations, CCFPD, LCFPD	Decrease sediment load, improve water quality/habitat/bio diversity, native plant buffer, retrofits	Educational information, workshops	Mailings, phone contact	# of projects, $ spent on projects, linear feet restored, acres of additional buffers

Driving Force: Substantial flood damage.

Goal: Reduce flood damages in the North Branch Chicago River

Objective:	Target Audience	Message	Format	Distribution	Evaluation
Reduce flow rates and volumes from existing developed areas and prevent increases in flow rates and volumes from new development.	Public and prive landowners, HOA, Municipalities	Reduce overbank occurance, stabilize bounce, increase infiltration, create rain gardens, use rain barrels, "keep your water on your own property", reduce impermeable surfaces	Educational material, demonstration projects, rain barrel sales, change landscape and other ordinance requirements, incentive programs	Mailings, workshops	# rainbarrels sold, # of rain garden projects, $ spent on rain gardens, landscape requirements changes, # brochures distributed
Protect and restore floodplain functions.	Municipalities, public and private landowners, Drainage Districts, County Agencies	Reduce overbank occur., prevent property damage, preserve open space, improve enforcement of ordinances, recreational aspects of wildlife habitat.	Educational material, policies, training for municipal staff & landowners	Mailings, workshops	# projects implemented, $ spent, acre/feet additional storage provided, change in the amount of open space.
Maintain and manage the river corridor and other drainageways to preserve conveyance of stormwater in an environmentally-friendly manner.	Municipalities, Drainage Districts, MWRD, public and private landowners	Remove debris/trash, plantings along channel, incorporate streambank stabilization/restoration into conveyance projects	Meetings, policies, technical or support materials, i.e. NIPC plant guide, etc. workshops	Collaborative or individual agency effort	# clean-up events, # people involved, photos of trash removed, Chicago River Day # of participants and # of sites, feet of streambank stabilized
Mitigate flood damages using both remedial and preventative measures including property protection.	Public and private landowners, Municipalities, Drainage Districts, MWRD	Prevent property damage from repetitive losses, participate in CRS program and/or improve CRS rating, notify people who are in floodplain, voluntary buyout of repetitive loss properties	Educational material, meetings, projects, workshops	Mailings, workshops	# of participants, CRS level improved
Determine potential locations and feasibility of regional stormwater detention sites.	SMC, Drainage Districts, MWRD	Reduce overbank occur., decrease $ in property damage	Meetings, projects/studies	Collaborative or individual agency effort	# of projects completed, $ spent on projects, # of locations/studies completed, additional acre-ft of storage created

Building Blocks Worksheet

Driving Force: Need for better natural resources protection and more open space.

Goal: Protect and enhance natural resources and provide associated recreational opportunities

Objective:	Target Audience	Message	Format	Distribution	Evaluation
Protect and restore wetlands and streams to improve water quality and aquatic habitat.	Public and private landowners, Drainage Districts, SMC, MWRD, FPDCC, LCFPD, Munic., Park Dist., schools, ecosystem partnerships, regional water trails, recreational groups	Better water quality means improved ecosystem resulting in improved fishery, improved recreational opportunities, economic benefit, clean water	Restoration workshops, tours, educational info, policies, signage, grant assistance, improved ordinances and enforcement	Workshops, reference materials, inservice training for staff, interpretive signs, demo project tours, public events.	Additional wetland acres protected &/or restored, additional linear stream reaches improved, acres of stream buffer restored, # of landowners taking some action, # of municipalities and MWRD enacting ordinances.
Protect and enhance plant communities wildlife habitat and biodiversity.	Public and private landowners, Drainage Districts, SMC, MWRD, ecosystem partnerships,LCFPD, FPDCC, Park Dist.	Improve watershed, improve quality of habitat, benefit wildlife communities, improved visual aesthetics, improve biodiversity, control invasive species	Educational info, policies, signage, workshops, tours, grant assistance, conservation easements, MIPN plants of concern, brochure	Workshops, reference and resource materials for target audience	$ spent, # of projects completed, # of events for volunteers, # of volunteers, monitoring - improved diversity, acres protected/enhanced/ restored, plants of concern monitoring results, # baseline surveys/inventories completed
Identify and develop potential areas for river-based recreational opportunities such as hiking, fishing, canoeing, running, biking, birding, peace of mind, tranquil setting for social benefit.	Public and private landowners, special interest groups, i.e. canoeists, LCFPD, CCFPD, Park Dist.	Increase river-based quality for recreational uses, explain the benefits, economic benefit	Educational info, planning documents, policies, grant workshops, tours of existing facilities, implement recommendations in NBOS plan, canoe and bike trail maps	Workshops, implementation, one-on-one meeting with potential implementers	$ spent, # of communities participating, survey of users, trail miles added, river access points added

Building Blocks Worksheet

Driving Force: Need for improved watershed-based public information and education.

Goal: Develop a public information and education program within the watershed communities.

Objective:	Target Audience	Message	Format	Distribution	Evaluation
Develop and implement a schools-based river curriculum.	High schools, Jr. High schools, elementary schools, conservation/natural resource organization partners	Improvements within the watershed having direct and indirect results, river can be an integral part of science and other curricula	Classes, field trips, presentations, instructional materials for staff, monitoring by classes	Workshops, website, resource materials, phone and meeting contact with teachers, school administrators and community groups	# of schools participating, # of students participating, # sites monitored by students
Provide public information and education program to community leaders, elected officials, businesses and homeowners.	Public and private landowners, HOA, elected officials, corporations	Benefits of collective efforts, economic benefits of improved watershed mgmt., shared responsibility for watershed resources	Phone calls, Tours, Newsletter, brochures, examples from other communities, presentations, DVDs/Autorun CDs	Workshops, resource materials, phone calls, public service announcement, cable TV, billboards, corporate newsletters	# of phone calls, # of targets that received information, workshops held, behavioral changes?
Improve stewardship of the North Branch Chicago River and its aquatic resources by increasing public participation in the upkeep of the River.	Municipalities, Ecosystem Partnership, Youth Groups Community Groups, Conservation Orgs., Park Districts, LCFPD, CCFPD, Drainage Dist., HOA, Anglers,	Change perceptions of North Branch from ditch/liability to resource/river, instill sense of ownership in North Branch stakeholders, don't trash fishing location	Clean-up days, tours, rallies, tie in with existing community events	Sample of organizational materials, brochures, incentives, recognition, contained within utility bill, Cable TV, radio, billboards	# of events, # of participants, # of communities, # of returning participants, # of community groups, questionaire comparisons before and after, FOCR data
Identify open space parcels adjacent to or near schools or existing public facilities that would be appropriate for outdoor education.	Appropriate Landowners, teachers, community groups, youth groups, civic governments.	Ideal locations for educational opportunities and improvements, benefits to environmental education, create multiple benefit areas with habitat, runoff reduction and other benefits	Examples of successful partnerships; field tours; organization; or meetings to facilitate message	One on one meetings, phone contact.	# of contacts made, # of requests for more information, # of projects/parcels identified, # of field tour participants.

Building Blocks Worksheet

Driving Force: • Need for increased participation and coordination of government agencies, representative stakeholder organizations, schools and individual and business property owners in watershed improvement activities.

Goal: Improve participation and coodination in watershed improvement activities.

Objective:	Target Audience	Message	Format	Distribution	Evaluation
Coordinate North Branch Chicago River Watershed Plan implementation activities.	Public and private landowners, organizations with a watershed interest,i.e. canoe, water trails, etc., ecosystem partnerships, watershed groups, drainage districts, municipalities, local legistators, OSLAT, SMC, MWRD, IDNR, IEPA	Benefits of regional effort, benefits of cost sharing, benefits of watershed management	Implementation projects, information sessions, quality grant applications	Workshops, emails on grant opportunities; grant application assistance	# of projects, $ spent, grant $ spent, local match $ spent.
Educate and encourage public and private landowners to increase their involvement in implementing best management practices.	Public and private landowners, Drainage Districts, SMC, MWRD, elected officials, citizen committees, land managers.	BMP's improve water quality; link to quality of life issues, economic benefits	Workshops, presentations, brochures	Brochures, workshops, DVDs/Autorun CDs, Cable TV, radio, billboards, websites, press releases	# of active communities, # of projects, $ spent, # of press releases, # of hits on websites
Increase river and watershed monitoring efforts and coordinate data sharing.	IEPA, IDNR, Citizen Scientists, public and private Landowners, NSSD, MWRD, LCHD Lakes Mgmt., USGS, NOAH, Sierra Club, Coast Guard Auxillary, Illinois Lakes Management Assoc.	More data gathered = better understanding of problems, need for RiverWatch-type program in IL	Instructional sessions on water sampling, certified labs, etc. standard protocol for what is being tested for, etc., continue River Watch program or establish new hands on program.	Workshops, informational mailings, training sessions,	# of studies, funding applied for, $ received, $ spent, number of participating landowners, re-funding of RiverWatch, # of projects, sites monitored

Building Blocks Worksheet

North Branch Chicago River WATERSHED PROJECT

MEMORANDUM

To: Chris Davis, Illinois Environmental Protection Agency

From: Sean Wiedel, Lake County Stormwater Management Commission

Subject: North Branch BMP Selection Team –
Funding Recommendations for December 1, 2006 Funding Deadline

Date: February 19, 2007

The North Branch BMP Selection Team (BST) met on December 13, 2006 to review initial funding proposals from seven Section 319 applicants. Based on the comments and concerns expressed at the December 13th BST meeting, the applicants were sent letters summarizing the issues and questions raised by the BMP Selection Team. Each of the funding applicants was asked to address the BST's questions and concerns in writing. After receiving the applicants' responses, the BST met a second time on January 31, 2007 to evaluate the revised funding requests. After reviewing the revised funding proposals, the BMP Selection Team reached a consensus on the funding recommendations summarized in the table below and discussed in detail on the following pages. The North Branch Watershed Project has $107,125 available for water quality BMPs. Given the funding availability, the BST is only recommending funding for one project out of the current grant (3190606) as indicated in the table below. Four projects are recommended for funding in the amounts noted contingent on receipt and successful negotiation of a new grant with the IEPA. The remaining two projects are not being recommended for funding.

Project Applicant - Project Name	Total Project Cost ($)	Funding Sought ($)	Funding Recommended	Funding Source
East Skokie DD – Foss Park Golf Course (Skokie River) Stabilization	500,000	200,000	75,000	Contingent
Glenview – Reach 1 West Fork Stabilization (South of Willow Road)	48,223	23,223	23,223	Contingent
Green Oaks – South Branch of MF Tributary Enhancement Project Phase 2	373,200	159,650	0	None
Lake Forest – Pond Conversion	737,391	120,035	107,125	3190606
Northbrook – Community (West Fork) River Restoration Project	49,655	24,676	24,676	Contingent
Northfield Park Dist. – Willow Park Permeable Pavement Installation	182,660	89,730	60,000	Contingent
Youth Conservation Corps – Lake Bluff Project	107,794	31,230	0	None
Total 319 Funding Requested	**1,998,923**	**648,544**	**290,024**	

East Skokie Drainage District – Foss Park Golf Course (Skokie River) Stabilization

Project Description
The East Skokie Drainage District (ESDD) requested $200,000 to be matched 40-60 with $300,000 already committed by the ESDD board, for a total project cost of $500,000. The ESDD wishes to provide the underserved northern portion of the district with overdue improvements to the Skokie River. For the requested funding, the ESDD proposes to stabilize and restore approximately 6,500 feet of the Skokie River and add approximately 12 pool riffles at the Foss Park Golf Course in the City of North Chicago. The project would repair streambank erosion and sedimentation by removing growth on and near the banks, grading the banks to 3 to 1 or 4 to 1 slopes, providing tree revetments, planting the banks with vegetation, and providing pool riffles in the stream. Because the ESDD will be unable to restore the entire reach within the golf course, they will stabilize the streambanks based on the severity of erosion.

BST Recommendation
The ESDD has been a good partner with the North Branch Watershed Project and has constructed several high quality projects to date. Given their track record and the desire to help the underserved population of North Chicago, the BST recommends funding the ESDD for $75,000. Funding for this project is recommended contingent on the receipt additional Section 319 funding from the IEPA. For this funding, based on their proposal calculations, the ESDD will be asked to stabilize at least 4,300 linear feet of streambank and add at least 9 pool riffle complexes to the Skokie River.

Glenview – Reach 1 West Fork Stabilization (South of Willow Road)

Project Description
The Village of Glenview proposes streambank stabilization of “Reach 1,” a portion of the West Fork of the North Branch of the Chicago River. Reach 1 runs from Willow Road to a spillway that redirects high flows of the river into the Techny (flood control) Basin. The Village of Glenview seeks to improve water quality, enhance wildlife habitat and increase biodiversity and public appreciation of the river resource through this project. The project will utilize best management practices to restore and stabilize the streambank adjacent to a large riverfront public open space. The project is based on consultant reports advising that erosion and habitat problems of the stream be addressed. Specifically, stabilizing the banks and replacing brush with native herbaceous species will reduce streambank erosion, make the river more visible and accessible and provide opportunities for habitat enhancement and education. The project is anticipated to proceed in phases, with design and construction to repair high-priority areas taking place in 2007 as part of Phase I. Phase II will involve stabilization of less severely eroded locations at the southern end of the reach and will proceed, pending funding, in 2008. Phase I will stabilize 750 linear feet of streambank. The streambank will be re-graded and replanted to repair and eliminate slumping and erosion by using bioengineering methods and vegetated slopes. Glenview requested $23,223 in Section 319 (48%) funding for a $48,223 project.

BST Recommendation
The BST recommends funding the Glenview project at the $23,223 level. Funding for this project is recommended contingent on the receipt additional Section 319 funding from the IEPA. The location of this site is important, as it is the largest contiguous naturalized area in Glenview, known for its bird habitat and aquatic resources, and frequented by bicyclists, joggers and pedestrians because of trails along the river. Enhancing the water quality and habitat of this high-visibility site is also a priority for the Village of Glenview’s Natural Resources Commission. The Village of Glenview will install educational signage in strategic locations along the trail adjacent to the project.

Green Oaks – South Branch of Middle Fork Tributary Enhancement Project Phase 2

Project Description

The Village of Green Oaks is seeking funding for a stream maintenance and restoration project along a tributary to the Middle Fork. Green Oaks proposes to stabilize 950 feet of stream on which both banks will be restored (1,900 feet of streambank). This project feeds into another tributary of the Middle Fork that Green Oaks has received IEPA 319 funds to stabilize. With this proposed and two previous projects, Green Oaks will stabilize nearly a mile of stream tributaries in the headwaters of the Middle Fork. The proposed project will re-grade and reshape the existing channel and remove large amounts of vegetative debris within the channel and along the banks to reduce streambank erosion caused by the debris and to reduce the effects of nuisance flooding on local properties. This project will include the removal of invasive, non-native species and the restoration and stabilization with appropriate native plant species. The restored channel will be designed with wetland shelves on alternating banks to mimic a naturally-formed, meandering stream channel. The project also will enhance a 3-acre wetland that currently provides some nuisance flood relief by removing all non-native vegetation and planting new native wetland species. Green Oaks proposes to re-grade and reshape the wetland bottom to provide compensatory storage for low frequency events that will help to recharge the wetland and enhance the stormwater carrying characteristics of the drainageway. The Village of Green Oaks requested $159,650 in North Branch 319 funding (43% of the total project cost).

BST Recommendation

The Village of Green Oaks originally submitted this funding application in June 2006. At that time, the BST expressed a number of concerns that have not been resolved in this grant application. Therefore, the BST does not recommend funding for the Green Oaks project because the BST felt that the water quality benefits of the project were much less prevalent than the flood damage reduction benefits. The BST felt that the West Skokie Drainage District (chartered with maintaining conveyance in the Middle Fork) should take on at least partial financial responsibility for this project. Finally, and most importantly, the BST was concerned with the potential for negative wetlands impact associated with the wetland reshaping/enhancement component. The BST felt that the purpose of this wetland excavation was to create floodwater storage rather than improve water quality. In its comments to Green Oaks, the BST requested additional information on the wetland component of the project that was not provided. Of the seven questions posed in comment # 6 to Green Oaks, only three questions were answered fully. The BST did not feel the response was adequate and therefore funding is not recommended.

Lake Forest – Dalitsch Pond Conversion

Project Description

The Dalitsch property is located west of the Middlefork Savanna Forest Preserve and east of Interstate 94 (Tollway) on the western edge of Lake Forest. Middlefork Savanna is home to a rare tallgrass savanna, and features a mix of oak savanna and woodlands, wet and mesic prairies, sedge meadows and marshes. The approximately 40-acre Dalitsch property was purchased by the City of Lake Forest in 2005 and contains a 3.62 acre excavated pond/borrow pit. The remaining 36.28 acres of the Dalitsch property drains into this pond, along with 250 acres of off-site land including the Tollway and property to the west. The pond discharges water into the Middlefork Savanna wetland via an excavated ditch.

V3 Consultants conducted water quality sampling in 2005 that indicated that the pond is contributing to lower water quality entering the Middlefork Savanna wetland and the Middle

Fork. Based on its location, the pond has the potential to filter and improve water quality entering the Middlefork Savanna and Middle Fork from upstream areas including Interstate 94. The objective of this project is to preserve and protect the high quality Middlefork Savanna wetland by improving water quality entering the wetland and ultimately the Middle Fork. The proposed project includes converting the existing pond into an emergent wetland complex. This will be accomplished by raising the bottom elevation of the pond and planting resulting areas with emergent wetland plants. Additionally, the slopes of the pond will be planted with native wet-mesic prairie species. The wetland complex will remove pollutants via settling, attenuation and vegetative filtration. The City of Lake Forest requested $120,035 in North Branch 319 funds for this $737,391 project (16% of the total project cost).

BST Recommendation
The City of Lake Forest originally submitted this funding application in June 2006. At that time, the BST did not recommend funding for the project because of a number of outstanding issues. Since that time, Lake Forest has resolved most of the issues and/or made significant progress on them. Therefore, the BST is recommending funding for this project at $107,125. This will deplete the remainder of our existing IEPA Section 319 grant (3190606).

Northbrook – Community (West Fork) River Restoration Project

Project Description
The Northbrook streambank project targets a section of the West Fork of the North Branch of the Chicago River in a residential neighborhood. This section of the West Fork has experienced a dramatic widening over the past 50 years and is now twice as wide as when originally constructed. This is partially due to the unchecked growth of buckthorn and garlic mustard along the riverbanks, and a lack of education of the homeowners about riparian stewardship. Riparian residents are leading an effort in conjunction with the Village of Northbrook and the Northbrook Park District to remove invasive buckthorn trees and garlic mustard and replace them with native grasses, plants, shrubs and trees along the banks of both sides of the river for approximately five city blocks. Both banks of the river are approximately 18 feet wide, and the length of the project is 1500 feet long. This amounts to just over one acre of total area involved. The Village of Northbrook recently completed a major river revitalization project immediately upstream of this project through the Village Green Park and downtown area. The Northbrook Park District owns the property immediately downstream of the project area, and is considering a future project to stabilize the riverbanks and reduce erosion with native plants. In the fall of 2006 the residents organized two workdays within the project area with the help of the Friends of the Chicago River, Village of Northbrook and the Northbrook Park District. The Village and partners requested $24,676 (approximately 50%) of the total project cost of $49,655.

BST Recommendation
The BST felt that Northbrook's proposal is a low cost project that will provide the North Branch Watershed Project with valuable information that can guide similar homeowner-driven projects throughout the watershed. The BST therefore recommends full funding ($24,676) for the Northbrook Community River Restoration Project. Funding for this project is recommended contingent on the receipt additional Section 319 funding from the IEPA.

Northfield Park District – Willow Park Permeable Pavement Installation

Project Description
The Northfield Park District (NPD) proposes to include permeable pavement for new and replacement parking in their Willow Park redevelopment project. Willow Park is located along the Middle Fork in Cook County. Other BMPs to be incorporated at Willow Park include construction of a new bio-swale to filter runoff from play fields and other park facilities; Middle Fork riverbank restoration; and native habitat restoration. NPD is committed to improving water quality through innovative BMP practices and providing enhancement to natural resources. The Northfield Park District requested $89,730 (49% of total project cost) in North Branch 319 funds to install 8,890 square feet of permeable pavement at Willow Park.

BST Recommendation
The BST felt that the NPD project was a high quality project. However, the BST felt that the cost of $16 per square foot for permeable pavers was higher than the research indicates and the costs we have seen. The research we have seen estimates that the cost of the permeable pavers should be $10-15 per square foot including installation. Because of this fact, the BST is recommending $60,000 in funding for the project which works out to ~ $13.50 per square foot. Funding for this project is recommended contingent on the receipt additional Section 319 funding from the IEPA.

Youth Conservation Corps – Lake Bluff Project

Project Description
The Youth Conservation Corps, Inc., in cooperation with the Lake Bluff Open Lands Association, and the Village of Lake Bluff proposes to complete environmental projects along the Skokie River in Lake Bluff. The projects will improve water quality on the Skokie River while also reducing flood damages, natural resource conservation and restoration, and providing educational opportunities for YCC crew members. Components of this project will include:

- Removal of invasive species
- Installation of 100’ of 12” Coirlog
- Streambank restoration on 150’ of the East Bank of the Skokie River
- Backfill to Coirlog with added topsoil
- Seeding and plugging with native wetland seed and plug
- Placement of erosion control matting
- Placement of rock at outfalls of draintiles
- Placement of riffles to oxygenate and improve water quality

The YCC requested $31,230 (29%) to complete the work at the Lake Bluff site.

BST Recommendation
While the BST strongly supports the goals of the YCC and its work with disadvantaged youth, the BST did not feel that they could recommend funding for this project. The BST felt that the work to be completed for the $108,000 needed to clarified and better focused. The BST also requested that the project and budget be characterized in terms of projects and products rather than personnel. The reason for this request was so that the BST and IEPA could better gage project success upon completion. The results of the proposal as currently written are not clear. The BST also felt that design of the project and oversight of the YCC crew by a qualified expert were essential and this was not evident in the proposal.

APPENDIX B: SUMMARY OF NORTH BRANCH STREAM REACH CHARACTERISTICS

The Lake County Stormwater Management Commission (SMC) conducted a stream inventory of the three forks of North Branch in Lake County during summer 2005. Twelve tributaries were also inventoried in 2006-2007. Although water quality sampling was not performed, many of the sources and causes of water quality impairment along the streams were investigated. An important component of the assessment process is the evaluation of current hydraulic, geomorphic, and aquatic stream characteristics. Major stream characteristics that were assessed include:

1. Instream and overbank debris loads;
2. Substrate composition, stability and embeddedness;
3. Turbidity;
4. Channelization and degree of sinuosity;
5. Degree of bank erosion; and
6. Channel measurements such as bank heights and channel widths.

These characteristics were identified for each stream reach. A stream reach is defined as a stream segment having fairly homogenous hydraulic, geomorphic and riparian cover and land use characteristics. In Lake County, the three forks were broken down into a total of 96 stream reaches (20 in the West Fork, 34 in the Middle Fork, and 42 in the Skokie River) with an overall average reach length of 2,000 feet. The major stream reach characteristics are summarized in Table B-1 below. The table is arranged by fork where WF is the West Fork, MF is the Middle Fork and SR is the Skokie River. The stream reach number follows the fork designation, for example WF001 indicates the West Fork of the North Branch stream reach #1. The stream reaches are mapped in Figure 3-33.

Table B-1

Stream Reach Characteristics

Lake Co ID	Reach Boundary Upstream	Reach Boundary Downstream	SDL[1] - Instream	SDL - Overbank	Substrate Stability	Substrate Embededdness	Turbidity	Channelization	Bankfull Sinuosity	Baseflow Sinuosity	Bank Erosion[2] Left	Bank Erosion Right	Mean Bank Ht (ft)	Top Mean Channel Width (ft)	Bottom Mean Channel Width (ft)
WF001	upstream from fence/debris impoundment in photo 182	Lake-Cook Road bridge	Low	Low	Low	High	High	High	None	None	4	4	2.17	30.67	30.77
WF002	upstream from WWTP discharge in photo 198	upstream from fence/debris impoundment in photo 182	Low	Low	Low to Moderate	Low	Low	High	None	None	5	7	7.67	40.67	21.5
WF003	upstream from sandbar in photo 212	upstream from WWTP discharge in photo 28	Low	Low	Moderate	Moderate	Low	Moderate	Low	Low	6	4	6.15	28.58	12
WF004	upstream from Central Avenue bridge	upstream from sandbar in photo 212	Low	Low	Moderate	Moderate	Moderate	High	None	None	6	6	7.77	37.67	17.17
WF005	upstream from Deerfield Road bridge	upstream from Central Avenue bridge	Low	Low	Moderate	Moderate	Low	High	Low	Low	6	6	11.375	44.72	16.86
WF006	upstream from Juniper Street bridge	upstream from Deerfield Road bridge	Low	Low	Moderate	Moderate	Low	High	Low	Low	3	3	8.52	40.25	15.97
WF007	upstream from Hazel Road bridge	upstream from Juniper Street bridge	Low	Low	Moderate	Moderate	Low	High	None	None	3	3	8.49	32.44	13.28

[1] SDL stands for stream debris load.
[2] 0-2 is high, 3-5 is moderate, 6-8 is low, 9-10 is none.

Table B-1 (Continued)

Lake Co ID	Reach Boundary Upstream	Reach Boundary Downstream	SDL[1] - Instream	SDL - Overbank	Substrate Stability	Substrate Embededdness	Turbidity	Channelization	Bankfull Sinuosity	Baseflow Sinuosity	Bank Erosion[2] Left	Bank Erosion Right	Mean Bank Ht (ft)	Top Mean Channel Width (ft)	Bottom Mean Channel Width (ft)
WF008	upstream from footbridge in photo 313	upstream from bridge at Hazel Rd.	Low	Low	Moderate	Moderate	High	High	Low	Low	5	6	9.73	36.78	11.58
WF009	Lake Eleanor dam	upstream from footbridge in photo 313	Low	Low	High	Low	Moderate	Low	None	None	5	7	6.83	31.92	14.92
WF010	downstream from rip rap armoring near detention basin	upstream from Lake Eleanor @ Montgomery Bridge	Low	Low	Low	High	Low	High	Low	Low	5	5	9.27	41.63	13.75
WF011	upstream from two box culverts at 94 tollway	beginning of rip rap armoring near detention basin	Low	Low	Low	High	Low	High	Low	Low	9	9	9.04	66.28	14.53
WF012	upstream from Duffy Ln. bridge	upstream from two box culverts at 94 tollway	Moderate	Moderate	Low	High	High	High	Low	Low	1	2	8.45	38	16.81
WF013	approx. 100 feet downstream from where the west fork meanders west and the residential area begins	upstream from Duffy Lane bridge	Low	Low	Moderate	High	Moderate	High	Low	Low	8	7	9.86	41.42	10.42

[1] SDL stands for stream debris load.
[2] 0-2 is high, 3-5 is moderate, 6-8 is low, 9-10 is none.

Table B-1 (Continued)

Lake Co ID	Reach Boundary Upstream	Reach Boundary Downstream	SDL[1] - Instream	SDL - Overbank	Substrate Stability	Substrate Embededdness	Turbidity	Channelization	Bankfull Sinuosity	Baseflow Sinuosity	Bank Erosion[2] Left	Bank Erosion Right	Mean Bank Ht (ft)	Top Mean Channel Width (ft)	Bottom Mean Channel Width (ft)
WF014	downstream from detention pond	approx. 100 feet downstream from where the West Fork meanders west and the residential area begins	Low	Moderate	Moderate	Low	Low	High	Low	Low	6	5	9.21	35.03	9.14
WF015	upstream from Half Day Rd. bridge	downstream from detention pond	Low	Low	Moderate	Moderate	Low	High	Low	Low	8	8	2.03	15.06	9.22
WF 016	at Old Mill Rd. turn around, upstream from concrete boulders in photo 83	upstream from Half Day Rd. bridge	High	Moderate to High	Moderate	Moderate	Low	High	Low	Moderate	7	7	7.14	36.56	10.17
WF017	upstream from tributary in photo 97	at Old Mill Rd. turnaround, upstream from concrete boulders in photo 83	Moderate	High	Low	High	Low	High	Low	Low	8	7	4.98	33.67	10.39
WF 018	downstream from Everett Rd.	upstream from tributary in photo 97	Low	Low	Moderate	Moderate	Low	High	Low	Moderate	9	9	3.2	27.33	9.64
WF019	culvert at Clendenin Lane	confluence with West Fork	Low	Low	High	Low	Low	Moderate	Low	Moderate	6	6	4.8	12	6
WF020	head of channel in wetland complex; 1000' us of WF	confluence with West Fork	Moderate	Low	High	Low	Low	Low	Low	Moderate	9	9	2	5	3.5

[1] SDL stands for stream debris load.
[2] 0-2 is high, 3-5 is moderate, 6-8 is low, 9-10 is none.

Table B-1 (Continued)

Lake Co ID	Reach Boundary Upstream	Reach Boundary Downstream	SDL[1] - Instream	SDL - Overbank	Substrate Stability	Substrate Embededdness	Turbidity	Channelization	Bankfull Sinuosity	Baseflow Sinuosity	Bank Erosion[2] Left	Bank Erosion Right	Mean Bank Ht (ft)	Top Mean Channel Width (ft)	Bottom Mean Channel Width (ft)
MF001	upstream from tributary in photo 128	upstream from Lake-Cook Road Bridge	Moderate	High	Moderate	Moderate	High	High	Low	Low	2	4	5.61	40	24.75
MF002	upstream from 48" concrete pipe in photo 150 (where Kildare Lane is closest to stream)	upstream from tributary in photo 128	Moderate	High	Low	Moderate	High	High	Low	Low	4	4	6.97	36.45	21.75
MF003	upstream from Deerfield Road bridge	upstream from 48" concrete pipe in photo 150 (where Kildare Lane is closest to stream)	Moderate	Moderate	Low	High	Moderate	High	Low	Low	3	3	6.67	34.33	20.08
MF004	upstream from where Briargate Drive dead ends at Castlewood Road	upstream from Deerfield Road bridge	Moderate	Moderate	Moderate	Moderate	Moderate	None	Low	Low	3	3	7.83	39.17	18.5
MF005	near intersection of Woodvale Avenue and Kenton Road	upstream from where Briargate Drive dead ends at Castlewood Road	Low	High	low to moderate	High	High	High	Low	Low	3	3	8.08	36.25	17.61
MF006	upstream from tributary in photo 437	upstream from intersection of Woodvale Ave. and Kenton Rd.	Moderate	Moderate	low to moderate	Moderate	Low	High	Low	Low	4	4	7.45	37.44	19.97
MF007	downstream from where offices start	upstream from tributary in photo 437	Low	Low	Moderate	Moderate	High	High	Low	Low	5	6	8.06	42.86	18.08

[1] SDL stands for stream debris load.
[2] 0-2 is high, 3-5 is moderate, 5-8 is low, 9-10 is none.

Table B-1 (Continued)

Lake Co ID	Reach Boundary Upstream	Reach Boundary Downstream	SDL[1] - Instream	SDL - Overbank	Substrate Stability	Substrate Embededdness	Turbidity	Channelization	Bankfull Sinuosity	Baseflow Sinuosity	Bank Erosion[2] Left	Bank Erosion Right	Mean Bank Ht (ft)	Top Mean Channel Width (ft)	Bottom Mean Channel Width (ft)
MF008	upstream from Half Day Road bridge	downstream from where corporate buildings begin (left bank)	Low	Low	Moderate	Moderate	High	Low	Low	Low	6	5	7.67	34.52	15.73
MF009	upstream from swale/deer path in photo 487	upstream from Half Day Road bridge	Low	Low	Moderate	Moderate	High	High	Low	Low	6	5	7.16	34.83	17
MF010	approx. 150 feet upstream from bridge at Old Mill Road	upstream from swale/deer path in photo 487	Low	Moderate	Moderate	Low	Moderate	High	None	None	6	5	8.69	33.83	15.78
MF011	downstream from logjam in photo 524	approximately 150 feet upstream from bridge at Old Mill Road	High	Low	Moderate	Low	low/moderate	High	Low	Low	6	3	8.89	34	15.47
MF012	upstream from 20" concrete pipe in photo 546 north of Everett Road bridge	downstream from logjam in photo 524	Moderate	Moderate	Moderate	Low to Moderate	Moderate	High	Low	Low	6	6	7.81	38	13.89
MF013	upstream from log jam in photo 183	upstream from 20" concrete pipe (photo 546) north of Everett Road bridge	High	Moderate	Moderate	Moderate	Moderate	High	Low	Low	4	4	8.47	35.47	12.56
MF014	downstream from Westleigh Rd.	upstream from log jam in photo 183	Moderate	Moderate	Moderate	Moderate	Low	High	Low	Low	7	7	7.7	34.78	12.86

[1] SDL stands for stream debris load.
[2] 0-2 is high, 3-5 is moderate, 6-8 is low, 9-10 is none.

Table B-1 (Continued)

Lake Co ID	Reach Boundary Upstream	Reach Boundary Downstream	SDL[1] - Instream	SDL - Overbank	Substrate Stability	Substrate Embededdness	Turbidity	Channelization	Bankfull Sinuosity	Baseflow Sinuosity	Bank Erosion[2] Left	Bank Erosion Right	Mean Bank Ht (ft)	Top Mean Channel Width (ft)	Bottom Mean Channel Width (ft)
MF015	upstream from bridge at Lake Forest High School (west campus)	downstream from Westleigh Rd. bridge	Low	Low	Moderate	Moderate	Low	High	Low	Low	6	6	8.47	36.36	11.28
MF016	upstream from bridge at route 60	upstream from footbridge at Lake Forest High School (west campus)	Low	Low	Low	High	Low	Low	Low	Low	6	6	6.63	39.67	14.06
MF017	at edge of water body on left bank (where trail on left bank heads west)	upstream from bridge at Rte. 60	Low	Low	Low	High	Low	High	None	None	8	8	3.52	26.67	17.83
MF018	upstream from first foot bridge within forest preserve	upstream from edge of water body on left bank (where trail on left bank turns west)	Moderate	Moderate	Low	High	Low	High	Low	Low	6	5	5.31	35.33	14.94
MF019	upstream from 3rd foot bridge in Middle Fork Savannah Forest Preserve	upstream from first foot bridge in forest preserve	Low	Low	Low	High	Low	High	None	None	8	8	4.89	36.67	14.33
MF020	upstream from railroad tracks	upstream from 3rd foot bridge in Middle Fork Savannah Forest Preserve	Moderate	Low	Low	High	Low	High	Low	Low	7	7	6.13	37.33	11.44
MF021	downstream from where the stream bends due east	upstream from railroad tracks	High	Moderate	Low	High	Low	High	Low	Moderate	7	7	3.81	28.06	12.75

[1] SDL stands for stream debris load.
[2] 0-2 is high, 3-5 is moderate, 6-8 is low, 9-10 is none.

Table B-1 (Continued)

Lake Co ID	Reach Boundary Upstream	Reach Boundary Downstream	SDL[1] - Instream	SDL - Overbank	Substrate Stability	Substrate Embededdness	Turbidity	Channelization	Bankfull Sinuosity	Baseflow Sinuosity	Bank Erosion[2] Left	Bank Erosion Right	Mean Bank Ht (ft)	Top Mean Channel Width (ft)	Bottom Mean Channel Width (ft)
MF022	upstream from bridge at 176	downstream from where the stream bends due east	High	Low	Moderate	Moderate	Moderate	High	Low	Moderate	5	5	5.11	32.75	5.17
MF023	upstream from 36" steel pipe in photo 700	upstream from bridge at Route 176	High	Moderate	Moderate	Low	Moderate	High	Low	Low	5	5	3	23.61	8.03
MF024	Atkinson Rd bridge	upstream from 36" steel pipe in photo 700	Moderate	Low	Moderate	Moderate	N/A	High	None	None	5	4	5.71	25.31	7.61
MF025	north end of hill where fence on left bank ends	upstream from bridge at Atkinson Road	Low	Low	High	Moderate	Low	High	None	None	7	7	7.64	35.67	7.86
MF026	downstream from where stream widens	north end of hill where fence on left bank ends	Low	Low	High	Low	Low	High	None	None	8	8	5.07	31	5
MF027	culvert at route 137	downstream from where stream widens	Moderate	Low	High	Low	Low	High	Low	Low	5	5	4.21	16.89	6.78
MF028	culverts at I-94	confluence with Middle Fork	Moderate	Low	Moderate	Moderate	Low	High	Low	Low	7	7	3.4	17.4	9.25
MF029	Oasis West access road	culvert under I-94	Moderate	Low	High	Low	Low	Moderate	Low	Low	3	3	3	13	7.75
MF030	Illinois43 (Waukegan Road)	confluence with Middle Fork	Moderate	Low	High	Low	Low	Moderate	Low	Moderate	5	5	5.7	16.4	6.2

[1] SDL stands for stream debris load.
[2] 0-2 is high, 3-5 is moderate, 6-8 is low, 9-10 is none.

Table B-1 (Continued)

Lake Co ID	Reach Boundary Upstream	Reach Boundary Downstream	SDL[1] - Instream	SDL - Overbank	Substrate Stability	Substrate Embededdness	Turbidity	Channelization	Bankfull Sinuosity	Baseflow Sinuosity	Bank Erosion[2] Left	Bank Erosion Right	Mean Bank Ht (ft)	Top Mean Channel Width (ft)	Bottom Mean Channel Width (ft)
MF031	concrete pipe/culvert in Bannockburn Lake Office Park	confluence with Middle Fork	Moderate	Low	Moderate	Moderate	Moderate	High	Low	Low	6	6	5.4	20	5.8
MF032	pipe draining detention pond/ head of tributary	confluence with Middle Fork	Low	Low	High	Low	Moderate	High	None	Low	6	8	10	38	7.5
MF033	outfalls east of IL 43 (Waukegan Road)	confluence with Middle Fork	High	Low	High	Low	Low	High	None	Low	0	5	4.75	19	6.7
MF034	culvert draining from south side of DHS	confluence with Middle Fork	Low	Low	High	Low	Low	High	Low	Moderate	3	2	6.75	24	8

[1] SDL stands for stream debris load.
[2] 0-2 is high, 3-5 is moderate, 6-8 is low, 9-10 is none.

Table B-1 (Continued)

Lake Co ID	Reach Boundary Upstream	Reach Boundary Downstream	SDL[1] - Instream	SDL - Overbank	Substrate Stability	Substrate Embededdness	Turbidity	Channelization	Bankfull Sinuosity	Baseflow Sinuosity	Bank Erosion[2] Left	Bank Erosion Right	Mean Bank Ht (ft)	Top Mean Channel Width (ft)	Bottom Mean Channel Width (ft)
SR001	upstream from Clavey Rd. bridge	upstream from Lake-Cook Rd. bridge	Low	Low	High	Low	Moderate	High	Low	Low	8	8	3.46	39.5	31.33
SR002	upstream from water body on left bank in Larry Fink Memorial Park	upstream from Clavey Rd. bridge	Low	Low	Moderate	Moderate	Low	High	None	None	4	5	7.09	38.67	21.11
SR003	upstream from 4th bridge within Bob-o-link golf course	upstream from water body on left bank in Larry Fink Memorial Park	Low	Low	Moderate	Moderate	Moderate	High	None	None	6	6	8.56	44.17	19.83
SR004	upstream from 4th bridge within sunset valley golf course	upstream from 4th bridge in bobolink golf course	Low	Low	High	Low	Low	High	None	None	6	6	7.22	38.06	20.08
SR005	upstream from west boundary of Sunset Golf course	upstream from 4th bridge within Sunset Valley Golf Course	Low	Low	Moderate	Moderate	High	High	Low	Low	5	5	7.17	36.17	22.36
SR006	upstream from bridge @ Central Avenue	upstream from west boundary of Sunset Valley Golf Course	Low	Moderate	Moderate	Moderate	Low	High	Low	Low	4	4	5.78	33.67	22.56
SR007	upstream from box culvert under 41 (in photo 1063)	upstream from bridge @ Central Ave.	Low	Low	High	Moderate	Low	High	Low	Low	7	7	4.24	32.33	17.86
SR008	upstream from Park Ave. west	upstream from box culvert under 41 (in photo 1063)	Low	Low	High	Low	Low	High	None	Low	6	6	4.6	37.33	23.42

[1] SDL stands for stream debris load.
[2] 0-2 is high, 3-5 is moderate, 6-8 is low, 9-10 is none.

Table B-1 (Continued)

Lake Co ID	Reach Boundary Upstream	Reach Boundary Downstream	SDL[1] - Instream	SDL - Overbank	Substrate Stability	Substrate Embededdness	Turbidity	Channelization	Bankfull Sinuosity	Baseflow Sinuosity	Bank Erosion[2] Left	Bank Erosion Right	Mean Bank Ht (ft)	Top Mean Channel Width (ft)	Bottom Mean Channel Width (ft)
SR009	upstream from first bridge within Highland Park Country Club	upstream from Park Ave. West bridge	Low	Low	High	Low	Low	High	None	None	6	5	5.11	36.67	22.64
SR010	upstream from 3rd concrete bridge	upstream from 2nd bridge	Low	Low	High	Low	Low	High	None	None	5	5	5.56	34	22.83
SR011	upstream from intersection of Trail Way and Eaton ct.	upstream from 3rd bridge in HPGC	Low	Low	High	Low	Low	High	Low	Low	4	4	6.17	37.89	23.39
SR012	upstream from Oxford Ct. and Trail Way	upstream from intersection of Trailway and Eaton	Low	Low	High	Low	Low	High	None	None	4	5	6.99	37.33	19.69
SR013	upstream from swale in photo 1148	upstream from intersection of Oxford and Trail Way	Low	Low	High	Low	Low	High	None	Low	6	4	8.86	53.75	21.11
SR014	downstream from artificial riffle	upstream from intersection of Oxford and Trail Way	Low	Low	Moderate	Low	Moderate	High	Low	Low	3	5	8	58.17	20.53
SR015	upstream from bridge at Old Elm Rd.	upstream from artificial riffle	Low	Low	Moderate	Moderate	Low	High	Low	Low	4	5	8.52	55	20.28
SR016	upstream from Linden Ave.	upstream from Old Elm bridge	Low	High	Moderate	Moderate	Moderate	High	Low	Low	2	3	6.65	37	16.55
SR017	upstream from 2- 12" plastic pipes	upstream from Linden Ave.	Moderate	High	Moderate	Low	Low	High	Low	Low	2	4	7.64	39.5	17.69

[1] SDL stands for stream debris load.
[2] 0-2 is high, 3-5 is moderate, 6-8 is low, 9-10 is none.

Table B-1 (Continued)

Lake Co ID	Reach Boundary Upstream	Reach Boundary Downstream	SDL[1] - Instream	SDL - Overbank	Substrate Stability	Substrate Embededdness	Turbidity	Channelization	Bankfull Sinuosity	Baseflow Sinuosity	Bank Erosion[2] Left	Bank Erosion Right	Mean Bank Ht (ft)	Top Mean Channel Width (ft)	Bottom Mean Channel Width (ft)
SR018	upstream from stormdrain in photo 1245	upstream from 2-12" plastic pipes	Low	Moderate	High	Moderate	Low	High	Low	Low	5	5	6.17	34.92	18.53
SR019	upstream from 4" plastic pipe in photo 1262	upstream from stormdrain in photo 1245	Low	Moderate	Moderate	Moderate	Moderate	High	Low	Low	5	4	5.14	29.75	16.5
SR020	bridge @ Onwentsia Rd.	upstream from 4" plastic pipe in photo 1262	Moderate	Low	Moderate	Moderate	Low	High	Low	Moderate	7	7	4.87	43.69	12.83
SR021	4th bridge in Onwentsia Club. photo 1294	upstream from Onwentsia Rd	Low	Low	Moderate	Moderate	Moderate	High	None	None	7	7	5	30.67	14.67
SR022	upstream from Deerpath Ave. bridge	upstream from 4th bridge in Onwentsia Club	Low	Low	Moderate	Moderate	Moderate	High	None	None	5	5	5.12	30.67	16.33
SR023	upstream from 12" clay pipe in photo 1346	upstream from Deerpath Rd bridge	Low	Low	Low	High		High	Low	Low	8	8	4.40	34.67	18.25
SR024	55' downstream from bridge on Laurel Ln.	upstream from 12" clay pipe in photo 1346	Low	Low	Moderate	Moderate	Moderate	High	Low	Low	6	6	5.72	45.94	16
SR025	upstream from RR tracks	500' downstream from footbridge near Laurel Ln.	Moderate	Moderate	Moderate	Moderate	Low	High	Low	Low	5	5	5.79	37.17	12.83
SR026	upstream from 48" steel pipe in photo 5042	upstream from RR tracks	Low	Low	Moderate	Moderate	Moderate	High	Low	Low	6	6	7.39	38.94	15.17

[1] SDL stands for stream debris load.
[2] 0-2 is high, 3-5 is moderate, 6-8 is low, 9-10 is none.

Table B-1 (Continued)

Lake Co ID	Reach Boundary Upstream	Reach Boundary Downstream	SDL[1] - Instream	SDL - Overbank	Substrate Stability	Substrate Embededdness	Turbidity	Channelization	Bankfull Sinuosity	Baseflow Sinuosity	Bank Erosion[2] Left	Bank Erosion Right	Mean Bank Ht (ft)	Top Mean Channel Width (ft)	Bottom Mean Channel Width (ft)
SR027	downstream from Mariani Landscaping parking lot on the left bank	upstream from 48" steel pipe in photo 5048	Moderate	Low	Low	High	Moderate	High	None	None	8	8	7.99	38.83	12.95
SR028	upstream from bridge @176	downstream from Mariani Landscaping parking lot	Moderate	Low	Low	High	Low	High	Low	Low	5	5	9.42	45.53	14.06
SR029	upstream from 1st footbridge	upstream from 176 bridge	Low	Low	Low	High	Moderate	High	None	None	8	8	4.88	33.33	15.44
SR030	upstream from RR tracks @ north end of LBGC	upstream from 1st footbridge in LBGC	Moderate	Low	Moderate	Moderate	Low	High	None	None	5	5	5.68	39.83	15.61
SR031	250' upstream from Sutton Ct. (in GLNTC)	upstream from RR tracks (north end of LBGC)	Low	Low	High	Low	Low	High	Low	Low	6	6	5.58	57.06	11.31
SR032	upstream from Wyoming Ave. culvert in GLNTC	250" upstream from Sutton Ct. (in GLNTC)	Low	Low	Moderate	Moderate	Moderate	High	Moderate	Moderate	5	5	5.65	44.11	12.45
SR033	upstream from Rte137. downstream from box culverts @ 137	upstream from Wyoming Ave. culvert in GLNTC	Low	Low	High	Low	Low	High	None	Low	4	4	6.02	39.67	9.06

[1] SDL stands for stream debris load.
[2] 0-2 is high, 3-5 is moderate, 6-8 is low, 9-10 is none.

Table B-1 (Continued)

Lake Co ID	Reach Boundary Upstream	Reach Boundary Downstream	SDL[1] - Instream	SDL - Overbank	Substrate Stability	Substrate Embededdness	Turbidity	Channelization	Bankfull Sinuosity	Baseflow Sinuosity	Bank Erosion[2] Left	Bank Erosion Right	Mean Bank Ht (ft)	Top Mean Channel Width (ft)	Bottom Mean Channel Width (ft)
SR034	48" steel culvert in photo 1558 (in Willow Glen GC)	downstream from box culverts @ 137	Low	Low	Moderate	Moderate	High	High	Low	Low	5	5	8.63	57.33	8.05
SR035	upstream from culvert in photo 1446 (w/in Foss Park Golf Course)	south end of Foss Park	Low	Low	Low	High	High	High	Low	Low	4	3	6.61	35.25	12.78
SR036	northern end of FPGC	upstream from culvert in photo to 1446 (w/in FPGC)	Low	Low	Moderate	Moderate	High	High	Low	Low	4	4	7.25	41.53	8.78
SR037	@ northern end of Greenbelt FP photo 1610	near trail in Greenbelt Forest Preserve	Moderate	Moderate	Moderate	Low	High	Moderate	Low	Low	10	10	N/A	N/A	5.67
SR038	culvert @ Washington St.	near Diana Ave. in park city where channel becomes defined. upstream from water body	Moderate	Low	Moderate	Low	High	High	None	None	8	8	4.13	32	6.28
SR039	concrete culvert at Chantilly Condos	confluence with Skokie River	Low	Moderate	Moderate	Moderate	Low	High	None	None	5	6	7	32	11
SR040	culverts at US Route 41	confluence with Skokie River	High	Low	Moderate	Moderate	Low	High	None	None	10	10	8.25	41.5	6.0
SR041	outlet structure at Kendler's Lake	confluence with Skokie River	Low	Low	High	Low	Low	Moderate	Low	Moderate	8	8	4	23	5.75

[1] SDL stands for stream debris load.
[2] 0-2 is high, 3-5 is moderate, 6-8 is low, 9-10 is none.

APPENDIX C: DISCHARGE POINTS INTO THE NORTH BRANCH

Discharge points refer to gullies, open channels, tributaries, pipes and other outfalls that drain into the North Branch. As part of the stream inventory in Lake County, SMC identified 925 outfalls draining into the North Branch (172 into the West Fork, 324 into the Middle Fork and 429 into the Skokie). The outfalls range in size from two-inch sump pump pipes to 6 or 7 foot pipes draining from Interstate 94. Tributaries were defined based on those identified on the USGS topographic quad maps. Table C-1 summarizes the types, sizes and locations of all discharge points into the North Branch in Lake County as well as general notes on each outfall by stream reach. The table is arranged by fork where WF is the West Fork, MF is the Middle Fork, and SR is the Skokie River. The stream reach number follows the fork designation, for example WF001 indicates the West Fork of the North Branch stream reach #1. The stream reaches are mapped in Figure 3-33.

Table C-1
Discharge Points, North Branch Chicago River, Lake County

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
WF001	176	Concrete Pipe		0	0	24	176	located downstream of footbridge	Trickle
WF001	181	Plastic Pipe		0	0	4	181	see also photo 192 (aspect: downstream)	None
WF001	195	Concrete Pipe		0	0	25	195	drains a detention basin in residential area	Trickle
WF001	194	Concrete Pipe		0	0	60	194	stormdrain; some water in pipe, but doesn't appear to be flowing into stream	None
WF002	191	Plastic Pipe		0	0	6	191	gravel underneath pipe for erosion control	None
WF002	190	Plastic Pipe		0	0	6	190	gravel underneath for erosion control; erosion problem	None
WF002	189	Steel Pipe		0	0	12	189	gravel underneath for erosion control	None
WF002	188	Plastic Pipe		0	0	4	188	soil eroding underneath pipe, erosion problem	None
WF002	186	Plastic Pipe		0	0	4	186		None
WF002	185	Concrete Pipe		0	0	60	185	stormdrain; water is in pipe, but it appears to be coming from the stream	None
WF002	197	Steel Pipe		0	0	24.25	197	WWTP is nearby (on other side of fence on bank)	None
WF002	198	Concrete Pipe		0	0	36	198	WWTP discharge; soapy smell, bubbles; potential water quality problem	Substantial
WF003	202	Plastic Pipe		0	0	4	202	see also photo 203	None
WF003	205	Steel Pipe		0	0	15	205	this pipe is the upper one in photo 205; erosion problem, bank eroding	None
WF003	205	Steel Pipe		0	0	15	205	debris inside pipe; this pipe is the lower one in photo 205	None
WF003	206	Concrete Pipe		0	0	36	206		Trickle
WF003	209	Concrete Pipe		0	0	36	209		Moderate

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
WF004	215	Steel Pipe		0	0	17	215	sewer odor near pipe and sheen on water flowing from it; erosion problem below pipe	Trickle
WF004	216	Plastic Pipe		0	0	8	216	concrete apron	None
WF004	220	Plastic Pipe		0	0	16	220	cobble below pipe	Trickle
WF004	219	Plastic Pipe		0	0	4	219	erosion occurring below pipe, erosion problem	None
WF004	221	Plastic Pipe		0	0	4	221	wood structure underneath pipe	None
WF004	218	Concrete Pipe		0	0	24	218	pool below pipe	None
WF004	222	Plastic Pipe		0	0	4	222		None
WF004	224	Concrete Pipe		0	0	48	224	located near bridge at Central Avenue	Moderate
WF004	225	Plastic Pipe		0	0	12	225	located within and under bridge at Central Avenue	Trickle
WF005	246	Concrete Pipe		0	0	6	246	soil eroding below pipe	None
WF005	245	Concrete Pipe		0	0	12	245	very eroded near pipe; part of pipe is broken; erosion problem	Moderate
WF005	244	Concrete Pipe		0	0	36	244	concrete apron	Trickle
WF005	243	Concrete Pipe				34	243	concrete apron	Moderate
WF005	241	Concrete Pipe				14	241		Trickle
WF005	240	Concrete Pipe				14	240	soil eroding above pipe	Trickle
WF005	239			0	0		239	leaky, broken pipe; unable to locate source to determine material and measure dimensions; eroded area surrounding pipe, erosion problem	None
WF005	237	Concrete Pipe		0	0	24	237	concrete apron	Trickle
WF005	235	Concrete Pipe		0	0	12	235	circular pipe	None
WF005	235	Concrete Pipe		3	3		235	square pipe with bars	
WF005	234	Clay Pipe		0	0	6	234		None
WF005	231	Concrete Pipe		6	4		231	rectangular pipe within Deerfield Road bridge	Moderate
WF005	232	Concrete Pipe		0	0	25	232	located within bridge	trickle
WF006	256	Concrete Pipe		0	0	30	256		None
WF006	257	Concrete Pipe		0	0	12	257	cobble and gravel apron below pipe; wet inside pipe	None
WF006	258	Concrete Pipe		0	0	12	258	pipe half buried with debris (height is about 6"); cobble below and above pipe and creating riffle	None
WF006	259	Concrete Pipe		0	0	48	259	debris and muck has filled 1/5 of the pipe; bottom of pool below pipe covered with green substance	Moderate
WF006	260	Clay Pipe		0	0	8	260	concrete apron; erosion problem; three dead fish on opposite bank	None
WF006	263	Plastic Pipe		0	0	4	263	pipe opening is covered with a cap that has multiple small, 0.25" diameter holes in it to allow water to flow through; erosion below pipe	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
WF006	264	Concrete Pipe		0	0	24	264	pipe within bridge; crayfish in pool below pipe	Trickle
WF007	268	Plastic Pipe		0	0	4	268	soil eroding underneath pipe	None
WF007	269	Plastic Pipe		0	0	4	269		None
WF007	270	Plastic Pipe		0	0	4	270	boulders below pipe	None
WF007	270	Plastic Pipe		0	0	4	270	boulders below pipe	None
WF007	271	Concrete Pipe		0	0	18	271		Trickle
WF007	272	Concrete Pipe		0	0	6	272		None
WF007	273	Plastic Pipe		0	0	4	273		None
WF007	275	Plastic Pipe		0	0	4	275		None
WF007	276	Concrete Pipe		0	0	15	276	small pool underneath pipe; streambed mucky in pool and whitish fog in pool water, potential water quality problem	Trickle
WF007	277	Concrete Pipe		0	0	12	277		None
WF007	277	Plastic Pipe		0	0	4	277		None
WF007	279	Plastic Pipe		0	0	4	279		None
WF007	280	Plastic Pipe		0	0	4	280		None
WF007	282	Plastic Pipe		0	0	4	282	appears to be disconnected (and therefore, not a discharge point)	None
WF007	283	Plastic Pipe		0	0	4	283		None
WF007	284	Steel Pipe		0	0	7	284	erosion problem	None
WF007	285	Plastic Pipe		0	0	4	285	eroding underneath pipe	None
WF007	286	Plastic Pipe		0	0	4	286	eroding underneath pipe down to streambed, erosion problem	None
WF007	287	Concrete Pipe		0	0	27	287	pipe within bridge; pool below	Moderate
WF008	310	Concrete Pipe		0	0	18	310	within bridge	Moderate
WF008	291	Concrete Pipe		0	0	48	291	mucky pool below; concrete apron	Substantial
WF008	292	Plastic Pipe		0	0	4	292	highly eroded, erosion problem	None
WF008	293	Plastic Pipe		0	0	6	293	eroded bank underneath	Moderate
WF008	294	Concrete Pipe				13	294	boulders below	None
WF008	295	Concrete Pipe		0	0	12	295	concrete apron	None
WF008	298	Plastic Pipe		0	0	4	298	swale above pipe, eroded bank below; erosion problem	None
WF008	299	Swale		4.5	0.67		299	drains yard	None
WF008	303	Plastic Pipe		0	0	4	303	erosion underneath	None
WF008	304	Plastic Pipe		0	0	4	304	erosion above and below, erosion problem	None
WF008	305	Plastic Pipe		0	0	4	305	erosion beneath, erosion problem	
WF008	306	Steel Pipe		0	0	4	306	concrete beneath; erosion problem	Trickle
WF008	307	Clay Pipe		0	0	4	307		None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
WF008	307	Plastic Pipe		0	0	4	307	severely eroded beneath, erosion problem	None
WF008	309	Concrete Pipe				25	309	cobble below, adjacent to bridge	None
WF008	309	Concrete Pipe		0	0	30	310	within bridge	Substantial
WF008	312	Concrete Pipe		0	0	30	312	just downstream of foot bridge, concrete blocks underneath	Trickle
WF009	321	Concrete Pipe		0	0	18	321	closed; eroded below	Trickle
WF009	316	Steel Pipe		0	0	8	316		None
WF009	317	Concrete Pipe				19	317	eroding underneath, erosion problem; concrete block placed below to protect bank	None
WF009	318	Concrete Pipe		0.5	1		318	pipe buried under tree, half filled with debris, wet inside; debris in swale leading from pipe to channel and erosion	None
WF009	320	Concrete Pipe		0	0	16	320	swale leading to stream; eroded below	Trickle
WF009	322	Concrete Pipe		0	0	36	322		Trickle
WF010	328	Swale		16.5	7.42		328	significant amounts of sediment in near toe	Trickle
WF010	334	Concrete Pipe		6	4		334	oval pipe underneath highway; rip rap underneath pipe to channel	Trickle
WF010	339	Swale		23.3	9.75		339	sediment recently deposited near toe	None
WF010	340	Plastic Pipe		0	0	6	340	wet inside; bank protected underneath with concrete	Trickle
WF010	341	Plastic Pipe		0	0	6	341	unable to measure, approximately 6" plastic pipe; severe erosion, erosion problem; swale leading to channel; see also photo 342	Trickle
WF011	344	Concrete Pipe		0	0	6	344	see also photo 343 (concrete conduit leading from pipes depicted in 344); cannot measure pipe diameter precisely due to presence of bars	None
WF011	344	Concrete Pipe		0	0	6	344	see also photo 343 (concrete conduit leading from pipes depicted in 344); cannot measure pipe diameter precisely due to presence of bars	None
WF011	344	Concrete Pipe		0	0	18	344	see also photo 343 (concrete conduit leading from pipes depicted in 344); cannot measure pipe diameter precisely due to presence of bars	None
WF011	344	Concrete Pipe		0	0	18	344	see also photo 343 (concrete conduit leading from pipes depicted in 344); cannot measure pipe diameter precisely due to presence of bars	None
WF011	348	Concrete Pipe				13	348	surrounded by rip rap	None
WF012	367	Swale		15.7	5.25		367	accumulation of dead leaves in swale	None
WF012	362	Steel Pipe		0	0	3	362		None
WF012	365	Plastic Pipe				4	365	soil eroding around pipe	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
WF012	370	Concrete Pipe		2.5	1.92		370	gravel below pipe	Trickle
WF012	371	Swale		15.3	5.42		371	woody debris inside swale	None
WF012	366	Tributary		28.5	8.08		366	debris accumulating within tributary; many ducks on top of bank nearby	Trickle
WF012	369	Concrete Pipe		0	0	24	369	severely eroded underneath both pipes depicted in this photo	None
WF012	369	Concrete Pipe		0	0	24	369	severely eroded underneath both pipes depicted in this photo	None
WF012	102	Swale		13.3	5		102	eroding banks	None
WF012	103	Swale		15	15.5		103	woody debris in swale	None
WF012	15	Plastic Pipe				12	15		None
WF012	15	Concrete Pipe		0	0	24	15	gravel below pipe	Trickle
WF012	16	Swale		15.3	5.42		16	woody debris within swale	None
WF013	38	Steel Pipe		0	0	18	20	unable to measure. source WWTP detention basin	Trickle
WF013	21	Swale	1.5	10.8	5		21	vegetated with cattails	None
WF013	23	Swale	1.5	9.83	5.67		23		None
WF013	24	Swale	2	19.5	7.75		24	sediment accumulating where swale reaches the west fork; eroded bank within swale; source: 94	None
WF013	28	Swale	2	9.5	7.67		28	severely eroded banks; source: 94	Trickle
WF013	30	Swale	3.25	20.6	9.33		30	source: 94	None
WF013	31	Swale	1.08	9	7		31	severely eroded; source: 94	Trickle
WF013	32	Steel Pipe		0	0	18	32	some erosion occurring below pipe; damp inside pipe; source: pond	None
WF013	38	Steel Pipe		0	0	18	38	unable to measure. source WWTP detention basin	None
WF014	36	Swale	2.25	10.3	7.67		36	severely eroded; source: 94	Trickle
WF014	38	Swale	1.5	3.83	2		38	moderate erosion within swale	None
WF014	39	Plastic Pipe		0	0	6	39		Moderate
WF014	40	Concrete Pipe				19	40	concrete apron broken; eroding above pipe	Trickle
WF014	41	Concrete Pipe				18	41		Trickle
WF014	42	Plastic Pipe		0	0	12	2	eroded above pipe; concrete apron, cobble surrounding pipe	None
WF014	43	Concrete Pipe		3	1.5		43	broken concrete below pipe	Trickle
WF014	44	Concrete Pipe				24	44	cobble below pipe	Trickle
WF014	45	Concrete Pipe				16	45	cobble below pipe and erosion occurring above pipe	Trickle
WF014	47	Concrete Pipe		0	0	48	47	severely eroded area across bank from pipe; midstream bar immediately downstream from pipe; algae on water surface	Trickle

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
WF014	50	Concrete Pipe		3	1.5		50	erosion occurring above pipe; cannot determine whether water is flowing from pipe	None
WF015	55	Concrete Pipe		0	0	30	55		None
WF015	57	Swale	2	3	0.83		57		None
WF015	59	Concrete Pipe		0	0	48	59		Moderate
WF015	60	Steel Pipe		0	0	12	60	broken, rusty with boulders underneath	Trickle
WF015	62	Concrete Pipe		0	0	24	62	closed	Trickle
WF015				0	0			various discharge points within detention basins downstream from reach	
WF016	64	Steel Pipe		0	0	12	64	eroding below pipe and creating swale; some cobble near pipe to protect bank	Moderate
WF016	66	Swale	0.83	4.83	6.17		66	near Highway 94	None
WF016	68	Steel Pipe		0	0	19	68	swale from pipe to channel; erosion occurring within swale; near Highway 94	None
WF016	70	Concrete Pipe		0	0	24	70	concrete apron; some erosion occurring underneath apron	Trickle
WF016	72	Concrete Pipe		0	0	21	72	erosion occurring below and under concrete apron	None
WF016	74	Steel Pipe		0	0	24	74	severe erosion	None
WF016	75	Concrete Pipe		0	0	~48	75	unable to measure (on other side of fence draining Highway 94); creating swale that leads to channel	Trickle
WF016	77	Swale	3	5.5	2.5		77	vegetated; sediment accumulating where swale meets channel	None
WF016	78	Clay Pipe		0	0	8	78	bank eroding underneath pipe; tree roots exposed	None
WF016	79	Swale	1.67	3.25	1.67		79	eroding near channel	None
WF016	80	Swale	3.83	18.8	6.75		80	source is a culvert (about 4' in diameter) that can't be accessed to measure; near Highway 94; some erosion occurring within swale	Moderate
WF016	81	Swale	2.83	10.3	4.33		81	source: Highway 94	Trickle
WF016	82	Swale	1.08	9.33	3.08		82	source: Highway 94; some erosion	Trickle
WF017	86	Concrete Pipe		0	0	9	86	cobble underneath; strawbales; source: detention pond	None
WF017	87	Concrete Pipe		0	0	6	87	multiple strawbales; created swale leading down to stream	None
WF017	88	Swale	4	33.8	7.67		88	concrete pipe under highway 94, unable to measure pipe; creating swale to channel	Moderate
WF017	91	Swale	5.25	18.3	4		91	debris in swale	None
WF017	92	Swale	2.5	10.6	3.33		92	debris (leaves and branches) in swale; source: highway 94	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
WF017	93	Swale	1.67	8.25	2		93	source: highway 94; see also photo 94	Moderate
WF017	97	Tributary	8.67	22	5		97		Substantial
WF018	374	Swale	2.58	5.5	1.33		374	vegetated banks; no erosion	Substantial
WF018	375	Plastic Pipe		0	0	6	375	some erosion	Trickle
WF018	378	Clay Pipe		0	0	6	378	broken and partly underground; moderate erosion	Moderate
WF018	379	Steel Pipe		0	0	53	379	under Everett Road; source: detention pond	Moderate
WF019	2308	Plastic Pipe		0	0	4	2308	moderate bank erosion at outfall	None
WF019	2310	Plastic Pipe		0	0	4	2310	moderate bank erosion at outfall	None
WF019	2311	Plastic Pipe		0	0	4	2311	drains from south	None
WF019	2312	Plastic Pipe		0	0	4	2312	sump drain	None
WF019	2313	Tributary		10	2		2313	overflow from pond under bridge, drains pond to south	Trickle
WF019	2314	Steel Pipe		0	0	24	2314	culvert and swale draining West Course Drive	None
WF019	2319	Plastic Pipe		0	0	6	2319	drains from north	None
WF019	2320	Plastic Pipe		0	0	4	2320	drains from west	None
WF019	2323	Plastic Pipe		0	0	6	2323	no erosion	None
WF019	2328	Open Channel		10	2		2328	no erosion, drains from left bank	None
WF019	2328	Plastic Pipe		0	0	6	2328	drains from left (south) bank	None
MF001	114	Concrete Pipe		0	0	24	114	concrete apron broken, eroding around and above	Moderate
MF001	117	Plastic Pipe		0	0	5	117	source: residential	None
MF001	118	Plastic Pipe		0	0	5	118	source: residential; minor erosion	None
MF001	119	Concrete Pipe		0	0	19	119	unsure of flow; water level same as stream	Other
MF001	120	Concrete Pipe		0	0	41	120	erosion surrounding	Moderate
MF001	121	Clay Pipe		0	0	6	121		None
MF001	122	Concrete Pipe		0		12	122	unsure of flow; water same level as stream	Other
MF001	123	Concrete Pipe		0	0	12	123	unsure of flow; water level same as stream	Other
MF001	124	Concrete Pipe		0	0	9	124	unsure of flow; water level same as stream	Other
MF001	125	Concrete Pipe		0	0	21	125	eroded around pipe; unsure of flow due to high water level	Other
MF001	126	Concrete Pipe		0	0	12	126	eroded above pipe; unsure of flow due to high water level	Other
MF001	128	Tributary	2.5	13	7.25		128	right bank eroded; accumulation of dead leaves	Substantial
MF002	132	Swale	1.92	9.75	1.67		132	vegetated with garlic mustard	None
MF002	133	Clay Pipe		0	0	6	133		None
MF002	134	Steel Pipe		0	0	7	134	pipe filled with sediment	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
MF002	134	Steel Pipe		0	0	6	134	pipe mostly filled with sediment	None
MF002	134	Steel Pipe		0	0	23	134	broken concrete apron; pipe filled with sediment	None
MF002	135	Steel Pipe		0	0	48	135	unsure of flow; water level same as stream	Other
MF002	136	Plastic Pipe		0	0	4	136	eroded above and below pipe	None
MF002	138	Concrete Pipe		0	0	19	138	eroded soil around pipe	Moderate
MF002	139	Concrete Pipe		0	0	12	139	eroded above pipe; filled with sediment	None
MF002	141	Concrete Pipe		0	0	12	141	eroded below pipe	down
MF002	142	Swale	4	19.3	3.17		142	wood chips in swale channel	None
MF002	143	Steel Pipe		0	0	4	143	eroded soil around pipe	None
MF002	144	Concrete Pipe		0	0	18	144		Trickle
MF002	145	Plastic Pipe		0	0	4	145		None
MF002	146	Plastic Pipe		0	0	4	146	eroded below pipe	None
MF002	147	Swale	0.58	5.5	2		147	woody debris accumulating within swale	None
MF002	148	Concrete Pipe		0	0	27	148	concrete apron; some erosion; mulch on upstream bank near pipe; 1/4 of pipe filled with water	None
MF002	150	Concrete Pipe		0	0	48	150	soil eroded surrounding pipe; less than 1/4 of pipe filled with water	None
MF003	154	Steel Pipe		0	0	4	154	eroded below pipe; source: residential	Trickle
MF003	157	Plastic Pipe		0	0	4	157	some erosion below pipe; source: residential	None
MF003	158	Plastic Pipe		0	0	4	158	some erosion below pipe, tree roots exposed; source: residential	None
MF003	159	Plastic Pipe		0	0	4	159	source: residential	None
MF003	160	Concrete Pipe		0	0	36	160	storm drain with concrete apron	Trickle
MF003	162	Plastic Pipe		0	0	4	162	adjacent to a plastic pipe (less than 4 inches in diameter), which is eroding soil and exposing roots; source: residential	None
MF003	163	Clay Pipe		0	0	4	163	source: residential	None
MF003	165	Clay Pipe		0	0	4	165	eroding soil below pipe, tree roots exposed; source: residential	None
MF003	166	Plastic Pipe		0	0	4	166	some erosion on bank below pipe; source: residential	Trickle
MF003	166	Plastic Pipe		0	0	4	166	some erosion on bank below pipe; source: residential	None
MF003	167	Plastic Pipe		0	0	6	167	source: residential	Trickle
MF003	168	Plastic Pipe		0	0	6	167	some erosion below pipe; source: residential	None
MF003	169	Clay Pipe		0	0	4	169	pipe filled with sediment; source: residential	None
MF003	170	Plastic Pipe		0	0	6	170	source: residential	None
MF003	170	Plastic Pipe		0	0	6	170	source: residential	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
MF003	171	Clay Pipe		0	0	4	171	broken pipe; source: residential	None
MF003	172	Concrete Pipe		0	0	29	172	storm drain; pool below; water level in pipe same as stream	None
MF003	381	Concrete Pipe		0	0	36	381	storm drain; pipe has been broken (dislocated)	Trickle
MF003	382	Swale	1.75	8	3.42		382		None
MF003	385	Concrete Pipe		0	0	16	385	concrete apron	Trickle
MF003	386	Plastic Pipe		0	0	24	386		None
MF004	389	Steel Pipe		0	0	12	389	source: Deerfield Road	None
MF004	391	Clay Pipe		0	0	6	391	some erosion below pipe	None
MF004	392	Plastic Pipe		0	0	4	392	concrete blocks below pipe; source: residential	Trickle
MF004	393	Steel Pipe		0	0	10	393	pipe rusted; eroded soil surrounding pipe; source: residential	None
MF004	394	Swale	1	6	1.17		394	source: residential	None
MF004	396	Swale	3	10.5	2.33		396	woody debris accumulating within swale	None
MF004	397	Plastic Pipe		0	0	6	397	swale above and below pipe; source: residential	None
MF004	399	Concrete Pipe		0	0	12	399	cobble below and above pipe; some erosion occurring near pipe, mesh stabilizing bank on either side of pipe and eroding soil underneath mesh on the downstream end; storm drain	Trickle
MF004	400	Swale	1.33	5	2.25		400	eroding banks near pipe, especially near toe	None
MF004	402	Plastic Pipe		0	0	4	402	closed pipe	None
MF004	404	Steel Pipe		0	0	25	404	source: residential	Trickle
MF004	405	Concrete Pipe		0	0	30	405	source: residential road	Trickle
MF004	406	Plastic Pipe		0	0	10	406	A-jacks below pipe; source: residential road	None
MF004	408	Concrete Pipe		0	0	36	408	moderate erosion surrounding pipe, sediment accumulating within channel; storm drain with concrete apron	Trickle
MF004	409	Steel Pipe		0	0	17	409	severe erosion surrounding rusty and broken pipe; source: residential road	None
MF004	410	Plastic Pipe		0	0	10	410	some erosion below pipe; source: residential road	Trickle
MF004	411	Plastic Pipe		0	0	4	411	erosion below pipe; source: residential	Trickle
MF004	412	Plastic Pipe		0	0	4	412	eroded below pipe; source: residential	Trickle
MF005	5002	Swale	1.67	9	4.5		5002	cobble within swale channel; right bank of swale eroding despite mesh protection	Trickle
MF005	5003	Steel Pipe		0	0	12	5003	erosion underneath pipe; source: residential	None
MF005	5004	Plastic Pipe		0	0	4	5004	small swale leading from pipe to channel; source: residential	None
MF005	5005	Swale	2.83	8.67	2.75		5005	some debris within swale	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
MF005	5008	Plastic Pipe		0	0	6	5008	lawn clippings dumped above pipe; source: residential	None
MF005	5009	Plastic Pipe		0	0	4	5009	some erosion below; source: residential	None
MF005	5010	Plastic Pipe		0	0	4	5010	small swale leading from pipe to channel; source: residential	None
MF005	5011	Concrete Pipe		0	0	36	5011	storm drain with concrete apron	None
MF005	5012	Concrete Pipe		0	0	12	5012	cobble and small swale above pipe	None
MF005	5013	Concrete Pipe		0	0	48	5013	A-jacks downstream from pipe; storm drain	Moderate
MF005	5014	Discharge Point		2	3		5014	no pipe structure present, only a hole with mesh above and cobble below	None
MF005	5015	Steel Pipe		0	0	30	5015	opposite bank eroded; 1/3 of pipe filled with water	None
MF005	5017	Steel Pipe		0	0	6	5017	somewhat eroded below pipe; source: residential	None
MF005	5018	Swale	0.92	8	2.25		5018	moderately eroded; woody debris within swale	None
MF005	5019	Swale	0.83	8	1.75		5019	woody debris within swale	None
MF005	5020	Steel Pipe		0	0	36	5020	opposite bank eroded; 3/4 of pipe filled with water; storm drain	None
MF005	5021	Concrete Pipe		0	0	12	5021	severely eroded bank above pipe	None
MF005	5022	Swale	1.38	12.8	5		5022	woody debris within swale	None
MF005	5023	Plastic Pipe		0	0	4	5023	somewhat eroded below pipe	None
MF005	5024	Swale	1.42	4.5	1.75		5024	severely eroded banks within swale	None
MF005	5025	Swale	1.5	7.5	2.33		5025	somewhat eroded within swale	None
MF006	417	Concrete Pipe		0	0	21	417	storm drain near Woodgale Ave.; 1/4 of pipe filled with water	None
MF006	418	Swale	1.75	14	6.42		418	soil somewhat eroded around pipe	None
MF006	419	Swale	1.75	12.6	3.83		419	woody debris within swale, some erosion	None
MF006	420	Swale	2	13.5	5.33		420	banks severely eroded within swale	None
MF006	421	Concrete Pipe		0	0	24	421	concrete apron below and burlap mesh downstream from pipe	Trickle
MF006	423	Steel Pipe		0	0	6	423	small swale leading to channel	None
MF006	424	Concrete Pipe		0	0	36	424	soil eroding around pipe and on opposite bank; somewhat filled with water	None
MF006	426	Swale	1.25	14.5	4		426	deer run within swale, some erosion	None
MF006	427	Plastic Pipe		0	0	8	427	swale leading from pipe to channel	None
MF006	428	Swale	1.75	12	4.75		428	deer run within swale	None
MF006	429	Steel Pipe		0	0	9	429	rusted, broken pipe; bank severely eroded surrounding pipe	None
MF006	430	Concrete Pipe		0	0	12	430	bank severely eroded underneath pipe; burlap mesh and tree revetments near pipe	Trickle
MF006	433	Plastic Pipe		0	0	8	433	swale leading from pipe to channel	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
MF006	434	Steel Pipe		0	0	10	434	1/2 of pipe filled with sediment	None
MF006	435	Swale	1.5	13.5	5		435		None
MF006	436	Concrete Pipe		0	0	14	436	cobble and boulders above and below pipe	None
MF006	437	Tributary	4.75	12	5		437	severely eroded	Moderate
MF007	440	Swale	2.5	19	6.67		440		None
MF007	441	Concrete Pipe		0	0	13	441	boulders and cobble beneath and concrete above pipe	None
MF007	445	Swale	1.58	12.6	3.25		445		None
MF007	444	Concrete Pipe		0	0	12	444	cobble above and below pipe	none
MF007	442	Concrete Pipe		0	0	12	442	boulders above and cobble below	Moderate
MF007	446	Plastic Pipe		0	0	4	446	cap on opening of pipe with 1/2-inch holes	None
MF007	447	Plastic Pipe		0	0	6	447		None
MF007	448	Tributary	8.33	33.8	6.42		448	moderately eroding banks; water level in tributary same as that in stream, but does not appear to be flowing into stream	None
MF007	450	Concrete Pipe		0	0	24	450	concrete apron; source: Deerfield High School	None
MF007	452	Steel Pipe		0	0	26	452	cobble below pipe and some erosion near channel; small swale from pipe to stream channel	None
MF007	454	Concrete Pipe		0	0	72	454	two circular, concrete culverts depicted in photo 454; swale/tributary on other side of culverts; some erosion occurring around culverts	Moderate
MF007	454	Concrete Pipe		0	0	72	454	two circular, concrete culverts depicted in photo 454; swale/tributary on other side of culverts; some erosion occurring around culverts	Moderate
MF007	455	Tributary	10.33	40.8	8.42		455	severe erosion; several fallen trees span tributary	Moderate
MF007	457	Concrete Pipe		0	0	72	457	three circular, concrete culverts depicted in photo 457; tributary on other side of culverts; some erosion occurring along swale leading from culverts to stream channel	None
MF007	457	Concrete Pipe			0		457	three circular, concrete culverts depicted in photo 457; tributary on other side of culverts; some erosion occurring along swale leading from culverts to stream channel	None
MF007	457	Concrete Pipe		0	0	72	457	three circular, concrete culverts depicted in photo 457; tributary on other side of culverts; some erosion occurring along swale leading from culverts to stream channel	None
MF007	458	Swale	2.58	16.8	5		458	some erosion occurring within swale	None
MF007	459	Concrete Pipe		0	0	24	459	boulders and cement above pipe; water level in pipe same as that of the stream	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
MF008	464	Swale	1	15.5	4.67		464	some erosion, small amount of sediment accumulating near channel	None
MF008	465	Concrete Pipe		0	0	24	465	swale above pipe, erosion occurring on either side of pipe; source: corporate campus	Moderate
MF008	466	Swale	4	12.2	3		466	moderate erosion	None
MF008	467	Concrete Pipe		0	0	52	467	two concrete culverts depicted in photo 467; erosion occurring near channel; boulders below culverts; source: corporate campus	None
MF008	467	Concrete Pipe		0	0	52	467	two concrete culverts depicted in photo 467; erosion occurring near channel; boulders below culverts; source: corporate campus	None
MF008	467	Concrete Pipe		0	0	12	467	water level in pipe same as that of stream; source: corporate campus	None
MF008	468	Concrete Pipe		0	0	12	468	cobble and boulders below; source: wetland water control structure	None
MF008	469	Plastic Pipe		0	0	12	469	cobble below and upstream from pipe; source: Prairie Wolf Slough	None
MF009	472	Concrete Pipe		0	0	24	472	within old bridge structure (the part of the structure that likely will be removed during current construction); source: Half Day Road	Trickle
MF009	477	Steel Pipe		0	0	4	477	buried pipe, concrete blocks above and swale below leading from pipe to channel; source: residential	None
MF009	478	Concrete Pipe		0	0	36	478	pipe within detention basin	None
MF009	479	Concrete Pipe		0	0	72	479	pipe within detention basin; some water within pipe	None
MF009	481	Swale	2.75	9.25	2.67		481	some erosion within swale; source: residential	None
MF009	482	Concrete Pipe		0	0	36	482	sediment inside pipe; erosion above and sediment accumulating below pipe	Trickle
MF009	484	Tributary	3	27	8.17		484		None
MF009	485	Steel Pipe		0	0	9	485	erosion surrounding pipe, broken concrete blocks above pipe; pipe under water	None
MF009	486	Swale	2.5	18.8	4.58		486	deer path; some erosion occurring within swale	None
MF009	487	Swale	0.67	13.5	3.42		487	source: residential	None
MF010	490	Plastic Pipe		0	0	8	490	small swale from pipe to channel, some erosion; source: residential	None
MF010	491	Concrete Pipe		0	0	36	491	some sedimentation downstream from pipe; pool below concrete apron; source: storm drain	Trickle
MF010	492	Plastic Pipe		0	0	4	492	source: residential	None
MF010	493	Plastic Pipe		0	0	8	493	grass clippings above pipe resulting in erosion and sedimentation; source: residential	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
MF010	494	Clay Pipe		0	0	6	494	swale above and below pipe; source: residential	None
MF010	496	Plastic Pipe		0	0	6	496	highly eroded, swale above pipe; source: residential	Trickle
MF010	498	Swale	0.83	4	2		498	sediment accumulating near channel; source: residential	None
MF010	499	Swale	0.75	8.67	4.58		499	some erosion occurring within swale; source: Prairie Wolf Forest Preserve	None
MF010	500	Steel Pipe		0	0	8	500	extends out into channel; source: residential (right side of photo)	None
MF010	500	Concrete Pipe		0	0	42	500	pool below pipe; storm drain (left side of photo)	None
MF010	501	Plastic Pipe		0	0	12	501	some erosion below pipe; source: Prairie Wolf Forest Preserve	None
MF010	503	Plastic Pipe		0	0	8	503	some erosion around pipe; source: Prairie Wolf Forest Preserve	None
MF010	504	Steel Pipe		0	0	18	504	source: Prairie Wolf Forest Preserve	None
MF011	511	Swale	1.67	6.42	4.38		511	moderately eroded; source: forest preserve	None
MF011	510	Clay Pipe		0	0	12	510	swale leading from pipe to channel; source: forest preserve	None
MF011	513	Clay Pipe		0	0	8	513	severely eroded swale leading to channel	None
MF011	514	Concrete Pipe		0	0	21	514	concrete blocks below pipe; storm drain	Moderate
MF011	518	Swale	2	11.3	3.83		518	source: forest preserve	None
MF011	520	Swale	1.33	7.83	2.33		520	some erosion, sediment accumulating near channel; source: forest preserve	None
MF011	521	Swale	4.25	8.5	4.67		521	sediment accumulating near channel; woody debris within swale; source: forest preserve	None
MF012	526	Concrete Pipe		0	0	24	526	severely eroded downstream from pipe; 1/4 filled with water; storm drain	None
MF012	527	Concrete Pipe		0	0	48	527	sediment accumulating downstream from pipe; pool below concrete apron; storm drain	None
MF012	529	Concrete Pipe		0	0	12	529	eroded bank and pool below pipe	Trickle
MF012	530	Steel Pipe		0	0	4	530		None
MF012	532	Steel Pipe		0	0	8	532	concrete blocks below pipe; some erosion occurring; near Old Elm Road	None
MF012	533	Concrete Pipe		0	0	18	533	filled with water; near Old Elm Road	None
MF012	535	Steel Pipe		0	0	8	535	swale below; pipe rusted with holes; source: residential	None
MF012	536	Steel Pipe		0	0	8	536	near Old Elm Road	None
MF012	537	Plastic Pipe		0	0	6	537	small swale below pipe; some erosion occurring; source: residential	None
MF012	538	Concrete Pipe		0	0	24	538	swale below and woody debris above pipe; 1/2 filled with sediment	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
MF012	539	Concrete Pipe		0	0	4	539	small swale below pipe; source: residential	None
MF012	540	Steel Pipe		0	0	5	540		None
MF012	541	Steel Pipe		0	0	12	541	within bridge at Everett Road	None
MF012	542	Steel Pipe		0	0	12	542	within bridge at Everett Road	None
MF012	544	Concrete Pipe		0	0	60	544	pool below; within bridge at Everett Road	Moderate
MF012	543	Concrete Pipe		0	0	48	543	pool below; within bridge at Everett Road	Trickle
MF012	546	Concrete Pipe		0		20	546	eroded below pipe; broken	Trickle
MF013	549	Steel Pipe		0	0	8	549	severe erosion above	None
MF013	550	Clay Pipe		0	0	4	550	large swale leading from pipe to stream, moderate erosion; severe erosion above pipe	None
MF013	551	Steel Pipe		0	0	8	551	erosion below	None
MF013	553	Steel Pipe		0	0	8	553	eroded below	None
MF013	893	Swale	0.75	4.83	1.75		893	moderately eroded banks	None
MF013	894	Swale	2.25	11.3	3.5		894	swale from old broken steel pipe; severely eroding banks	None
MF013	896	Clay Pipe		0	0	6	896	swale leading from pipe to channel; pipe may be disconnected from source of water	None
MF013	897	Concrete Pipe		0	0	18	897	erosion occurring on bank upstream and downstream from pipe; source: detention ponds	Moderate
MF013	898	Swale	1.67	25.8	7.92		898	severely eroding banks	Moderate
MF013	899	Concrete Pipe		0	0	14	899	large swale above pipe; sedimentation occurring within channel, water flowing between apron and pipe (concrete apron has broken away from pipe)	Moderate
MF013	900	Swale	1.67	12	3.42		900		None
MF013	901	Clay Pipe		0	0	10	901	small swale leading from pipe to stream	None
MF013	902	Swale	1.75	15.3	4.75		902	some debris and erosion within swale	None
MF013	903	Steel Pipe		0	0	18	903	eroding bank around pipe	None
MF014	908	Concrete Pipe		0	0	28	908	concrete apron broken; boulders below pipe; erosion occurring around pipe despite mesh	None
MF014	909	Clay Pipe		0	0	12	909	swale leading to channel; sediment accumulating within channel below pipe	None
MF014	910	Swale	2.25	14.8	4.75		910	moderately eroded	None
MF014	913	Concrete Pipe		0	0	12	910	cobble surrounding pipe, swale leading to channel	Trickle
MF014	914	Concrete Pipe		0	0	19	914	erosion downstream from pipe	None
MF014	562	Concrete Pipe		0	0	4	562	small swale above pipe	None
MF014	559	Plastic Pipe		0	0	4	559	cobble below pipe and leading to channel	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
MF014	559	Plastic Pipe		0	0	4	559	cobble below and leading to channel	None
MF014	559	Clay Pipe		0	0	12	559	cobble below and leading to channel	
MF014	560	Clay Pipe		0	0	4	560	erosion above and sediment accumulating below	None
MF014	561	Swale	2	13.5	3.75		561	moderately eroding banks	None
MF015	564	Steel Pipe		0	0	19	564	within bridge at Westleigh Road; small swale leading to channel	Trickle
MF015	569	Concrete Pipe		0	0	15	569	within bridge at Westleigh Road	Trickle
MF015	568	Concrete Pipe		0	0	15	568		None
MF015	567	Steel Pipe		0	0	18	567	small swale leading to channel	None
MF015	572	Concrete Pipe		0	0	18	572	closed pipe with concrete apron; boulders and gravel in channel near pipe; some erosion surrounding pipe	Trickle
MF015	574	Plastic Pipe		0	0	6	574	sediment accumulating in channel, small swale leading to pipe	None
MF015	575	Steel Pipe		0	0	6	575	severely eroded bank	None
MF015	575	Steel Pipe		0	0	20	575	pool below, eroded bank downstream from pipe	None
MF015	576	Steel Pipe		0	0	12	576	rusted pipe with hole in bottom; some erosion	None
MF015	577	Swale	1.42	10.9	4.17		577	moderately eroded	None
MF015	578	Concrete Pipe		0	0	12	578	closed pipe with concrete apron; boulders at toe; cobble below apron	None
MF015	580	Concrete Pipe		0	0	16	580		Trickle
MF015	581	Concrete Pipe		0	0	16	581		Trickle
MF015	582	Concrete Pipe		0	0	18	582	pipe on right in photo 582; concrete apron; rip rap surrounding pipe	Trickle
MF015	582	Concrete Pipe		0	0	18	582	pipe on left in photo 582; concrete apron; rip rap surrounding pipe	None
MF015	583	Concrete Pipe		0	0	24	583	concrete apron broken; severe erosion surrounding pipe	Trickle
MF016	589	Concrete Pipe		0	0	14	589	source: Lake Forest High School; cobble below, bubbles forming and water slightly foamy	Moderate
MF016	590	Concrete Pipe		0	0	14	590	cobble below pipe and lead to stream	Trickle
MF016	593	Swale	1.83	11	5.67		593	severely eroded	None
MF016	594	Concrete Pipe		0	0	36	594	some erosion	None
MF016	596	Steel Pipe		0	0	15	596	eroding bank below	Trickle
MF016	597	Concrete Pipe		0	0	36	597	concrete apron coming away from pipe; pool below pipe	Moderate
MF017	600	Concrete Pipe		0	0	4	600	hidden among vegetation	Trickle
MF017	601	Steel Pipe		0	0	24	601	hidden among vegetation	None
MF017	603	Steel Pipe		0	0	12	603	some erosion below; source: Forest Preserve	None
MF017	605	Steel Pipe		0	0	12	605	erosion above and below	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
MF017	608	Concrete Pipe		0	0	13	608	1/4 filled with water	None
MF017	611	Plastic Pipe		0	0	24	611	cobble leading to channel, some sedimentation near toe	None
MF017	612	Steel Pipe		0	0	8	612	1/4 filled up with water	None
MF017	613	Steel Pipe		0	0	12	613	1/2 filled with sediment	None
MF018	625	Plastic Pipe		0	0	16	625	erosion; sediment accumulating near channel	None
MF018	626	Plastic Pipe		0	0	4	626	some erosion; small swale leading from pipe to channel	None
MF018	627	Plastic Pipe		0	0	4	627	gravel below and some sedimentation	None
MF018	631	Concrete Pipe		0	0	42	631	pool below apron	None
MF018	616	Swale	11.5	16	3.33		616	some erosion; tree roots exposed	None
MF018	618	Concrete Pipe		0	0	12	618	some erosion on either side of pipe	None
MF018	619	Concrete Pipe		0	0	30	619	some water within pipe; pool of water below concrete apron	None
MF018	620	Clay Pipe		0	0	4	620	more than 1/2 filled with sediment; small swale leading to channel; some erosion	None
MF018	621	Plastic Pipe		0	0	16	621	cobble leading to channel; moderate erosion near toe of channel	None
MF018	621	Plastic Pipe				16	621	cobble leading to channel; moderate erosion near toe of channel	None
MF018	622	Plastic Pipe		0	0	8	622	lawn clippings and broken concrete above pipe	None
MF018	624	Steel Pipe		0	0	6	624	some erosion	None
MF018	625	Plastic Pipe		0	0	6	625	erosion; sediment accumulating near channel	None
MF018	625	Plastic Pipe		0	0	16	625	erosion; sediment accumulating near channel	None
MF018	621	Plastic Pipe		0	0	16	621	cobble leading to channel; moderate erosion near toe of channel	None
MF019	646	Steel Pipe		0	0	10	646		None
MF019	643	Plastic Pipe		0	0	16	643		None
MF019	637	Plastic Pipe		0	0	16	637		None
MF019	637	Plastic Pipe		0	0	16	637		None
MF019	637	Plastic Pipe		0	0	16	637		None
MF019	638	Clay Pipe		0	0	14	638	mostly filled with sediment	None
MF019	639	Swale	2	3.75	1.17		639	vegetated swale	None
MF019	640	Concrete Pipe		0	0	24	640	small swale from pipe to channel	Trickle
MF019	641	Steel Pipe		0	0	12	641	mostly filled with sediment	None
MF019	642	Concrete Pipe		0	0	18	642	sediment and vegetation inside pipe; some bank erosion upstream and downstream from pipe	None
MF019	645	Clay Pipe		0	0	12	645	concrete blocks above and below	None
MF019	643	Plastic Pipe		0	0	16	643		None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
MF019	643	Plastic Pipe		0	0	16	643		None
MF020	651	Tributary	8	20	2.17		651	cobble and boulders near channel; some erosion	None
MF020	652	Plastic Pipe		0	0	15	652	boulders lead to channel from pipe; pipe underneath trail	None
MF020	654	Steel Pipe		0	0	24	654	1/2 filled with sediment; small swale leading to channel; erosion surrounding pipe	None
MF020	655	Swale	1.33	9	3.25		655	moderate erosion	None
MF020	657	Steel Pipe		0	0	24	657	severely eroded	None
MF020	659	Plastic Pipe		0	0	8	659	some erosion; small swale to stream	None
MF020	660	Swale	1.25	8.5	2.75		660		None
MF020	662	Plastic Pipe		0	0	15	662	cobble to stream; pipe goes underneath trail	None
MF020	663	Concrete Pipe		0	0	18	663	large swale to channel; some erosion	None
MF020	664	Plastic Pipe		0	0	18	664	pool below; erosion around pipe	Trickle
MF020	665	Concrete Pipe		0	0	30	665	under trail; large swale leads to channel; some erosion	None
MF021	676	Concrete Pipe		0	0	42	676	concrete apron broken (apron has fallen away from pipe); soil eroding where water flows from pipe; pool below	Moderate
MF022	680	Swale	2	12.5	4.5		680	strong organic smell within swale; moderate erosion, tree roots exposed	Moderate
MF022	681	Steel Pipe		0	0	18	681	broken pipe; erosion occurring above pipe	Trickle
MF022	684	Swale	4.25	11.6	3		684	gravel within swale channel, some erosion	None
MF022	687	Swale	2	8.5	1.75		687	some erosion occurring; source: railroad tracks	None
MF022	689	Concrete Pipe		0	0	36	689	within bridge	Trickle
MF022	690	Concrete Pipe		0	0	27	690	within bridge	Trickle
MF023	694	Steel Pipe		0	0	12	694	1/2 filled with sediment	None
MF023	696	Steel Pipe		0	0	12	696	broken; eroded soil surrounding pipe	Moderate
MF023	698	Plastic Pipe		0	0	7	698	within bridge at railroad tracks	None
MF023	699	Plastic Pipe		0	0	7	699	within bridge at railroad tracks	None
MF023	700	Steel Pipe		0		36	700	sever erosion on opposite bank; boulders below; source: railroad yard	Moderate
MF024	705	Swale	3.33	14	5.5		705	eroding soil within swale; exposed tree roots	None
MF024	709	Steel Pipe		0	0	10	709	some erosion; wet inside pipe	None
MF025	916	Concrete Pipe		0	0	36	916	water level same as stream	None
MF025	712	Steel Pipe		0	0	16	712	small swale leading to channel; culvert under driveway parallel to river	None
MF025	716	Steel Pipe		0	0	36	716	pool below; concrete rip rap structure surrounding pipe; source: detention pond	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
MF025	717	Concrete Pipe		0	0	36	717	concrete rip rap structure below pipe; source: detention pond	Moderate
MF026	921	Steel Pipe		0	0	36	921	eroding above pipe; woody debris in channel; access road above pipe	None
MF027	931	Concrete Pipe		0	0	14	931	filled with water; source:137	None
MF028	2239	Open Channel		11	0.5		2239	minor erosion at outfall	None
MF028	2340	Open Channel		3	1		2340	minor erosion at bank	None
MF028	2345	Open Channel		6	1		2345	drains wetland from left bank (south)	Moderate
MF028	2347	Tributary		8	2		2347	drains pond from development to north	Moderate
MF029	2239	Plastic Pipe		0	0	4	2239	slightly crushed by downed tree	None
MF029	2240	Plastic Pipe		0	0	4	2240	minor bank erosion	None
MF029	2243	Open Channel		5.5	2.5		2243	drains Bradley Rd., moderate bank erosion	Moderate
MF029	2244	Plastic Pipe		0	0	4	2244	sump outfall	None
MF029	2247	Plastic Pipe		0	0	4	2247	sump outfall	None
MF030	2261	Open Channel		17	6		2261	drains from north, no erosion, unsure of source	None
MF030	2262	Open Channel		9.5	3		2262	no vegetation but low erosion	Trickle
MF030	2266	Steel Pipe		0	0	6	2266	drains IL 43 from north	None
MF030	2266	Steel Pipe		0	0	6	2266	drains IL 43 from north	None
MF030	2267	Steel Pipe		0	0	6	2267	drains IL 43 from south	None
MF030	2267	Steel Pipe		0	0	6	2267	drains IL 43 from south	None
MF031	2286	Open Channel		7	2.5		2286	drains woodland to north	None
MF031	2288	Open Channel		9	3		2288	drains woodland and detention pond to north	None
MF031	2289	Open Channel		10	2.5		2289	drains parking area to south (Sears facility)	None
MF031	2294	Concrete Pipe		0	0	24	2294	head of tributary, drains from west	Trickle
MF032	2281	Concrete Pipe		0	0	42	2281	source of tributary, drains detention pond upstream, eroding tributary banks downstream	Trickle
MF033	2302	Steel Pipe		0	0	6	2302	pipe is failing	None
MF033	2303	Concrete Pipe		0	0	12	2303	drains Sears parking area/grease and oil in water	None
MF033	2304	Concrete Pipe		0	0	18	2304	drains Sears parking area/grease and oil in water	None
MF034	2276	Plastic Pipe		0	0	18	2276	discharges from east	None
MF034	2276	Steel Pipe		0	0	60	2276	causing severe erosion downstream, head of tributary	Moderate
MR023	694	Steel Pipe		0	0	12	694	1/2 filled with sediment	None
MR023	696	Steel Pipe		0	0	18	696	broken; soil eroded surrounding pipe	Moderate
MR023	698	Plastic Pipe		0	0	7	698	within RR track bridge	None
MR023	699	Plastic Pipe		0	0	7	699	within RR track bridge	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
MR023	700	Steel Pipe		0	0	36	700	severe erosion up on opposite bank. source: RR yard. boulders below	Moderate
SR001	934	Concrete Pipe		0	0	18	934	swale leading from pipe to channel; some erosion occurring	None
SR001	935	Tributary	7	13.5	4		935	source: HWY 41	None
SR001	936	Steel Pipe		0	0	54	936	pool below; algae present	None
SR001	937	Swale	5	8	2		937	vegetated	None
SR001	938	Steel Pipe		0	0	18	938	unable to measure; source: sewage treatment plant detention basin	None
SR001	940	Concrete Pipe		0	0	72	940	lots of sediment and organic matter below; some erosion occurring; source: sewage treatment plant at Clavey Rd.	None
SR001	941	Concrete Pipe		0	0	36	941	large swale to channel; some erosion occurring; source: sewage treatment plant at Clavey Rd.	None
SR001	941	Concrete Pipe		0	0	72	941	large swale from pipe to channel; some erosion occurring; source: sewage treatment plant at Clavey Rd.	None
SR001	941	Concrete Pipe		0	0	10	941	source: sewage treatment plant at Clavey Rd.	None
SR001	944	Concrete Pipe		0	0	72	944	small swale leading to stream; source: sewage treatment at Clavey Rd.	None
SR001	947	Concrete Pipe		0	0	30	947	concrete blocks below; source: Clavey Rd.	
SR001	938	Steel Pipe		0	0	18	938	unable to measure; source: sewage treatment plant detention basin	None
SR002	952	Steel Pipe		0	0	12	952	underwater	None
SR002	953	Clay Pipe		0	0	12	953		None
SR002	956	Steel Pipe		0	0	18	956		None
SR002	961	Steel Pipe		0	0	30	961	closed	None
SR003	965	Steel Pipe		2	1.5		965	oval pipe; eroded soil surrounding pipe	None
SR003	966	Swale	2.42	26.5	9.92		966	high erosion, little vegetation	Moderate
SR003	968	Clay Pipe		0	0	10	968		None
SR003	969	Steel Pipe		0	0	36	969	1/2 filled with sediment	None
SR003	971	Tributary	8	31	9.25		971	log jam within tributary	None
SR003	973	Plastic Pipe		0	0	4	973	source: Bob-O-Link Golf Course	None
SR003	974	Plastic Pipe		0	0	6	974	source: Bob-O-Link Golf Course	None
SR003	975	Steel Pipe		0	0	12	975	source: Bob-O-Link Golf Course	None
SR003	977	Plastic Pipe		0	0	15	977	source: Bob-O-Link Golf Course; some erosion under plastic apron	Trickle
SR003	979	Plastic Pipe		0	0	16	979	source: Bob-O-Link Golf Course; erosion occurring below apron	
SR003	980	Plastic Pipe		0	0	4	980	source: Bob-O-Link Golf Course	None
SR003	981	Steel Pipe		0	0	7	981	some erosion occurring below pipe; source: Bob-O-Link Golf Course	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
SR003	985	Plastic Pipe		0	0	4	985	some erosion; source: Bob-O-Link Golf Course	None
SR003	986	Steel Pipe		0	0	6	986	erosion above and below pipe; bank sloughing above; source: Bob-O-Link Golf Course	None
SR003	988	Plastic Pipe		0	0	6	988	source: Bob-O-Link Golf Course	None
SR003	989	Plastic Pipe		0	0	10	989	closed with small 1.5" diameter holes; cobble under pipe; source: Bob-O-Link Golf Course	Trickle
SR003	983	Plastic Pipe		0		4	983	some erosion occurring; source: Bob-O-Link Golf Course	None
SR004	992	Steel Pipe		0	0	16	992	some erosion above and below pipe; source: Bob-O-Link Golf Course	None
SR004	992	Plastic Pipe		0	0	6	UP	some erosion above and below; source: Bob-O-Link Golf Course	None
SR004	994	Steel Pipe		0	0	6	994	erosion under pipe; source: Bob-O-Link Golf Course	None
SR004	996	Plastic Pipe		0	0	4	996	source: Bob-O-Link Golf Course	None
SR004	997	Clay Pipe		0	0	12	997	under bridge in photo 995; source: Bob-O-Link Golf Course	None
SR004	998	Clay Pipe		0	0	4	998	half of pipe filled with sediment; source: Bob-O-Link Golf Course	None
SR004	999	Plastic Pipe		0	0	15	999	erosion under plastic apron; source: Bob-O-Link Golf Course	None
SR004	1003	Swale	2	13	3.5		1003	moderate erosion; source: Bob-O-Link Golf Course (swale is between the two golf courses)	None
SR004	1004	Plastic Pipe		0	0	5	1004	some erosion; source: Sunset Valley Golf Course	Trickle
SR004	1006	Plastic Pipe		0	0	4	1006	sediment inside pipe; source: Sunset Valley Golf Course	None
SR004	1007	Steel Pipe		0	0	24	1007	source: Sunset Valley Golf Course	None
SR004	1008	Plastic Pipe		0	0	4	1008	source: Sunset Valley Golf Course	None
SR004	1010	Clay Pipe		0	0	6	1010	filled with sediment, broken: under bridge in photo 1009	None
SR004	1011	Plastic Pipe		0	0	6	1011	some erosion; source: Sunset Valley Golf Course	Trickle
SR004	1012	Plastic Pipe		0	0	8	1012	extends into channel; erosion downstream from pipe; source: Sunset Valley Golf Course	Trickle
SR004	1014	Steel Pipe		0	0	8	1014	eroded above; source: Sunset Valley Golf Course	None
SR004	1016	Plastic Pipe		0	0	4	1016	extends into channel; holes in bottom of pipe; source: Sunset Valley Golf Course	None
SR004	1017	Plastic Pipe		0	0	8	1017	extends into channel; swale and erosion above pipe; source: Sunset Valley Golf Course	None
SR004	1018	Plastic Pipe		0	0	4	1018	erosion occurring above pipe; source: Sunset Valley Golf Course	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
SR004	1019	Plastic Pipe		0	0	4	1019	some erosion; source: Sunset Valley Golf Course	None
SR005	1023	Steel Pipe		0	0	72	1023	large pool underneath pipe; source: Sunset Valley Golf Course	None
SR005	1024	Steel Pipe		1.75	1.17		1024	oval; source: Sunset Valley Golf Course	Substantial
SR005	1025	Plastic Pipe		0	0	4	1025	some erosion above; source: Sunset Valley Golf Course	None
SR005	1027	Steel Pipe		0	0	8	1027	source: Sunset Valley Golf Course	None
SR005	1028	Plastic Pipe		0	0	8	1028	filled with sediment; beehive inside; source: Sunset Valley Golf Course	None
SR005	1031	Plastic Pipe		0	0	4	1031	source: Sunset Valley Golf Course	None
SR005	1036	Clay Pipe		0	0	12	1036	broken; source: Sunset Valley Golf Course	None
SR005	1037	Plastic Pipe		0	0	6	1037	some erosion surrounding pipe; source: Sunset Valley Golf Course	None
SR005	1039	Plastic Pipe		0	0	4	1039	source: Sunset Valley Golf Course	None
SR005	1040	Plastic Pipe		0	0	6	1040	some sediment inside pipe; source: Sunset Valley Golf Course	Trickle
SR005	1042	Plastic Pipe		0	0	8	1042	eroded bank surrounding pipe; pipe extends into channel; source: Sunset Valley Golf Course	Moderate
SR006	1045	Concrete Pipe		0	0	24	1045	sediment accumulating below pipe; source: Sunset Valley Golf Course	Trickle
SR006	1046	Concrete Pipe		0	0	24	1046	sediment accumulating below and within pipe; source: Sunset Valley Golf Course	None
SR006	1049	Concrete Pipe		7.5	5		1049	oval; rip rap protecting banks upstream and downstream on opposite bank; storm drain; source: Sunset Valley Golf Course	None
SR006	1051	Concrete Pipe		0	0	18	1051	cobble below pipe; erosion above; source: pool parking lot	None
SR006	1052	Plastic Pipe		0	0	8	1052	bank eroded above pipe	None
SR006	1055	Concrete Pipe		0	0	36	1055	boulders below; stormdrain; source: Fredrickson Rd.	Moderate
SR006	1053	Clay Pipe		0	0	8	1053	swale above pipe	Trickle
SR007	1059	Concrete Pipe		8	3.5		1059	stormdrain (residential); swale from pipe to channel, concrete boulders underneath pipe and sediment inside	Trickle
SR007	1061	Concrete Pipe		0	0	54	1061	erosion on either side of pipe; pool below pipe; stormdrain (near HWY 41)	None
SR007	1063	Concrete Pipe		14	2		1063	box culvert under HWY 41; boulders and cobble from pipe to channel; swale from pipe to channel; moderate erosion surrounding pipe	Trickle
SR008	1068	Plastic Pipe		0	0	18	1068	eroded bank below	None
SR008	1068	Plastic Pipe		0	0	7	1068	eroded bank below	None
SR008	1069	Clay Pipe		0	0	10	1069	erosion surrounding concrete, pipe has broken and water is flowing behind concrete; concrete has cracked in 2 parts	Moderate

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
SR008	1070	Clay Pipe		0	0	12	1070	severe erosion; sedimentation occurring in swale that leads to channel	None
SR008	1071	Concrete Pipe		0	0	18	1071	erosion on both sides of pipe; pool below; source: 41	None
SR008	1073	Concrete Pipe		0	0	18	1073	broken; erosion occurring in small swale to channel; source: residential	None
SR008	1074	Concrete Pipe		0	0	16	1074	concrete apron broken away from pipe; swale to channel; moderate erosion; source: residential	None
SR008	1075	Concrete Pipe		0	0	16	1075	broken; small swale to stream; sedimentation occurring near toe	Trickle
SR008	1076	Concrete Pipe		0	0	16	1076	moderate erosion; swale to channel; source: residential	Trickle
SR008	1078	Concrete Pipe		0	0	36	1078	swale to channel; moderate erosion; source: residential	Trickle
SR008	1080	Steel Pipe		3.5	2.5		1080	oval pipe; swale to channel; broken concrete underneath pipe; sedimentation occurring; source: residential	Trickle
SR008	1082	Plastic Pipe		0	0	4	1082	extends into channel; cracked in middle; source: residential	None
SR008	1081	Concrete Pipe		6.5	2.5		1081	oval pipe; concrete blocks underneath; swale to channel; stormdrain	Trickle
SR009	1085	Concrete Pipe		3.83	5.42		1085	oval; mesh protection upstream from pipe; concrete blocks and pool below pipe; stormdrain (near Park Ave West)	Trickle
SR009	1086	Concrete Pipe		3.17	5		1086	oval; concrete blocks below; stormdrain	Trickle
SR009	1088	Clay Pipe		0	0	17	1088	erosion surrounding concrete structure; mesh on both sides; source: Highland Park Country Club	None
SR009	1091	Concrete Pipe		0	0	15	1091	minor erosion above; sedimentation below	Trickle
SR009	1093	Tributary	4	9.83	1.83		1093	erosion potential near channel; some boulders	Moderate
SR009	1096	Concrete Pipe		0	0	24	1096	sediment inside; erosion downstream and above pool; source: Highland Park Country Club	None
SR010	1101	Concrete Pipe		0	0	20	1101	some sedimentation below near toe. source: HPCC	None
SR011	1107	Steel Pipe		0	0	12	1107	swale to channel. source: Public Works parking lot	None
SR011	1108	Concrete Pipe		0	0	12	1108	some erosion. source: parking lot of Public Works building	Trickle
SR011	1110	Steel Pipe		0	0	18	1110	pool below. source: Public Works. Swale to stream, severe erosion	Trickle
SR011	1111	Concrete Pipe		0	0	36	1111	under Half Day Rd. bridge. pool below stormdrain	Trickle
SR011	1117	Steel Pipe		0	0	6	1117	silty water coming from source. significant erosion occurring. chlorine smell. source: pool.	Substantial

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
SR011	1118	Concrete Pipe		0	0	6	1118	source: stormdrain, large swale to stream channel. severe erosion (banks of swale covered with garlic mustard)	Moderate
SR011	1119	Steel Pipe		0	0	18	1119	pool below. some erosion. source: residential	Trickle
SR011	1113	Concrete Pipe		0	0	36	1113	under Half Day Rd. Bridge stormdrain. erosion occurring around pipe and below concrete apron.	None
SR011	1115	Concrete Pipe		0	0	24	115	steel door closes off pipe; some erosion occurring around pipe.	None
SR011	1113	Concrete Pipe		0	0	36	1113	under Half Day Rd. Bridge stormdrain. erosion occurring around pipe and below concrete apron.	None
SR012	1124	Steel Pipe		0	0	18	1124	pipe extends into channel, pool below, erosion surrounding pipe. source: residential	Trickle
SR012	1127	Steel Pipe		0	0	60	1127	large pool below stormdrain near Trail Way Rd.	None
SR012	1128	Concrete Pipe		0	0	60	1128	erosion on both sides and under concrete apron stormdrain. pool below. source: recreational	None
SR012	1130	Steel Pipe		0	0	10	1130	sediment inside erosion on opposite bank and surrounding pipe. source: recreational	None
SR012	1131	Steel Pipe		0	0	12	1131	erosion surrounding pipe. source: residential	None
SR012	1133	Steel Pipe		0	0	18	1133	pool below. erosion surrounding pipe. source: residential	Trickle
SR012	1134	Steel Pipe		0	0	1.25X1.75	1134	oval, rusted. pool below. some erosion. source: residential.	None
SR012	1135	Steel Pipe		0	0	18	1135	pool below. source: residential	None
SR013	1138	Steel Pipe		0	0	12	1138	extending into stream. source: residential	None
SR013	1139	Steel Pipe		0	0	3x4.5	1139	oval. sediment almost fills pipe. source: residential near Trail Way	None
SR013	1140	Concrete Pipe		0	0	3.58X5.5	1140	large pool below. apron. source: stormdrain near Trail Way/Centennial Park	None
SR013	1141	Steel Pipe		0	0	8	1141	small pool below; erosion near toe. source: recreational (near Centennial Park)	None
SR013	1142	Concrete Pipe		0		12	1142	small pool near toe. swale to stream channel. erosion above and below pipe. source: recreational (Danny Cunniff Park)	None
SR013	1143	Concrete Pipe		0	0	42	1143	gabions above. erosion apron. concrete boulders below. source: stormdrain from Danny Cunniff Park	None
SR013	1149	Swale	2.33	17.5	8.25		1149	severe erosion. source: golf course	None
SR014	1153	Clay Pipe		0	0	12	1153	small pool below. disconnected and eroding at point where dislocated. source: Danny Cunniff Park	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
SR014	1154	Swale	2.5	11.3	4.17		1154	severe erosion within swale. source: Old Elm Golf Course	None
SR014	1159	Steel Pipe		0	0	8	1159	severe erosion surrounding pipe. extends into channel. source: Danny Cunniff Park	None
SR014	1161	Clay Pipe		0	0	24	1161	filled with sediment	None
SR014	1162	Steel Pipe		0	0	2.92X1.58	1162	oval. rusted. severely eroded underneath pipe. pool below. source: Danny Cunniff Park	None
SR014	1165	Swale	1.67	8.08	2.5		1165	moderate erosion. rip rap near channel. source: Old Elm Golf Course	None
SR015	1171	Swale	2.17	11	5.25		1171	severely eroded throughout swale. footbridge extending across swale. sediment accumulating near toe. source: residential area	None
SR015	1173	Swale	1.25	6	2.33		1173	small accumulation of sediment near toe. deer run	None
SR015	1175	Concrete Pipe		0	0	15		pipe is broken and is eroding at point of dislocation. source: Danny Cunniff Park	None
SR015	1176	Plastic Pipe		0	0	7	1176	source: residential	None
SR015	1177	Clay Pipe		0	0	6	1177	2" plastic pipe with clay pupe. source. residential	None
SR015	1179	Concrete Pipe		0	0	18	1179	erosion under apron. source: storm drain near Old Elm Rd.	None
SR015	1180	Concrete Pipe		0	0	18	1180	swale below. near Old Elm	None
SR015	1181	Concrete Pipe		0	0	42	1181	within Old Elm Rd. pool below	Moderate
SR016	1184	Plastic Pipe		0	0	4	1184	some erosion surrounding. lawn clippings above.	None
SR016	1184	Clay Pipe		0	0	6	1184	some erosion surrounding. lawn clippings above.	
SR016	1186	Plastic Pipe		0	0	4	1186	erosion surrounding pipe and erosion directly below	None
SR016	1188	Steel Pipe		0	0	24	1188	lawn clippings above. eroded above and below. pool below.	Trickle
SR016	1189	Concrete Pipe		0	0	6	1189	some erosion. sediment accumulating at toe. source: residential	None
SR016	1190	Clay Pipe		0	0	6	1190	yard waste above. source: residential area	None
SR016	1192	Plastic Pipe		0	0	4	1192	eroded below. source: residential area	None
SR016	1193	Plastic Pipe		0	0	4	1193	source: residential area	None
SR016	1194	Plastic Pipe		0	0	6	1194	source: residential area	None
SR016	1195	Clay Pipe		0	0	6	1195	erosion above. source: residential area	None
SR016	1196	Plastic Pipe		0	0	4	1196	severely eroded bank surrounding pipe. source: residential area	None
SR016	1197	Clay Pipe		0	0	4	1197	severely eroded bank. source: residential area	None
SR016	1198	Clay Pipe		0	0	6	1198	within severely eroded bank. source: residential area	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
SR016	1199	Plastic Pipe		0	0	4	1199	source: residential area	None
SR016	1201	Clay Pipe		0	0	4	1201	erosion below. source: residential area	None
SR016	1202	Steel Pipe		0	0	30	1202	erosion surrounding pipe; pool and swale below. source: stormdrain	None
SR016	1203	Concrete Pipe		0	0	48	1203	large pool below. severe erosion surrounding. source: residential stormdrain	Moderate
SR017	1206	Plastic Pipe		0	0	4	1206	source: residential	None
SR017	1209	Concrete Pipe		0	0	6	1209	severe erosion surrounding pipe. source: residential	None
SR017	1209	Plastic Pipe		0	0	4	1209	erosion surrounding. source: residential	None
SR017	1209	Plastic Pipe		0	0	4	1209	erosion surrounding. source: residential area	None
SR017	1210	Plastic Pipe		0	0	4	1210	erosion surrounding. source: residential area	None
SR017	1211	Clay Pipe		0	0	6	1211	eroded bank below. source: residential area	None
SR017	1214	Plastic Pipe		0	0	4	1214	erosion below. small pool. source: residential area	None
SR017	1216	Plastic Pipe		0	0	4	1216	eroded bank surrounding pipe. source: residential area	None
SR017	1219	Plastic Pipe		0	0	4	1219	fence collapsing above pipe.. source: residential area	None
SR017	1221	Swale	1.67	25.5	4.83		1221	erosion within swale	None
SR017	1222	Plastic Pipe		0	0	4	1222	erosion above and below. source: residential area	None
SR017	1225	Steel Pipe		0	0	12	1225	culvert under pathway. eroded swale to channel. source: residential area	None
SR017	1226	Plastic Pipe		0	0		1226	concrete blocks above and below. pool below. source: residential area.	None
SR017	1226	Plastic Pipe		0	0	12	1226	concrete blocks above and below. pool below. source: residential area	None
SR017	1217	Residential		0	0	4	1217	swale to channel. erosion due to pipe outfall. source: residential area	None
SR017	1224	Clay Pipe		0	0	6	1224	erosion above and below. source: residential area	None
SR018	1229	Plastic Pipe		0	0	8	1229	eroding bank surrounding pipe. source: residential area	None
SR018	1230	Plastic Pipe		0	0	6	1230	source: residential area	None
SR018	1231	Plastic Pipe		0	0	6	1234	source: residential area	None
SR018	1233	Concrete Pipe		0	0	20	1233	square outfall within concrete wall. erosion under concrete apron. source: residential area	None
SR018	1234	Clay Pipe		0	0	6	1234	within concrete wall. erosion under concrete apron.	None
SR018	1235	Concrete Pipe		0	0	18	1235	sediment within. pipe is broken/dislocated and eroding at point where disconnected. erosion under concrete apron. source: residential area	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
SR018	1236	Clay Pipe		0	0	12	1236	concrete beneath pipe. source: residential area and open space.	None
SR018	1238	Clay Pipe		0	0	12	1238	filled with sediment. concrete blocks below. source: residential area	None
SR018	1242	Steel Pipe	1	5	2		1242	severe erosion near channel. source: parking lot at Wareland Park.	None
SR018	1244	Concrete Pipe		0	0	18	1244	severe erosion near channel. erosion under liner near channel.	Moderate
SR018	1245	Concrete Pipe		0	0	30	1245	erosion around and under apron. broken stormdrain. water flowing from point of dislocation	Moderate
SR018	1243	Steel Pipe		0	0	8	1243	extends into channel	None
SR019	1249	Clay Pipe		0	0	12	1249	eroded bank surrounding pipe. source: residential area	None
SR019	1251	Clay Pipe		0	0	4	1251	eroded below. source: residential area	None
SR019	1254	Plastic Pipe		0	0	6	1254	boulders underneath. near Westleigh Rd.	None
SR019	1256	Plastic Pipe		0	0	20	1256	at Westleigh Rd.bridge boulders above; swale leading to channel.	None
SR019	1257	Steel Pipe		0	0	12	1257	Westleigh Rd. bridge boulders below	None
SR019	1259	Clay Pipe		0	0	6	1259	broken and erosion occurring where dislocated	None
SR019	1260	Plastic Pipe		0	0	4	1260	erosion surrounding pipe. source: residential area	None
SR019	1261	Clay Pipe		0	0	4	1261	underwater	None
SR019	1262	Plastic Pipe		0	0	4	1262		None
SR019	1252	Plastic Pipe		0	0	4	1252	source: residential area	None
SR019	1254	Steel Pipe		0	0	12	1254	boulders beneath near Westleigh Rd.	None
SR020	1265	Steel Pipe		0	0	8	1265	concrete below. soil eroding underneath concrete. source: residential area	None
SR020	1268	Concrete Pipe		0	0	24	1268	erosion downstream from pipe. source: residential area	Trickle
SR020	1269	Concrete Pipe		0	0	24	1269	pool below. eroding where broken. swale leading to eroding stream. source: stormdrain from residential area	None
SR020	1271	Clay Pipe		0	0	12	1271	erosion under concrete apron and sediment accumulating underneath. source: residential area	Trickle
SR020	1272	Concrete Pipe		0	0	12	1272	swale leading to channel. debris in swale. water inside of pipe (stagnant) source: residential area	None
SR020	1274	Swale	0.83	7.25	1.83		1274	erosion within swale. source: residential area	None
SR020	1276	Steel Pipe		0	0	8	1276	near Onwentsia Rd. bridge. boulders at toe and above	None
SR020	1277	Steel Pipe		0	0	30	1277	near Onwentsia Rd. bridge. boulders below	Trickle

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
SR021	1280	Concrete Pipe		0	0	30	1280	near Onwentsia Rd. bridge. concrete apron broken away from pipe. erosion occurring where apron has been isolated. stormdrain	Trickle
SR021	1281	Swale	1	8	2.5		1281	source: residential area	None
SR021	1282	Clay Pipe		0	0	6	1282	eroded bank surrounding. source: open space	None
SR021	1283	Clay Pipe		0	0	8	1283	sediment accumulating below pipe. source: Onwentsia Club	None
SR021	1284	Swale	3.17	8	2		1284	erosion near channel. source: open space	None
SR021	1285	Swale	1	4.5	4		1285	lots of sediment near toe. source: Onwentsia Club	None
SR021	1287	Steel Pipe		0	0	12	1287	source: Onwentsia Club	Trickle
SR021	1288	Plastic Pipe		0	0	8	1288	erosion above and under pipe. source: Onwentsia Club	Trickle
SR021	1290	Clay Pipe		0	0	8	1290	erosion above. concrete apron broken away. source: Onwentsia Club	Moderate
SR021	1291	Steel Pipe		0	0	12	1291	wet sediment inside. bank eroding downstream. source: Onwentsia Club	None
SR021	1292	Steel Pipe		0	0	16	1292	bank eroding underneath. source: Onwentsia Club	Trickle
SR021	1294	Steel Pipe		0	0	18	1294	closed. source: Onwentsia Club	None
SR021				0	0				
SR022	1299	Steel Pipe		0	0	18	1299	erosion underneath and downstream. source: Onwentsia Club	Moderate
SR022	1301	Clay Pipe		0	0	4	1301	concrete apron. erosion surrounding concrete.	None
SR022	1302	Steel Pipe		0	0	6	1302	some erosion around concrete. source: Onwentsia Club	None
SR022	1305	Steel Pipe		0	0	8	1305	erosion above and sedimentation below. source: Onwentsia Club	None
SR022	1306	Steel Pipe		0	0	4	1306	erosion around concrete. broken and water flowing from dislocation area. source: Onwentsia Club	Moderate
SR022	1307	Steel Pipe		0	0	12	1307	source: Onwentsia Club	None
SR022	1309	Plastic Pipe		0	0	4	1309	severe erosion. source: Onwentsia Club	None
SR022	1310	Concrete Pipe		0	0	12	1310	broken apron. erosion underneath. source: Deerpath Elementary School.	Moderate
SR022	1311	Plastic Pipe		0	0	4	1311	source: Deerpath Elementary	None
SR022	1311	Clay Pipe		0	0	8	1311	source: Deerpath Elementary	None
SR022	1312	Plastic Pipe		0	0	4	1312	source: Deerpath Elementary	None
SR022	1312	Plastic Pipe		0	0	4	1312	source: Deerpath Elementary	None
SR022	1312	Plastic Pipe		0	0	4	1312	source: Deerpath Elementary	None
SR022	1312	Plastic Pipe		0	0	4	1312	source: Deerpath Elementary	None
SR022	1312	Plastic Pipe		0	0	4	1312	source: Deerpath Elementary	None
SR022	1312	Plastic Pipe		0	0	4	1312	source: Deerpath Elementary	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
SR022	1312	Plastic Pipe		0	0	6	1312	source: residential	None
SR022	1314	Plastic Pipe		0	0	6	1314	erosion surrounding pipe. source: residential area	Trickle
SR022	1315	Steel Pipe		0	0	12	1315	erosion surrounding pipe. source: residential area	None
SR022	1316	Steel Pipe		0	0	12	1316	source: residential	None
SR022	1317	Plastic Pipe		0	0	6	1317	erosion surrounding pipe. source: residential area	Trickle
SR022	1318	Clay Pipe		0	0	6	1318	source: residential	None
SR022	1319	Clay Pipe		0	0	6	1319	erosion surrounding pipe. source:: Deerpath Elementary	None
SR022	1320	Steel Pipe		0	0	12	1320	eroding bank surrounding pipe and sedimentation at toe. source: residential area.	None
SR022	1321	Steel Pipe		0	0	12	1321	source: residential area	None
SR022	1321	Clay Pipe		0	0	12	1321	sediment inside. source: residential area	None
SR022	1321	Steel Pipe		0	0	12	1321	severe erosion of bank and around pipe. source: residential area	None
SR022	1323	Plastic Pipe		0	0	6	1323	closed source: residential area	None
SR022	1323	Plastic Pipe		0	0	4	1323	source: residential area	None
SR022	1324	Steel Pipe		0	0	8	1324	source: near Deerpath Elementary and police station	None
SR022	1325	Clay Pipe		0	0	6	1325	underwater. source: residential area	None
SR022	1326	Plastic Pipe		0	0	4	1326	source: residential area	None
SR022	1327	Concrete Pipe		0	0	12	1327	source: police department	None
SR022	1328	Concrete Pipe		0	0	12	1328	concrete apron broken away from pipe near Deerpath Rd.	None
SR022	1329	Concrete Pipe		0	0	27	1329	near Deerpath Rd	None
SR022	1330	Concrete Pipe		0	0	42	1330	pool below near Deerpath Rd. bridge	None
SR022	1330	Clay Pipe		0	0	8	1330	pool below near Deerpath Rd. bridge.	None
SR022	1332	Steel Pipe		0	0	12	1332	within Deerpath Rd. Bridge	None
SR022	1333	Steel Pipe		0	0	12	1333	within Deerpath Rd. Bridge.	None
SR022	1322	Concrete Pipe		0	0	36	1322	concrete apron broken and water flowing out of disconnection point. source: stormdrain near Deerpath Elementary	None
SR023	1336	Plastic Pipe		0	0	4	1336	sediment inside. source: Deerpath Golf Course	None
SR023	1337	Concrete Pipe		0	0	6	1337	eroded bank below. source: residential area	None
SR023	1338	Clay Pipe		0	0	8	1338	sediment inside (1/2 filled) source: Deerpath Golf Course	None
SR023	1339	Plastic Pipe		0	0	6	1339	bank eroding near toe. source: Deerpath Golf Course	None
SR023	1340	Concrete Pipe		0	0	18	1340	water and sediment inside. erosion surrounding pipe. source: Deerpath Golf Course	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
SR023	1341	Plastic Pipe		0	0	8	1341	erosion near toe. source: Deerpath Golf Course	Trickle
SR023	1342	Clay Pipe		0	0	6	1342	erosion near toe. source: Deerpath Golf Course	None
SR023	1343	Plastic Pipe		0	0	6	1343	rip rap surrounding pipe. source: Deerpath Golf Course	None
SR023	1344	Clay Pipe		0	0	6	1344	rip rap surrounding pipe. source: Deerpath Golf Course	None
SR023	1345	Plastic Pipe		0	0	6	1345	rip rap surrounding pipe. source: Deerpath Golf Course	None
SR023	1346	Clay Pipe		0	0	12	1346	rip rap surrounding pipe. source: Deerpath Golf Course	None
SR023	1349	Pipe		0	0		1349	rip rap protecting bank from point discharge. pipe not visible. source: Deerpath Golf Course	None
SR023	1350	Pipe		0	0		1350	RIPRAP PROTECTING BANK FROM POINT DISCHARGE. PIPE NOT VISIBLE. source: Deerpath Golf Course	None
SR024	1351	Clay Pipe		0	0	6	1351	rip rap surrounding pipe. sediment on rip rap. source: Deerpath Golf Course	None
SR024	1352	Clay Pipe		0	0	6	1352	rip rap surrounding pipe. source: Deerpath Golf Course	None
SR024	1353	Plastic Pipe		0	0	6	1353	rip rap surrounding pipe. source: Deerpath Golf Course	None
SR024	1354	Concrete Pipe		0	0	8	1354	rip rap line swale to channel. source: open space	Moderate
SR024	1355	Plastic Pipe		0	0	6	1355	rip rap surrounding pipe. source: Deerpath Golf Course	None
SR024	1356	Pipe		0	0		1356	rip rap protecting bank from point discharge. pipe not visible	None
SR024	1357	Concrete Pipe		0	0	42	1357	bank eroding around concrete. source: Deerpath Golf Course	None
SR024	1358	SWALE	2.25	5.25	2		1358	some erosion. source: open space	None
SR024	1359	Plastic Pipe		0	0	6	1359	source: Deerpath Golf Course	None
SR024	1360	Swale	1	4.5	0.83		1360	source: open space	None
SR024	1361	Plastic Pipe		0	0	10	1361	source: open space	None
SR024	1363	Clay Pipe		0	0	8	1363	under footbridge. moderate to severe erosion below. source: Deerpath Golf Course	None
SR024	1364	Steel Pipe		0	0	12	1364	concrete and erosion underneath. source: Deerpath Golf Course	None
SR024	1365	Concrete Pipe		0	0	2X1.5	1365	oval. erosion upstream from pipe. source: Deerpath Golf Course	None
SR024	1367	Clay Pipe		0	0	4	1367	source: Deerpath Golf Course	None
SR024	1369	Clay Pipe		0	0	6	1369	small swale to channel. source: Deerpath Golf Course	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
SR024	1370	Concrete Pipe		0	0	8	1370	concrete block to protect bank. some concrete has broken away from pipe. moderate erosion surrounding pipe. source: Deerpath Golf Course	D
SR025	1378	Clay Pipe		0	0	10	1378	some erosion surrounding pipe. broken/dislocated and water cant flow properly. source: residential area	None
SR025	1383	Steel Pipe		0	0	30	1383	eroded bank underneath; pool below. near Laurel Ln. source: open space	Moderate
SR025	1492	Steel Pipe		0	0	12	1492	rip rap in swale to channel. source: open space	None
SR025	1388	Clay Pipe		0	0	6	1388	small swale to stream; erosion. source: open space.	None
SR025	1389	Swale	1.5	5	0.92		1389	source: open space	None
SR025	1493	Swale	5.33	18	2.67		1493	boulders under trail and leading to channel. source: open space	None
SR025	1501	Swale	0.5	11	4.5		1501	woodchips within swale. no vegetation near stream. source: open space	None
SR025	1394	Steel Pipe		0	0	12	1394	small swale to stream. source: open space	None
SR025	1395	Swale	2.5	21	4.5		1395	wood debris and leaves in swale. source: open space	None
SR025	1396	Steel Pipe		0	0	12	1396	source: open space	None
SR025	1496	Swale	4.5	19.3	4.5		1496	near trail. source: open space	None
SR025	1401	Steel Pipe		0	0	6	1401	severe erosion surrounding pipe. source: open space	None
SR025	1402	Clay Pipe		0	0	10	1402	eroded bank nearby. source: open space	None
SR025	1403	Steel Pipe		0	0	12	1403	source: open space	None
SR025	1403	Steel Pipe		0	0	12	1403	source: open space	None
SR025	1498	Swale	6.83	16	5		1498	large swale to the channel, debris in swale. source: open space (near RR tracks)	None
SR026	1408	Concrete Pipe		0	0	21	1408	source: open space	None
SR026	1410	Plastic Pipe		0	0	9	1410	erosion above and below; swale to channel. source: open space	None
SR026	1412	Concrete Pipe		0	0	12	1412	moderate erosion swale to channel. source: open space	None
SR026	1414	Clay Pipe		0	0	10	1414	within stone wall armoring. source: Lake Bluff Forest Preserve.	None
SR026	1415	Clay Pipe		0	0	8	1415	within stone wall. source: open space.	None
SR026	1419	Steel Pipe		0	0	48	1419	large pool below and very large swale to channel. Erosion under concrete apron; severe erosion in swale. source: stormdrain near 41	Trickle
SR026	1420	Swale	1.58	16	7		1420	source: near 41	None
SR026	5032	Concrete Pipe		0	0	21	5032	source: open space	None
SR026	5033	Plastic Pipe		0	0	9	5033	moderate erosion above and below. swale to channel. source: open space.	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
SR026	5037	Clay Pipe		0	0	10	5037	within stone wall armoring. source: open space.	None
SR026	5038	Clay Pipe		0	0	8	5038	within stone wall. source: open space.	None
SR026	5042	Steel Pipe		0	0	48	5042	large pool below and very large swale to channel. very large swale to channel. erosion under concrete apron. severe erosion in swale. source: stormdrain near 41	Trickle
SR026	5043	Swale	1.58	16	7		5043	source: near 41	None
SR027	5048	Concrete Pipe		0	0	36	5048	pool below. source: stormdrain near 41	None
SR027	5049	Swale	4.67	21.7	6		5049	severely eroded. inside lots of woody debris. source: open space	None
SR027	5050	Concrete Pipe		0	0	36	5050	pool below. source: stormdrain near 41	None
SR028	5060	Swale	1	1	1		5060	stone chips within swale. source: Mariani parking lot	None
SR028	5062	Steel Pipe		0	0	10	5062	boulders underneath pond cover. swale to channel source: Mariani Landscaping	Trickle
SR028	5067	Steel Pipe		0	0	10	5067	small swale to channel. source: 176	None
SR028	5068	Steel Pipe		0	0	16	5068	swale along 176 leads to pipe. small swale from pipe to stream. some erosion above pipe. source:176	None
SR028	5055	Concrete Pipe		0	0	12	5055	SEVERE EROSION IN SWALE LEADING TO CHANNEL. source: Mariani Landscaping	None
SR028	5057	Swale	0.75	2.5	1.58		5057	moderate to severely eroded. source: Mariani Landscaping	None
SR028	5058	Plastic Pipe		0	0	6	5058	swale to channel severe erosion. source: Mariani Landscaping	Trickle
SR028	5049	Concrete Pipe		0	0	30	5049	swale to stream lined with cobble and boulders. source: Mariani Landscaping	Moderate
SR028	5064	Plastic Pipe		0	0	4	5064	someone washing a truck. see photo of discharge 5063 discharge is milky white source: Mariani Landscaping.	Moderate
SR029	5070	Concrete Pipe		0	0	36	5070	just upstream from 176 bridge. pool below. storm drain. source 176	None
SR029	5072	Swale	6	17.7	2.5		5072	water in channel. near 41 and LBGC	None
SR029	5075	Steel Pipe		0	0	12	5075	closed. erosion downstream from pipe. source: Lake Bluff Golf Course (LBGC)	None
SR029	5076	Swale	2	13.5	2.25		5076	source: LBGC	None
SR030	5081	Steel Pipe		0	0	12	5081	closed; eroded below; eroded below. source: LBGC	None
SR030	5083	Plastic Pipe		0	0	4	5083	source: LBGC	None
SR030	5083	Steel Pipe		0	0	18	5083	closed. eroded below. source: LBGC	None
SR030	5084	Plastic Pipe		0	0	4	5084	source: LBGC	None
SR030	5084	Steel Pipe		0	0	18	5084	some erosion below. source: LBGC	None
SR030	5087	Steel Pipe		0	0	12	5087	swale to channel some erosion. source: LBGC	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
SR030	5088	Steel Pipe		0	0	12	5088	swale to channel some erosion. source: LBGC	None
SR030	5089	Concrete Pipe		0	0	17	5089	pool below. moderate erosion. swale to below pipe. source: LBGC	None
SR030	5091	Concrete Pipe		0	0	24	5091	swale to channel. moderate erosion sedimentation near toe. source: LBGC	None
SR030	5093	Swale	3.5	16.5	4.5		5093	woody debris in swale. source: LBGC near RR tracks	None
SR030	5094	Swale	1.17	14.3	2.33		5094	source: LBGC near RR tracks	None
SR031	5097	Swale	5	24.5	5.83		5097	left bank of swale eroded upstream near RR tracks	None
SR031	5098	Steel Pipe		0	0	12	5098	closed. mostly buried in sediment. unable to measure. source: open space	None
SR031	5104	Concrete Pipe		0	0	12	5104	boulders below. source: GLNTC	Trickle
SR031	5103	Clay Pipe		0	0	29	5103	broken. water seems to be flowing from another area. source: GLNTC	Trickle
SR031	5105	Concrete Pipe		0	0	?	5105	buried. unable to measure. source: GLNTC	None
SR031	5106	Concrete Pipe		0	0	?	5106	buried. unable to measure. source: GLNTC	None
SR031	5108	Concrete Pipe		0	0	30	5108	faces upstream. sediment inside. concrete blocks in front of pipe (closing it off). source: GLNTC	None
SR031	5111	Concrete Pipe			0	?	5111	broken. unable to measure. very eroded upstream from pipe. source: GLNTC	None
SR031	5115	Concrete Pipe		0	0	18	5115	pool below. some erosion surrounding concrete. source: GLNTC	Trickle
SR031	5116	Swale	0.83	1	1.5		5116	likely a pipe. unable to locate source. source: GLNTC	Trickle
SR031	5109	Concrete Pipe		0	0	18	5109	soapy discharge. water is white in pool below. swale going to channel. also see photos 1409 and 1410 which were taken on 8/22/05	Moderate
SR031	5110	Concrete Pipe		0	0		5110	buried. source: GLNTC	None
SR031	5113	Concrete Pipe		0	0	18	51113	partially buried. source: GLNTC	None
SR031	5114	Clay Pipe		0	0	30	5114	partially buried and sediment inside. source: GLNTC	None
SR031	5118	Concrete Pipe		0	0	1.08X1.5	5118	moderate erosion upstream from pipe. source: GLNTC	None
SR032	5122	Concrete Pipe		0	0	18	5122	submersed; erosion behind concrete. source: GLNTC	None
SR032	5125	Concrete Pipe		0	0	12	5125	swale to channel. source: GLNTC	None
SR032	5128	Steel Pipe		0	0	24	5128	erosion below apron. pool below. opposite bank erosion source: GLNTC	Trickle
SR032	5130	Concrete Pipe		0	0	21	5130	pool below. source: GLNTC	None
SR032	5134	Concrete Pipe		0	0	15	5134	source: GLNTC	None
SR032	5135	Concrete Pipe		0	0	15	5135	source: GLNTC	None

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
SR032	5136	Steel Pipe		0	0	18	5136	erosion underneath apron. source: GLNTC	None
SR032	5137	Concrete Pipe		0	0	15	5137	erosion around apron. (upstream end). swale to channel. source: GLNTC	Trickle
SR032	5138	Steel Pipe		0	0	18	5138	erosion around apron upstream. source: GLNTC	None
SR032	5139	Concrete Pipe		0	0	24	5139	swale to channel. boulders beneath pipe and surrounding apron. source: GLNTC	None
SR032	5140	Concrete Pipe		0	0	36	5140	swale to channel. boulders beneath pipe and surrounding apron. source: GLNTC	None
SR032	5141	Concrete Pipe		0	0	15	5141	source: GLNTC	None
SR032	5143	Concrete Pipe		0	0	18	5143	broken. apron has broken away from pipe. pool below. eroded above pipe.	None
SR032	5144	Concrete Pipe		0	0	15	5144	source: GLNTC	None
SR032	5145	Concrete Pipe		0	0	30	5145	erosion around, upstream of source. source: GLNTC	Trickle
SR032	5147	Steel Pipe		0	0	9	5147	source: GLNTC at Wyoming	None
SR032	5149	Swale	1.67	3.83	1.75		5149	source: GLNTC at Wyoming	None
SR032	5148	Steel Pipe		0	0	6	5148	severe erosion under pipe. bank completely eroded around pipe. source: GLNTC (near Wyoming)	None
SR032	5150	Steel Pipe		0	0	9	5150	source: GLNTC at Wyoming	None
SR033	5153	Concrete Pipe		0	0	30	5153	apron has broken away. pool below. erosion above. source: GLNTC (open space)	None
SR033	5157	Concrete Pipe		0	0	15	5157	some erosion downstream from apron severe erosion above pipe. source: GLNTC (open space). orange fence marking erosion.	None
SR033	5161	Steel Pipe		0	0	18	5161	under Colorado Ave. source: GLNTC	None
SR033	5162	Concrete Pipe		0	0	24	5162	extends across channel; just north of Colorado in GLNTC. leak in middle of pipe	Trickle
SR033	5164	Steel Pipe		0	0	24	5164	pool below. some erosion at Connecticut Ave. swale to channel lots of mosquito larvae	None
SR033	5164	Steel Pipe		0	0	9	5164	erosion underneath at Connecticut Ave. in GLNTC	None
SR033	5166	Concrete Pipe		0	0	12	5166	severely eroded below at 137 and Alaska Ave.. within GLNTC	None
SR033	5167	Steel Pipe		0	0	6	5167	@137 and Alaska Ave. in GLNTC	None
SR033	5168	Steel Pipe		0	0	6	5168	at W. Alaska Ave.	None
SR033	5158	Steel Pipe		0	0	4	5158	old pipe may be detached from water source. source: GLNTC	None
SR033		Concrete Pipe		0	0	15		water inside pipe. source: GLNTC	None
SR034	1412	Concrete Pipe		0	0	24	1412	sediment below pipe. within bridge at137	Trickle
SR034	1413	Steel Pipe		0	0	30	1413	rusty, broken, very large pool below. debris in pipe (near 137). source: WGGC	Moderate

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
SR034	1421	Plastic Pipe		0	0	6	1421	source: WGGC	None
SR034	1421	Plastic Pipe		0	0	12	1421	source: WGGC	None
SR034	1426	Steel Pipe		0	0	36	1426	source: WGGC. swale to stream. boulders above pipe.	None
SR035	1429	Culvert		0	0	18	1429	some erosion under apron. under road in FPGC	None
SR035	1430	Concrete Pipe		0	0	18	1430	some erosion surrounding pipe. source: detention basin in FPGC	None
SR035	1431	Concrete Pipe		0	0	18	1431	some erosion surrounding pipe. source: detention basin in FPGC	None
SR035	1434	Steel Pipe	1.58	7	2		1434	source: FPGC	None
SR035	1436	Plastic Pipe		0	0	4	1436	eroded above. (bank sloughing) source: FPGC	None
SR035	1438	Plastic Pipe		0	0	6	1438	eroded above. (bank sloughing) source: FPGC	None
SR035	1440	Steel Pipe		0	0	12	1440	minor erosion. source: FPGC	None
SR035	1441	Plastic Pipe		0	0	12	1441	source: FPGC	None
SR035	1442	Plastic Pipe		0	0	27	1442	erosion surrounding pipe. pool below. source: FPGC	None
SR035	1445	Plastic Pipe		0	0	6	1445	moderately eroded above pipe. source: FPGC	None
SR036	1465	Plastic Pipe		0	0	8	1465	eroded bank surrounding pipe; source: FPGC	None
SR036	1450	Plastic Pipe		0	0	4	1450	within FPGC	None
SR036	1450	Plastic Pipe		0	0	4	1450	within FPGC	None
SR036	1452	Plastic Pipe		0	0	4	1452	near culvert in photo 1584. source: FPGC	None
SR036	1454	Swale	1.67	5	1.33		1454	source: FPGC	None
SR036	1455	Swale	4.5	4.5	3.5		1455	source: FPGC	None
SR036	1456	Plastic Pipe		0	0	24	1456	swale to channel. source: FPGC	Trickle
SR036	1458	Steel Pipe		0	0	18	1458	large swale to channel. severe erosion. source: FPGC	
SR036	1460	Plastic Pipe		0	0	6	1460	moderate erosion swale to channel. source: FPGC	None
SR036	1470	Tributary	5.67	16.7	2.92		1470	some erosion. source: FPGC	Moderate
SR037	1477	Swale	2.5	10.2	2.08		1477	some erosion. source: FPGC	None
SR037	1478	Plastic Pipe		0	0	14	1478	riprap above. source: trailer park north of GBFP	None
SR037	1479	Swale	2.17	14.5	2.42		1479	source: within GBFP. grass clippings from trailer park	None
SR038	1483	Concrete Pipe		0	0	36	1483	gasoline smell. source: Penske Truck Rental. sheen on water and brown bubbles forming below pipe	Moderate
SR038	1485	Steel Pipe		0	0	8	1485	strong gasoline smell. source: Penske Truck Rental. sheen on water. pipe has broken	Trickle
SR038	1487	Swale	7	30.5	5.5		1487	heavy sheen in water. cattails within. source: Washington Road	Moderate

Stream Reach ID	GPS ID	Type	Size Bottom (ft)	Size Top (ft)	Size Deep (ft)	Dia. (in)	Photo #	Existing Condition/Problem	Flow
SR038	1488	Swale	8.33	40	5		1488	grassy swale. source: Washington Road	None
SR039	2389	Plastic Pipe		0	0	4	2389	drains golf course to north	None
SR039	2390	Plastic Pipe		0	0	4	2390	drains golf course to north	None
SR039	2391	Steel Pipe		0	0	6	2391	slight discharge, erosion	Trickle
SR039	2393	Steel Pipe		0	0	12	2393	pipe has failed in bank	Trickle
SR039	2394	Concrete Pipe		0	0	78	2394	head of open channel, drains from west/U.S. 41	Trickle
SR040	2396	Concrete Pipe		0	0	18	2396	drains golf dome from north, armored	Trickle
SR040	2397	Plastic Pipe		0	0	4	2397	drains golf dome from north, armored	Trickle
SR040	2398	Steel Pipe		0	0	12	2398	drains Target loading dock from south	None
SR040	2400	Steel Pipe		0	0	12	2400	drains Target loading dock	None
SR040	2401	Steel Pipe		0	0	8	2401	drains golf dome from north	None
SR040	2402	Steel Pipe		0	0	12	2402	drains target loading dock from south	None
SR040	2403	Concrete Pipe		6	3		2403	3 concrete box culverts under U.S. 41 (6w x 3h), head of tributary	Moderate
SR040	2404	Concrete Pipe		0	0	36	2404	drains from U.S. 41 north of channel	Trickle
SR041	2412	Concrete Pipe		0	0	36	2412		None
SR041	2413	Concrete Pipe		0	0	12	2413	drains from Buena Road	None
SR041	2416	Concrete Pipe		0	0	48	2416	drains subdivision from north (Valley Road)	None

APPENDIX D: HYDRAULIC STRUCTURES IN THE NORTH BRANCH

Hydraulic structures were measured and recorded as part of the stream inventory due to the likelihood that these structures can act as constriction points in the flow of the river and result in backwater flooding problems. Hydraulic structures include bridges, instream culverts, dams, reservoirs and weirs as well as other structures in the stream such as fences. One hundred ninety-three hydraulic structures were inventoried in the North Branch. The Skokie River has the greatest number of hydraulic structures (100 total). In fact, there are almost twice as many hydraulic structures in the Skokie River than there are in the other two forks in Lake County. Table D-1 contains a summary of the types, sizes, locations as well as specific notes on the hydraulic structures inventoried in the Lake County North Branch. The table is arranged by fork where WF is the West Fork, MF is the Middle Fork and SR is the Skokie River. The stream reach number follows the fork designation, for example WF1 indicates the West Fork of the North Branch stream reach #1. The stream reaches are mapped in Figure 3-33.

Table D-1
Hydraulic Structures, North Branch Chicago River, Lake County

Stream Reach No.	HS No	GPS Loc. ID	Type	Material	Diam. (ft)	Width (ft)	Height (ft)	Length (ft)	Notes
WF	1		Bridge	Wood		33.67	8.8	0	wooden foot bridge with metal cables
WF	2		Bridge	Wood		42.5	11.08	0	eroding underneath green mat (see photo)
WF001	3	173	Culvert	Concrete		100	14.083	0	bridge at Lake-Cook Road is divided into three sections by two concrete supports; the center section is 37.5 feet wide; concrete armoring underneath bridge
WF001	4	175	Bridge	Wood		101	14.42	0	footbridge constructed primarily of wood and also some kind of metal wire
WF003	5	208	Bridge	Steel		48.5	18.92	0	footbridge
WF004	6	223	Bridge	Concrete		29.83	10.17	0	at Central Avenue; see also photo 55 (aspect: downstream); sandbars inside bridge and some debris accumulation
WF005	7	252	Bridge	Concrete		29.83	11.67	0	Deerfield Road bridge; instream debris located upstream from bridge
WF006	8	265	Bridge	Concrete		32	8.67	0	sediment accumulating on right (east) bank
WF007	9	288	Bridge	Concrete		43	9.83	0	Hazel Road bridge; sediment bars on either side under bridge
WF008	10	309	Bridge	Concrete		30.5	10.25	0	bridge at Wilmot; sediment bars within and on both streambanks
WF008	11	313	Bridge	Wood		30.5	9.74	0	riffle (large concrete boulders) underneath
WF009	12	324	Dam	Concrete		49	5.6	0	spilled over top and through weir
WF010	13	325	Bridge	Concrete		45.5	9.25	0	sedimentation on both sides of bank under bridge
WF010	14	330	Bridge	Wood		33.67	8.83	0	
WF010	15	331	Bridge	Wood		42.5	11.08	0	eroding underneath green mat

Stream Reach No.	HS No	GPS Loc. ID	Type	Material	Diam. (ft)	Width (ft)	Height (ft)	Length (ft)	Notes
WF011	16	345	Culvert	Concrete	2.5	0	0	0	impounded; water flows through
WF011	17	356	Culvert	Concrete		15.58	7.17	0	two box culverts underneath 94, each culvert measures 15.58' W by 7.17' H; strong organic matter odor
WF012	18	359	Bridge	Wood		49.17	11.25	0	wood and concrete golf cart bridge
WF012	19	363	Bridge	Concrete		47	11.25	0	concrete and metal golf cart bridge
WF012	20	104	Bridge	Wood		8.5	41.42	0	wood and cable foot bridge; unsafe to walk across; photo number same as GPS
WF012	21	18	Bridge	Concrete		10.42	5.33	0	Duffy Road bridge; 2 box culverts, each of the two culverts is 10.42' W and 5.33' H; support beam in culvert causing debris to accumulate at upstream end of bridge
WF014	22	51	Culvert	Concrete		4.83	1.08	0	boulders downstream from culvert; detention pond upstream from culvert
WF015	23	53	Other	Concrete		0	0	0	sidewalk/boulder impoundment at edge of pond at office complex
WF015	24	61	Culvert	Concrete		20	5.17	0	at Half Day Rd.; this structure is a box culvert with 2 openings, each culvert is 10 feet wide
WF016	25	73	Fence	Metal Wire		38	5.67	0	log jam; water stagnent upstream from debris pile
WF018	26	372	Bridge	Wood		42	8.67	0	foot bridge (wood with steel frame); vegetation growing underneath
WF018	27	377	Bridge	Wood		44.5	6	0	foot bridge (wood with steel frame); mesh underneath to protect bank; vegetation growing underneath
WF018	28	380	Bridge	Wood		23	3.25	0	foot bridge (wood and steel); mesh underneath to protect bank; vegetation underneath
WF019	29	2306	Culvert	Steel	4	0	0	0	Saunders Rd.
WF019	30	2309	Bridge	Wood		16	0	3	foot bridge
WF019	31	2315	Culvert	Steel	2	0	0	0	overflow from pond to west
WF019	32	2317	Bridge	Wood		19	4	0	wooden golf cart bridge
WF019	33	2318	Culvert	Plastic	1	0	0	0	drain channel from upstream (low flow)
WF019	34	2318	Culvert	Plastic	1	0	0	0	drain channel from upstream (low flow)
WF019	35	2318	Culvert	Plastic	.5	0	0	0	drain channel from upstream (low flow)
WF019	36	2321	Bridge	Concrete		10	2.5		concrete golf cart bridge
WF019	37	2322	Culvert	Steel	2	0	0	0	drains tributary under cart path into pond
WF019	38	2326	Bridge	Wood		10	2.5	0	foot bridge
WF019	39	2329	Culvert	Steel	2	0	0	0	drains swales along Clendenin
WF019	40	2329	Culvert	Steel	2	0	0	0	drains swales along Clendenin
WF019	41	2329	Culvert	Steel	2	0	0	0	drains swales along Clendenin

Stream Reach No.	HS No	GPS Loc. ID	Type	Material	Diam. (ft)	Width (ft)	Height (ft)	Length (ft)	Notes
WF020	42	2330	Fence	Metal Wire		10	6	0	fence in tributary at confluence with West Fork
MF001	43	113	Bridge	Concrete		52	9.5	0	boulders along bank near bridge
MF002	44	140	Bridge	Concrete		38	8.5	0	bridge at Shenandoah Court; three box culverts, each 8.5' high by 11.83' wide
MF003	45	387	concrete	bridge		42.33	10.92	0	bridge at Deerfield Road; rip rap underneath bridge on both banks
MF007	46	443	Bridge	Concrete		22	8.67	0	concrete supports, steel frame (out of commission)
MF007	47	451	Bridge	Steel		43	5.58	0	steel frame, wood planks
MF008	48	471	Bridge	Concrete		94	11.83	0	at Half Day Road; two, 2' supports; the middle section is 28' wide; currently a construction site, piles of sediment and debris; west section of bridge is filled with debris, but appears that will be removed in future
MF010	49	502	Bridge	Steel		63.33	12.25	0	foot bridge with steel frame and wood planks; both banks eroding underneath bridge, no vegetation present
MF011	50	519	Bridge	Steel		40	10.25	0	eroded banks underneath bridge; old car on bridge
MF012	51	147	Culvert	Concrete		25.67	7	0	two box culverts at Old Elm Road; severe logjam, stagnant water
MF012	52	161	Bridge	Concrete		38	11.83	0	bridge at Everett Road; boulders underneath bridge; sediment bar on left bank under bridge
MF015	53	566	Bridge	Concrete		68.5	12.25	0	bridge at We sleigh Rd.
MF015	54	579	Bridge	Steel		67	8	0	at Waukegan Rd; rip rap underneath
MF015	55	585	Bridge	Steel		38	8	0	wood foot bridge with steel frame at Lake Forest High School
MF016	56	598	Bridge	Concrete		38	11.33	0	bridge at Route 60; sediment accumulating on both banks
MF017	57	604	Bridge	Concrete		30	9.92	0	bridge at Melody Lane; sediment bars on both banks under bridge; severe erosion on right bank upstream from bridge
MF017	58	609	Bridge	Concrete		20	9	0	left bank; crumbling asphalt; right bank; sediment bar
MF018	59	636	Bridge	Steel		34	7.33	0	foot bridge with steel frame, wood planks
MF019	60	644	Bridge	Wood			7.42	34	foot bridge in Middle Fork Savannah Forest Preserve
MF019	61	648	Bridge	Wood		0	6	33	foot bridge in Middle Fork Savannah Forest Preserve; steel frame with wood planks
MF020	62	658	Bridge	Wood		0	7.75	41	foot bridge with wood planks and steel frame in Middle Fork Savannah Forest Preserve

Stream Reach No.	HS No	GPS Loc. ID	Type	Material	Diam. (ft)	Width (ft)	Height (ft)	Length (ft)	Notes
MF020	63	668	Bridge	Concrete		0	8.25	20	RR tracks; sediment accumulating on right bank underneath tracks
MF021	64	672	Bridge	Steel		21.83	8.25		frame of bridge out of commission
MF022	65	683	Culvert	Concrete		7	6	0	concrete box culvert under railroad tracks; water level differential; channel downcuts downstream from culvert
MF022	66	688	Bridge	Concrete		12	9.67	0	dome-shaped culvert under railroad tracks; sediment bar on right bank under bridge
MF022	67	691	Bridge	Concrete		25.58	7	0	three box culverts under bridge at 176; each culvert is 8' wide; pool downstream from bridge; culvert on left is filled with sediment and vegetation
MF023	68	697	Bridge	Concrete		0	6.75	14.58	RR tracks; rip rap underneath bridge on both banks
MF023	69	697	Bridge	Concrete		0	6.75	14.58	RR tracks; rip rap underneath bridge on both banks
MF024	70	711	Bridge	Wood		0	6	20	wood and steel bridge at Atkinson Rd
MF027	71	929	Culvert	Concrete		20.42	3.5	0	two box culverts at RR tracks; each box culvert is 9.25' wide; gravel under culvert and downstream from culvert
MF027	72	932	Culvert	Concrete		10.5	5	0	box culvert at 137
MF028	73	2338	Bridge	Steel		31.5	5	0	Middlefork Savanna path and bridge
MF028	74	2342	Culvert	Steel	7.5	0	0	0	culvert under R.R., 2 ft. of sediment on bottom
MF028	75	2342	Culvert	Steel	4	0	0	0	culvert has separated in places
MF028	76	2232	Culvert	Steel	3.5	0	0	0	borrow pit outlet near Lake Forest Oasis (Dalitsch property), ends of culverts collapsed
MF028	77	2232	Culvert	Steel	2	0	0	0	borrow pit outlet near Lake Forest Oasis (Dalitsch property), ends collapsed, erosion over top of berm
MF028	78	2236	Culvert	Concrete	4	0	0	0	tributary under I-94
MF028	79	2236	Culvert	Concrete	4	0	0	0	tributary under I-94
MF029	80	2237	Fence	Metal Wire		0	0	0	significant debris blockage and bank erosion
MF029	81	2242	Culvert	Steel	4	0	0	0	severe bank erosion on right bank downstream
MF029	82	2248	Culvert	Concrete	2.5	0	0	0	severe erosion on left bank downstream
MF029	83	2250	Culvert	Concrete	1	0	0	0	under W. Oasis Access Road

Stream Reach No.	HS No	GPS Loc. ID	Type	Material	Diam. (ft)	Width (ft)	Height (ft)	Length (ft)	Notes
MF029	84	2250	Culvert	Concrete	2	0	0	0	drains under W. Oasis Access Road
MF030	85	2257	Culvert	Steel	6	0	0	0	walking path, debris clog at upstream end
MF030	86	2265	Culvert	Concrete	3	0	0	0	IL 43 (Waukegan Rd.)
MF030	87	2265	Culvert	Concrete	3	0	0	0	IL 43 (Waukegan Rd.)
MF031	88	2284	Culvert	Concrete	4.5	0	0	0	under Prairie Wolf- Deerfield H.S. path
MF031	89	2284	Culvert	Concrete	4.5	0	0	0	under Prairie Wolf -Deerfield H.S. path
MF031	90	2284	Culvert	Concrete	4.5	0	0	0	under Prairie Wolf -Deerfield H.S. path
MF033	91	2295	Culvert	Concrete	6	0	0	0	LCFPD bike path
MF033	92	2295	Culvert	Concrete	6	0	0	0	LCFPD bike path
MF034	93	2270	Culvert	Concrete		12.5	4.5	0	concrete box culvert, access to detention pond to SE
SR001	94	948	Bridge	Concrete		0	11.17	47	steel frame; @ Lake Cook Rd; small amounts of sediment on both banks underneath bridge
SR001	95	942	Bridge	Concrete		0	11.83	155	concrete and steel bridge at Clavey Rd. sewage treatment plant; two, 1.5' concrete supports; lots of sediment on left bank under bridge
SR001	96	945	Bridge	Concrete		0	10.42	62	steel frame; at Clavey Rd.; sediment accumulating on both banks under bridge
SR002	97	955	Bridge	Wood		0	9.16	42.5	concrete blocks underneath, upstream, and downstream from bridge on left bank
SR003	98	972	Bridge	Wood			9.67	59.67	within Bob-O-Link Golf Course
SR003	99	976	Bridge	Wood		0	5.58	31	fence with concrete boulders behind bridge upstream on left; within Bob-O-Link Golf Course
SR003	100	987	Bridge	Wood		0	6.75	32.75	some erosion; within Bob-O-Link Golf Course
SR003	101	978	Bridge	Wood		0	6.25	34	concrete blocks under bridge on right bank; within Bob-O-Link Golf Course
SR004	102	995	Bridge	Wood		0	8.25	22.75	within Bob-O-Link Golf Course
SR004	103	1000	Fence	Metal Wire		0	6.17	35	fence separates Bob-O-Link Golf Course and Sunset Valley Golf Course
SR004	104	1005	Bridge	Concrete		0	7.58	30	within Sunset Valley golf course
SR004	105	1009	Bridge	Concrete		0	6.25	44.5	some erosion underneath; within Sunset Valley golf course
SR004	106	1013	Bridge	Concrete		0	7.67	38	within Sunset Valley golf course
SR004	107	1020	Bridge	Concrete		0	7.42	44.5	some erosion underneath; toe protection on left bank upstream from bridge; within Sunset Valley golf course
SR005	108	1026	Bridge	Concrete		0	6.75	42	within Sunset Valley golf course

Stream Reach No.	HS No	GPS Loc. ID	Type	Material	Diam. (ft)	Width (ft)	Height (ft)	Length (ft)	Notes
SR005	109	1030	Bridge	Wood		0	7.58	42	within Sunset Valley golf course
SR005	110	1032	Bridge	Concrete			7.42	44	within Sunset Valley golf course; rip rap upstream on right bank; toe protection upstream on left bank
SR005	111	1035	Bridge	Concrete			6.92	42.5	within Sunset Valley golf course
SR005	112	1041	Bridge	Concrete		0	8.5	45.5	within Sunset Valley golf course
SR006	113	1054	Bridge	Concrete		0	10.67	84.5	at Fredricksons Rd.; concrete with two supports (comprised of multiple columns)
SR006	114	1056	Bridge	Concrete		0	8.17	67	at Central Ave.; one support in middle (with multiple columns); log jam upstream from bridge
SR008	115	1078	Bridge	Concrete		0	8.33	61.5	concrete and steel bridge at Park Ave. West; sediment on both sides underneath
SR009	116	1095	Bridge	Concrete		0	9.33	55	within Highland Park Country Club
SR010	117	1102	Bridge	Wood		0	10	64.5	at HPGC. steel frame, wood planks
SR010	118	1105	Bridge	Wood		0	9.58	59	at HPGC. steel frame, wood planks. some erosion underneath
SR011	119	1112	Bridge	Concrete		0	10.17	86	at Half Day Rd. sediment barin center of bridge. center support, midstream sandbar downstream from bridge
SR012	120	1126	Bridge	Concrete		0	9.67	47.5	steel frame erosion occurring under bridge
SR015	121	1178	Bridge	Concrete		0	7.75	32	at Old Elm Rd. sediment accumulating on both sides of bank
SR017	122	1220	Bridge	Wood		0	10.83	41.67	boulders at toe on right bank and upstream from bridge on left bank
SR018	123	1232	Bridge	Wood		0	7.25	18.5	some erosion upstream and downstream from bank and underneath concrete armoring upstream and downstream from bridge
SR018	124	1240	Bridge	Wood		0	9.58	47.5	steel frame. right bank eroding underneath bridge. sediment under left bank
SR019	125	1253	Bridge	Concrete		0	12.5	42	at Westleigh Rd. woody debris accumulating at riffle under bridge. stagnant water upstream. boulders under bridge on both banks
SR020	126	1275	Bridge	Concrete		0	9.08	67	at Onwentsia club
SR021	127	1286	Bridge	Wood		0	7.42	19.5	in Onwentsia club. erosion around bridge structure steel frame.
SR021	128	1289	Bridge	Wood		0	6.67	32	in Onwentsia Club. steel frame

Stream Reach No.	HS No	GPS Loc. ID	Type	Material	Diam. (ft)	Width (ft)	Height (ft)	Length (ft)	Notes
SR021	129	1293	Bridge	Wood		0	6.75	32	erosion under concrete on left bank. in Onwentsia Club. steel frame
SR021	130	1295	Bridge	Wood		0	6.5	36	concrete broken erosion occurring underneath righ bank. in Onwentsia Club. steel frame
SR022	131	1300	Bridge	Wood		0	6.58	26	in Onwentsia Club. steel frame
SR022	132	1303	Bridge	Wood		0	6.75	44	in Onwentsia Club. steel frame. erosion under concrete on right bank
SR022	133	1308	Bridge	Wood		0	6.42	42	in Onwentsia Club. steel frame
SR022	134	1331	Bridge	Wood		0	8.67	81	at Deerpath Rd. piles of lawn debris on right bank upstream from bridge. rip rap underneath bridge.
SR024	135	1362	Bridge	Wood		0	5.25	35.83	in Deerpath GC. lots of erosion underneath
SR024	136	1366	Bridge	Concrete		0	6.42	39	in Deerpath GC
SR024	137	1371	Bridge	Wood		0	6.17	59.75	in Deerpath GC
SR025	138	1382	Bridge	Wood		0	8.25	38.75	near Laurel Lane, steel frame
SR025	139	1390	Bridge	Concrete		0	14.5	10.5	concrete blocks at toe
SR025	140	1397	Bridge	Wood		0	4.5	41.5	concrete supports eroding. severely eroded bank
SR025	141	1404	Bridge	Concrete		0	7.67	0	concrete supports eroding. severely eroded bank
SR025	142	1499	Bridge	Concrete		0	7.67	14	at RR tracks. cable in channel under bridge
SR026	143	1409	Fence	Metal Wire		0	7.58	19.17	just upstream from RR tracks
SR026	144	1411	Bridge	Steel		0	5.75	34	out of commission
SR026	145	1417	Bridge	Steel		0	7.67	39	stone armoring eroding underneath (on left bank)
SR026	146	1418	Fence	Metal Wire		0	6	20	
SR026	147	5031	Fence	Metal Wire		0	7.58	19.17	just upstream from RR tracks
SR026	148	5034	Bridge	Steel		0	5.75	34	out of commission
SR026	149	5040	Bridge	Steel		0	7.67	39	stone armoring eroding underneath (on left bank)
SR026	150	5041	Fence	Metal Wire		0	6	20	
SR028	151	5061	Bridge	Wood		0	5.42	19	steel and wood. water coming through bridge from worker washing truck. bridge is on Mariani property. erosion under bridge right bank boulders on left bank
SR028	152	5066	Bridge	Concrete		0	9.08	20	Northshore bike path
SR028	153	5066	Bridge	Concrete		0	7.25	24	at 176. sediment bar underneath
SR029	154	5078	Bridge	Concrete		0	6.92	33	within Lake Bluff Golf Course (LBGC)
SR030	155	5085	Bridge	Concrete		0	4.92	32	within LBGC. steel frame

Stream Reach No.	HS No	GPS Loc. ID	Type	Material	Diam. (ft)	Width (ft)	Height (ft)	Length (ft)	Notes
SR030	156	5090	Bridge	Concrete		0	4.92	32	within LBGC. steel frame
SR030	157	5092	Bridge	Concrete		0	13.67	15.67	RR tracks
SR031	158	5102	Culvert	Steel		0	6.92	11	steel and concrete at W. Alabama Ave. in GLNTC
SR031	159	5112	Fence	Metal Wire		0	4.25	25	in GLNTC
SR032	160	5132	Culvert	Steel		0	4	7	under Virginia Ave in GLNTC. steel and concrete
SR032	161	5146	Culvert	Steel		0	4.5	11	near Wyoming Ave in GLNTC. Top is caving in
SR032	162	5147	Culvert	Steel		0	5.5	11	at Wyoming Ave in GLNTC. steel and concrete
SR033	163	5154	Culvert	Steel		0	5	11	almost completely caved in; eroded around entire pipe at GLNTC
SR033	164	5160	Culvert	Steel		0	5.5	10	caving in near steel pipe in photo 5161. soil is coming through pipe at GLNTC, W. Colorado Ave.
SR033	165	5165	Culvert	Concrete		0	3.5	21	2- box culverts each 10' wide. lots of sediment within culvert in GLNTC at Connecticut Ave. mosquito larvae
SR033	166	5167	Culvert	Steel		0	5.5	10	steel and concrete at Alaska Ave. in GLNTC
SR034	167	1412	Culvert	Concrete			4	21	2- box culverts each 10' wide. some sediment inside. bridge leaking from underneath in culvert near right bank
SR034	168	1417	Bridge	Wood		0	3.5	19	wood and steel. at Willow Glen Golf Course. very vegetated. wetland.
SR034	169	1422	Bridge	Wood		0	3.67	24	at WGGC. vegetation surrounding. bridge on either bank
SR034	170	1425	Culvert	Steel	48	0	0	0	at Willow Brook Golf Course
SR034	171	1419	Culvert	Steel	24	0	0	0	rip rap (cobble) above; some erosion within WGGC
SR034	172	1419	Culvert	Steel	24	0	0	0	rip rap (cobble) above; some erosion within WGGC
SR034	173	1416	Culvert	Concrete	18	0	0	0	severely eroded above pipe. lots of sediment below. pool downstream from culvert. source: WGGC
SR035	174	1432	Culvert	Steel		0	6.17	10.5	within Foss Park Golf Course. concrete blocks surrounding culvert
SR035	175	1439	Culvert	Steel		0	5.75	10.67	within Foss Park Golf Course. grass clippings on top of culvert. concrete blocks surrounding
SR035	176	1446	Culvert	Steel		0	5	10.17	culvert within FPGC. concrete blocks surrounding

Stream Reach No.	HS No	GPS Loc. ID	Type	Material	Diam. (ft)	Width (ft)	Height (ft)	Length (ft)	Notes
SR036	177	1449	Bridge	Wood		0	11.08	49	wood and steel. within FPGC. some erosion under bridge
SR036	178	1451	Culvert	Steel		0	5.5	10	within FPGC. gravel road above. concrete blocks surrounding culvert
SR036	179	1457	Culvert	Steel		0	4.17	10	gravel road above. within FPGC
SR036	180	1461	Culvert	Steel		0	4.67	10	gravel road above. within FPGC
SR036	181	1462	Culvert	Steel		0	5	10	vegetated above culvert. within FPGC
SR036	182	1466	Culvert	Steel		0	3.83	10	gravel road above. within FPGC
SR036	183	1468	Culvert	Concrete	24	0	0	0	at north end of GBFP
SR037	184	1476	Bridge	Wood		0	6.58	71	
SR037	185	1478	Culvert	Concrete	4	0	0	0	rip rap above; at north end of GBFP
SR038	186	1486	Culvert	Concrete		0	0.5	1	at Washington St. pool below
SR038	187	1486	Culvert	Concrete	22	0	0	0	at Washington St. pool below
SR038	188	1486	Culvert	Concrete	27	0	0	0	at Washington St. pool below
SR041	189	2406	Culvert	Concrete	2	0	0	0	3 concrete culverts, outlet from online tributary pond
SR041	190	2408	Culvert	Concrete		5	3	0	Valley Road culverts (3x)
SR041	191	2410	Culvert	Concrete	1.5		0	0	3 concrete culverts, outflow from online tributary pond; flow under structure, possibly failing
SR041	192	2414	Culvert	Concrete		5	3	0	Buena Road culverts (2x)
SR041	193	2415	Culvert	Concrete	1	0	0	0	Outlet draining pond (headwaters of channel)

APPENDIX E: STREAM INVENTORY PHOTO LOG

As the stream inventory was performed, photographs were taken to document the conditions encountered. The representative conditions of each reach, and all of the point discharges and hydraulic structures were photographed. In total, over 1,200 photos were taken. The photos are listed and described in the photo log below (Table E-1). The table is arranged by fork where WF is the West Fork, MF is the Middle Fork and SR is the Skokie River. The stream reach number follows the fork designation, for example WF1 indicates the West Fork of the North Branch stream reach #1. The stream reaches are mapped in Figure 3-33.

Table E-1

Photo Log

Lake Co. ID	GPS	Photo Description
WF001	149	beginning of representative reach
WF001	173	concrete bridge at Lake-Cook Road, first set of channel measurements taken at this location
WF001	174	small pipe (less than 4" diameter); no discharge
WF001	175	footbridge
WF001	176	concrete pipe
WF001	177	second set of channel measurements taken at this location
WF001	178	eroded area
WF001	179	eroded area
WF001	180	eroded area
WF001	181	4" plastic pipe near fence/debris impoundment (see also photo 192)
WF001	182	impoundment: broken fence accumulating debris and creating water level differential
WF001	182	4" plastic pipe near fence/debris impoundment
WF001	193	end of representative reach
WF001	194	5' concrete pipe; third set of channel measurements taken at this location
WF001	195	25" concrete pipe, stormdrain
WF001	196	severe erosion just upstream of storm drain
WF002	183	beginning of representative reach; A-jacks
WF002	184	wood, metal, and mesh structure to stabilize bank
WF002	185	concrete pipe, stormdrain; second measurement
WF002	186	4" black plastic pipe
WF002	187	erosion located near plastic pipe in photo 186; erosion problem
WF002	188	4" black plastic pipe with ridges
WF002	189	12" steel pipe, gravel beneath
WF002	190	6" green plastic pipe, gravel beneath; erosion problem
WF002	191	6" green plastic pipe, gravel beneath; first measurement
WF002	197	24.25" steel pipe; third measurement

Lake Co. ID	GPS	Photo Description
WF002	198	36" concrete pipe, substantial flow; potential water quality problem
WF002	199	end of representative reach
WF003	200	beginning of representative reach
WF003	201	stabilization structures
WF003	202	4" black pipe; first measurement
WF003	203	4" black pipe (same as depicted in photo 202)
WF003	204	eroded area
WF003	205	two, 15" steel pipes; debris inside lower one; erosion problem around upper pipe
WF003	206	36" concrete pipe, trickle
WF003	207	sandbar
WF003	208	footbridge
WF003	209	36" concrete pipe, moderate flow
WF003	210	severe erosion; second measurement
WF003	211	stabilizing structure
WF003	212	end of representative reach; sandbar; third measurement
WF004	213	beginning of representative reach; first measurement; see also photo 214
WF004	214	beginning of representative reach; first measurement; see also photo 213
WF004	215	17" steel pipe, sewer odor; sheen on water flowing from it; erosion problem
WF004	216	8" plastic pipe, concrete apron
WF004	217	eroded area
WF004	218	24" concrete pipe, pool below
WF004	219	4" plastic pipe, eroding below; erosion problem
WF004	220	16" plastic pipe with cobble below; second measurement
WF004	221	4" plastic pipe, wood structure below
WF004	222	4" plastic pipe
WF004	223	bridge at Central Avenue; third measurement
WF004	224	48" concrete pipe near bridge
WF004	225	12" plastic pipe under and within bridge at Central Avenue; sediment bar underneath bridge (sediment bars located underneath bridge on both sides of channel)
WF004	226	sediment bar
WF004	227	end of representative reach
WF005	228	beginning of representative reach
WF005	229	midstream bar
WF005	230	second measurement
WF005	231	rectangular concrete pipe within Deerfield Road bridge
WF005	232	25" concrete pipe within bridge

Lake Co. ID	GPS	Photo Description
WF005	234	6" clay pipe
WF005	235	12" circular concrete pipe and 3' square concrete pipe with bars
WF005	236	midstream bars
WF005	237	24" concrete pipe with concrete apron
WF005	238	midstream bars; third measurement
WF005	239	leaky, broken pipe; erosion surrounding pipe, unable to locate source
WF005	240	14" concrete pipe
WF005	241	14" concrete pipe; first measurement
WF005	242	eroded area opposite two concrete pipes near tree swing
WF005	243	34" concrete pipe with concrete apron
WF005	244	36" concrete pipe with concrete apron
WF005	245	12" concrete pipe; very eroded near pipe, erosion problem; part of pipe has broken
WF005	246	6" concrete pipe, eroding soil beneath
WF005	252	end of representative reach; Deerfield Road bridge
WF006	253	beginning of representative reach
WF006	254	armoring; erosion above and below
WF006	255	severe erosion; debris on bank
WF006	256	30" concrete pipe
WF006	257	12" concrete pipe; cobble and gravel below and above
WF006	258	half buried 1" concrete pipe; cobble below and above
WF006	259	48" concrete pipe; debris has filled 1/5 of pipe; bottom of pool below covered with green substance
WF006	260	8" clay pipe; concrete apron; erosion problem; three dead fish on opposite bank
WF006	261	second measurement
WF006	262	severe erosion, roots exposed
WF006	263	4" plastic pipe with 0.25" holes in opening; erosion below
WF006	264	24" concrete pipe within bridge; crayfish in pool below pipe
WF006	265	Juniper Street bridge; sediment accumulating on right (east) bank
WF006	266	end of representative reach
WF007	267	beginning of representative reach
WF007	268	4" plastic pipe; eroding underneath
WF007	269	4" plastic pipe; ladder in channel
WF007	270	two, 4" plastic pipes; concrete apron
WF007	271	18" concrete pipe
WF007	272	6" concrete pipe
WF007	273	4" plastic pipe

Lake Co. ID	GPS	Photo Description
WF007	274	eroded area; streambed mucky nearby
WF007	275	4" plastic pipe
WF007	276	15" concrete pipe; streambed mucky in pool and whitish fog in pool water; potential water quality problem
WF007	277	12" concrete pipe and 4" plastic pipe
WF007	278	midstream bar
WF007	279	4" plastic pipe
WF007	280	4" plastic pipe
WF007	281	second measurement
WF007	282	4" plastic pipe; appears to be disconnected
WF007	283	4" plastic pipe
WF007	284	7" steel pipe; erosion problem
WF007	285	4" plastic pipe; eroding underneath
WF007	286	4" plastic pipe; eroding underneath down to streambed, erosion problem
WF007	287	27" concrete pipe within bridge; moderate flow; pool below
WF007	288	Hazel Road bridge
WF007	289	end of representative reach
WF008	290	beginning of representative reach
WF008	291	48" concrete pipe with substantial flow after rain event
WF008	292	4" white plastic pipe; highly eroded below, erosion problem
WF008	293	6" plastic pipe; eroded bank below
WF008	294	13" concrete pipe; boulders below
WF008	295	12" concrete pipe, concrete apron
WF008	296	eroded bank
WF008	297	1st measurements
WF008	298	4" black pipe; swale above pipe, eroded bank below; erosion problem
WF008	299	swale (above pipe in photo 298)
WF008	300	eroded bank
WF008	301	eroded bank
WF008	302	2nd measurements
WF008	303	4" white plastic pipe w/ erosion underneath
WF008	304	4" green plastic pipe; eroding above and below, erosion problem
WF008	305	4" plastic pipe; eroding beneath, erosion problem
WF008	306	4" steel pipe, concrete below; eroding below pipe, erosion problem
WF008	307	4" orange clay pipe; eroding beneath, erosion problem
WF008	307	4" plastic pipe; severely eroded beneath, erosion problem

Lake Co. ID	GPS	Photo Description
WF008	308	bridge (Wilmot)
WF008	309	two concrete pipes under bridge
WF008	310	18" concrete pipe under bridge
WF008	311	eroded bank
WF008	312	30" concrete pipe, concrete blocks underneath
WF008	313	footbridge; riffle (large concrete boulders) beneath
WF008	314	end of representative reach
WF008	471	Half Day Road bridge with two, 2' supports and a middle section 28' wide; currently a construction site, piles of sediment and debris; west section of bridge is filled with debris, but appears that will be removed in future
WF009	315	beginning of representative reach
WF009	316	8" steel pipe
WF009	317	19" concrete pipe, eroding underneath, erosion problem; concrete blocks below to protect bank
WF009	318	concrete pipe buried under tree, half filled with debris, wet inside; debris in swale leading from pipe to channel and erosion occurring within swale
WF009	319	eroded bank
WF009	320	16" concrete pipe; swale leading down to channel
WF009	321	closed concrete pipe, eroded below
WF009	322	36" concrete pipe
WF009	323	end of representative reach
WF009	324	dam, water spilling over top and through weir
WF010	325	beginning of representative of reach
WF010	326	erosion near coir fiber roll
WF010	327	coir fiber roll under water
WF010	328	swale with significant amount of sediment
WF010	329	grass clippings on bank
WF010	330	footbridge
WF010	331	wooden footbridge
WF010	332	erosion under footbridge
WF010	333	erosion around riffle
WF010	334	concrete pipe, draining highway
WF010	335	3rd measurements
WF010	338	eroded bank
WF010	339	tributary, debris in tributary
WF010	340	6" black plastic pipe; bank protected underneath with concrete
WF010	341	~6" black plastic pipe; unable to measure; severe erosion, erosion problem; swale leading to channel; see also photo 342

Lake Co. ID	GPS	Photo Description
WF010	342	swale leading to stream from black pipe in photo 341
WF010	349	end of reach
WF011	343	concrete conduit from detention pond
WF011	344	closer view of structure in photo 343, four concrete pipes behind bars
WF011	345	2.5' diameter concrete culvert
WF011	346	rock dam
WF011	347	gabions
WF011	348	13" concrete pipe, surrounded by rip rap
WF011	350	beginning of representative reach
WF011	351	1st measurements
WF011	352	dam surrounding pipe in photo 345
WF011	353	concrete armor, detention basin structure
WF011	354	2nd measurements
WF011	355	3rd measurements
WF011	356	two box culverts underneath highway 94
WF011	357	end of representative reach
WF012	15	12" plastic and oval concrete pipes
WF012	16	swale; woody debris within it
WF012	17	end of representative reach
WF012	18	Duffy Road bridge; 2 box culverts; support beam in culvert causing debris to accumulate at upstream end of bridge
WF012	100	eroded area; cannot locate source
WF012	101	3rd measurements
WF012	102	swale; eroding banks within it
WF012	103	swale; woody debris within it
WF012	104	footbridge; unsafe to walk across
WF012	358	beginning of representative reach
WF012	359	golf cart bridge; 1st measurements
WF012	360	erosion under bridge
WF012	361	eroded bank
WF012	362	3" metal pipe
WF012	363	golf cart bridge
WF012	364	eroded bank
WF012	365	4" black plastic pipe; soil eroding around it
WF012	366	tributary; debris accumulating within tributary; many ducks on top of bank nearby
WF012	367	swale; accumulation of dead leaves within it

Lake Co. ID	GPS	Photo Description
WF012	368	eroded bank
WF012	369	(2) 24" diameter concrete pipes; bank severely eroded beneath them
WF013	19	Duffy Road bridge logjam
WF013	20	swale, eroded bank within swale; source: 94
WF013	21	swale, vegetated with cattails
WF013	22	1st measurements
WF013	23	swale
WF013	24	swale; sediment accumulating where swale reaches west fork; eroded bank, erosion problem; source: 94
WF013	25	2nd measurements
WF013	26	midstream sediment bar
WF013	27	sediment accumulating and extending into channel
WF013	28	swale; severely eroded on both banks, erosion problem; source: 94
WF013	29	fallen trees across channel, accumulating debris
WF013	30	swale; source: 94
WF013	31	swale; severely eroded, erosion problem; source: 94
WF013	32	18" steel pipe, some erosion occurring below pipe; source: pond
WF013	33	3rd measurements
WF013	34	end of representative reach
WF014	35	beginning of representative reach
WF014	36	swale; severely eroded, erosion problem
WF014	37	1st measurements
WF014	38	swale, moderate erosion
WF014	39	6" plastic pipe
WF014	40	19" concrete pipe; concrete apron broken; soil eroding above pipe
WF014	41	18" concrete pipe; pool below; 2nd measurements
WF014	42	12" plastic pipe with concrete apron; soil eroding above pipe
WF014	43	18" concrete pipe
WF014	44	24" concrete pipe
WF014	45	16" concrete pipe; soil eroding above pipe
WF014	46	severely eroding bank across from storm drain, erosion problem
WF014	47	48" concrete pipe, storm drain; wood chips along bank
WF014	48	midstream bar
WF014	49	3rd measurements
WF014	50	18" concrete pipe; soil eroding above pipe
WF014	51	culvert, boulders downstream; detention pond upstream from culvert

Lake Co. ID	GPS	Photo Description
WF014	52	end of representative reach
WF015	53	boulder/sidewalk impoundment
WF015	54	beginning of representative reach
WF015	55	30" concrete pipe; 1st measurements
WF015	56	2nd measurements
WF015	57	swale
WF015	58	3rd measurements; mesh screen downstream from culvert stabilization
WF015	59	48" concrete pipe
WF015	60	12" steel pipe; broken, rusty with boulders underneath
WF015	61	two box culverts, bridge at Half Day Rd. Water level differential downstream from culvert
WF015	62	closed, 24" concrete pipe
WF015	63	end of representative reach
WF016	64	12" steel pipe
WF016	65	beginning of representative reach
WF016	66	swale
WF016	67	1st measurements
WF016	68	steel pipe; erosion
WF016	69	fallen trees
WF016	70	24" concrete pipe; erosion occurring below concrete apron
WF016	71	2nd measurements
WF016	72	21" concrete pipe
WF016	73	log jam at fence; water stagnant upstream
WF016	74	24" steel pipe; severe erosion occurring below apron, erosion problem
WF016	75	~48" concrete pipe; unable to measure (pipe is on other side of fence by Hwy 94); erosion causing swale to channel
WF016	76	3rd measurements
WF016	77	swale; vegetated; sediment collecting where swale meets channel
WF016	78	8" clay pipe; eroding underneath; roots exposed
WF016	79	swale; eroding near channel
WF016	80	swale; source is culvert near Hwy 94; unable to measure culvert (on other side of fence); some erosion
WF016	81	swale; source: Hwy 94
WF016	82	swale; source: Hwy 94
WF016	83	cement boulders; silt fence; broken metal pipe
WF016	84	end of representative reach
WF017	85	beginning of representative reach

Lake Co. ID	GPS	Photo Description
WF017	86	9" concrete pipe; source: detention pond; cobble underneath pipe, strawbales
WF017	87	6" concrete pipe creating swale leading to stream; multiple strawbales present
WF017	88	swale; source: concrete pipe by highway 94 (unable to measure)
WF017	89	log jam
WF017	90	1st measurements
WF017	91	swale with debris
WF017	92	swale with debris (leaves and branches)
WF017	93	swale; source: highway 94; see also photo 94
WF017	94	swale; see also photo 93
WF017	95	log jam; stagnant water upstream
WF017	96	2nd measurements
WF017	97	tributary
WF017	98	end of representative reach
WF017	99	3rd measurements
WF018	111	end of representative reach
WF018	370	beginning of representative reach
WF018	371	1st measurements
WF018	372	foot bridge
WF018	373	2nd measurements
WF018	374	vegetated swale without erosion; substantial flow
WF018	375	6" plastic pipe with some erosion
WF018	376	3rd measurements
WF018	377	wood foot bridge with steel frame; vegetated and mesh to protect bank
WF018	378	6" clay pipe; broken, partly underground; erosion problem
WF018	379	53" steel pipe under Everett Rd; source: detention pond
WF018	380	foot bridge; vegetated underneath, mesh to protect bank
WF019	2305	confluence with West Fork North Branch Chicago River/ representative reach
WF019	2306	steel culvert under Saunders Rd.
WF019	2307	representative reach
WF019	2308	4 in. plastic pipe with moderate bank erosion
WF019	2309	wooden footbridge
WF019	2310	4 in. plastic pipe with moderate bank erosion
WF019	2311	4 in. plastic pipe, no erosion
WF019	2312	4 in. plastic pipe
WF019	2313	golf cart bridge and pond overflow from south
WF019	2314	24 in. culvert and swale from West Course Drive

Lake Co. ID	GPS	Photo Description
WF019	2315	overflow from pond to SW
WF019	2316	pond on golf course, moderate erosion on north
WF019	2317	wooden golf cart path bridge between ponds
WF019	2318	two 12 in. and one 16 in. plastic pipe, low flow from upstream
WF019	2319	6 in. plastic drain from north
WF019	2320	4 in. plastic pipe draining west
WF019	2321	concrete golf cart bridge with two low flow culverts
WF019	2322	2 ft. culvert conveying tributary to pond under golf cart path
WF019	2323	6 in. sump discharge
WF019	2324	representative reach
WF019	2325	severe bank erosion
WF019	2326	wooden foot bridge
WF019	2327	severe bank erosion
WF019	2328	swale and 6 in. pipe draining left (south)
WF019	2329	3 24 in culverts draining swales along Clendenin, head of reach
WF020	2330	confluence with West Fork North Branch Chicago River and fence across tributary
WF020	2331	representative reach
WF020	2332	severe debris blockage
WF020	2333	representative reach
WF020	2334	degraded wetland at head of reach
MF001	112	beginning of representative reach
MF001	113	bridge at Lake-Cook Road; boulders along bank near bridge
MF001	114	24" concrete pipe; concrete apron broken, erosion occurring around and above pipe
MF001	115	1st measurements
MF001	116	eroded bank near Lake-Cook Road
MF001	117	5" plastic pipe; source: residential
MF001	118	5" plastic pipe; minor erosion; source: residential
MF001	119	19" concrete pipe; water level same as stream
MF001	120	41" concrete pipe; erosion surrounding pipe
MF001	121	6" clay pipe
MF001	122	12" concrete pipe, water same level as stream
MF001	123	12" concrete pipe, water same level as stream; 2nd measurements
MF001	124	9" concrete pipe; water level same as stream
MF001	125	21" concrete pipe; erosion occurring around pipe; water level same as stream
MF001	126	12" concrete pipe; erosion occurring above pipe; water level same as stream

Lake Co. ID	GPS	Photo Description
MF001	127	eroded bank
MF001	128	tributary; right bank eroded; accumulation of dead leaves
MF001	129	end of representative reach; 3rd measurements
MF002	130	beginning of representative reach
MF002	131	1st measurements
MF002	132	swale; vegetated with garlic mustard
MF002	133	6" clay pipe
MF002	134	three steel pipes filled with sediment; the concrete apron of the largest pipe is broken
MF002	135	48" steel pipe; water same level as stream
MF002	136	4" plastic pipe; eroding above and below
MF002	137	eroded bank, exposed roots
MF002	138	19" concrete pipe; eroded soil around pipe
MF002	139	12" concrete pipe; eroded above pipe; filled with sediment
MF002	140	bridge at Shenandoah Court, three box culverts; 2nd measurements
MF002	141	12" concrete pipe; eroded below pipe
MF002	142	swale; wood chips within swale channel
MF002	143	4" steel pipe; eroded soil around pipe
MF002	144	18" concrete pipe
MF002	145	4" plastic pipe
MF002	146	4" plastic pipe; eroded below pipe
MF002	147	swale; woody debris accumulating within swale
MF002	148	27" concrete pipe with apron; mulch on upstream bank near pipe; 1/4 of pipe filled with water
MF002	150	48" concrete pipe; soil eroded surrounding pipe; less than 1/4 of pipe filled with water
MF002	151	3rd measurements
MF002	152	end of representative reach
MF003	153	beginning of representative reach
MF003	154	4"steel pipe; eroding soil underneath pipe; source: residential
MF003	155	eroded bank, tree roots exposed
MF003	156	1st measurements
MF003	157	4" plastic pipe, some erosion below pipe; source: residential
MF003	158	4" plastic pipe, some erosion below pipe; source: residential
MF003	159	4" plastic pipe; source: residential
MF003	160	36" concrete pipe with concrete apron; storm drain
MF003	161	2nd measurements
MF003	162	4" plastic pipe; adjacent to a plastic pipe (less than 4 inches in diameter), which is eroding soil and exposing roots; source: residential

Lake Co. ID	GPS	Photo Description
MF003	163	4" clay pipe; source: residential
MF003	164	eroded bank
MF003	165	4" clay pipe; eroding soil below, tree roots exposed; source: residential
MF003	166	two, 4" plastic pipes; some erosion on bank below pipes; source: residential
MF003	167	6" plastic pipe; source: residential
MF003	168	6" plastic pipe; some erosion below pipe; source: residential
MF003	169	4" clay pipe, filled with sediment; source: residential
MF003	170	two, 6" plastic pipes; source: residential
MF003	171	4" clay pipe, broken; source: residential
MF003	172	29" concrete pipe, pool below; storm drain; water level in pipe same as stream
MF003	381	36" concrete pipe; storm drain; pipe is broken (dislocated)
MF003	382	swale; 3rd measurements
MF003	383	eroded bank
MF003	384	eroded bank
MF003	385	16" concrete pipe with concrete apron
MF003	386	24" plastic pipe
MF003	387	bridge at Deerfield Road; rip rap underneath bridge on both banks
MF003	388	end of representative reach
MF004	390	beginning of representative reach
MF004	389	12" steel pipe; source: Deerfield Road
MF004	391	6" clay pipe; some erosion below pipe
MF004	392	4" plastic pipe; concrete blocks below pipe; source: residential
MF004	393	10" steel pipe, rusted within; eroded soil surrounding pipe; source: residential
MF004	394	swale; source: residential; 1st measurements
MF004	395	eroded bank
MF004	396	swale; woody debris accumulating within swale
MF004	397	6" plastic pipe; swale above and below pipe; source: residential
MF004	398	eroded bank
MF004	399	12" concrete pipe, cobble below and above pipe; some erosion occurring near pipe, mesh stabilizing bank on either side of pipe and eroding soil underneath mesh on the downstream end; storm drain
MF004	400	swale; eroded banks within swale, especially near toe of stream; 2nd measurements
MF004	401	eroded bank
MF004	402	closed, 4" plastic pipe
MF004	403	steel pipe spanning channel
MF004	404	25" steel pipe; source: residential
MF004	405	30" concrete pipe; source: residential road

Lake Co. ID	GPS	Photo Description
MF004	406	10" plastic pipe, A-jacks below; source: residential road
MF004	407	steel pipe spanning channel
MF004	408	36" concrete pipe; moderate erosion surrounding pipe, sediment accumulating within channel; storm drain with concrete apron
MF004	409	17" steel pipe; severely eroded below rusted and broken pipe, erosion problem; source: residential road; 3rd measurements
MF004	410	10" plastic pipe, some erosion below; source: residential
MF004	411	4" plastic pipe, erosion below pipe; source: residential
MF004	412	4" plastic pipe, eroded below; source: residential
MF004	413	steel pipe spanning channel
MF004	5000	end of representative reach
MF005	5001	beginning of representative reach
MF005	5002	swale; cobble within swale channel; right bank of swale eroding despite mesh protection
MF005	5003	12" steel pipe; soil eroding underneath pipe, erosion problem; source: residential
MF005	5004	4" plastic pipe with small swale leading from pipe to channel; source: residential
MF005	5005	swale; some debris within swale
MF005	5006	1st measurements
MF005	5007	eroded bank
MF005	5008	6" plastic pipe; lawn clippings dumped above pipe; source: residential
MF005	5009	4" plastic pipe, some erosion below; source: residential
MF005	5010	6" plastic pipe with small swale leading from pipe to channel; source: residential
MF005	5011	36" concrete pipe with concrete apron; storm drain
MF005	5012	12" concrete pipe; cobble and small swale above pipe
MF005	5013	48" concrete pipe; storm drain
MF005	5014	discharge point; no pipe structure present, only a hole with mesh above and cobble below
MF005	5015	30" steel pipe; opposite bank eroded, erosion problem
MF005	5016	2nd measurements
MF005	5017	6" steel pipe; somewhat eroded below; source: residential
MF005	5018	swale; moderately eroded within swale; woody debris within swale
MF005	5019	swale; woody debris within swale
MF005	5020	36" steel pipe; opposite bank eroded, erosion problem; storm drain
MF005	5021	12" concrete pipe; severely eroded bank above pipe, erosion problem
MF005	5022	swale; woody debris within swale
MF005	5023	4"plastic pipe; bank somewhat eroded below pipe
MF005	5024	swale; severely eroded banks within swale, erosion problem
MF005	5025	swale; banks somewhat eroded within swale
MF005	5026	eroded bank; 3rd measurements

Lake Co. ID	GPS	Photo Description
MF005	5027	end of representative reach
MF006	5028	beginning of representative reach
MF006	417	21" concrete pipe, storm drain near Woodvale Ave.; 1/4 of pipe filled with water1st measurements
MF006	418	swale, somewhat eroded
MF006	419	swale, woody debris within swale and some erosion occurring
MF006	420	swale; severe erosion, erosion problem
MF006	421	24" concrete pipe; concrete apron below and burlap mesh downstream from pipe
MF006	422	eroded bank
MF006	423	6" steel pipe, small swale leading to channel
MF006	424	36" concrete pipe; soil eroding around pipe and on opposite bank, erosion problem; somewhat filled with water
MF006	425	eroded bank; 2nd measurements
MF006	426	swale, deer run; some erosion occurring
MF006	427	8" plastic pipe; swale leading from pipe to channel
MF006	428	swale, deer run
MF006	429	9" steel rusted and broken pipe; severe erosion, erosion problem
MF006	430	12" concrete pipe; bank severely eroded underneath pipe, erosion problem; burlap mesh and tree revetments near pipe
MF006	431	logjam
MF006	432	logjam, creating somewhat of an impoundment
MF006	433	8" plastic pipe, swale leading from pipe to channel
MF006	434	10" steel pipe; 1/2 of pipe filled with sediment
MF006	435	swale; 3rd measurements
MF006	436	14" concrete pipe; cobble and boulders below and above; source: residential
MF006	437	tributary; severely eroded, erosion problem
MF006	438	end of representative reach
MF007	439	beginning of representative reach
MF007	440	swale
MF007	441	13" concrete pipe; boulders and cobble beneath and concrete above pipe
MF007	442	12" concrete pipe
MF007	443	bridge
MF007	444	12" concrete pipe; cobble above and below pipe
MF007	445	swale
MF007	446	4" plastic pipe; cap on opening of pipe with 1/2-inch holes
MF007	447	6" plastic pipe

Lake Co. ID	GPS	Photo Description
MF007	448	tributary; moderately eroding banks; water level in tributary same as that in stream, but does not appear to be flowing into stream
MF007	449	logjam, slightly impounded
MF007	450	24" concrete pipe with concrete apron; source: Deerfield High School
MF007	451	bridge (out of commission)
MF007	452	26" steel pipe; cobble below pipe and some erosion near channel; small swale from pipe to stream channel
MF007	453	1st measurements
MF007	454	two, circular, 72" concrete culverts; swale/tributary on other side of culverts; some erosion occurring around culverts
MF007	455	tributary, severe erosion; several fallen trees span tributary
MF007	456	severe erosion
MF007	457	3 circular 72" concrete culverts; tributary on other side of culverts; some erosion occurring along swale leading from culverts to stream channel
MF007	458	swale, some erosion within; 2nd measurements
MF007	459	24" concrete pipe, boulders and cement above pipe; 3rd measurements
MF007	460	end of representative reach
MF008	461	beginning of representative reach
MF008	462	eroded bank, sedimentation
MF008	463	eroded bank, 1st measurements
MF008	464	swale; some erosion, small amount of sediment accumulating near channel
MF008	465	24" concrete pipe; swale above pipe, erosion occurring on either side of pipe; source: corporate campus
MF008	466	swale with moderate erosion; source: detention basin
MF008	467	52" concrete culverts and 12" concrete pipe; erosion occurring near channel; boulders below culverts; source: corporate campus; 2nd measurements
MF008	468	12" concrete pipe with cobble and boulders below; source: wetland water control structure; 3rd measurements
MF008	469	12" plastic pipe; cobble below and upstream from pipe; source: Prairie Wolf Slough
MF008	470	4th measurements
MF008	474	end of representative reach
MF009	472	24" concrete pipe; within old bridge structure (the part of the structure that likely will be removed during current construction); source: Half Day Road
MF009	473	beginning of representative reach
MF009	475	1st measurements
MF009	476	eroded bank
MF009	477	mostly buried, approximately 4" steel pipe and broken clay pipe above the steel pipe (the latter is not a discharge point any more); concrete blocks above and swale extends from steel pipe to channel; source: residential

Lake Co. ID	GPS	Photo Description
MF009	478	36" concrete pipe within detention basin
MF009	479	72" concrete pipe within detention basin
MF009	480	logjam; stagnant water and slightly impounded
MF009	481	swale, some erosion occurring within swale; source: residential; 2nd measurements
MF009	482	36" concrete pipe with sediment inside; erosion above and sediment accumulating below pipe
MF009	483	eroded bank
MF009	484	tributary
MF009	485	9" steel pipe; erosion surrounding pipe, broken concrete blocks above pipe; pipe under water
MF009	486	swale; source: residential
MF009	487	swale
MF009	488	end of representative reach; 3rd measurements
MF010	489	beginning of representative reach
MF010	490	8" plastic pipe; small swale from pipe to channel, some erosion; source: residential
MF010	491	36" concrete pipe; some sedimentation downstream from pipe; pool below concrete apron; source: storm drain
MF010	492	4" plastic pipe; source: residential; 1st measurements
MF010	493	8" plastic pipe; grass clippings above pipe resulting in erosion and sedimentation; source: residential
MF010	494	6" clay pipe; swale above and below pipe; source: residential
MF010	495	eroded bank
MF010	496	6" plastic pipe; highly eroded, erosion problem; swale above pipe; source: residential
MF010	497	eroded area within bank
MF010	498	swale; sediment accumulating near channel; source: residential
MF010	499	swale with some erosion; source: forest preserve; 2nd measurements
MF010	500	8" steel pipe extends into channel (right side of photo); source: residential; left side of photo: 42" concrete pipe with pool below; storm drain
MF010	501	12" plastic pipe with some erosion below; source: Prairie Wolf Forest Preserve
MF010	502	foot bridge with steel frame and wood planks; both banks eroding underneath bridge, no vegetation present
MF010	503	8" plastic pipe with some erosion; source: Prairie Wolf Forest Preserve
MF010	504	18" steel pipe; source: Prairie Wolf Forest Preserve
MF010	505	eroded area within bank
MF010	506	eroded bank
MF010	507	3rd measurements; end of representative reach
MF011	508	beginning of representative reach
MF011	509	eroded bank

Lake Co. ID	GPS	Photo Description
MF011	510	12" clay pipe; swale leading from pipe to channel; source: forest preserve
MF011	511	swale; moderately eroded; source: forest preserve
MF011	512	eroded bank
MF011	513	8" clay pipe; severely eroded swale leading from pipe to channel
MF011	514	21" concrete pipe with concrete blocks below; storm drain; 1st measurements
MF011	515	eroded bank near several piles of instream debris
MF011	516	eroded bank downstream from logjam
MF011	517	logjam downstream from bridge creating slight impoundment (stagnant water)
MF011	518	swale; source: forest preserve; 2nd measurements
MF011	519	steel bridge; eroded banks underneath; old car on bridge
MF011	520	swale; source: forest preserve
MF011	521	swale; sediment accumulating near channel and woody debris within swale; source: forest preserve
MF011	522	3rd; eroded bank
MF011	523	end of representative reach
MF012	524	beginning of representative reach; logjam
MF012	525	1st measurements
MF012	526	24" concrete pipe; severely eroded downstream from pipe, erosion problem; storm drain
MF012	527	48" concrete pipe; sediment accumulating downstream from pipe; pool below; storm drain
MF012	528	eroded bank near Old Elm Road
MF012	529	12" concrete pipe; eroded bank and pool below
MF012	530	4" steel pipe
MF012	531	two box culverts at Old Elm Road; severe logjam, stagnant water
MF012	532	18" steel pipe near Old Elm Road; some erosion occurring; concrete blocks below
MF012	533	18" concrete pipe near Old Elm Road
MF012	534	2nd measurements
MF012	535	8" steel pipe, rusted and with holes in it; swale below pipe; source: residential
MF012	536	8" steel pipe near Old Elm Road
MF012	537	6" plastic pipe; some erosion occurring; small swale below pipe; source: residential
MF012	538	24" concrete pipe; swale below and woody debris above pipe; 1/2 filled with sediment
MF012	539	4" concrete pipe with small swale below; source: residential
MF012	540	5" steel pipe
MF012	541	12" steel pipe within bridge at Everett Road
MF012	542	12" steel pipe within bridge at Everett Road
MF012	543	48" concrete pipe within bridge at Everett Road; pool below
MF012	544	60" concrete pipe within bridge at Everett Road; pool below

Lake Co. ID	GPS	Photo Description
MF012	545	bridge at Everett Road; boulders underneath bridge; sediment bar on left bank under bridge
MF012	546	20" concrete pipe, broken; eroded soil below pipe; 3rd measurements
MF012	547	end of representative reach
MF013	548	beginning of upstream reach
MF013	549	8" steel pipe; severe erosion above pipe, erosion problem
MF013	550	6" clay pipe; large swale leading from pipe to stream, moderate erosion occurring; severe erosion above pipe, erosion problem
MF013	551	8" steel pipe; erosion below pipe
MF013	552	1st measurements
MF013	553	8" steel pipe; erosion below pipe
MF013	554	log jam, stagnant water present
MF013	893	swale; moderately eroding banks
MF013	894	swale from old, broken pipe; severely eroding banks within swale, erosion problem
MF013	895	erosion within bank
MF013	896	6" clay pipe; swale leading from pipe to channel; pipe may be disconnected from water source
MF013	897	18' concrete pipe; erosion occuring on bank upstream and downstream from pipe; source: detention ponds
MF013	898	swale; severely eroding banks, erosion problem; 2nd measurements
MF013	899	14" concrete pipe; large swale above pipe; sedimentation occurring within channel, water flowing between apron and pipe (concrete apron has broken away from pipe)
MF013	900	swale
MF013	901	10" clay pipe; small swale leading from pipe to stream
MF013	902	swale; some debris and erosion within swale
MF013	903	18" steel pipe; eroding bank around pipe
MF013	904	3rd measurements
MF013	905	log jam, some stagnant water present
MF013	906	end of representative reach
MF014	555	erosion within bank
MF014	556	erosion within bank; deer run
MF014	557	severe erosion
MF014	558	2nd measurements
MF014	559	three pipes (two 4" plastic, 12" clay); cobble below pipes and leading to channel
MF014	560	4" clay pipe; erosion above and sediment accumulating below
MF014	561	swale with moderately eroding banks
MF014	562	4" concrete pipe; small swale above pipe; 3rd measurements
MF014	563	eroded bank

Lake Co. ID	GPS	Photo Description
MF014	565	end of representative reach
MF014	907	beginning of representative reach
MF014	908	28" concrete pipe; concrete apron broken; boulders below pipe; erosion occurring around pipe despite mesh
MF014	909	12" clay pipe; swale leading to channel; sediment accumulating below pipe
MF014	910	swale; moderately eroded
MF014	911	1st measurements
MF014	912	erosion within bank
MF014	913	12" concrete pipe; cobble surrounding pipe; swale leading to channel
MF014	914	19" concrete pipe; erosion downstream from pipe
MF015	564	19" steel pipe within bridge 19" steel pipe at Westleigh Rd; small swale leading from pipe to channel
MF015	566	beginning of representative reach; bridge at Westleigh Rd.
MF015	567	18" steel pipe; small swale leading to channel
MF015	568	15" concrete pipe
MF015	569	15" concrete pipe within bridge at Westleigh Rd.
MF015	570	woody debris pile
MF015	571	1st measurements
MF015	572	closed, 18" concrete pipe with concrete apron; boulders and cobble in channel below; some erosion surrounding pipe
MF015	573	old clay pipe; mostly buried; swale from pipe to channel
MF015	574	6" plastic pipe; sediment accumulating in channel; small swale leading to channel
MF015	575	two steel pipes (6" and 20"); severely eroded bank
MF015	576	12" steel pipe; rusted, hole in bottom; some erosion
MF015	577	swale with moderate erosion
MF015	578	2nd measurements; closed 12" concrete pipe with concrete apron; boulders at toe and cobble below apron
MF015	579	bridge at Waukegan Rd; rip rap underneath bridge
MF015	580	16" concrete pipe under bridge at Waukegan Rd
MF015	581	16" concrete pipe under bridge at Waukegan Rd
MF015	582	two, 18" concrete pipes with concrete aprons and rip rap surrounding pipes
MF015	583	24" concrete pipe with concrete apron; severe erosion surrounding pipe; 3rd measurements
MF015	584	eroded bank across from concrete swale (Lake Forest High School)
MF015	585	footbridge at Lake Forest High School
MF015	586	end of representative reach
MF016	587	beginning of representative reach
MF016	588	1st measurements

Lake Co. ID	GPS	Photo Description
MF016	589	14" concrete pipe; cobble below; bubbles forming, water slightly foamy; source: Lake Forest High School
MF016	590	14" concrete pipe; cobble below pipe and leading to stream
MF016	591	debris load instream
MF016	592	2nd measurements
MF016	593	swale; severe erosion within swale
MF016	594	36" concrete pipe; some erosion occurring
MF016	595	3rd measurements
MF016	596	15" steel pipe; eroding bank below
MF016	597	36" concrete pipe; concrete apron coming away from pipe; pool below
MF016	598	bridge at route 60; sediment accumulating on both banks under bridge
MF016	599	end of representative reach
MF017	600	4" concrete pipe (hidden among vegetation)
MF017	601	24" steel pipe (hidden among vegetation)
MF017	602	beginning of representative reach
MF017	603	12" steel pipe; some erosion below; source: forest preserve
MF017	604	concrete bridge at Melody Lane; sediment bars on both banks under bridge; severe erosion on right bank upstream from bridge
MF017	605	12" steel pipe; erosion above and below
MF017	606	severe erosion upstream from bridge at Melody Lane
MF017	607	1st measurements
MF017	608	13" concrete pipe; 1/4 filled with water
MF017	609	concrete bridge; left bank: crumbling asphalt; right bank: sediment bar
MF017	610	2nd measurements
MF017	611	24" plastic pipe; cobble leading to channel; some sedimentation near toe
MF017	612	8" steel pipe; 1/4 filled with water
MF017	613	12" steel pipe; 1/2 filled with sediment
MF017	614	3rd measurements; end of representative reach
MF018	615	beginning of representative reach
MF018	616	swale with some erosion, tree roots exposed
MF018	617	1st measurements
MF018	618	12" concrete pipe; some erosion on either side of pipe
MF018	619	30" concrete pipe; some water within pipe; pool below concrete apron
MF018	620	4" clay pipe; more than 1/2 filled with sediment; small swale leading to channel; some erosion
MF018	621	three, 16" plastic pipes; cobble leading to channel; moderate erosion near toe of channel
MF018	622	8" plastic pipe; lawn clippings and broken concrete above pipe

Lake Co. ID	GPS	Photo Description
MF018	623	2nd measurements
MF018	624	6" steel pipe
MF018	625	three, 16" plastic pipes; erosion occurring; sediment accumulating near channel
MF018	626	4" plastic pipe; some erosion; small swale leading from pipe to channel
MF018	627	4" plastic pipe; gravel below and some sedimentation
MF018	628	erosion caused by lawn clippings
MF018	629	eroded bank
MF018	630	logjam, stagnant water upstream (somewhat of an impoundment)
MF018	631	42" concrete pipe; pool below apron
MF018	632	logjam
MF018	633	3rd measurements
MF018	634	end of representative reach
MF018	636	footbridge
MF019	635	beginning of representative reach
MF019	637	three, 16" plastic pipes
MF019	638	18" concrete pipe mostly filled with sediment
MF019	639	swale; 1st measurements
MF019	640	24" concrete pipe
MF019	641	12" steel pipe
MF019	642	18" concrete pipe
MF019	643	three, 16" plastic pipes
MF019	644	footbridge in Middle Fork Savannah Forest Preserve; 2nd measurements
MF019	645	12" clay pipe with concrete blocks above and below
MF019	646	10" steel pipe
MF019	647	3rd measurements
MF019	648	foot bridge within Middle Fork Savannah Forest Preserve
MF019	649	end of representative reach
MF020	650	beginning of representative reach
MF020	651	tributary; cobble and boulders near channel; some erosion
MF020	652	15" plastic pipe; boulders lead to channel from pipe; pipe underneath trail
MF020	653	1st measurements
MF020	654	24" steel pipe; 1/2 filled with sediment; small swale to channel; erosion surrounding pipe
MF020	655	moderately eroded swale
MF020	656	log jam; water somewhat stagnant (slightly impounded)
MF020	657	24" steel pipe; severe erosion, erosion problem
MF020	658	foot bridge; 2nd measurements

Lake Co. ID	GPS	Photo Description
MF020	659	8" plastic pipe; some erosion; small swale to stream
MF020	660	swale
MF020	661	log jam; stagnant water present
MF020	662	15" plastic pipe; cobble to stream; pipe goes underneath trail
MF020	663	18" concrete pipe; large swale to channel; some erosion
MF020	664	18" plastic pipe; pool below; eroding soil around pipe
MF020	665	30" concrete pipe under trail; large swale leads to channel; some erosion
MF020	666	log jam
MF020	667	3rd measurements
MF020	668	bridge at railroad tracks; sediment accumulating on right bank underneath tracks
MF020	669	end of representative reach
MF021	670	beginning of representative reach
MF021	671	1st measurements
MF021	672	steel bridge frame (out of commission)
MF021	673	2nd measurements
MF021	675	woody debris in stream; water very stagnant upstream from debris
MF021	676	3rd measurements; 42" concrete pipe with apron broken; soil eroding where water flows from pipe, erosion problem; pool below pipe
MF021	677	end of representative reach
MF022	678	beginning of representative reach
MF022	679	log jam, stagnant water; 1st measurements
MF022	680	swale; strong organic matter smell; moderate erosion within swale, tree roots exposed
MF022	681	18" steel pipe; broken and eroded above
MF022	682	severe log jam; 2nd measurements
MF022	683	box culvert at railroad tracks; water level differential; channel downcuts downstream from culvert
MF022	684	swale with gravel within; some erosion
MF022	685	3rd measurements
MF022	686	log jam
MF022	687	swale with some erosion within; source: railroad tracks
MF022	688	bridge (railroad tracks); sediment bar on right bank under bridge
MF022	689	36" concrete pipe within bridge
MF022	690	27" concrete pipe within bridge
MF022	691	end of representative reach; concrete bridge at 176; pool downstream from bridge; culvert on left is filled with sediment and vegetation
MF023	692	beginning of representative reach
MF023	693	1st measurements

Lake Co. ID	GPS	Photo Description
MF023	694	12" steel pipe; 1/2 filled with sediment
MF023	695	log jam, stagnant water present
MF023	696	broken, 18" steel pipe; eroded soil surrounding pipe; 2nd measurements
MF023	697	concrete bridge at railroad tracks; rip rap underneath bridge on both banks
MF023	698	7" plastic pipe within bridge at railroad tracks
MF023	699	7" plastic pipe within bridge at railroad tracks
MF023	700	36" steel pipe; severe erosion on opposite bank, erosion problem; boulders below; source: railroad yard
MF023	701	end of representative reach; 3rd measurements
MF023	703	erosion opposite 36" pipe in photo 700
MF024	702	beginning of representative reach
MF024	704	1st measurements
MF024	705	swale; eroding soil within swale; tree roots exposed
MF024	706	eroded bank
MF024	707	2nd measurements
MF024	708	eroded bank
MF024	709	10" steel pipe; some erosion around pipe
MF024	710	3rd measurements
MF024	711	bridge at Atkinson road
MF024	713	end of representative reach
MF025	712	16" steel pipe under culvert; small swale leading to channel
MF025	714	beginning of representative reach
MF025	715	1st measurements
MF025	716	36" steel pipe; pool below; concrete rip rap structure surrounding pipe; source: detention pond
MF025	717	36" concrete pipe; concrete rip rap structure below pipe; source: detention pond
MF025	718	vegetated streambed; 2nd measurements
MF025	719	vegetated streambed
MF025	720	three, 20" concrete pipes
MF025	721	willows and cattails in streambed
MF025	722	cattails in streambed
MF025	915	3rd measurements
MF025	916	36" concrete pipe
MF025	917	end of representative reach
MF026	918	beginning of representative reach
MF026	919	1st measurements
MF026	920	2nd measurements

Lake Co. ID	GPS	Photo Description
MF026	921	36" steel pipe; eroding above pipe; woody debris present; access road above pipe (culvert)
MF026	922	sediment, gravel and debris on right bank, eroding and accumulating in channel near railroad tracks
MF026	923	3rd measurements
MF026	924	end of representative reach
MF028	2232	2 culverts draining Dalitsch pond (borrow pit near Lake Forest Tollway Oasis)
MF028	2233	Dalitsch pond (borrow pit near Lake Forest Tollway Oasis)
MF028	2234	Inlet to Dalitsch pond, culverts non-functional, flow enters overland
MF028	2235	debris blockage downstream of I-94
MF028	2236	2 culverts under I-94, upstream end of reach
MF028	2335	confluence at Middle Fork North Branch Chicago River
MF028	2336	erosion at riffle grade control near confluence
MF028	2337	representative reach
MF028	2338	Middle Fork Savanna bike path bridge
MF028	2339	swale-over flow from restored wetland
MF028	2340	swale/deer crossing
MF028	2341	representative reach (higher banks)
MF028	2342	twin culverts under RR tracks
MF028	2343	representative reach
MF028	2344	representative reach with debris blockage (minor)
MF028	2345	swale draining wetland from left (south) bank
MF028	2346	tributary exiting wetland complex
MF028	2347	tributary from pond to north
MF029	2237	fence and debris blocking stream at I-94
MF029	2238	significant debris jam and garbage in stream
MF029	2239	sump outfall
MF029	2240	sump outfall, slight bank erosion
MF029	2241	severe bank erosion/representative reach (near driveway)
MF029	2242	culvert under drive, severe erosion on right bank
MF029	2243	swale draining from west/ Bradley Road
MF029	2244	sump drain
MF029	2245	representative reach
MF029	2246	debris blockage
MF029	2247	sump outfall
MF029	2248	severe erosion on outside bend
MF029	2249	culvert under driveway

Lake Co. ID	GPS	Photo Description
MF029	2250	culverts under W. Oasis Access Road
MF030	2251	confluence with Middle Fork North Branch Chicago River
MF030	2252	debris blockage
MF030	2253	erosion caused by debris blockage in 2252
MF030	2254	debris jam and minor bank erosion
MF030	2255	representative reach
MF030	2256	debris jam with moderate erosion
MF030	2258	representative reach-wooded, more bank erosion
MF030	2259	representative reach, moderate to severe bank erosion, bare banks
MF030	2260	erosion due to meandering/pilot channel
MF030	2261	swale draining from north (source unknown)
MF030	2262	swale draining from north, no vegetation but low erosion
MF030	2263	representative reach
MF030	2264	braided channel in woodland
MF030	2265	2 concrete culverts under IL 43 (Waukegan Rd.)
MF030	2266	2 steel pipes draining IL 43 (Waukegan Rd.) from north
MF030	2267	2 steel pipes draining IL 43 (Waukegan Rd) from south
MF031	2283	confluence with Middle Fork North Branch Chicago River
MF031	2284	3 concrete culverts under Prairie West-DHS bike path
MF031	2285	representative reach
MF031	2286	swale draining from north
MF031	2287	debris blockage in stream
MF031	2288	swale draining from north
MF031	2289	swale draining parking area to south (Sears facility)
MF031	2290	representative reach
MF031	2291	representative reach-cattails in channel
MF031	2292	storage area to north
MF031	2293	representative reach
MF031	2294	concrete pipe at head of tributary
MF032	2278	confluence with Middle Fork North Branch Chicago River at Fujisawa/WSDD bank restoration project
MF032	2279	representative reach
MF032	2280	severe erosion due to outfall
MF032	2281	point discharge at head of tributary
MF032	2282	pond at headwaters of tributary
MF033	2295	confluence with Middle Fork North Branch Chicago River/ culverts under LCFPD bike path

Lake Co. ID	GPS	Photo Description
MF033	2296	representative reach
MF033	2297	severe erosion on entire left bank
MF033	2298	severe erosion due to tree roots/debris
MF033	2299	representative reach
MF033	2300	shear bank-severe erosion
MF033	2301	severe erosion, 1-2 ft. undercut bank
MF033	2302	6 in. pipe, cracked and failing
MF033	2303	12 in. pipe draining Sears parking area
MF033	2304	18 in. pipe draining Sears parking area
MF034	2268	confluence with Middle Fork North Branch Chicago River
MF034	2269	representative reach
MF034	2270	box culvert crossing tributary
MF034	2271	severe erosion on right/west bank
MF034	2272	exposed 6 in. plastic pipe crossing streambed
MF034	2273	severe erosion/claypan bank
MF034	2274	severe bank erosion
MF034	2275	severe bank erosion due to outfall in 2276
MF034	2276	culvert discharging from west
MF034	2277	representative reach
SR001	934	18" concrete pipe
SR001	935	tributary; source HWY 41; 1st measurements
SR001	936	54" steel pipe: pool below; algae present
SR001	937	vegetated swale
SR001	938	two 18" steel pipes; unable to measure; source: sewage treatment plant detention basin
SR001	939	debris jam upstream from midstream sand bar
SR001	940	4" black plastic pipe and ~72"concrete pipe; lots of sediment and organic matter below pipe; some erosion occurring
SR001	941	three concrete pipes (36", 72", 10" from right to left); large swale from pipes to channel; some erosion occurring; source: sewage treatment plant at Clavey Rd.
SR001	942	concrete and steel bridge at Clavey Rd. sewage treatment plant; lots of sediment on left bank under bridge; 2nd measurements
SR001	943	3rd measurement
SR001	944	~72" concrete pipe; small swale to stream; source: sewage treatment plant at Clavey Rd.
SR001	945	Clavey Rd. bridge; sediment accumulating on either bank under bridge
SR001	946	end of representative reach
SR001	947	30" concrete pipe; concrete blocks below; source: Clavey Road
SR001	948	bridge at Lake Cook Rd.; small amounts of sediment on both banks

Lake Co. ID	GPS	Photo Description
SR001	949	beginning of representative reach
SR002	950	beginning of representative reach
SR002	951	eroded bank; exposed roots
SR002	952	12" steel pipe; under water
SR002	953	12" clay pipe
SR002	954	1st measurements
SR002	955	wood bridge; concrete blocks underneath, upstream and downstream from bridge on left bank
SR002	956	18" steel pipe
SR002	957	eroded bank
SR002	958	eroded bank
SR002	959	eroded bank
SR002	960	2nd measurements
SR002	961	closed; 30" steel pipe
SR002	962	3rd measurements
SR002	963	end of representative reach
SR003	964	beginning of representative reach
SR003	965	oval steel pipe; eroded soil surrounding pipe
SR003	966	swale; high erosion, little vegetation
SR003	967	1st measurements
SR003	968	10" clay pipe
SR003	969	36" steel pipe; 1/2 filled with sediment
SR003	970	2nd measurements
SR003	971	tributary; log jam within tributary
SR003	972	wood bridge within bob-o-link golf course
SR003	973	4" plastic pipe; source: bob-o-link golf course
SR003	974	6" plastic pipe; source: bob-o-link golf course
SR003	975	12" steel pipe; source: bob-o-link golf course
SR003	976	wood bridge bob-o-link golf course
SR003	977	15" plastic pipe; some erosion under plastic apron; source: Bob-o-link Golf Course
SR003	978	wood bridge within bob-o-link golf course; concrete blocks under right bank
SR003	979	16" plastic pipe; erosion occurring below apron; source: Bob-o-link Golf Course
SR003	980	4" plastic pipe; source: Bob-o-link Golf Course
SR003	981	7" steel pipe; some erosion occurring around pipe; source: Bob-o-link Golf Course
SR003	982	eroded bank
SR003	983	4" plastic pipe; some erosion occurring; source: Bob-o-link Golf Course

Lake Co. ID	GPS	Photo Description
SR003	984	3rd measurements
SR003	985	4" plastic pipe; some erosion; source: bob-o-link golf course
SR003	986	6" steel pipe; erosion above and below; bank sloughing above; source: bob-o-link golf course
SR003	987	wood bridge within Bob-o-link Golf Course; some erosion
SR003	988	6" plastic pipe; source: Bob-o-link Golf Course
SR003	989	closed, 10" plastic pipe with small, 1.5" diameter holes; cobble under pipe; source Bob-o-link Golf Course
SR003	990	6" steel pipe
SR003	991	end of representative reach
SR004	992	16" steel pipe and 6" plastic pipe; some erosion above and below pipes; source: Bob-o-link Golf Course
SR004	993	beginning of representative reach
SR004	994	6" steel pipe; erosion under pipe; source: Bob-o-link Golf Course
SR004	995	wood bridge within Bob-o-link Golf Course
SR004	996	4" plastic pipe within Bob-o-link Golf Course; 1st measurements
SR004	997	12" clay pipe within Bob-o-link Golf Course and under bridge in photo 995
SR004	998	4" clay pipe within Bob-o-link Golf Course; half of pipe filled with sediment
SR004	999	15" plastic pipe within Bob-o-link Golf Course; erosion under plastic apron
SR004	1000	chain link fence between Bob-o-link and Sunset Valley golf courses
SR004	1003	swale between Bob-o-link and Sunset Valley golf courses; moderate erosion within swale
SR004	1004	5" plastic pipe within Sunset Valley Golf Course; some erosion occurring
SR004	1005	concrete bridge within Sunset Valley Golf Course
SR004	1006	4" plastic pipe within Sunset Valley Golf Course; sediment inside pipe
SR004	1007	24" steel pipe within Sunset Valley Golf Course
SR004	1008	4" plastic pipe
SR004	1009	concrete bridge within Sunset Valley Golf Course; 2nd measurements
SR004	1010	6" clay pipe within Sunset Valley Golf Course and under bridge in photo 1009; pipe filled with sediment, broken
SR004	1011	6" plastic pipe within Sunset Valley Golf Course; some erosion
SR004	1012	8" plastic pipe within Sunset Valley Golf Course; extends into channel; erosion downstream from pipe
SR004	1013	concrete bridge within Sunset Valley Golf Course
SR004	1014	8" steel pipe within Sunset Valley Golf Course; erosion occurring above pipe
SR004	1015	3rd measurements
SR004	1016	4" plastic pipe within Sunset Valley Golf Course; extends into channel; holes in bottom of pipe
SR004	1017	8" plastic pipe within Sunset Valley Golf Course; extends into channel; swale and erosion above

Lake Co. ID	GPS	Photo Description
SR004	1018	4" plastic pipe within Sunset Valley Golf Course; erosion occurring around pipe; eroded bank
SR004	1019	4" plastic pipe within Sunset Valley Golf Course; some erosion
SR004	1020	concrete bridge within Sunset Valley Golf Course
SR004	1021	end of representative reach
SR005	1022	beginning of representative reach
SR005	1023	72" steel pipe; large pool below; source: Sunset Valley Golf Course
SR005	1024	oval steel pipe; source: Sunset Valley Golf Course
SR005	1025	4" plastic pipe; some erosion above; source: source: Sunset Valley Golf Course
SR005	1026	concrete bridge within Sunset Valley Golf Course; 1st measurements
SR005	1027	8" steel pipe; source: Sunset Valley Golf Course
SR005	1028	8" plastic pipe; filled with sediment; beehive inside; source: Sunset Valley Golf Course
SR005	1029	intake for irrigation
SR005	1030	wood bridge within Sunset Valley Golf Course
SR005	1031	4" plastic pipe; source: Sunset Valley Golf Course; 2nd measurements
SR005	1032	concrete bridge; rip rap upstream on right bank; toe protection upstream on left bank; within Sunset Valley Golf Course
SR005	1033	eroded bank
SR005	1035	concrete bridge sunset valley golf course
SR005	1036	broken, 12" clay pipe; source: Sunset Valley Golf Course
SR005	1037	6" plastic pipe; some erosion surrounding pipe; source: Sunset Valley Golf Course
SR005	1038	eroded bank
SR005	1039	4" plastic pipe; source: Sunset Valley Golf Course
SR005	1040	6" plastic pipe; somewhat filled with sediment; source: Sunset Valley Golf Course
SR005	1041	concrete bridge within Sunset Valley Golf Course
SR005	1042	8" plastic pipe; eroded bank surrounding pipe; pipe extends into channel; source: Sunset Valley Golf Course
SR005	1043	end of representative reach; 3rd measurements
SR006	1044	beginning of representative reach
SR006	1045	24" concrete pipe; sediment accumulating below pipe; source: Sunset Valley Golf Course
SR006	1046	24" concrete pipe; sediment accumulating below and within pipe; source: Sunset Valley Golf Course
SR006	1047	pipe extending across left bank (near transition between Sunset Valley Golf Course and residential area)
SR006	1048	erosion
SR006	1049	oval concrete pipe; rip rap protecting banks upstream and downstream on opposite bank; storm drain; source: Sunset Valley Golf Course
SR006	1050	1st measurements

Lake Co. ID	GPS	Photo Description
SR006	1051	18" concrete pipe; cobble below pipe; erosion above; source: pool/parking lot
SR006	1052	8" plastic pipe; bank eroded above pipe
SR006	1053	8" clay pipe; swale above pipe; 2nd measurements
SR006	1054	concrete bridge at Fredrickson road
SR006	1055	36" concrete pipe; boulders below; storm drain; source: Fredrickson road; 3rd measurement
SR006	1056	concrete bridge at Central Ave.; log jam upstream from bridge
SR006	1057	end of representative reach; log jam upstream from Central Ave.
SR007	1058	beginning of representative reach
SR007	1059	oval concrete pipe; storm drain (residential); swale from pipe to channel, concrete boulders underneath pipe and sediment inside
SR007	1060	1st measurements
SR007	1061	54" concrete pipe; erosion on either side of pipe; pool below pipe; storm drain (near Hwy 41)
SR007	1062	2nd measurements
SR007	1063	concrete pipe (box culvert under hwy 41); boulders and cobble from pipe to channel; swale from pipe to channel; moderate erosion surrounding pipe
SR007	1064	end of representative reach; 3rd measurements
SR008	1065	beginning of representative reach
SR008	1066	eroded bank
SR008	1067	1st measurements
SR008	1068	two plastic pipes (18" and 7"); eroded bank below
SR008	1069	10" clay pipe; erosion problem; erosion surrounding concrete, pipe has broken and water is flowing behind concrete; concrete has cracked in 2 parts
SR008	1070	12" clay pipe; erosion problem; severe erosion; sedimentation occurring in swale that leads to channel
SR008	1071	18" concrete pipe; erosion on either side of pipe; pool below; source: 41
SR008	1072	2nd measurements
SR008	1073	broken 18" concrete pipe; erosion problem; erosion and small swale to channel; source: residential
SR008	1074	16" concrete pipe, apron broken; erosion problem; swale to stream; moderate erosion; source: residential
SR008	1075	16" concrete pipe, broken; small swale to stream; sedimentation occurring near toe
SR008	1076	16" concrete pipe; moderate erosion; swale to channel; source: residential
SR008	1077	3rd measurements
SR008	1078	concrete and steel bridge at Park Ave. West; sediment on both sides underneath bridge
SR008	1079	36" concrete pipe; moderate erosion; swale to channel; source: residential
SR008	1080	oval steel pipe with broken concrete underneath; swale to channel; sedimentation occurring; source: residential
SR008	1081	oval concrete pipe; concrete blocks underneath; swale to channel; storm drain

Lake Co. ID	GPS	Photo Description
SR008	1082	4" plastic pipe extends into channel and cracked in middle; source: residential
SR008	1083	end of representative reach
SR009	1084	beginning of representative reach
SR009	1085	oval concrete pipe; mesh protection upstream from pipe; concrete blocks and pool below pipe; storm drain (near Park Ave. West)
SR009	1086	oval concrete pipe; concrete blocks below; storm drain
SR009	1087	eroded bank, steep slope (protected with mesh); fallen tree
SR009	1088	17" clay pipe; erosion surrounding concrete structure; mesh on both sides; source: Highland Park Country Club
SR009	1089	1st measurements
SR009	1090	erosion near toe where mesh is unvegetated; sleep slope
SR009	1091	15" concrete pipe; minor erosion above; sedimentation below
SR009	1092	2nd measurements
SR009	1093	tributary; erosion potential near channel; some boulders
SR009	1094	3rd measurements
SR009	1095	concrete bridge
SR009	1096	24" concrete pipe; sediment inside; erosion downstream and above pipe; source: Highland Park Country Club
SR009	1097	end of representative reach
SR010	1098	beginning of reach
SR010	1099	1st measurement
SR010	1100	2nd measurement
SR010	1101	20" concrete pipe
SR010	1102	wood and steel bridge
SR010	1103	3rd measurement
SR010	1104	wood and steel bridge (Highland Park Country Club)
SR010	1105	end of reach
SR011	1106	beginning of reach
SR011	1107	12" steel pipe
SR011	1108	12" concrete pipe
SR011	1109	1st measurement
SR011	1110	18" steel pipe
SR011	1112	bridge at Half Day Rd.
SR011	1113	two 36" concrete pipe
SR011	1114	erosion under bridge
SR011	1115	24" concrete pipe closed
SR011	1116	2nd measurement

Lake Co. ID	GPS	Photo Description
SR011	1117	6" steel pipe
SR011	1118	66" concrete pipe
SR011	1119	18" steel pipe
SR011	1120	3rd measurement
SR011	1121	end of reach
SR012	1122	beginning of reach
SR012	1123	high case of erosion
SR012	1124	18" steel pipe
SR012	1125	1st measurement
SR012	1126	concrete and steel bridge
SR012	1127	60" steel pipe
SR012	1128	60" concrete pipe
SR012	1129	eroded bank across from steel pipe.
SR012	1130	10" steel pipe
SR012	1131	12" steel pipe
SR012	1132	2nd measurement
SR012	1133	18" steel pipe
SR012	1134	oval steel pipe
SR012	1135	18" steel pipe
SR012	1136	end of reach. same GPS as 3rd measurement
SR013	1137	beginning of reach
SR013	1138	12" steel pipe
SR013	1139	oval pipe
SR013	1140	oval concrete pipe
SR013	1141	8" steel pipe. 1st measurement
SR013	1142	12" clay pipe
SR013	1143	42" concrete pipe
SR013	1144	eroded bank
SR013	1145	2nd measurement
SR013	1146	eroded bank
SR013	1147	eroded bank
SR013	1148	3rd measurement. large swale. severe erosion
SR013	1149	end of reach
SR014	1150	beginning of reach
SR014	1151	severe erosion on outside of bend
SR014	1152	1st measurement

Lake Co. ID	GPS	Photo Description
SR014	1153	12" clay pipe
SR014	1154	swale
SR014	1155	severe erosion on outside of bend.
SR014	1156	instream debris
SR014	1157	severe erosion and debris
SR014	1158	disconnected 12" clay pipe
SR014	1159	8" steel pipe. severe erosion
SR014	1160	severe erosion
SR014	1161	24" clay pipe. 2nd measurement
SR014	1162	oval steel pipe
SR014	1163	3rd measurement
SR014	1164	swale
SR014	1165	end of reach
SR015	1166	beginning of reach
SR015	1167	1st measurement. restoration area
SR015	1168	severe erosion
SR015	1169	2nd measurement
SR015	1170	severe erosion
SR015	1171	swale, erosion problem
SR015	1172	severe erosion
SR015	1173	swale
SR015	1174	3rd measurement
SR015	1175	15" concrete pipe
SR015	1176	7" plastic pipe
SR015	1177	6" clay pipe
SR015	1178	bridge at Old ElmRd.
SR015	1179	36" concrete pipe
SR015	1180	18" concrete pipe
SR015	1181	42" concrete pipe within Old Elm Rd
SR015	1182	end of reach
SR016	1183	beginning of reach
SR016	1184	4" plastic pipe. 6" clay pipe. 1st measurement
SR016	1185	severe erosion due to lack of vegetation and yard waste
SR016	1186	4" plastic pipe
SR016	1187	severe erosion
SR016	1188	24" steel pipe. 2nd measurement

Lake Co. ID	GPS	Photo Description
SR016	1189	6" clay pipe
SR016	1190	6" steel pipe
SR016	1191	severe erosion
SR016	1192	4" plastic pipe
SR016	1193	4" plastic pipe
SR016	1194	6" plastic pipe
SR016	1195	6" clay pipe
SR016	1196	4" plastic pipe
SR016	1197	4" clay pipe
SR016	1198	6" clay pipe
SR016	1199	4" plastic pipe
SR016	1200	severe erosion
SR016	1201	4" clay pipe. 3rd measurement
SR016	1202	30" steel pipe
SR016	1203	48" concrete pipe
SR016	1204	severe erosion
SR016	1205	end of reach
SR017	1206	beginning of reach
SR017	1207	4" plastic pipe
SR017	1208	1st measurement. severe erosion
SR017	1209	6" clay pipe. 3- 4" plastic pipes
SR017	1210	4" plastic pipe
SR017	1211	6" clay pipe
SR017	1212	yard debris on bank
SR017	1213	erosion. 2nd measurement
SR017	1214	4" plastic pipe
SR017	1215	steep bank with severe erosion
SR017	1216	4" plastic pipe
SR017	1217	4" plastic pipe
SR017	1218	log jam w/ stagnant water
SR017	1219	4" plastic pipe
SR017	1220	foot bridge
SR017	1221	swale
SR017	1222	3rd measurement
SR017	1223	erosion
SR017	1224	6" clay pipe

Lake Co. ID	GPS	Photo Description
SR017	1225	12" metal pipe. culvert under pathway
SR017	1226	2- 12" plastic pipes
SR017	1227	end of reach
SR018	1228	beginning of reach. logjam. riffle, standing water
SR018	1229	8" plastic pipe
SR018	1230	6" plastic pipe
SR018	1231	6" plastic pipe
SR018	1232	wood footbridge
SR018	1233	20" square outfall within concrete wall
SR018	1234	6" clay within concrete wall
SR018	1235	1st measurement. 18" clay pipe
SR018	1236	12" clay pipe
SR018	1237	erosion
SR018	1238	12" clay pipe
SR018	1239	2nd measurement
SR018	1240	wood and steel footbridge
SR018	1241	eroded bank
SR018	1242	swale
SR018	1243	8" steel pipe
SR018	1244	18" concrete pipe
SR018	1245	30" concrete pipe
SR018	1246	3rd measurement. end of reach
SR019	1247	beginning of reach
SR019	1248	1st measurement. eroded bank
SR019	1249	12" clay pipe
SR019	1250	eroded bank
SR019	1251	4" clay pipe
SR019	1252	4" plastic pipe
SR019	1253	Westleigh bridge
SR019	1254	12" steel pipe, 6" plastic pipe
SR019	1255	debris accumulating at artificial riffle under bridge at Westleigh. stagnant water upstream
SR019	1256	20" plastic pipe at Westleigh bridge
SR019	1257	12" steel pipe at Westleigh bridge
SR019	1258	2nd measurement
SR019	1259	6" clay pipe
SR019	1260	4" plastic pipe

Lake Co. ID	GPS	Photo Description
SR019	1261	4" clay pipe
SR019	1262	4" plastic pipe. 3rd measurement
SR019	1263	end of reach
SR020	1264	beginning of reach
SR020	1265	8" steel pipe
SR020	1266	1st measurement
SR020	1267	logjam at midstream sandbar. lawn clippings in stream
SR020	1268	24" concrete pipe
SR020	1269	24" concrete pipe
SR020	1270	2nd measurement
SR020	1271	12" clay pipe
SR020	1272	12" concrete pipe
SR020	1273	3rd measurement
SR020	1274	swale
SR020	1275	bridge at Onwetsia
SR020	1276	8" steel pipe
SR020	1277	30" steel pipe
SR020	1278	end of reach
SR021	1279	beginning of reach
SR021	1280	30" concrete pipe near Onwentsia Rd. bridge
SR021	1281	swale. 1st measurement
SR021	1282	6" clay pipe
SR021	1283	8" clay pipe
SR021	1284	swale
SR021	1285	swale
SR021	1286	concrete and steel bridge
SR021	1287	12" steel pipe
SR021	1288	8" plastic pipe
SR021	1289	steel and wood bridge on Onwentsia club. 2nd measurement
SR021	1290	8" clay pipe
SR021	1291	12" steel pipe
SR021	1292	16" steel pipe
SR021	1293	bridge within Onwentsia club
SR021	1294	18" steel pipe
SR021	1295	bridge w/in Onwentsia club. 3rd measurement
SR021	1296	6" plastic pipe. 4" plastic pipe

Lake Co. ID	GPS	Photo Description
SR021	1297	end of reach
SR022	1298	beginning of reach
SR022	1299	1st measurement.18" steel pipe
SR022	1300	bridge in Onwentsia club
SR022	1301	4" clay pipe
SR022	1302	6" steel pipe
SR022	1303	bridge
SR022	1304	pipe extending across channel
SR022	1305	8" steel pipe
SR022	1306	4" steel pipe
SR022	1307	12" steel pipe
SR022	1308	bridge at Onwentsia club
SR022	1309	4" plastic pipe. eroded bank.
SR022	1310	12" concrete pipe
SR022	1311	4"plastic pipe. 8" clay pipe. 2nd measurement
SR022	1312	6- 4" plastic pipes
SR022	1313	6" plastic pipe
SR022	1314	6" plastic pipe
SR022	1315	12" steel pipe
SR022	1316	eroded bank
SR022	1317	12" steel pipe and 6" plastic pipe
SR022	1318	6" clay pipe
SR022	1319	6" clay pipe
SR022	1320	12" steel pipe
SR022	1321	2- 12" steel pipe. 12" clay pipe
SR022	1322	36" concrete pipe
SR022	1323	4" plastic pipe. 6" plastic pipe
SR022	1324	8" steel pipe
SR022	1325	6" clay pipe
SR022	1326	4" plastic pipe
SR022	1327	12" concrete pipe
SR022	1328	12" concrete pipe
SR022	1329	27" concrete pipe
SR022	1330	42" concrete pipe. 8" clay pipe
SR022	1331	concrete and steel bridge
SR022	1332	12" steel pipe in bridge.at Deerpath Rd.

Lake Co. ID	GPS	Photo Description
SR022	1333	12" steel pipe in bridge at Deerpath rd.
SR022	1334	end of reach
SR023	1335	beginning of reach
SR023	1336	4" plastic pipe. 1st measurement
SR023	1337	6" concrete pipe
SR023	1338	8" clay pipe
SR023	1339	6" plastic pipe
SR023	1340	18" concrete
SR023	1341	8" plastic pipe
SR023	1342	6" clay pipe. 2nd measurement
SR023	1343	6" plastic pipe
SR023	1344	6" clay pipe
SR023	1345	6" plastic pipe
SR023	1346	12" clay pipe
SR023	1347	end of reach.3rd measurement
SR023	1349	rip rap (pipe not visible)
SR023	1350	rip rap (pipe not visible.)
SR024	1348	beginning of reach
SR024	1351	6" clay pipe
SR024	1352	6" clay pipe
SR024	1353	6" plastic pipe
SR024	1354	18" concrete pipe. 1st measurement
SR024	1355	6" plastic pipe
SR024	1356	rip rap protecting bank. pipe not visible
SR024	1357	42" concrete pipe
SR024	1358	swale
SR024	1359	6" plastic pipe
SR024	1360	swale
SR024	1361	10" plastic pipe
SR024	1362	wood foot bridge
SR024	1363	8" clay pipe under bridge
SR024	1364	12" steel pipe. 2nd measurement
SR024	1365	oval concrete
SR024	1366	bridge
SR024	1367	4" clay pipe
SR024	1368	eroded bank

Lake Co. ID	GPS	Photo Description
SR024	1369	6" clay pipe
SR024	1370	8" plastic pipe. 18" concrete pipe
SR024	1371	wood bridge. 3rd measurement.
SR024	1376	end of reach
SR025	1377	beginning of reach
SR025	1378	10" clay pipe
SR025	1381	eroded bank
SR025	1382	foot bridge near Laurel Lane.
SR025	1383	30" steel pipe
SR025	1387	1st measurements
SR025	1388	6" clay pipe
SR025	1389	swale
SR025	1390	logjam, footbridge
SR025	1394	12" steel pipe
SR025	1395	swale
SR025	1396	12" steel pipe
SR025	1397	wood bridge
SR025	1401	6" clay pipe. eroded bank
SR025	1402	10" clay pipe
SR025	1403	2- 12" pipes
SR025	1404	concrete footbridge. 3rd measurement
SR025	1492	12" steel pipe
SR025	1493	swale
SR025	1495	eroded bank
SR025	1496	swale
SR025	1497	log jam
SR025	1498	swale
SR025	1499	RR tracks
SR025	1500	end of reach
SR025	1501	swale
SR025	5030	2nd measurement
SR026	1408	beginning of reach
SR026	5031	chain link fence
SR026	5032	21" concrete pipe
SR026	5033	1st measurement. eroded bank. plastic pipe
SR026	5034	steel bridge

Lake Co. ID	GPS	Photo Description
SR026	5035	12" clay pipe
SR026	5036	2nd measurement
SR026	5037	10" clay pipe
SR026	5038	8" clay pipe
SR026	5039	eroded bank. stone wall crumbling. 3rd measurement
SR026	5040	steel bridge
SR026	5041	chain link fence
SR026	5042	48" steel pipe.
SR026	5043	swale
SR026	5044	eroded bank near 48" steel pipe.
SR026	5045	end of reach
SR027	5046	beginning of reach
SR027	5047	1st measurement
SR027	5048	36" concrete pipe
SR027	5049	2nd measurement
SR027	5050	tributary
SR027	5051	36" concrete pipe
SR027	5052	3rd measurement. end of reach
SR028	5053	beginning of reach
SR028	5054	1st measurement
SR028	5055	12" concrete pipe
SR028	5056	2nd measurement
SR028	5057	swale
SR028	5058	6" plastic pipe
SR028	5059	30" concrete pipe
SR028	5060	swale
SR028	5061	steel wood bridge
SR028	5062	10" steel pipe
SR028	5063	3rd measurement. white fog on water
SR028	5064	4" plastic pipe. source of discharge in photo 5063
SR028	5065	eroded bank
SR028	5066	Northshore Bike Path bridge. 176 bridge
SR028	5067	12" steel pipe
SR028	5068	16" steel pipe
SR028	5069	end of reach
SR029	5070	36" concrete pipe

Lake Co. ID	GPS	Photo Description
SR029	5071	beginning of reach
SR029	5072	tributary
SR029	5073	1st measurement
SR029	5074	2nd measurement
SR029	5075	12" steel pipe
SR029	5077	3rd measurement
SR029	5076	swale
SR029	5077	3rd measurement
SR029	5078	footbridge in Lake Bluff Golf Course
SR029	5079	end of reach
SR030	5080	beginning of reach
SR030	5081	12" steel pipe
SR030	5082	1st measurement
SR030	5083	4" plastic pipe, 18" steel pipe
SR030	5084	4" plastic pipe. 18" plastic pipe
SR030	5085	footbridge in Lake Bluff Golf Course
SR030	5086	2nd measurement
SR030	5087	12" steel pipe
SR030	5088	12" steel pipe
SR030	5089	17" concrete pipe
SR030	5090	footbridge in Lake Bluff Golf Course
SR030	5091	24" concrete pipe. 3rd measurement
SR030	5092	bridge. RR tracks
SR030	5093	swale
SR030	5094	swale
SR030	5095	end of reach
SR031	1409	pool below 18" concrete pipe shown in photos 1509 and 1410
SR031	1410	18" concrete pipe (also shown in photo 1509)
SR031	5096	beginning of reach
SR031	5097	swale. closed steel pipe. buried.
SR031	5101	1st measurement
SR031	5102	steel culvert
SR031	5103	29" clay pipe
SR031	5104	12" concrete pipe
SR031	5105	buried concrete pipe
SR031	5106	buried concrete pipe

Lake Co. ID	GPS	Photo Description
SR031	5107	eroded bank
SR031	5108	30" concrete pipe
SR031	5109	18" concrete pipe
SR031	5110	buried concrete pipe. 2nd measurement
SR031	5111	broken concrete pipe
SR031	5112	chain link fence
SR031	5113	buried. 18" concrete pipe
SR031	5114	buried. 30" clay pipe
SR031	5115	18" concrete pipe
SR031	5116	swale
SR031	5117	eroded bank
SR031	5118	concrete pipe
SR031	5120	end of reach. 3rd measurement
SR032	5119	beginning of reach
SR032	5121	eroded bank
SR032	5122	submersed 8" concrete pipe
SR032	5123	severe erosion
SR032	5124	1st measurement
SR032	5125	12" concrete pipe
SR032	5126	clay pipe extending across channel broken
SR032	5126	eroded bank
SR032	5128	24" steel pipe
SR032	5129	2nd measurement
SR032	5130	21" concrete pipe
SR032	5131	3rd measurement
SR032	5132	3- 4" steel pipe
SR032	5133	logjam upstream
SR032	5134	15" concrete pipe
SR032	5135	15" concrete pipe
SR032	5136	18" steel pipe
SR032	5137	15" concrete pipe
SR032	5138	18" steel pipe
SR032	5139	24" concrete pipe
SR032	5140	36" concrete pipe
SR032	5141	15" concrete pipe
SR032	5142	eroded bank

Lake Co. ID	GPS	Photo Description
SR032	5143	18" concrete pipe
SR032	5144	15" concrete pipe
SR032	5145	30" concrete pipe. steel culvert.
SR032	5146	steel culvert
SR032	5147	steel culvert at Wyoming. 9" steel pipe
SR032	5148	6" steel pipe at Wyoming
SR032	5149	swale
SR032	5150	end of reach
SR033	5151	beginning of reach
SR033	5152	1st measurement
SR033	5153	30" concrete pipe
SR033	5154	steel culvert
SR033	5155	eroded bank left bank and right bank
SR033	5156	2nd measurement
SR033	5157	15" concrete pipe
SR033	5158	4" steel pipe
SR033	5159	erosion above pipe in photo 1530
SR033	5160	steel culvert
SR033	5161	steel pipe under West Colorado Ave.
SR033	5162	24" concrete pipe extending across channel. leaking in center of pipe
SR033	5164	24" and 9" steel pipe
SR033	5165	2 concrete culverts
SR033	5166	12" concrete pipe
SR033	5167	steel culvert. 6" steel pipe
SR033	5168	6" steel pipe
SR033	5169	end of reach
SR034	1411	beginning of reach
SR034	1412	2 box culverts at 137. 24" concrete pipe
SR034	1413	30" steel pipe
SR034	1414	2nd measurement
SR034	1416	eroded bank near culvert. 18" concrete culvert
SR034	1417	wood and steel bridge in Willow Glen Golf Course
SR034	1418	4" plastic pipe in Willow Glen Golf Course. underwater extends across channel
SR034	1419	2- 24" steel pipes (culvert under road in Glen Golf Course)
SR034	1420	severe erosion at north end of culvert in photo 1416
SR034	1421	6" plastic pipe. 12" plastic pipe

Lake Co. ID	GPS	Photo Description
SR034	1422	wood footbridge in Glen Golf Course
SR034	1423	3rd measurement
SR034	1424	eroded bank
SR034	1425	48" steel culvert
SR034	1426	36" steel pipe
SR034	1427	end of reach (same GPS as 1426)
SR035	1428	beginning of reach
SR035	1429	18" steel culvert
SR035	1430	18" concrete pipe
SR035	1432	steel culvert
SR035	1433	1st measurement
SR035	1434	swale
SR035	1435	eroded bank
SR035	1436	4" plastic pipe
SR035	1437	grass clippings. eroded bank. 2nd measurement
SR035	1438	6" plastic pipe
SR035	1439	steel culvert
SR035	1440	12" steel pipe
SR035	1441	12" plastic pipe
SR035	1442	27" plastic pipe
SR035	1443	3rd measurement
SR035	1444	eroded bank
SR035	1445	6" plastic pipe. erosion above
SR035	1446	steel culvert
SR035	1447	end of reach
SR036	1448	beginning of reach
SR036	1449	footbridge in Foss Park Golf Course
SR036	1450	2-4" plastic pipes. 1st measurement
SR036	1451	steel culvert
SR036	1452	4" plastic pipe
SR036	1453	swale
SR036	1454	swale
SR036	1455	swale
SR036	1456	24" plastic pipe
SR036	1457	steel culvert
SR036	1458	18" steel pipe

Lake Co. ID	GPS	Photo Description
SR036	1459	2nd measurement
SR036	1460	6" plastic pipe
SR036	1462	steel culvert
SR036	1463	steel culvert
SR036	1465	8" plastic pipe
SR036	1466	steel culvert
SR036	1468	24" concrete culvert
SR036	1469	3rd measurement
SR036	1470	tributary
SR036	1471	end of reach
SR037	1472	beginning of reach
SR037	1473	1st measurement
SR037	1474	2nd measurement
SR037	1475	3rd measurement
SR037	1476	wood foot bridge in Greenbelt Forest Preserve
SR037	1477	swale
SR037	1478	48" concrete culvert. 14" plastic pipe
SR037	1479	swale
SR037	1491	end of reach
SR038	1480	debris jam (umbrella, trash cans)
SR038	1481	beginning of reach
SR038	1482	1st measurement
SR038	1483	36" concrete
SR038	1484	bubbles, sheen from pipe in photo 1483
SR038	1485	8"steel
SR038	1486	concrete culvert under Washington Rd.
SR038	1487	swale
SR038	1488	swale
SR038	1489	end of reach
SR038	1490	3rd measurement
SR039	2386	confluence with Skokie River
SR039	2387	representative reach
SR039	2388	severe bank erosion
SR039	2389	plastic pipes draining golf course to north
SR039	2390	plastic pipes draining golf course to north
SR039	2391	corrugated metal pipe draining Fink Park to south

Lake Co. ID	GPS	Photo Description
SR039	2392	representative reach
SR039	2393	failing steel pipe from north
SR039	2394	concrete pipe at head of open channel
SR040	2395	confluence with Skokie River
SR040	2396	concrete pipe draining from north
SR040	2397	plastic pipe draining from north
SR040	2398	steel pipe draining Target loading docks
SR040	2399	representative reach
SR040	2400	steel pipe draining Target loading docks
SR040	2401	steel culvert draining golf dome
SR040	2402	steel pipe draining Target loading docks
SR040	2403	3 concrete box culverts under U.S. 41, head of channel
SR040	2404	concrete pipe draining from U.S. 41 north of channel
SR041	2405	Confluence with Skokie River; severe erosion (downcutting/head-cut)
SR041	2406	3 concrete culverts at outfall from online pond
SR041	2407	online pond
SR041	2408	3 oval concrete culverts under Valley Rd.
SR041	2409	representative reach
SR041	2410	3 concrete culverts; outfalls from online pond
SR041	2411	online pond
SR041	2412	36" concrete pipe draining from south
SR041	2413	12" concrete pipe draining from south
SR041	2414	2 oval concrete culverts under Buena Road
SR041	2415	concrete culvert draining pond at headwaters
SR041	2416	concrete pipe draining from north (Valley Rd.)

APPENDIX F: CALCULATING NON-POINT SOURCE POLLUTANT LOADING AND POLLUTANT LOADING MAPS FOR NORTH BRANCH SUBWATERSHEDS IN LAKE AND COOK COUNTIES

Pollutant loading and pollutant load reductions were determined using a Microsoft Excel workbook model following NIPC methodology, which had been developed by the Illinois Environmental Protection Agency (IEPA). The NIPC methodology uses Event Mean Concentrations based on differing land use. This document was originally adapted from a workbook used by the Indiana Department of Environmental Management and the Pollutants Controlled Calculation and Documentation for Section 319 Watersheds Training Manual (Michigan Department of Environmental Quality, June 1999).

F.1 Pollutant Loading and Reduction Methodology

The Microsoft Excel workbook (the blank example is located at the end of this Appendix) was used to calculate the total pollutant load for each stormsewershed, and is based on the nine land uses in the North Branch Chicago River watershed in Lake and Cook Counties. The nine land uses include: commercial, industrial, institutional, transportation, multi-family, residential, agricultural, vacant and open space. A summary table for each of the pollutant loads was created for each county and is organized by stormsewershed (see following pollutant loading data). Load reduction calculations were completed using this IEPA Urban Runoff BMP Pollutant Load Reduction Worksheet which incorporates land use and associated BMP for the action proposed. Within the worksheet there are BMPs such as vegetated filter strips or creating wetland detention, that can be used as parameters for load reduction by indicating true if it applies to the action or false if it does not. Land use was determined by designating the acreage of each contributing land use within the sewered column for all variables that apply. Percent load reduction was calculated for detention basins, outfalls, stream and wetland restorations, flood mitigation, and hydraulic structures based on action recommended.

Action recommendations for detention basin water quality retrofits were determined using land use values of one for commercial, industrial, institutional, transportation, multi-family and residential. This value system was also used in all other site action plans except open space. To correct short circuit problems a true statement was created for settling basin which would move the intake further from the outlet and reduce circuiting errors. Another prevalent recommendation was to replace turf grass with native vegetation in which a true statement was added for vegetated filter strips and grass swales. Converting dry-bottom detention basin to wet-bottom detention basin creates true statements for settling basin, extended wet detention, as well as vegetated filter strips and grass swales. Assessing load reduction from retrofitting underground detention basins was determined using a true statement for sand filtration. Action recommendations in any combination followed this system to provide load reduction values.

Management for correcting outfall retrofits included stabilization of erosion, monitoring and maintenance, and removing debris or sedimentation. In all action pertaining to stabilization true statements were assigned to vegetated filter strips and grass swales because of their ability to take hold of soil through root systems. Sites where monitoring and maintenance were the only proposed action load reduction estimates could not be calculated. Removing debris or sediment creates a settling basin and was given a true statement in all actions that met criteria. Action recommendation

for potential wetland restoration created true statements for vegetated filter strips and grass swales, extended wet detention, and wetland detention. Wetland restoration greatly reduced pollutant loading because wetlands act as a natural filter of NPS pollution.

Flood mitigation sites and hydraulic structures had similar action recommendations such as provide additional storage, debris removal, and reduce erosion. An infiltration basin is designed to use the natural filtering ability of the soil to remove pollutants from stormwater as well increase storage volume. All sites requiring additional storage selected as true statements.

All of the individual stormsewershed were evaluated for pollutant loading using this procedure. These stormsewersheds were then ordered by lbs/yr and divided by their individual areas to provide lbs/acre/yr. The significance of pollutant load was ranked by highest value. Stormsewersheds which appeared within the top 15 in any one of the ten parameters was prioritized and shown in Figure 3-33 of Chapter 3.

In addition, estimated pollutant load reductions expected from management measures were determined using the same worksheet. Estimations were only provided in accordance with specific site locations referenced in Chapter 5.4 - Site Specific Action Plan. An explanation of the methodology used to calculate pollutant load reductions also discussed in Chapter 5.3.

Lake County - Biological Oxygen Demand

SSD ID	BOD (lbs/yr)	Total Area (ac)	BOD (lbs/ac/yr)
1001	1,198	138.8	8.63
1002	4,755	285.9	16.63
1003	5,600	351.6	15.93
1004	5,541	413.4	13.40
1005	2,031	93.9	21.63
1006	3,326	161.1	20.64
1007	998	52.6	18.97
1008	2,090	95.0	22.00
1009	911	41.4	22.00
1010	8,795	280.3	31.38
1011	28,056	673.2	41.68
1012	2,996	113.1	26.49
1013	101	4.6	22.00
1014	1,287	55.5	23.19
1015	97	10.6	9.13
1016	233	4.4	53.00
1017	194	8.8	22.00
1018	328	14.0	23.41
1019	4,168	163.7	25.46
1020	414	18.8	22.00
1021	2,801	85.6	32.72
1022	40	1.8	22.00
1023	1,222	38.5	31.74
1024	8,760	138.5	63.25
1025	660	16.1	40.98
1026	2,003	82.0	24.43
1027	4,054	153.9	26.34
1028	5,331	123.4	43.20
1029	621	28.1	22.08
1030	3,239	165.0	19.63
1501	7	28.8	0.24
1502	696.6	42.5	16.39
1503	729.2	14.9	48.94
1504	3430.9	161.5	21.24
1505	27.88	7.3	3.82
1506	2711.5	31.9	85.00
1507	7682.2	309.6	24.81
1508	2191.07	211.6	10.35
1509	2336.2	38.2	61.16
2001	2,635	480.8	5.48
2002	32,373	5218.3	6.20
2003	15,114	450.0	33.59
2004	2,245	112.0	20.04
2005	463	30.3	15.28
2006	1,531	73.0	20.97
2007	778	32.1	24.24
2008	4,975	299.6	16.61
2009	503	29.7	16.95
2010	187	8.5	22.00
2011	1,040	60.8	17.10
2012	1,852	89.0	20.81
2013	1,361	60.9	22.34
2014	1,380	64.3	21.45
2015	26,094	1012.0	25.78
2016	2,458	316.1	7.78
2017	11,402	599.2	19.03
2018	2,849	140.7	20.25
2019	973	142.8	6.82
2020	754	11.4	66.17
2021	2,520	41.8	60.28
2022	4,813	196.4	24.51
2023	3,917	52.5	74.62
2024	3,160	102.4	30.86
2025	2,470	47.5	52.00
2026	2,973	117.7	25.26
2027	418	19.0	22.00
2028	251	15.9	15.77
2029	1,112	49.7	22.38
2030	1,149	45.9	25.03
2031	465	18.8	24.71
2032	355	16.7	21.25
2033	2,249	96.9	23.21
2034	2,093	99.6	21.01
2035	629	28.8	21.85
2036	244	11.2	21.81
2037	427	25.8	16.55
2038	296	6.1	48.56
2039	917	41.7	22.00
2040	2,256	81.0	27.85
2041	410	21.2	19.36
2042	635	168.9	3.76
2043	867	39.4	22.00
2044	46	2.1	22.00
2045	173	8.6	20.14
2046	2,172	109.4	19.86
2047	137	7.6	18.05
2048	39	15.4	2.50
2049	17	2.2	7.68
2050	1,152	55.8	20.65
2051	1,347	37.8	35.64
2052	4,630	103.3	44.82
2053	2,548	57.3	44.47
2054	12,297	281.2	43.73
2055	581	77.0	7.55
2056	1,145	82.3	13.91
2057	18,326	420.8	43.55
2058	1,942	79.6	24.40
2059	14,189	568.2	24.97
2501	9,130	1068.9	8.54
2502	2,685	133.9	20.06
2503	697	18.5	37.68
2504	1,359	111.1	12.23
2505	1,189	71.8	16.55
2506	6,805	141.6	48.06
2507	50.2	43.8	1.15
2508	2272.8	182.5	12.45
2509	3158.4	118.8	26.59
2510	24.2	68	0.36
2511	164.5	109.7	1.50
2512	277.4	72.3	3.84
2513	2974.5	105.6	28.17
2514	1406.02	168.9	8.32
3002	1,030	59.7	17.24
3003	446	20.2	22.08
3004	1,831	78.2	23.42
3005	3,971	96.4	41.19
3006	7,941	177.6	44.72
3007	3,729	343.1	10.87
3008	5,515	212.1	26.00
3009	11,483	554.2	20.72
3010	26,887	523.0	51.41
3011	2,745	232.7	11.80
3012	5,297	132.4	40.01
3013	10,191	163.3	62.41
3014	2,829	157.5	17.96
3015	4,807	105.3	45.65
3016	4,701	120.7	38.95
3017	2,665	202.0	13.19
3018	5,043	295.0	17.09
3019	5,771	200.3	28.81
3020	443	73.0	6.07
3021	1,752	69.1	25.35
3022	5,383	212.8	25.30
3023	123	5.7	21.63
3024	12	12.2	1.00
3025	507	124.8	4.06
3026	331	78.7	4.20
3027	1,042	52.9	19.70
3028	2,078	82.4	25.22
3029	596	27.1	22.00
3030	1,595	72.5	22.00
3031	893	40.6	22.00
3032	3,768	178.5	21.11
3033	367	16.7	22.00
3034	568	25.8	22.00
3035	576	47.1	12.24
3036	1,563	78.2	19.99
3037	2,379	106.9	22.25
3038	3,597	156.6	22.97
3039	194	8.8	22.00
3040	180	8.2	22.00
3041	636	28.9	22.00
3042	3,522	146.8	23.99
3043	238	10.8	22.00
3044	326	14.1	23.09
3045	10,291	635.9	16.19
3046	7,196	296.0	24.28
3047	31,623	1105.9	28.59
3048	4,061	300.5	13.51
3049	15,364	640.2	24.00
3050	20,179	685.7	29.43
3051	2,764	279.8	9.88
3052	12,224	537.5	22.74
3053	6,162	448.8	13.73
3054	12,745	397.9	32.03
3055	3,853	92.8	41.52
3056	1,451	47.3	30.67
3057	11,749	394.0	29.82
3058	1,068	78.1	13.68
3501	14,775	577.1	25.60
3502	18,299	394.5	46.39
3503	1,130	25.6	44.14
3504	2,627	42.9	61.23
3505	2,595	38.3	67.74
3506	6,597	88.4	74.63
3507	4,022	103.3	38.93
3508	10,502	174.7	60.11
3509	4,976	80.8	61.58
3510	1,183	23.5	50.35

Lake County - Chemical Oxygen Demand

SSD ID	COD (lbs/yr)	Total Area (ac)	COD (lbs/ac/yr)
1001	8,376	138.8	60.34
1002	31,610	285.9	110.56
1003	46,568	351.6	132.44
1004	52,151	413.4	126.15
1005	13,006	93.9	138.51
1006	21,788	161.1	135.12
1007	7,457	52.6	141.77
1008	13,300	95.0	140.00
1009	5,796	41.4	140.00
1010	62,604	280.3	223.35
1011	241,977	673.2	359.44
1012	19,252	113.1	170.22
1013	644	4.6	140.00
1014	8,550	55.5	154.05
1015	616	10.6	58.11
1016	1,484	4.4	337.27
1017	1,232	8.8	140.00
1018	2,085	14.0	148.94
1019	27,168	163.7	165.96
1020	2,632	18.8	140.00
1021	18,633	85.6	217.67
1022	252	1.8	140.00
1023	7,640	38.5	198.44
1024	61,324	138.5	442.77
1025	4,214	16.1	261.71
1026	12,900	82.0	157.31
1027	27,401	153.9	178.04
1028	43,301	123.4	350.90
1029	3,964	28.1	141.06
1030	21,477	165.0	130.17
1501	224	28.8	7.78
1502	5067.2	42.5	119.23
1503	4408	14.9	295.84
1504	21894.6	161.5	135.57
1505	238.4	7.3	32.66
1506	18789.1	31.9	589.00
1507	49665.8	309.6	160.42
1508	23.31768	211.6	0.11
1509	16174.8	38.2	423.42
2001	20,038	480.8	41.68
2002	274,274	5218.3	52.56
2003	86,968	450.0	193.26
2004	14,905	112.0	133.08
2005	3,330	30.3	109.91
2006	9,923	73.0	135.93
2007	5,005	32.1	155.93
2008	42,332	299.6	141.30
2009	3,588	29.7	120.81
2010	1,190	8.5	140.00
2011	7,380	60.8	121.38
2012	12,057	89.0	135.47
2013	8,652	60.9	142.07
2014	8,859	64.3	137.77
2015	173,439	1012.0	171.38
2016	24,217	316.1	76.61
2017	82,042	599.2	136.92
2018	21,589	140.7	153.44
2019	9,805	142.8	68.66
2020	5,215	11.4	457.46
2021	17,941	41.8	429.22
2022	33,273	196.4	169.16
2023	27,407	52.5	522.05
2024	20,737	102.4	202.51
2025	15,200	47.5	320.00
2026	18,986	117.7	161.31
2027	2,673	19.0	140.69
2028	2,015	15.9	126.72
2029	7,093	49.7	142.71
2030	7,264	45.9	158.27
2031	2,938	18.8	156.28
2032	2,282	16.7	136.62
2033	14,268	96.9	147.24
2034	13,502	99.6	135.56
2035	4,013	28.8	139.35
2036	1,559	11.2	139.16
2037	2,982	25.8	115.59
2038	1,826	6.1	299.34
2039	5,838	41.7	140.00
2040	14,808	81.0	182.82
2041	2,755	21.2	129.96
2042	9,923	168.9	58.75
2043	5,516	39.4	140.00
2044	294	2.1	140.00
2045	1,143	8.6	132.93
2046	14,276	109.4	130.49
2047	950	7.6	125.00
2048	812	15.4	52.71
2049	167	2.2	75.91
2050	7,507	55.8	134.53
2051	8,876	37.8	234.82
2052	26,105	103.3	252.71
2053	14,104	57.3	246.13
2054	69,751	281.2	248.05
2055	4,555	77.0	59.16
2056	7,431	82.3	90.29
2057	126,028	420.8	299.50
2058	12,431	79.6	156.17
2059	100,525	568.2	176.92
2501	73,264	1068.9	68.54
2502	20,435	133.9	152.61
2503	4,563	18.5	246.66
2504	22,832	111.1	205.51
2505	8,548	71.8	119.05
2506	48,905	141.6	345.37
2507	1324.4	43.8	30.24
2508	16401.6	182.5	89.87
2509	19970.4	118.8	168.10
2510	774.4	68	11.39
2511	5694.6	109.7	51.91
2512	5316.5	72.3	73.52
2513	17781.5	105.6	168.39
2514	10588.64	168.9	62.69
3002	11,875	59.7	198.91
3003	2,837	20.2	140.44
3004	16,374	78.2	209.38
3005	26,550	96.4	275.42
3006	45,937	177.6	258.65
3007	37,421	343.1	109.07
3008	52,548	212.1	247.75
3009	114,577	554.2	206.74
3010	187,949	523.0	359.37
3011	22,891	232.7	98.37
3012	64,651	132.4	488.30
3013	79,427	163.3	486.39
3014	31,717	157.5	201.38
3015	34,702	105.3	329.55
3016	34,137	120.7	282.83
3017	20,492	202.0	101.44
3018	35,676	295.0	120.93
3019	43,427	200.3	216.81
3020	9,510	73.0	130.27
3021	11,553	69.1	167.19
3022	52,451	212.8	246.48
3023	789	5.7	138.35
3024	561	12.2	46.00
3025	7,528	124.8	60.32
3026	4,748	78.7	60.33
3027	6,887	52.9	130.20
3028	20,173	82.4	244.82
3029	3,794	27.1	140.00
3030	10,150	72.5	140.00
3031	5,684	40.6	140.00
3032	40,153	178.5	224.95
3033	2,338	16.7	140.00
3034	3,612	25.8	140.00
3035	4,535	47.1	96.29
3036	10,243	78.2	130.98
3037	15,766	106.9	147.48
3038	22,945	156.6	146.52
3039	1,232	8.8	140.00
3040	1,148	8.2	140.00
3041	4,046	28.9	140.00
3042	28,373	146.8	193.28
3043	1,512	10.8	140.00
3044	2,742	14.1	194.48
3045	74,110	635.9	116.56
3046	52,493	296.0	177.34
3047	237,202	1105.9	214.49
3048	37,175	300.5	123.71
3049	105,277	640.2	170.69
3050	163,364	685.7	238.24
3051	24,823	279.8	88.72
3052	108,137	537.5	201.18
3053	59,523	448.8	132.63
3054	116,946	397.9	293.91
3055	22,267	92.8	239.94
3056	9,289	47.3	196.38
3057	76,167	394.0	193.32
3058	8,464	78.1	108.37
3501	169,872	577.1	294.35
3502	191,964	394.5	486.60
3503	6,496	25.6	253.77
3504	24,331	42.9	567.16
3505	18,385	38.3	480.04
3506	49,676	88.4	561.94
3507	27,328	103.3	264.55
3508	69,682	174.7	398.86
3509	35,621	80.8	440.86
3510	8,455	23.5	359.77

Lake County - Total Suspended Solids

SSD ID	TSS (lbs/yr)	Total Area (ac)	TSS (lbs/ac/yr)
1001	17,640	138.8	127.09
1002	87,278	285.9	305.28
1003	101,489	351.6	288.65
1004	112,326	413.4	271.71
1005	28,636	93.9	304.97
1006	49,959	161.1	310.11
1007	16,414	52.6	312.05
1008	29,355	95.0	309.00
1009	12,793	41.4	309.00
1010	151,687	280.3	541.16
1011	530,156	673.2	787.52
1012	57,253	113.1	506.22
1013	1,421	4.6	309.00
1014	24,890	55.5	448.47
1015	1,360	10.6	128.26
1016	3,275	4.4	744.41
1017	2,719	8.8	309.00
1018	5,085	14.0	363.23
1019	63,607	163.7	388.56
1020	5,809	18.8	309.00
1021	45,236	85.6	528.45
1022	556	1.8	309.00
1023	24,534	38.5	637.25
1024	145,224	138.5	1048.55
1025	15,611	16.1	969.61
1026	33,006	82.0	402.51
1027	61,820	153.9	401.69
1028	96,344	123.4	780.74
1029	8,728	28.1	310.61
1030	46,623	165.0	282.56
1501	350	28.8	12.15
1502	11726.5	42.5	275.92
1503	18108.6	14.9	1215.34
1504	49053.3	161.5	303.74
1505	1095.1	7.3	150.01
1506	37642	31.9	1180.00
1507	107675.4	309.6	347.79
1508	30882.4	211.6	145.95
1509	32435.9	38.2	849.11
2001	41,004	480.8	85.28
2002	780,896	5218.3	149.65
2003	382,824	450.0	850.72
2004	32,943	112.0	294.14
2005	6,957	30.3	229.61
2006	21,749	73.0	297.93
2007	13,182	32.1	410.66
2008	96,063	299.6	320.64
2009	7,610	29.7	256.22
2010	2,627	8.5	309.00
2011	15,673	60.8	257.78
2012	26,393	89.0	296.55
2013	19,526	60.9	320.62
2014	19,651	64.3	305.62
2015	447,579	1012.0	442.27
2016	44,757	316.1	141.59
2017	169,279	599.2	282.51
2018	43,473	140.7	308.97
2019	17,948	142.8	125.69
2020	10,498	11.4	920.89
2021	35,560	41.8	850.72
2022	75,335	196.4	383.58
2023	54,708	52.5	1042.05
2024	50,693	102.4	495.05
2025	62,700	47.5	1320.00
2026	45,669	117.7	388.01
2027	6,011	19.0	316.34
2028	5,622	15.9	353.60
2029	15,619	49.7	314.26
2030	18,914	45.9	412.07
2031	7,528	18.8	400.42
2032	5,012	16.7	300.09
2033	33,885	96.9	349.69
2034	29,611	99.6	297.30
2035	8,850	28.8	307.28
2036	3,436	11.2	306.79
2037	6,311	25.8	244.60
2038	7,344	6.1	1203.98
2039	12,885	41.7	309.00
2040	39,982	81.0	493.61
2041	5,966	21.2	281.40
2042	15,859	168.9	93.90
2043	12,175	39.4	309.00
2044	649	2.1	309.00
2045	2,490	8.6	289.56
2046	31,054	109.4	283.86
2047	2,035	7.6	267.75
2048	1,212	15.4	78.71
2049	308	2.2	139.91
2050	16,375	55.8	293.46
2051	20,420	37.8	540.21
2052	107,298	103.3	1038.70
2053	60,694	57.3	1059.23
2054	288,721	281.2	1026.75
2055	12,990	77.0	168.70
2056	16,286	82.3	197.89
2057	340,885	420.8	810.09
2058	32,521	79.6	408.56
2059	227,217	568.2	399.89
2501	191,757	1068.9	179.40
2502	45,759	133.9	341.74
2503	17,954	18.5	970.49
2504	52,963	111.1	476.71
2505	18,305	71.8	254.95
2506	105,774	141.6	746.99
2507	2114.5	43.8	48.28
2508	36334.8	182.5	199.09
2509	55856.2	118.8	470.17
2510	1210	68	17.79
2511	8145.9	109.7	74.26
2512	9532.4	72.3	131.85
2513	72128.5	105.6	683.04
2514	22050	168.9	130.55
3002	29,487	59.7	493.91
3003	6,386	20.2	316.15
3004	38,390	78.2	490.92
3005	72,632	96.4	753.44
3006	184,260	177.6	1037.50
3007	78,916	343.1	230.01
3008	117,032	212.1	551.78
3009	306,159	554.2	552.43
3010	721,121	523.0	1378.82
3011	54,909	232.7	235.96
3012	157,836	132.4	1192.11
3013	165,860	163.3	1015.68
3014	73,993	157.5	469.80
3015	131,508	105.3	1248.89
3016	67,786	120.7	561.61
3017	41,572	202.0	205.80
3018	83,744	295.0	283.88
3019	124,789	200.3	623.01
3020	20,655	73.0	282.94
3021	35,608	69.1	515.31
3022	126,454	212.8	594.24
3023	1,737	5.7	304.65
3024	744	12.2	61.00
3025	12,278	124.8	98.38
3026	7,777	78.7	98.81
3027	14,961	52.9	282.81
3028	48,201	82.4	584.96
3029	8,374	27.1	309.00
3030	22,403	72.5	309.00
3031	12,545	40.6	309.00
3032	94,989	178.5	532.15
3033	5,160	16.7	309.00
3034	7,972	25.8	309.00
3035	9,123	47.1	193.69
3036	22,304	79.2	281.21
3037	35,136	106.9	328.68
3038	55,104	156.6	351.88
3039	2,719	8.8	309.00
3040	2,534	8.2	309.00
3041	8,930	28.9	309.00
3042	65,860	146.8	448.64
3043	3,337	10.8	309.00
3044	6,223	14.1	441.32
3045	166,555	635.9	261.96
3046	107,802	296.0	364.20
3047	530,112	1105.9	479.35
3048	90,802	300.5	302.17
3049	262,551	640.2	410.11
3050	425,993	685.7	621.25
3051	57,117	279.8	204.14
3052	270,738	537.5	503.70
3053	133,902	448.8	298.36
3054	279,567	397.9	700.09
3055	93,913	92.8	1012.00
3056	30,618	47.3	647.32
3057	203,205	394.0	515.75
3058	17,340	78.1	222.03
3501	449,658	577.1	779.17
3502	468,959	394.5	1188.74
3503	28,804	25.6	1125.16
3504	55,411	42.9	1291.62
3505	43,010	38.3	1122.98
3506	106,424	88.4	1203.89
3507	109,383	103.3	1058.89
3508	187,532	174.7	1073.45
3509	70,720	80.8	875.25
3510	16,794	23.5	714.64

Lake County - Total Dissolved Solids

SSD ID	TDS (lbs/yr)	Total Area (ac)	TDS (lbs/ac/yr)
1001	38,508	138.8	277.43
1002	130,281	285.9	455.69
1003	261,486	351.6	743.70
1004	338,996	413.4	820.02
1005	41,965	93.9	446.91
1006	75,748	161.1	470.19
1007	36,473	52.6	693.40
1008	41,420	95.0	436.00
1009	18,050	41.4	436.00
1010	257,495	280.3	918.64
1011	1,357,500	673.2	2016.49
1012	57,641	113.1	509.65
1013	2,006	4.6	436.00
1014	29,636	55.5	533.99
1015	1,918	10.6	180.98
1016	4,622	4.4	1050.36
1017	3,837	8.8	436.00
1018	6,311	14.0	450.80
1019	90,274	163.7	551.46
1020	8,197	18.8	436.00
1021	73,097	85.6	853.93
1022	785	1.8	436.00
1023	19,124	38.5	496.71
1024	270,614	138.5	1953.88
1025	10,235	16.1	635.74
1026	41,006	82.0	500.07
1027	102,561	153.9	666.47
1028	234,075	123.4	1896.88
1029	12,646	28.1	450.03
1030	82,106	165.0	497.61
1501	4235	28.8	147.05
1502	31050	42.5	730.59
1503	10221.5	14.9	686.01
1504	70023	161.5	433.58
1505	832.96	7.3	114.10
1506	90277	31.9	2830.00
1507	170803.6	309.6	551.69
1508	46890.8	211.6	221.60
1509	77455.6	38.2	2027.63
2001	122,001	480.8	253.75
2002	1,938,938	5218.3	371.57
2003	555,059	450.0	1233.47
2004	58,472	112.0	522.07
2005	16,004	30.3	528.20
2006	34,254	73.0	469.24
2007	16,062	32.1	500.37
2008	228,665	299.6	763.23
2009	18,754	29.7	631.45
2010	3,706	8.5	436.00
2011	38,041	60.8	625.68
2012	42,906	89.0	482.09
2013	26,683	60.9	438.15
2014	28,696	64.3	446.28
2015	641,206	1012.0	633.60
2016	202,726	316.1	641.33
2017	409,402	599.2	683.25
2018	134,333	140.7	954.75
2019	83,440	142.8	584.31
2020	24,738	11.4	2169.98
2021	92,390	41.8	2210.29
2022	153,592	196.4	782.04
2023	135,275	52.5	2576.68
2024	75,230	102.4	734.67
2025	29,593	47.5	623.00
2026	59,513	117.7	505.63
2027	8,554	19.0	450.19
2028	14,134	15.9	888.91
2029	22,387	49.7	450.45
2030	20,969	45.9	456.83
2031	8,515	18.8	452.91
2032	7,454	16.7	446.35
2033	42,978	96.9	443.53
2034	44,779	99.6	449.59
2035	12,614	28.8	438.00
2036	4,912	11.2	438.57
2037	13,178	25.8	510.79
2038	3,669	6.1	601.54
2039	18,181	41.7	436.00
2040	51,226	81.0	632.42
2041	11,410	21.2	538.23
2042	117,193	168.9	693.86
2043	17,178	39.4	436.00
2044	916	2.1	436.00
2045	4,369	8.6	508.00
2046	51,264	109.4	468.59
2047	4,475	7.6	588.76
2048	10,833	15.4	703.43
2049	1,391	2.2	632.36
2050	26,017	55.8	466.26
2051	33,504	37.8	886.36
2052	140,549	103.3	1360.59
2053	76,293	57.3	1331.47
2054	358,179	281.2	1273.75
2055	30,066	77.0	390.47
2056	25,973	82.3	315.59
2057	553,554	420.8	1315.48
2058	38,772	79.6	487.08
2059	432,557	568.2	761.28
2501	504,278	1068.9	471.77
2502	96,899	133.9	723.67
2503	14,637	18.5	791.17
2504	209,183	111.1	1882.84
2505	43,685	71.8	608.43
2506	287,404	141.6	2029.88
2507	23934	43.8	546.44
2508	88843.6	182.5	486.81
2509	56600.7	118.8	476.44
2510	14641	68	215.31
2511	93486.6	109.7	852.20
2512	88230.6	72.3	1220.34
2513	117123	105.6	1109.12
2514	65328.1	168.9	386.79
3002	107,072	59.7	1793.50
3003	9,133	20.2	452.12
3004	87,608	78.2	1120.31
3005	120,599	96.4	1251.02
3006	242,504	177.6	1365.45
3007	308,074	343.1	897.91
3008	372,676	212.1	1757.08
3009	810,665	554.2	1462.77
3010	538,014	523.0	1028.71
3011	146,294	232.7	628.68
3012	419,214	132.4	3166.27
3013	425,563	163.3	2606.02
3014	215,798	157.5	1370.14
3015	205,692	105.3	1953.39
3016	182,573	120.7	1512.67
3017	116,301	202.0	575.75
3018	164,652	295.0	558.14
3019	183,086	200.3	914.06
3020	91,632	73.0	1255.23
3021	39,114	69.1	566.05
3022	277,028	212.8	1301.82
3023	2,514	5.7	441.05
3024	8,833	12.2	724.00
3025	88,019	124.8	705.28
3026	53,523	78.7	680.09
3027	25,736	52.9	486.50
3028	104,985	82.4	1274.09
3029	11,816	27.1	436.00
3030	31,610	72.5	436.00
3031	17,702	40.6	436.00
3032	238,006	178.5	1333.38
3033	7,281	16.7	436.00
3034	11,249	25.8	436.00
3035	26,843	47.1	569.91
3036	36,255	78.2	463.62
3037	52,950	106.9	495.32
3038	70,688	156.6	451.39
3039	3,837	8.8	436.00
3040	3,575	8.2	436.00
3041	12,600	28.9	436.00
3042	124,063	146.8	845.12
3043	4,709	10.8	436.00
3044	13,573	14.1	962.65
3045	348,544	635.9	548.21
3046	275,837	296.0	931.88
3047	1,138,683	1105.9	1029.64
3048	247,521	300.5	823.70
3049	514,243	640.2	803.25
3050	827,502	685.7	1206.80
3051	181,775	279.8	649.66
3052	582,991	537.5	1084.63
3053	381,601	448.8	850.27
3054	630,282	397.9	1584.02
3055	89,793	92.8	967.80
3056	27,402	47.3	579.33
3057	260,832	394.0	662.01
3058	59,207	78.1	758.09
3501	1,187,689	577.1	2058.03
3502	1,148,259	394.5	2910.67
3503	36,261	25.6	1416.45
3504	141,674	42.9	3302.47
3505	88,236	38.3	2303.80
3506	258,078	88.4	2919.43
3507	170,409	103.3	1649.66
3508	323,199	174.7	1850.02
3509	191,728	80.8	2372.87
3510	45,225	23.5	1924.47

Lake County - Total Nitrogen

SSD ID	TN (lbs/yr)	Total Area (ac)	TN (lbs/ac/yr)
1001	345	138.8	2.49
1002	1,186	285.9	4.15
1003	1,597	351.6	4.54
1004	1,633	413.4	3.95
1005	555	93.9	5.91
1006	906	161.1	5.62
1007	276	52.6	5.24
1008	570	95.0	6.00
1009	248	41.4	6.00
1010	2,255	280.3	8.04
1011	7,170	673.2	10.65
1012	746	113.1	6.60
1013	28	4.6	6.00
1014	326	55.5	5.87
1015	26	10.6	2.49
1016	64	4.4	14.45
1017	53	8.8	6.00
1018	87	14.0	6.21
1019	1,103	163.7	6.74
1020	113	18.8	6.00
1021	710	85.6	8.30
1022	11	1.8	6.00
1023	294	38.5	7.62
1024	2,133	138.5	15.40
1025	148	16.1	9.16
1026	523	82.0	6.37
1027	1,075	153.9	6.99
1028	1,372	123.4	11.11
1029	169	28.1	6.02
1030	895	165.0	5.42
1501	3.5	28.8	0.12
1502	197.1	42.5	4.64
1503	162.3	14.9	10.89
1504	935.8	161.5	5.79
1505	17.7	7.3	2.42
1506	669.9	31.9	21.00
1507	2059.8	309.6	6.65
1508	619.15	211.6	2.93
1509	577.8	38.2	15.13
2001	780	480.8	1.62
2002	10,968	5218.3	2.10
2003	4,305	450.0	9.57
2004	615	112.0	5.49
2005	133	30.3	4.40
2006	420	73.0	5.75
2007	202	32.1	6.28
2008	1,369	299.6	4.57
2009	141	29.7	4.74
2010	51	8.5	6.00
2011	290	60.8	4.77
2012	508	89.0	5.70
2013	369	60.9	6.06
2014	377	64.3	5.86
2015	6,711	1012.0	6.63
2016	825	316.1	2.61
2017	3,166	599.2	5.28
2018	769	140.7	5.46
2019	332	142.8	2.32
2020	188	11.4	16.48
2021	632	41.8	15.11
2022	1,268	196.4	6.46
2023	973	52.5	18.52
2024	807	102.4	7.88
2025	523	47.5	11.00
2026	783	117.7	6.65
2027	114	19.0	5.97
2028	64	15.9	4.05
2029	303	49.7	6.09
2030	298	45.9	6.50
2031	121	18.8	6.45
2032	97	16.7	5.82
2033	601	96.9	6.20
2034	574	99.6	5.76
2035	172	28.8	5.97
2036	67	11.2	5.96
2037	121	25.8	4.70
2038	64	6.1	10.43
2039	250	41.7	6.00
2040	570	81.0	7.04
2041	113	21.2	5.34
2042	280	168.9	1.66
2043	236	39.4	6.00
2044	13	2.1	6.00
2045	48	8.6	5.53
2046	600	109.4	5.49
2047	38	7.6	5.01
2048	21	15.4	1.36
2049	6	2.2	2.59
2050	317	55.8	5.68
2051	344	37.8	9.10
2052	1,280	103.3	12.39
2053	708	57.3	12.36
2054	3,349	281.2	11.91
2055	148	77.0	1.92
2056	314	82.3	3.81
2057	4,375	420.8	10.40
2058	504	79.6	6.33
2059	3,772	568.2	6.64
2501	2,951	1068.9	2.76
2502	738	133.9	5.51
2503	151	18.5	8.14
2504	394	111.1	3.55
2505	331	71.8	4.61
2506	1,732	141.6	12.23
2507	22.6	43.8	0.52
2508	628.4	182.5	3.44
2509	800.7	118.8	6.74
2510	12.1	68	0.18
2511	115.8	109.7	1.06
2512	106.4	72.3	1.47
2513	842.7	105.6	7.98
2514	398.01	168.9	2.36
3002	290	59.7	4.85
3003	122	20.2	6.03
3004	497	78.2	6.35
3005	1,002	96.4	10.39
3006	2,148	177.6	12.10
3007	1,122	343.1	3.27
3008	1,472	212.1	6.94
3009	3,088	554.2	5.57
3010	5,786	523.0	11.06
3011	796	232.7	3.42
3012	1,361	132.4	10.28
3013	2,537	163.3	15.54
3014	785	157.5	4.98
3015	1,329	105.3	12.62
3016	1,210	120.7	10.03
3017	788	202.0	3.90
3018	1,392	295.0	4.72
3019	1,415	200.3	7.07
3020	164	73.0	2.24
3021	432	69.1	6.25
3022	1,447	212.8	6.80
3023	34	5.7	5.91
3024	12	12.2	1.00
3025	214	124.8	1.72
3026	139	78.7	1.76
3027	288	52.9	5.44
3028	562	82.4	6.82
3029	163	27.1	6.00
3030	435	72.5	6.00
3031	244	40.6	6.00
3032	1,040	178.5	5.82
3033	100	16.7	6.00
3034	155	25.8	6.00
3035	173	47.1	3.68
3036	432	78.2	5.52
3037	648	106.9	6.06
3038	960	156.6	6.13
3039	53	8.8	6.00
3040	49	8.2	6.00
3041	173	28.9	6.00
3042	954	146.8	6.50
3043	65	10.8	6.00
3044	89	14.1	6.28
3045	2,896	635.9	4.55
3046	1,929	296.0	6.52
3047	8,302	1105.9	7.51
3048	1,144	300.5	3.81
3049	4,012	640.2	6.27
3050	5,392	685.7	7.86
3051	835	279.8	2.99
3052	3,261	537.5	6.07
3053	1,797	448.8	4.00
3054	3,314	397.9	8.33
3055	983	92.8	10.60
3056	344	47.3	7.28
3057	2,967	394.0	7.53
3058	306	78.1	3.92
3501	4,070	577.1	7.05
3502	4,606	394.5	11.68
3503	317	25.6	12.38
3504	663	42.9	15.45
3505	638	38.3	16.65
3506	1,645	88.4	18.61
3507	1,129	103.3	10.92
3508	2,590	174.7	14.82
3509	1,241	80.8	15.36
3510	295	23.5	12.55

Lake County - Total Phosphorous

SSD ID	TP (lbs/yr)	Total Area (ac)	TP (lbs/ac/yr)
1001	45	138.8	0.33
1002	122	285.9	0.43
1003	241	351.6	0.68
1004	265	413.4	0.64
1005	75	93.9	0.80
1006	126	161.1	0.78
1007	38	52.6	0.72
1008	77	95.0	0.81
1009	34	41.4	0.81
1010	257	280.3	0.92
1011	647	673.2	0.96
1012	101	113.1	0.90
1013	4	4.6	0.81
1014	46	55.5	0.83
1015	4	10.6	0.34
1016	9	4.4	1.95
1017	7	8.8	0.81
1018	12	14.0	0.84
1019	140	163.7	0.86
1020	15	18.8	0.81
1021	77	85.6	0.90
1022	1	1.8	0.81
1023	39	38.5	1.00
1024	170	138.5	1.22
1025	19	16.1	1.19
1026	70	82.0	0.85
1027	131	153.9	0.85
1028	124	123.4	1.01
1029	23	28.1	0.81
1030	124	165.0	0.75
1501	0.77	28.8	0.03
1502	27.161	42.5	0.64
1503	20.214	14.9	1.36
1504	126.587	161.5	0.78
1505	1.4716	7.3	0.20
1506	41.47	31.9	1.30
1507	253.206	309.6	0.82
1508	80.4998	211.6	0.38
1509	36.251	38.2	0.95
2001	104	480.8	0.22
2002	1,188	5218.3	0.23
2003	485	450.0	1.08
2004	84	112.0	0.75
2005	20	30.3	0.68
2006	57	73.0	0.78
2007	27	32.1	0.84
2008	190	299.6	0.63
2009	20	29.7	0.66
2010	7	8.5	0.81
2011	40	60.8	0.67
2012	69	89.0	0.77
2013	50	60.9	0.82
2014	51	64.3	0.80
2015	852	1012.0	0.84
2016	165	316.1	0.52
2017	419	599.2	0.70
2018	85	140.7	0.60
2019	68	142.8	0.48
2020	13	11.4	1.12
2021	43	41.8	1.03
2022	150	196.4	0.76
2023	62	52.5	1.18
2024	92	102.4	0.90
2025	67	47.5	1.40
2026	101	117.7	0.86
2027	15	19.0	0.81
2028	9	15.9	0.58
2029	40	49.7	0.81
2030	40	45.9	0.87
2031	16	18.8	0.86
2032	13	16.7	0.79
2033	81	96.9	0.83
2034	79	99.6	0.79
2035	23	28.8	0.81
2036	9	11.2	0.81
2037	18	25.8	0.70
2038	8	6.1	1.33
2039	34	41.7	0.81
2040	72	81.0	0.88
2041	16	21.2	0.73
2042	75	168.9	0.44
2043	32	39.4	0.81
2044	2	2.1	0.81
2045	6	8.6	0.76
2046	84	109.4	0.77
2047	5	7.6	0.69
2048	6	15.4	0.42
2049	1	2.2	0.52
2050	44	55.8	0.78
2051	36	37.8	0.94
2052	132	103.3	1.28
2053	74	57.3	1.29
2054	355	281.2	1.26
2055	21	77.0	0.27
2056	43	82.3	0.52
2057	411	420.8	0.98
2058	68	79.6	0.85
2059	462	568.2	0.81
2501	265	1068.9	0.25
2502	101	133.9	0.76
2503	20	18.5	1.06
2504	61	111.1	0.54
2505	46	71.8	0.64
2506	125	141.6	0.88
2507	4.717	43.8	0.11
2508	87.86	182.5	0.48
2509	106.59	118.8	0.90
2510	2.662	68	0.04
2511	38.311	109.7	0.35
2512	18.728	72.3	0.26
2513	94.235	105.6	0.89
2514	56.4522	168.9	0.33
3002	34	59.7	0.57
3003	16	20.2	0.81
3004	66	78.2	0.84
3005	98	96.4	1.02
3006	222	177.6	1.25
3007	184	343.1	0.54
3008	147	212.1	0.69
3009	398	554.2	0.72
3010	743	523.0	1.42
3011	141	232.7	0.60
3012	154	132.4	1.16
3013	175	163.3	1.07
3014	112	157.5	0.71
3015	147	105.3	1.39
3016	101	120.7	0.84
3017	127	202.0	0.63
3018	207	295.0	0.70
3019	177	200.3	0.88
3020	39	73.0	0.53
3021	60	69.1	0.86
3022	198	212.8	0.93
3023	5	5.7	0.80
3024	5	12.2	0.39
3025	55	124.8	0.44
3026	36	78.7	0.45
3027	40	52.9	0.76
3028	77	82.4	0.94
3029	22	27.1	0.81
3030	59	72.5	0.81
3031	33	40.6	0.81
3032	151	178.5	0.84
3033	14	16.7	0.81
3034	21	25.8	0.81
3035	29	47.1	0.61
3036	60	78.2	0.77
3037	88	106.9	0.82
3038	130	156.6	0.83
3039	7	8.8	0.81
3040	7	8.2	0.81
3041	23	28.9	0.81
3042	129	146.8	0.88
3043	9	10.8	0.81
3044	12	14.1	0.84
3045	440	635.9	0.69
3046	217	296.0	0.73
3047	931	1105.9	0.84
3048	180	300.5	0.60
3049	493	640.2	0.77
3050	655	685.7	0.96
3051	157	279.8	0.56
3052	445	537.5	0.83
3053	296	448.8	0.66
3054	385	397.9	0.97
3055	115	92.8	1.24
3056	45	47.3	0.96
3057	357	394.0	0.91
3058	44	78.1	0.56
3501	524	577.1	0.91
3502	473	394.5	1.20
3503	34	25.6	1.35
3504	55	42.9	1.28
3505	47	38.3	1.24
3506	113	88.4	1.28
3507	127	103.3	1.23
3508	211	174.7	1.21
3509	80	80.8	1.00
3510	19	23.5	0.81

Lake County - Total Copper

SSD ID	Copper (lbs/yr)	Total Area (ac)	**Copper (lbs/ac/yr)**
1001	3	138.8	0.019
1002	12	285.9	0.041
1003	18	351.6	0.051
1004	21	413.4	0.050
1005	4	93.9	0.047
1006	7	161.1	0.045
1007	3	52.6	0.052
1008	5	95.0	0.048
1009	2	41.4	0.048
1010	23	280.3	0.082
1011	102	673.2	0.152
1012	6	113.1	0.056
1013	0	4.6	0.048
1014	3	55.5	0.050
1015	0	10.6	0.020
1016	1	4.4	0.116
1017	0	8.8	0.048
1018	1	14.0	0.050
1019	9	163.7	0.058
1020	1	18.8	0.048
1021	6	85.6	0.072
1022	0	1.8	0.048
1023	2	38.5	0.065
1024	22	138.5	0.157
1025	1	16.1	0.087
1026	4	82.0	0.053
1027	10	153.9	0.063
1028	18	123.4	0.147
1029	1	28.1	0.048
1030	7	165.0	0.044
1501	0.035	28.8	0.001
1502	1.772	42.5	0.042
1503	1.6152	14.9	0.108
1504	7.5674	161.5	0.047
1505	0.04772	7.3	0.007
1506	6.38	31.9	0.200
1507	16.9968	309.6	0.055
1508	4.7962	211.6	0.023
1509	5.4928	38.2	0.144
2001	6	480.8	0.013
2002	93	5218.3	0.018
2003	64	450.0	0.142
2004	5	112.0	0.044
2005	1	30.3	0.036
2006	3	73.0	0.046
2007	2	32.1	0.052
2008	18	299.6	0.059
2009	1	29.7	0.038
2010	0	8.5	0.048
2011	2	60.8	0.039
2012	4	89.0	0.046
2013	3	60.9	0.049
2014	3	64.3	0.047
2015	58	1012.0	0.057
2016	7	316.1	0.022
2017	27	599.2	0.045
2018	7	140.7	0.048
2019	3	142.8	0.020
2020	2	11.4	0.155
2021	6	41.8	0.144
2022	11	196.4	0.055
2023	9	52.5	0.176
2024	7	102.4	0.068
2025	5	47.5	0.100
2026	6	117.7	0.055
2027	1	19.0	0.048
2028	1	15.9	0.035
2029	2	49.7	0.049
2030	2	45.9	0.053
2031	1	18.8	0.053
2032	1	16.7	0.047
2033	5	96.9	0.050
2034	5	99.6	0.046
2035	1	28.8	0.048
2036	1	11.2	0.048
2037	1	25.8	0.039
2038	1	6.1	0.094
2039	2	41.7	0.048
2040	5	81.0	0.060
2041	1	21.2	0.043
2042	3	168.9	0.015
2043	2	39.4	0.048
2044	0	2.1	0.048
2045	0	8.6	0.044
2046	5	109.4	0.044
2047	0	7.6	0.041
2048	0	15.4	0.013
2049	0	2.2	0.022
2050	3	55.8	0.046
2051	3	37.8	0.079
2052	18	103.3	0.175
2053	10	57.3	0.178
2054	46	281.2	0.165
2055	1	77.0	0.017
2056	3	82.3	0.031
2057	41	420.8	0.097
2058	4	79.6	0.052
2059	36	568.2	0.064
2501	24	1068.9	0.023
2502	8	133.9	0.059
2503	1	18.5	0.074
2504	12	111.1	0.104
2505	3	71.8	0.039
2506	18	141.6	0.124
2507	0.22	43.8	0.005
2508	5.1376	182.5	0.028
2509	6.6404	118.8	0.056
2510	0.121	68	0.002
2511	1.1436	109.7	0.010
2512	1.1378	72.3	0.016
2513	11.936	105.6	0.113
2514	3.2481	168.9	0.019
3002	6	59.7	0.095
3003	1	20.2	0.049
3004	7	78.2	0.096
3005	10	96.4	0.108
3006	29	177.6	0.166
3007	13	343.1	0.037
3008	23	212.1	0.106
3009	54	554.2	0.098
3010	70	523.0	0.133
3011	7	232.7	0.030
3012	35	132.4	0.261
3013	31	163.3	0.187
3014	15	157.5	0.097
3015	25	105.3	0.234
3016	11	120.7	0.094
3017	7	202.0	0.032
3018	11	295.0	0.039
3019	17	200.3	0.083
3020	5	73.0	0.065
3021	4	69.1	0.053
3022	26	212.8	0.121
3023	0	5.7	0.047
3024	0	12.2	0.010
3025	2	124.8	0.015
3026	1	78.7	0.016
3027	2	52.9	0.044
3028	10	82.4	0.122
3029	1	27.1	0.048
3030	3	72.5	0.048
3031	2	40.6	0.048
3032	20	178.5	0.112
3033	1	16.7	0.048
3034	1	25.8	0.048
3035	1	47.1	0.030
3036	3	78.2	0.044
3037	6	106.9	0.053
3038	8	156.6	0.050
3039	0	8.8	0.048
3040	0	8.2	0.048
3041	1	28.9	0.048
3042	12	146.8	0.085
3043	1	10.8	0.048
3044	1	14.1	0.084
3045	24	635.9	0.038
3046	17	296.0	0.058
3047	89	1105.9	0.080
3048	13	300.5	0.044
3049	36	640.2	0.056
3050	79	685.7	0.115
3051	7	279.8	0.026
3052	48	537.5	0.089
3053	24	448.8	0.054
3054	54	397.9	0.135
3055	12	92.8	0.133
3056	3	47.3	0.063
3057	26	394.0	0.065
3058	3	78.1	0.032
3501	96	577.1	0.167
3502	96	394.5	0.242
3503	5	25.6	0.195
3504	11	42.9	0.264
3505	7	38.3	0.177
3506	19	88.4	0.219
3507	20	103.3	0.192
3508	27	174.7	0.154
3509	12	80.8	0.146
3510	3	23.5	0.120

Lake County - Total Lead

SSD ID	Lead (lbs/yr)	Total Area (ac)	**Lead (lbs/ac/yr)**
1001	13	138.8	0.09
1002	59	285.9	0.21
1003	83	351.6	0.23
1004	94	413.4	0.23
1005	22	93.9	0.23
1006	35	161.1	0.22
1007	13	52.6	0.25
1008	22	95.0	0.23
1009	10	41.4	0.23
1010	110	280.3	0.39
1011	501	673.2	0.74
1012	27	113.1	0.24
1013	1	4.6	0.23
1014	12	55.5	0.21
1015	1	10.6	0.10
1016	2	4.4	0.56
1017	2	8.8	0.23
1018	3	14.0	0.24
1019	46	163.7	0.28
1020	4	18.8	0.23
1021	30	85.6	0.35
1022	0	1.8	0.23
1023	11	38.5	0.28
1024	107	138.5	0.77
1025	6	16.1	0.34
1026	20	82.0	0.24
1027	47	153.9	0.31
1028	92	123.4	0.75
1029	7	28.1	0.24
1030	35	165.0	0.21
1501	0.0945	28.8	0.00
1502	9.2731	42.5	0.22
1503	7.4655	14.9	0.50
1504	37.1285	161.5	0.23
1505	0.10845	7.3	0.01
1506	32.857	31.9	1.03
1507	83.7504	309.6	0.27
1508	23.31768	211.6	0.11
1509	28.2734	38.2	0.74
2001	28	480.8	0.06
2002	469	5218.3	0.09
2003	472	450.0	1.05
2004	24	112.0	0.21
2005	5	30.3	0.16
2006	16	73.0	0.22
2007	8	32.1	0.24
2008	84	299.6	0.28
2009	5	29.7	0.18
2010	2	8.5	0.23
2011	11	60.8	0.18
2012	20	89.0	0.22
2013	14	60.9	0.24
2014	15	64.3	0.23
2015	268	1012.0	0.26
2016	27	316.1	0.09
2017	127	599.2	0.21
2018	33	140.7	0.23
2019	11	142.8	0.08
2020	9	11.4	0.80
2021	31	41.8	0.73
2022	52	196.4	0.26
2023	47	52.5	0.90
2024	33	102.4	0.32
2025	17	47.5	0.37
2026	31	117.7	0.26
2027	4	19.0	0.23
2028	2	15.9	0.14
2029	12	49.7	0.24
2030	11	45.9	0.25
2031	5	18.8	0.26
2032	4	16.7	0.23
2033	23	96.9	0.24
2034	22	99.6	0.22
2035	7	28.8	0.23
2036	3	11.2	0.23
2037	5	25.8	0.18
2038	2	6.1	0.35
2039	10	41.7	0.23
2040	22	81.0	0.27
2041	4	21.2	0.21
2042	8	168.9	0.04
2043	9	39.4	0.23
2044	0	2.1	0.23
2045	2	8.6	0.21
2046	23	109.4	0.21
2047	1	7.6	0.19
2048	0	15.4	0.03
2049	0	2.2	0.09
2050	12	55.8	0.22
2051	15	37.8	0.39
2052	131	103.3	1.27
2053	75	57.3	1.31
2054	330	281.2	1.17
2055	5	77.0	0.07
2056	12	82.3	0.15
2057	188	420.8	0.45
2058	19	79.6	0.24
2059	175	568.2	0.31
2501	126	1068.9	0.12
2502	38	133.9	0.28
2503	5	18.5	0.27
2504	54	111.1	0.48
2505	13	71.8	0.19
2506	95	141.6	0.67
2507	0.6462	43.8	0.01
2508	23.8732	182.5	0.13
2509	30.0115	118.8	0.25
2510	0.3267	68	0.00
2511	2.3429	109.7	0.02
2512	4.7235	72.3	0.07
2513	86.323	105.6	0.82
2514	15.13827	168.9	0.09
3002	30	59.7	0.50
3003	5	20.2	0.25
3004	36	78.2	0.47
3005	57	96.4	0.59
3006	208	177.6	1.17
3007	56	343.1	0.16
3008	113	212.1	0.53
3009	275	554.2	0.50
3010	280	523.0	0.54
3011	28	232.7	0.12
3012	165	132.4	1.24
3013	154	163.3	0.94
3014	72	157.5	0.46
3015	162	105.3	1.54
3016	56	120.7	0.47
3017	29	202.0	0.14
3018	51	295.0	0.17
3019	75	200.3	0.37
3020	21	73.0	0.28
3021	15	69.1	0.22
3022	123	212.8	0.58
3023	1	5.7	0.23
3024	0	12.2	0.02
3025	6	124.8	0.05
3026	4	78.7	0.05
3027	11	52.9	0.21
3028	48	82.4	0.58
3029	6	27.1	0.23
3030	17	72.5	0.23
3031	10	40.6	0.23
3032	95	178.5	0.53
3033	4	16.7	0.23
3034	6	25.8	0.23
3035	6	47.1	0.13
3036	17	78.2	0.21
3037	28	106.9	0.26
3038	37	156.6	0.24
3039	2	8.8	0.23
3040	2	8.2	0.23
3041	7	28.9	0.23
3042	60	146.8	0.41
3043	3	10.8	0.23
3044	6	14.1	0.40
3045	110	635.9	0.17
3046	82	296.0	0.28
3047	430	1105.9	0.39
3048	66	300.5	0.19
3049	163	640.2	0.25
3050	415	685.7	0.60
3051	27	279.8	0.10
3052	226	537.5	0.42
3053	110	448.8	0.24
3054	258	397.9	0.65
3055	80	92.8	0.87
3056	12	47.3	0.26
3057	120	394.0	0.30
3058	12	78.1	0.15
3501	498	577.1	0.86
3502	459	394.5	1.16
3503	36	25.6	1.41
3504	57	42.9	1.32
3505	35	38.3	0.91
3506	100	88.4	1.13
3507	135	103.3	1.31
3508	149	174.7	0.85
3509	60	80.8	0.75
3510	14	23.5	0.61

Lake County - Total Zinc

SSD ID	Zinc (lbs/yr)	Total Area (ac)	Zinc (lbs/ac/yr)
1001	50	138.8	0.36
1002	111	285.9	0.39
1003	245	351.6	0.70
1004	252	413.4	0.61
1005	83	93.9	0.89
1006	130	161.1	0.81
1007	42	52.6	0.80
1008	86	95.0	0.90
1009	37	41.4	0.90
1010	267	280.3	0.95
1011	800	673.2	1.19
1012	84	113.1	0.75
1013	4	4.6	0.90
1014	37	55.5	0.66
1015	4	10.6	0.37
1016	10	4.4	2.17
1017	8	8.8	0.90
1018	12	14.0	0.87
1019	151	163.7	0.92
1020	17	18.8	0.90
1021	77	85.6	0.90
1022	2	1.8	0.90
1023	31	38.5	0.79
1024	176	138.5	1.27
1025	11	16.1	0.70
1026	68	82.0	0.83
1027	144	153.9	0.93
1028	151	123.4	1.22
1029	25	28.1	0.90
1030	133	165.0	0.81
1501	0.35	28.8	0.01
1502	27.49	42.5	0.65
1503	10.269	14.9	0.69
1504	138.99	161.5	0.86
1505	0.8067	7.3	0.11
1506	51.04	31.9	1.60
1507	283.86	309.6	0.92
1508	89.817	211.6	0.42
1509	44.51	38.2	1.17
2001	111	480.8	0.23
2002	940	5218.3	0.18
2003	402	450.0	0.89
2004	91	112.0	0.81
2005	19	30.3	0.64
2006	63	73.0	0.86
2007	26	32.1	0.82
2008	221	299.6	0.74
2009	21	29.7	0.70
2010	8	8.5	0.90
2011	43	60.8	0.70
2012	76	89.0	0.85
2013	55	60.9	0.90
2014	56	64.3	0.87
2015	822	1012.0	0.81
2016	109	316.1	0.34
2017	407	599.2	0.68
2018	87	140.7	0.62
2019	43	142.8	0.30
2020	15	11.4	1.34
2021	48	41.8	1.15
2022	154	196.4	0.79
2023	74	52.5	1.41
2024	92	102.4	0.90
2025	27	47.5	0.57
2026	106	117.7	0.90
2027	17	19.0	0.88
2028	7	15.9	0.41
2029	45	49.7	0.90
2030	40	45.9	0.86
2031	16	18.8	0.87
2032	15	16.7	0.87
2033	86	96.9	0.89
2034	86	99.6	0.86
2035	26	28.8	0.89
2036	10	11.2	0.89
2037	18	25.8	0.69
2038	4	6.1	0.61
2039	38	41.7	0.90
2040	64	81.0	0.78
2041	17	21.2	0.79
2042	31	168.9	0.18
2043	35	39.4	0.90
2044	2	2.1	0.90
2045	7	8.6	0.83
2046	89	109.4	0.82
2047	6	7.6	0.74
2048	2	15.4	0.14
2049	1	2.2	0.34
2050	47	55.8	0.84
2051	38	37.8	1.00
2052	117	103.3	1.14
2053	65	57.3	1.13
2054	303	281.2	1.08
2055	15	77.0	0.19
2056	47	82.3	0.57
2057	334	420.8	0.79
2058	66	79.6	0.83
2059	510	568.2	0.90
2501	232	1068.9	0.22
2502	115	133.9	0.86
2503	8	18.5	0.44
2504	78	111.1	0.70
2505	49	71.8	0.69
2506	136	141.6	0.96
2507	2.41	43.8	0.06
2508	89.316	182.5	0.49
2509	99.181	118.8	0.83
2510	1.21	68	0.02
2511	10.358	109.7	0.09
2512	10.07	72.3	0.14
2513	80.89	105.6	0.77
2514	58.101	168.9	0.34
3002	37	59.7	0.62
3003	18	20.2	0.90
3004	80	78.2	1.03
3005	90	96.4	0.94
3006	189	177.6	1.06
3007	143	343.1	0.42
3008	155	212.1	0.73
3009	373	554.2	0.67
3010	398	523.0	0.76
3011	93	232.7	0.40
3012	214	132.4	1.62
3013	226	163.3	1.39
3014	139	157.5	0.89
3015	151	105.3	1.43
3016	105	120.7	0.87
3017	111	202.0	0.55
3018	188	295.0	0.64
3019	158	200.3	0.79
3020	29	73.0	0.40
3021	45	69.1	0.65
3022	248	212.8	1.17
3023	5	5.7	0.89
3024	1	12.2	0.08
3025	25	124.8	0.20
3026	16	78.7	0.21
3027	43	52.9	0.81
3028	99	82.4	1.20
3029	24	27.1	0.90
3030	65	72.5	0.90
3031	37	40.6	0.90
3032	185	178.5	1.04
3033	15	16.7	0.90
3034	23	25.8	0.90
3035	24	47.1	0.52
3036	64	78.2	0.82
3037	99	106.9	0.92
3038	136	156.6	0.87
3039	8	8.8	0.90
3040	7	8.2	0.90
3041	26	28.9	0.90
3042	156	146.8	1.06
3043	10	10.8	0.90
3044	14	14.1	0.97
3045	401	635.9	0.63
3046	205	296.0	0.69
3047	1,013	1105.9	0.92
3048	136	300.5	0.45
3049	427	640.2	0.67
3050	747	685.7	1.09
3051	95	279.8	0.34
3052	466	537.5	0.87
3053	272	448.8	0.61
3054	471	397.9	1.18
3055	83	92.8	0.90
3056	33	47.3	0.70
3057	338	394.0	0.86
3058	44	78.1	0.57
3501	628	577.1	1.09
3502	642	394.5	1.63
3503	31	25.6	1.20
3504	77	42.9	1.79
3505	51	38.3	1.33
3506	143	88.4	1.62
3507	121	103.3	1.18
3508	195	174.7	1.12
3509	95	80.8	1.18
3510	23	23.5	0.96

Lake County - Total Cadmium

SSD ID	Cadmium (lbs/	Total Area (ac)	Cadmium (lbs/ac/yr)
1001	0	138.8	0.001
1002	1	285.9	0.002
1003	1	351.6	0.002
1004	1	413.4	0.002
1005	0	93.9	0.002
1006	0	161.1	0.002
1007	0	52.6	0.002
1008	0	95.0	0.002
1009	0	41.4	0.002
1010	1	280.3	0.003
1011	4	673.2	0.006
1012	0	113.1	0.002
1013	0	4.6	0.002
1014	0	55.5	0.002
1015	0	10.6	0.001
1016	0	4.4	0.005
1017	0	8.8	0.002
1018	0	14.0	0.002
1019	0	163.7	0.002
1020	0	18.8	0.002
1021	0	85.6	0.003
1022	0	1.8	0.002
1023	0	38.5	0.003
1024	1	138.5	0.006
1025	0	16.1	0.003
1026	0	82.0	0.002
1027	0	153.9	0.003
1028	1	123.4	0.008
1029	0	28.1	0.002
1030	0	165.0	0.002
1501	0.00165	28.8	0.000
1502	0.09979	42.5	0.002
1503	0.09109	14.9	0.006
1504	0	161.5	0.000
1505	0	7.3	0.000
1506	0	31.9	0.000
1507	0	309.6	0.000
1508	0	211.6	0.000
1509	0	38.2	0.000
2001	0	480.8	0.001
2002	6	5218.3	0.001
2003	7	450.0	0.017
2004	0	112.0	0.002
2005	0	30.3	0.001
2006	0	73.0	0.002
2007	0	32.1	0.002
2008	1	299.6	0.002
2009	0	29.7	0.002
2010	0	8.5	0.002
2011	0	60.8	0.002
2012	0	89.0	0.002
2013	0	60.9	0.002
2014	0	64.3	0.002
2015	2	1012.0	0.002
2016	0	316.1	0.001
2017	1	599.2	0.002
2018	0	140.7	0.002
2019	0	142.8	0.001
2020	0	11.4	0.006
2021	0	41.8	0.006
2022	0	196.4	0.002
2023	0	52.5	0.007
2024	0	102.4	0.003
2025	0	47.5	0.004
2026	0	117.7	0.002
2027	0	19.0	0.002
2028	0	15.9	0.001
2029	0	49.7	0.002
2030	0	45.9	0.002
2031	0	18.8	0.002
2032	0	16.7	0.002
2033	0	96.9	0.002
2034	0	99.6	0.002
2035	0	28.8	0.002
2036	0	11.2	0.002
2037	0	25.8	0.002
2038	0	6.1	0.004
2039	0	41.7	0.002
2040	0	81.0	0.002
2041	0	21.2	0.002
2042	0	168.9	0.000
2043	0	39.4	0.002
2044	0	2.1	0.002
2045	0	8.6	0.002
2046	0	109.4	0.002
2047	0	7.6	0.002
2048	0	15.4	0.000
2049	0	2.2	0.001
2050	0	55.8	0.002
2051	0	37.8	0.003
2052	2	103.3	0.019
2053	1	57.3	0.020
2054	5	281.2	0.018
2055	0	77.0	0.001
2056	0	82.3	0.001
2057	2	420.8	0.004
2058	0	79.6	0.002
2059	1	568.2	0.003
2501	1	1068.9	0.001
2502	0	133.9	0.002
2503	0	18.5	0.003
2504	0	111.1	0.004
2505	0	71.8	0.002
2506	1	141.6	0.006
2507	0.00686	43.8	0.000
2508	0.20826	182.5	0.001
2509	0.26749	118.8	0.002
2510	0.00363	68	0.000
2511	0.02707	109.7	0.000
2512	0.05828	72.3	0.001
2513	1.3345	105.6	0.013
2514	0.131603	168.9	0.001
3002	0	59.7	0.006
3003	0	20.2	0.002
3004	0	78.2	0.004
3005	1	96.4	0.006
3006	3	177.6	0.018
3007	0	343.1	0.001
3008	1	212.1	0.005
3009	3	554.2	0.005
3010	3	523.0	0.005
3011	0	232.7	0.001
3012	1	132.4	0.010
3013	1	163.3	0.007
3014	1	157.5	0.004
3015	2	105.3	0.021
3016	0	120.7	0.004
3017	0	202.0	0.001
3018	0	295.0	0.002
3019	1	200.3	0.003
3020	0	73.0	0.002
3021	0	69.1	0.002
3022	1	212.8	0.005
3023	0	5.7	0.002
3024	0	12.2	0.000
3025	0	124.8	0.000
3026	0	78.7	0.000
3027	0	52.9	0.002
3028	0	82.4	0.005
3029	0	27.1	0.002
3030	0	72.5	0.002
3031	0	40.6	0.002
3032	1	178.5	0.004
3033	0	16.7	0.002
3034	0	25.8	0.002
3035	0	47.1	0.001
3036	0	78.2	0.002
3037	0	106.9	0.002
3038	0	156.6	0.002
3039	0	8.8	0.002
3040	0	8.2	0.002
3041	0	28.9	0.002
3042	0	146.8	0.003
3043	0	10.8	0.002
3044	0	14.1	0.003
3045	1	635.9	0.002
3046	1	296.0	0.002
3047	4	1105.9	0.003
3048	0	300.5	0.002
3049	1	640.2	0.002
3050	4	685.7	0.006
3051	0	279.8	0.001
3052	2	537.5	0.004
3053	1	448.8	0.002
3054	2	397.9	0.005
3055	1	92.8	0.013
3056	0	47.3	0.002
3057	1	394.0	0.003
3058	0	78.1	0.001
3501	5	577.1	0.009
3502	4	394.5	0.009
3503	1	25.6	0.022
3504	0	42.9	0.011
3505	0	38.3	0.008
3506	1	88.4	0.009
3507	2	103.3	0.019
3508	2	174.7	0.009
3509	0	80.8	0.006
3510	0	23.5	0.005

Cook County - Biological Oxygen Demand

SSD ID	BOD (lbs/yr)	Total Area (ac)	**BOD (lbs/ac/yr)**
406	21,923	349.8	62.67
123	3,562	59.9	59.46
210	5,482	107.6	50.95
101	31,353	663.2	47.28
202	11,866	265.4	44.71
302	26,290	590.9	44.49
115	10,014	226.5	44.21
140	9,739	252.8	38.52
104	5,450	159.9	34.08
110	28,995	890.8	32.55
122	3,013	96.2	31.31
116	30,435	998.2	30.49
124	17,558	584.3	30.05
113	10,880	362.7	30.00
105	2,081	69.4	29.98
504	17,159	573.9	29.90
119	8,571	287.5	29.81
501	13,595	460.4	29.53
401	21,800	745.5	29.24
204	7,862	271.5	28.96
207	8,033	277.5	28.95
505	17,853	620.4	28.78
503	7,323	259.1	28.26
405	7,580	272.1	27.86
410	6,936	250.2	27.72
403	6,862	247.7	27.70
102	32,520	1208.8	26.90
107	30,279	1129.6	26.81
125	55,366	2159.0	25.64
118	6,981	278.9	25.03
502	3,721	149.1	24.96
404	4,029	163.2	24.69
201	4,508	184.4	24.45
126	4,362	179.4	24.31
206	6,690	275.5	24.28
127	3,390	140.7	24.09
402	34,691	1466.3	23.66
413	1,610	73.2	22.00
303	20,829	948.3	21.96
209	7,224	330.2	21.88
108	3,607	165.2	21.84
412	2,316	106.7	21.70
231	6,552	304.3	21.53
208	11,931	560.9	21.27
130	1,411	67.3	20.96
120	1,649	79.0	20.88
301	5,697	280.7	20.29
205	2,985	150.1	19.89
506	374	19.3	19.39
203	6,799	353.5	19.23
106	1,790	94.1	19.03
230	2,102	116.2	18.09
117	12,155	691.0	17.59
999	85,815	5201.8	16.50
109	2,447	154.5	15.84
304	4,718	415.3	11.36
121	5,018	467.0	10.75
111	636	170.2	3.73
112	513	171.6	2.99
103	2,376	1145.0	2.08
411	291	168.4	1.73

Cook County - Chemical Oxygen Demand

SSD ID	COD (lbs/yr)	Total Area (ac)	**COD (lbs/ac/yr)**
406	156,616	349.8	447.73
123	24,448	59.9	408.15
202	95,753	265.4	360.79
101	238,343	663.2	359.38
210	37,106	107.6	344.85
115	64,165	226.5	283.29
302	166,030	590.9	280.98
501	122,829	460.4	266.79
140	64,485	252.8	255.08
503	60,172	259.1	232.23
104	36,640	159.9	229.14
405	62,303	272.1	228.97
122	21,073	96.2	219.06
401	162,740	745.5	218.30
504	124,946	573.9	217.71
207	60,177	277.5	216.85
119	59,665	287.5	207.53
124	118,823	584.3	203.36
110	178,835	890.8	200.76
113	72,437	362.7	199.72
403	49,448	247.7	199.63
505	122,084	620.4	196.78
404	31,885	163.2	195.38
116	194,924	998.2	195.28
105	13,535	69.4	195.03
120	14,586	79.0	184.63
204	49,815	271.5	183.48
410	45,718	250.2	182.73
502	26,435	149.1	177.30
107	198,098	1129.6	175.37
999	907,925	5201.8	174.54
102	209,677	1208.8	173.46
118	47,770	278.9	171.28
125	364,888	2159.0	169.01
108	27,121	165.2	164.17
402	236,367	1466.3	161.20
206	44,050	275.5	159.89
231	48,627	304.3	159.80
201	29,190	184.4	158.30
203	55,614	353.5	157.32
127	21,747	140.7	154.56
126	27,498	179.4	153.28
303	138,538	948.3	146.09
413	10,248	73.2	140.00
209	46,076	330.2	139.54
412	14,797	106.7	138.68
208	77,660	560.9	138.46
130	9,156	67.3	136.05
117	91,746	691.0	132.77
301	37,155	280.7	132.36
106	12,408	94.1	131.86
205	19,595	150.1	130.54
109	20,142	154.5	130.37
230	14,991	116.2	129.01
506	2,476	19.3	128.31
121	49,855	467.0	106.76
304	38,450	415.3	92.58
112	10,161	171.6	59.21
111	9,474	170.2	55.66
411	8,334	168.4	49.49
103	15,455	1145.0	13.50

Cook County - Total Suspended Solids

SSD ID	TSS (lbs/yr)	Total Area (ac)	**TSS (lbs/ac/yr)**
406	415,593	349.8	1188.09
302	662,341	590.9	1120.90
123	62,454	59.9	1042.64
101	680,581	663.2	1026.21
210	103,339	107.6	960.40
115	197,743	226.5	873.04
202	229,948	265.4	866.42
110	605,205	890.8	679.39
204	177,484	271.5	653.72
501	293,323	460.4	637.10
140	158,423	252.8	626.67
113	215,574	362.7	594.36
118	160,620	278.9	575.90
116	566,905	998.2	567.93
401	416,482	745.5	558.66
405	149,970	272.1	551.16
503	142,106	259.1	548.46
124	312,405	584.3	534.66
104	83,544	159.9	522.48
119	149,134	287.5	518.73
403	125,914	247.7	508.33
504	290,288	573.9	505.82
505	311,365	620.4	501.88
102	592,461	1208.8	490.12
105	33,606	69.4	484.24
404	77,954	163.2	477.66
107	519,726	1129.6	460.10
120	36,216	79.0	458.43
207	126,813	277.5	456.99
502	67,104	149.1	450.06
122	43,067	96.2	447.68
117	297,535	691.0	430.59
125	893,494	2159.0	413.85
203	142,951	353.5	404.39
410	100,239	250.2	400.64
126	71,135	179.4	396.52
206	108,414	275.5	393.52
999	1,998,939	5201.8	384.28
402	546,900	1466.3	372.98
231	109,606	304.3	360.19
127	48,878	140.7	347.39
106	32,568	94.1	346.10
303	327,922	948.3	345.80
201	63,340	184.4	343.49
108	53,798	165.2	325.66
208	178,748	560.9	318.68
413	22,619	73.2	309.00
209	101,614	330.2	307.73
230	35,528	116.2	305.75
412	32,598	106.7	305.51
130	20,064	67.3	298.13
109	44,715	154.5	289.42
301	81,082	280.7	288.86
205	42,636	150.1	284.05
506	5,369	19.3	278.16
121	104,160	467.0	223.04
304	76,320	415.3	183.77
111	16,529	170.2	97.12
112	15,150	171.6	88.29
411	11,813	168.4	70.15
103	33,993	1145.0	29.69

Cook County - Total Dissolved Solids

SSD ID	TDS (lbs/yr)	Total Area (ac)	**TDS (lbs/ac/yr)**
101	1,286,009	663.2	1939.10
406	672,192	349.8	1921.65
202	472,522	265.4	1780.42
123	105,892	59.9	1767.81
115	369,692	226.5	1632.19
210	162,677	107.6	1511.87
501	636,630	460.4	1382.77
999	6,833,775	5201.8	1313.73
405	346,285	272.1	1272.64
120	98,979	79.0	1252.89
207	342,427	277.5	1233.97
118	334,256	278.9	1198.48
503	279,236	259.1	1077.72
117	739,176	691.0	1069.72
122	100,125	96.2	1040.80
121	486,050	467.0	1040.79
108	164,215	165.2	994.04
109	152,427	154.5	986.58
140	244,881	252.8	968.68
104	151,502	159.9	947.48
119	268,658	287.5	934.46
504	525,867	573.9	916.30
401	676,273	745.5	907.14
203	300,097	353.5	848.93
404	136,415	163.2	835.88
111	136,236	170.2	800.45
112	135,238	171.6	788.10
403	190,974	247.7	770.99
113	273,988	362.7	755.41
505	463,460	620.4	747.03
124	430,782	584.3	737.26
110	644,601	890.8	723.62
411	120,950	168.4	718.23
102	865,069	1208.8	715.64
502	104,702	149.1	702.23
410	172,107	250.2	687.88
231	207,715	304.3	682.60
116	676,345	998.2	677.56
105	46,640	69.4	672.04
302	396,233	590.9	670.56
107	710,291	1129.6	628.80
402	920,969	1466.3	628.09
125	1,350,019	2159.0	625.30
230	69,620	116.2	599.14
304	244,814	415.3	589.49
126	105,358	179.4	587.28
206	157,591	275.5	572.02
106	51,630	94.1	548.67
201	100,596	184.4	545.53
303	490,613	948.3	517.36
127	71,065	140.7	505.08
204	130,790	271.5	481.73
130	32,052	67.3	476.25
208	266,348	560.9	474.86
506	9,106	19.3	471.81
205	69,792	150.1	464.97
301	128,952	280.7	459.39
209	145,515	330.2	440.69
412	46,953	106.7	440.05
413	31,915	73.2	436.00
103	53,908	1145.0	47.08

Cook County - Total Nitrogen

SSD ID	TN (lbs/yr)	Total Area (ac)	**TN (lbs/ac/yr)**
406	5,194	349.8	14.85
123	861	59.9	14.37
210	1,381	107.6	12.84
101	8,222	663.2	12.40
115	2,676	226.5	11.81
202	2,966	265.4	11.18
140	2,432	252.8	9.62
302	5,660	590.9	9.58
104	1,393	159.9	8.71
110	7,330	890.8	8.23
122	790	96.2	8.21
504	4,474	573.9	7.80
501	3,570	460.4	7.75
116	7,689	998.2	7.70
105	532	69.4	7.67
124	4,454	584.3	7.62
401	5,619	745.5	7.54
119	2,165	287.5	7.53
505	4,660	620.4	7.51
207	2,081	277.5	7.50
503	1,933	259.1	7.46
410	1,832	250.2	7.32
113	2,627	362.7	7.24
403	1,772	247.7	7.15
405	1,946	272.1	7.15
102	8,628	1208.8	7.14
107	7,944	1129.6	7.03
118	1,925	278.9	6.90
502	1,005	149.1	6.74
125	14,522	2159.0	6.73
126	1,197	179.4	6.67
204	1,801	271.5	6.63
201	1,214	184.4	6.58
404	1,072	163.2	6.57
127	910	140.7	6.47
206	1,755	275.5	6.37
402	9,249	1466.3	6.31
413	439	73.2	6.00
209	1,971	330.2	5.97
412	633	106.7	5.93
303	5,595	948.3	5.90
231	1,790	304.3	5.88
208	3,234	560.9	5.77
130	386	67.3	5.74
108	946	165.2	5.73
301	1,570	280.7	5.59
205	825	150.1	5.50
120	426	79.0	5.39
506	104	19.3	5.38
203	1,803	353.5	5.10
106	476	94.1	5.05
230	574	116.2	4.94
117	3,358	691.0	4.86
999	24,314	5201.8	4.67
109	698	154.5	4.52
304	1,438	415.3	3.46
121	1,466	467.0	3.14
112	252	171.6	1.47
111	222	170.2	1.30
411	197	168.4	1.17
103	652	1145.0	0.57

Cook County - Total Phosphorous

SSD ID	TP (lbs/yr)	Total Area (ac)	**TP (lbs/ac/yr)**
406	449	349.8	1.28
302	733	590.9	1.24
101	805	663.2	1.21
210	130	107.6	1.21
123	72	59.9	1.20
202	288	265.4	1.08
115	242	226.5	1.07
110	899	890.8	1.01
140	248	252.8	0.98
501	437	460.4	0.95
116	939	998.2	0.94
401	695	745.5	0.93
503	240	259.1	0.93
124	539	584.3	0.92
505	569	620.4	0.92
403	225	247.7	0.91
504	519	573.9	0.90
105	63	69.4	0.90
104	143	159.9	0.90
502	133	149.1	0.89
404	145	163.2	0.89
107	1,000	1129.6	0.89
102	1,065	1208.8	0.88
204	237	271.5	0.87
113	315	362.7	0.87
126	153	179.4	0.85
410	212	250.2	0.85
125	1,816	2159.0	0.84
119	241	287.5	0.84
127	117	140.7	0.83
206	228	275.5	0.83
201	152	184.4	0.83
122	79	96.2	0.82
402	1,189	1466.3	0.81
413	59	73.2	0.81
209	266	330.2	0.81
405	219	272.1	0.81
303	763	948.3	0.80
412	86	106.7	0.80
231	244	304.3	0.80
208	444	560.9	0.79
118	219	278.9	0.79
130	52	67.3	0.78
301	218	280.7	0.78
205	115	150.1	0.77
506	15	19.3	0.76
106	70	94.1	0.75
203	259	353.5	0.73
207	198	277.5	0.71
230	83	116.2	0.71
120	52	79.0	0.65
999	3,288	5201.8	0.63
117	435	691.0	0.63
304	247	415.3	0.59
109	83	154.5	0.54
108	88	165.2	0.53
121	210	467.0	0.45
112	70	171.6	0.41
411	68	168.4	0.40
111	39	170.2	0.23
103	89	1145.0	0.08

Cook County - Total Copper

SSD ID	Copper (lbs/yr)	Total Area (ac)	**Copper (lbs/ac/yr)**
101	125	663.2	0.188
406	56	349.8	0.161
210	16	107.6	0.149
202	39	265.4	0.149
115	33	226.5	0.146
123	9	59.9	0.145
501	57	460.4	0.123
503	26	259.1	0.101
401	66	745.5	0.088
118	25	278.9	0.088
302	52	590.9	0.087
405	23	272.1	0.086
140	22	252.8	0.085
110	76	890.8	0.085
404	14	163.2	0.084
504	48	573.9	0.083
403	19	247.7	0.077
104	12	159.9	0.077
505	48	620.4	0.077
502	11	149.1	0.076
122	7	96.2	0.073
999	381	5201.8	0.073
124	42	584.3	0.072
116	71	998.2	0.071
102	85	1208.8	0.071
207	19	277.5	0.070
119	20	287.5	0.068
120	5	79.0	0.067
107	75	1129.6	0.066
105	5	69.4	0.065
113	23	362.7	0.064
126	11	179.4	0.063
231	19	304.3	0.062
410	16	250.2	0.062
204	16	271.5	0.058
117	40	691.0	0.058
125	125	2159.0	0.058
203	20	353.5	0.058
402	82	1466.3	0.056
201	10	184.4	0.054
206	15	275.5	0.054
127	7	140.7	0.053
108	9	165.2	0.053
303	48	948.3	0.050
109	7	154.5	0.048
413	4	73.2	0.048
209	16	330.2	0.048
412	5	106.7	0.047
208	26	560.9	0.047
130	3	67.3	0.046
301	13	280.7	0.045
205	7	150.1	0.044
506	1	19.3	0.043
106	4	94.1	0.042
230	5	116.2	0.042
121	14	467.0	0.030
304	12	415.3	0.029
112	2	171.6	0.014
111	2	170.2	0.012
411	2	168.4	0.011
103	5	1145.0	0.005

Cook County - Total Lead

SSD ID	Lead (lbs/yr)	Total Area (ac)	**Lead (lbs/ac/yr)**
101	726	663.2	1.10
115	218	226.5	0.96
210	89	107.6	0.83
406	266	349.8	0.76
202	190	265.4	0.72
123	43	59.9	0.72
501	270	460.4	0.59
118	160	278.9	0.57
503	126	259.1	0.49
110	423	890.8	0.47
401	316	745.5	0.42
140	103	252.8	0.41
504	231	573.9	0.40
404	65	163.2	0.40
405	108	272.1	0.40
502	59	149.1	0.40
102	473	1208.8	0.39
505	239	620.4	0.39
104	60	159.9	0.37
122	35	96.2	0.36
403	89	247.7	0.36
126	65	179.4	0.36
116	356	998.2	0.36
117	243	691.0	0.35
999	1,781	5201.8	0.34
124	199	584.3	0.34
107	381	1129.6	0.34
207	93	277.5	0.34
302	190	590.9	0.32
119	91	287.5	0.32
105	22	69.4	0.31
410	76	250.2	0.30
120	24	79.0	0.30
231	91	304.3	0.30
125	603	2159.0	0.28
113	101	362.7	0.28
201	49	184.4	0.27
402	389	1466.3	0.27
109	40	154.5	0.26
108	43	165.2	0.26
127	36	140.7	0.26
203	90	353.5	0.25
206	70	275.5	0.25
303	225	948.3	0.24
413	17	73.2	0.23
209	77	330.2	0.23
204	63	271.5	0.23
412	25	106.7	0.23
130	15	67.3	0.22
208	124	560.9	0.22
301	61	280.7	0.22
205	32	150.1	0.21
506	4	19.3	0.21
230	22	116.2	0.19
106	17	94.1	0.18
121	59	467.0	0.13
304	51	415.3	0.12
111	7	170.2	0.04
112	7	171.6	0.04
411	4	168.4	0.02
103	25	1145.0	0.02

Cook County - Total Zinc

SSD ID	Zinc (lbs/yr)	Total Area (ac)	**Zinc (lbs/ac/yr)**
101	902	663.2	1.36
202	324	265.4	1.22
210	130	107.6	1.21
406	405	349.8	1.16
501	526	460.4	1.14
123	68	59.9	1.13
503	285	259.1	1.10
404	167	163.2	1.02
115	228	226.5	1.01
504	578	573.9	1.01
401	739	745.5	0.99
502	148	149.1	0.99
140	243	252.8	0.96
505	597	620.4	0.96
403	234	247.7	0.95
104	150	159.9	0.94
410	232	250.2	0.93
201	169	184.4	0.92
127	128	140.7	0.91
231	276	304.3	0.91
413	66	73.2	0.90
105	62	69.4	0.90
209	296	330.2	0.90
124	522	584.3	0.89
412	95	106.7	0.89
107	1,003	1129.6	0.89
126	159	179.4	0.89
122	84	96.2	0.87
130	58	67.3	0.86
116	837	998.2	0.84
206	230	275.5	0.83
110	743	890.8	0.83
301	234	280.7	0.83
125	1,799	2159.0	0.83
402	1,219	1466.3	0.83
208	464	560.9	0.83
303	784	948.3	0.83
205	123	150.1	0.82
102	978	1208.8	0.81
506	15	19.3	0.80
119	221	287.5	0.77
405	189	272.1	0.69
113	247	362.7	0.68
207	172	277.5	0.62
106	58	94.1	0.62
230	72	116.2	0.62
120	48	79.0	0.60
118	167	278.9	0.60
203	210	353.5	0.60
108	90	165.2	0.55
204	148	271.5	0.54
999	2,793	5201.8	0.54
302	300	590.9	0.51
304	201	415.3	0.48
117	311	691.0	0.45
109	58	154.5	0.37
121	140	467.0	0.30
111	28	170.2	0.16
112	20	171.6	0.12
411	18	168.4	0.11
103	97	1145.0	0.08

Cook County - Total Cadmium

SSD ID	Cadmium (lbs/yr)	Total Area (ac)	**Cadmium (lbs/ac/yr)**
115	3	226.5	0.013
101	8	663.2	0.013
210	1	107.6	0.009
118	2	278.9	0.008
123	0	59.9	0.006
406	2	349.8	0.006
110	5	890.8	0.006
202	2	265.4	0.006
117	3	691.0	0.005
501	2	460.4	0.005
102	6	1208.8	0.005
126	1	179.4	0.004
503	1	259.1	0.004
502	1	149.1	0.004
116	4	998.2	0.004
401	3	745.5	0.004
505	2	620.4	0.004
140	1	252.8	0.003
107	4	1129.6	0.003
504	2	573.9	0.003
404	1	163.2	0.003
405	1	272.1	0.003
302	2	590.9	0.003
104	0	159.9	0.003
403	1	247.7	0.003
124	2	584.3	0.003
999	15	5201.8	0.003
122	0	96.2	0.003
109	0	154.5	0.003
207	1	277.5	0.003
119	1	287.5	0.003
105	0	69.4	0.003
120	0	79.0	0.003
410	1	250.2	0.003
125	5	2159.0	0.003
231	1	304.3	0.003
113	1	362.7	0.002
402	3	1466.3	0.002
201	0	184.4	0.002
204	1	271.5	0.002
127	0	140.7	0.002
206	1	275.5	0.002
203	1	353.5	0.002
108	0	165.2	0.002
303	2	948.3	0.002
413	0	73.2	0.002
209	1	330.2	0.002
412	0	106.7	0.002
208	1	560.9	0.002
130	0	67.3	0.002
301	1	280.7	0.002
205	0	150.1	0.002
506	0	19.3	0.002
106	0	94.1	0.002
230	0	116.2	0.002
121	1	467.0	0.001
304	0	415.3	0.001
111	0	170.2	0.000
112	0	171.6	0.000
411	0	168.4	0.000
103	0	1145.0	0.000

SMC Worksheet – Page 1

URBAN RUNOFF BMP POLLUTANT LOAD REDUCTION WORKSHEET

Please fill in the gray blank areas below.
Once you have successfully estimated the pollutant load reductions, please print a copy of this worksheet and attach it to the "BMP Application Form" for submittal to the Illinois EPA.

If you have any questions, please contact the Illinois EPA's Nonpoint Source Unit at 217/782-3362.

		Example
BMP Number:		3199802001

Please Select a Best Management Practice:

Vegetated Filter Strips	Sand Filters	Sand Filter/Infiltration Basin
Grass Swales	WQ Inlets	WQ Inlet w/ Sand Filter
Infiltration Devises	Weekly Street Sweeping	Oil/Grit Seperator
Extended Wet Detention	Infiltration Basin	Wet Pond
Wetland Detention	Infiltration Trench	Agriculture Filter Strip
Dry Detention	Porous Pavement	
Settling Basin	Concrete Grid Pavement	

BMP Pollutant Removal Efficiencies (Percent)

			BOD	COD	TSS	LEAD	COPPER	ZINC	TDS	TN	TKN	DP	TP	CADMIUM
1	Vegetated Filter Strips	A&B	0	0	0	0	0	0	0	0	0	0	0	0
1	Grass Swales	A,B&C	0	0	0	0	0	0	0	0	0	0	0	0
0	Infiltration Devises	A	0	0	0	0	0	0	0	0	0	0	0	0
0	Extended Wet Detention	A&B	0	0	0	0	0	0	0	0	0	0	0	0
0	Wetland Detention	A&B	0	0	0	0	0	0	0	0	0	0	0	0
0	Dry Detention	A&B	0	0	0	0	0	0	0	0	0	0	0	0
0	Settling Basin	A	0	0	0	0	0	0	0	0	0	0	0	0
0	Sand Filters	A	0	0	0	0	0	0	0	0	0	0	0	0
0	WQ Inlets	A&B	0	0	0	0	0	0	0	0	0	0	0	0
0	Weekly Street Sweeping	A	0	0	0	0	0	0	0	0	0	0	0	0
0	Infiltration Basin	B&D	0	0	0	0	0	0	0	0	0	0	0	0
0	Infiltration Trench	B&D	0	0	0	0	0	0	0	0	0	0	0	0
0	Porous Pavement	B	0	0	0	0	0	0	0	0	0	0	0	0
0	Concrete Grid Pavement	B	0	0	0	0	0	0	0	0	0	0	0	0
0	Sand Filter/Infiltration Basin	B	0	0	0	0	0	0	0	0	0	0	0	0
0	WQ Inlet w/ Sand Filter	B	0	0	0	0	0	0	0	0	0	0	0	0
0	Oil/Grit Seperator	B	0	0	0	0	0	0	0	0	0	0	0	0
0	Wet Pond	B	0	0	0	0	0	0	0	0	0	0	0	0
0	Agricultue Filter Strip	C	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0

A	Appendix D Model Best management Practice Selection Methodology & Lake County Decision-Making Framwork. NIPC. July 1994.
B	www.epa.gov/owowwtrl/NPS/MMGI/Chapter4/table407.gif
C	httl://.ohioline.ag.ohio-state.edu/aex-fact/0467.html
	took middle value of ranges or conflicting results
D	athayde 1983
E	Schueler 1987

Please enter landuse of contributing/drainage area in acres:

	Sewered	Unsewered
Commercial		
Industrial		
Institutional		
Transportation		
Multi-Family		
Residential		
Agriculture		
Vacant		
Open Space		

Note: Sewered and Unsewered refer to stormsewers.

SMC Worksheet – Page 2

AVERAGE POLLUTANT LOADS BY LAND USE (Lbs/Ac./Yr.) 1

Land Use	Commercial	Industrial	Institutional	Transportation	Multi-Family	Residential	Agriculture	Vacant	Open Space
BOD (Sewered)	85	50	52	50	52	22		2	1
BOD (Unsewered)	75	40	31	30	42	11	3	0.9	0.4
COD (Sewered)	589	260	320	881	320	140		64	46
COD (Unsewered)	520	230	190	518	260	71	28	26	15
TSS (Sewered)	1180	1240	1320	2260	1320	309		100	61
TSS (Unsewered)	1040	1080	790	1330	1050	154	153	40	20
LEAD (Sewered)	1.03	1.58	0.37	2.67	0.37	0.23		0.03	0.02
LEAD (Unsewered)	0.90	1.39	0.22	1.57	0.29	0.12	0.00	0.01	0.01
COPPER (Sewered)	0.2	0.21	0.1	0.56	0.1	0.048		0.01	0.01
COPPER (Unsewered)	0.18	0.18	0.061	0.33	0.081	0.024	0.0044	0.004	0.002
ZINC (Sewered)	1.6	1.3	0.57	3.2	0.57	0.9		0.1	0.08
ZINC (Unsewered)	1.4	1.2	0.34	1.9	0.46	0.45	0.069	0.06	0.03
TDS (Sewered)	2830	1290	623	6060	623	436		1210	724
TDS (Unsewered)	2500	1130	374	3565	498	218	89.2	483	241
TN (Sewered)	21	14	11	13	11	6		1	1
TN (Unsewered)	18	12	6.5	7.7	8.6	3.1	2.4	0.5	0.2
TKN (Sewered)	6.9	4	6.4	18	6.4	3.2		2.2	1.3
TKN (unsewered)	6.1	4	3.8	11	5.1	1.6	0.91	0.88	0.44
DP (Sewered)	0.69	0.86	0.61	0.2	0.61	0.26		0.1	0.08
DP (Unsewered)	0.61	0.75	0.36	0.1	0.48	0.13	0.08	0.05	0.03
TP (Sewered)	1.3	1.5	1.4	1.8	1.4	0.81		0.22	0.39
TP (Unsewered)	1.2	1.3	0.8	1.1	1.1	0.4	0.18	0.088	0.13
CADMIUM (sewered)	0.008	0.025	0.0037	0.021	0.0037	0.002		0.0003	0.0002
CADMIUM (Unsewered)	0.0071	0.022	0.0022	0.012	0.003	0.001	0.0002	0.0001	0.0001

1. Unit Area Pollutant Load Estimates for Lake County, Illinois Lake Michigan Watersheds." NIPC. August 1993.

	Pre-BMP Loading (lbs/yr)		Post-BMP Loading (lbs/yr)		Load Reduction (lbs/yr)
BOD	0		U		U
COD	0		U		U
TSS	0		U		U
LEAD	0		U		U
COPPER	0		U		U
ZINC	0		U		U
TDS	0		U		U
TN	0		U		U
TKN	0		U		U
DP	0		U		U
TP	0		U		U
CADMIUM	0		U		U

U = Removal Efficiency for the particular BMP and constituent unavailable.

SMC Worksheet – Page 3

BMP Pollutant Removal Efficiencies (Percent)

		BOD	COD	TSS	LEAD	COPPER	ZINC	TDS	TN	TKN	DP	TP	CADMIUM
Vegetated Filter Strips	A&B												
Grass Swales	A,B&C												
Infiltration Devises	A												
Extended Wet Detention	A&B												
Wetland Detention	A&B												
Dry Detention	A&B												
Settling Basin	A												
Sand Filters	A												
WQ Inlets	A&B												
Weekly Street Sweeping	A												
Infiltration Basin	B&D												
Infiltration Trench	B&D												
Porous Pavement	B												
Concrete Grid Pavement	B												
Sand Filter/Infiltration Basin	B												
WQ Inlet w/ Sand Filter	B												
Oil/Grit Seperator	B												
Wet Pond	B												
Agricultue Filter Strip	C												

A	Appendix D Model Best management Practice Selection Methodology & Lake County Decision-Making Framwork. NIPC. July 1994.
B	www.epa.gov/owowwtrl/NPS/MMGI/Chapter4/table407.gif
C	httl://.ohioline.ag.ohio-state.edu/aex-fact/0467.html
	took middle value of ranges or conflicting results
D	athayde 1983
E	Schueler 1987

SMC Worksheet – Page 4

AVERAGE POLLUTANT LOADS BY LAND USE (Lbs/Ac./Yr.) 1

Land Use		Commercial	Industrial	Institutional	Transportation	Multi-Family	Residential	Agriculture	Vacant	Open Space
BOD (Sewered)										
BOD (Unsewered)										
COD (Sewered)										
COD (Unsewered)										
TSS (Sewered)										
TSS (Unsewered)										
LEAD (Sewered)										
LEAD (Unsewered)										
COPPER (Sewered)										
COPPER (Unsewered)										
ZINC (Sewered)										
ZINC (Unsewered)										
TDS (Sewered)										
TDS (Unsewered)										
TN (Sewered)										
TN (Unsewered)										
TKN (Sewered)										
TKN (unsewered)										
DP (Sewered)										
DP (Unsewered)										
TP (Sewered)										
TP (Unsewered)										
CADMIUM (sewered)										
CADMIUM (Unsewered)										

F.2 POLLUTANT LOAD MAPS FOR NORTH BRANCH WATERSHED IN LAKE COUNTY

A pollutant loading layer was created for the Lake County Geographical Information System (GIS) by using the technique described in section F.1 to determine estimated pollutant loadings by stormsewershed. As mentioned previously, 230 stormsewersheds were identified in the Lake and Cook County portions of the North Branch Chicago River watershed.

The annual pollutant load for the evaluated parameters was calculated for the stormsewersheds for each land use. See exhibits F-1 through F-10. This calculation was obtained using the SMC provided worksheet. These loading rates were mapped using the natural breaks in the data to determine five pollutant loading categories (or groupings). These categories can facilitate prioritization of locations for BMP's. In addition, a map illustrating the top 15 priority pollutant loading rates in the North Branch watershed in Lake and Cook Counties was created (Figure 3-43). The 6 pollutants (and their proxies in parentheses) are nutrients (total nitrogen and total phosphorous), siltation (total suspended solids), organic enrichment/dissolved oxygen (biochemical oxygen demand) and total dissolved solids. In addition, metals exhibited elevated levels in the streambed sediments at many sites throughout Lake and Cook Counties. The four metals for which pollutant loads were estimated and mapped are zinc, lead, cadmium and copper. Maps were not created for dissolved phosphorous or total Kjeldahl nitrogen.

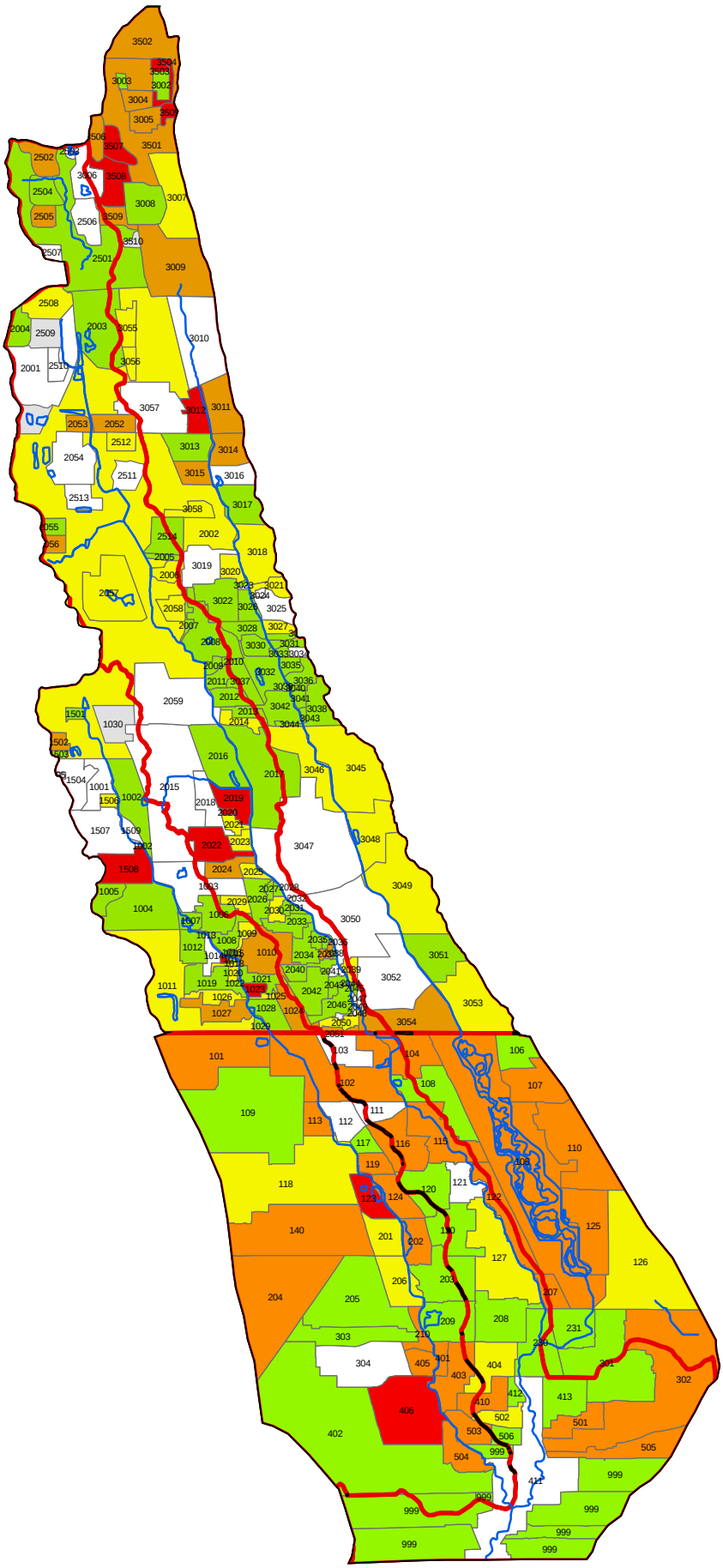


Figure F-1

Pollutant Loading Biochemical Oxygen Demand in Lake & Cook Counties

Legend

- Water
- Major Highways
- Watershed Boundary

Biological Oxygen Demand (lbs./acre)

- 1.729 - 13.730
- 13.731 - 23.999
- 24.000 - 25.643
- 25.644 - 52.000
- 52.001 - 74.630

Source:
Lake County Department of Information and Technology, GIS and Mapping Division

LAKE COUNTY
STORMWATER MANAGMENT COMMISSION

North Branch Chicago River Watershed

0 3 Miles

Maps to be used for Planning Purposes only.

Produced by V3 Companies

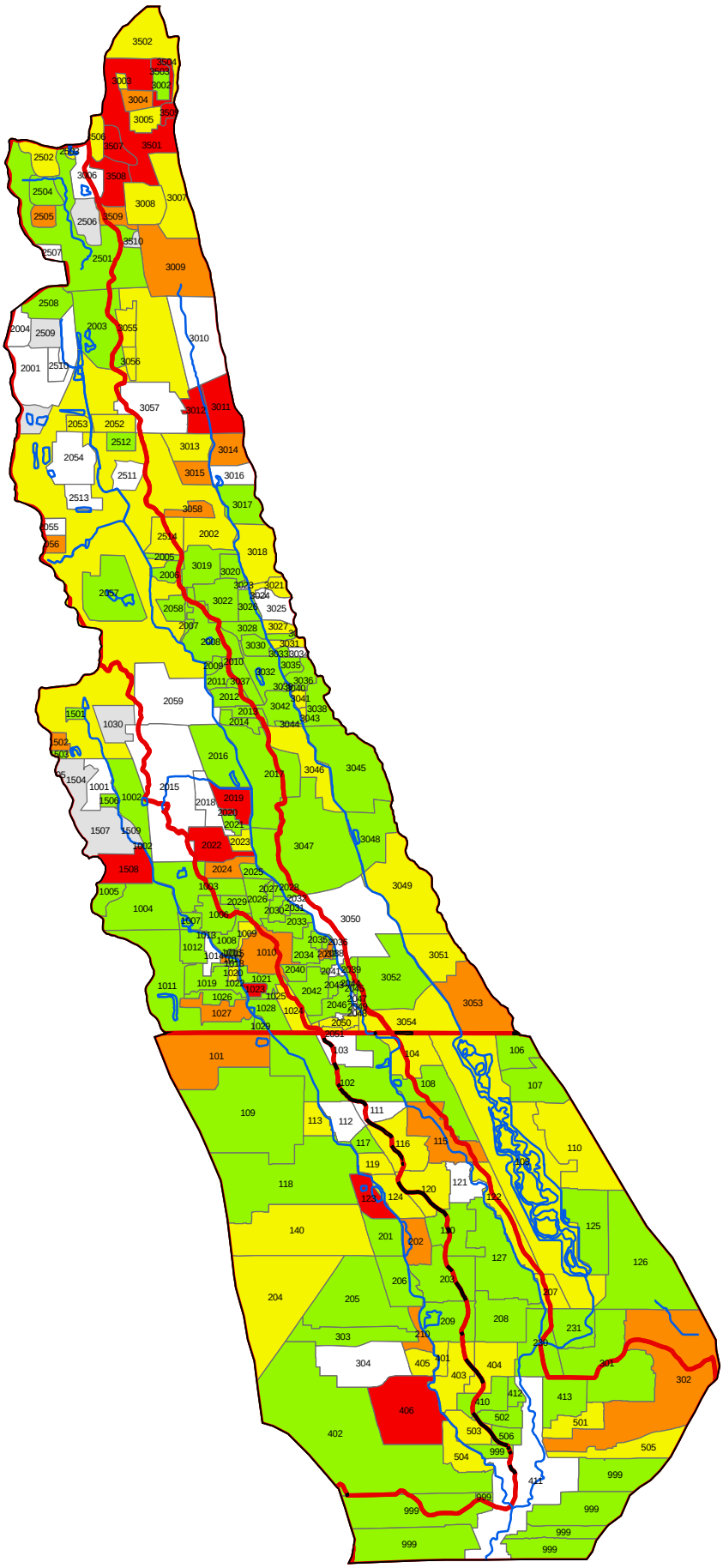


Figure F-2

Pollutant Loading Chemical Oxygen Demand in Lake & Cook Counties

Legend

- Water
- Major Highways
- Watershed Boundary

Chemical Oxygen Demand (lbs./acre)

- 0.000 - 109.910
- 109.911 - 182.820
- 182.821 - 275.420
- 275.421 - 398.860
- 398.861 - 567.160

Source:
Lake County Department of Information and Technology, GIS and Mapping Division

LAKE COUNTY

STORMWATER MANAGMENT COMMISSION

North Branch Chicago River Watershed

0 3 Miles

Maps to be used for Planning Purposes only.

Produced by V3 Companies

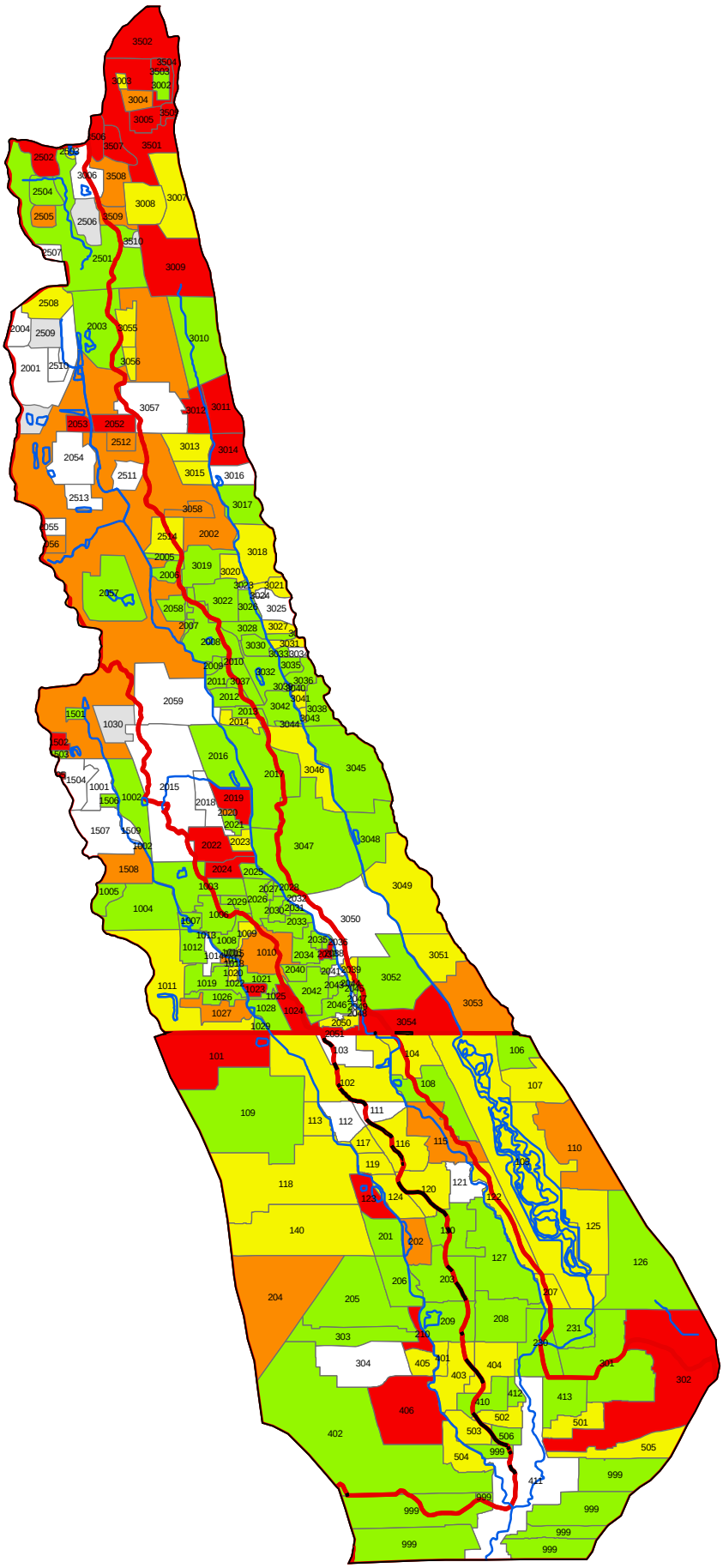


Figure F-3

Pollutant Loading Total Suspended Solids in Lake & Cook Counties

Legend

- Water
- Major Highways
- Watershed Boundary

Total Suspended Soils (lbs./acre)

- 0.000 - 235.960
- 235.961 - 412.070
- 412.071 - 647.320
- 647.321 - 920.890
- 920.891 - 1378.820

Source:
Lake County Department of Information and Technology, GIS and Mapping Division

LAKE COUNTY

STORMWATER MANAGMENT COMMISSION

North Branch Chicago River Watershed

0 3 Miles

Maps to be used for Planning Purposes only.

Produced by V3 Companies

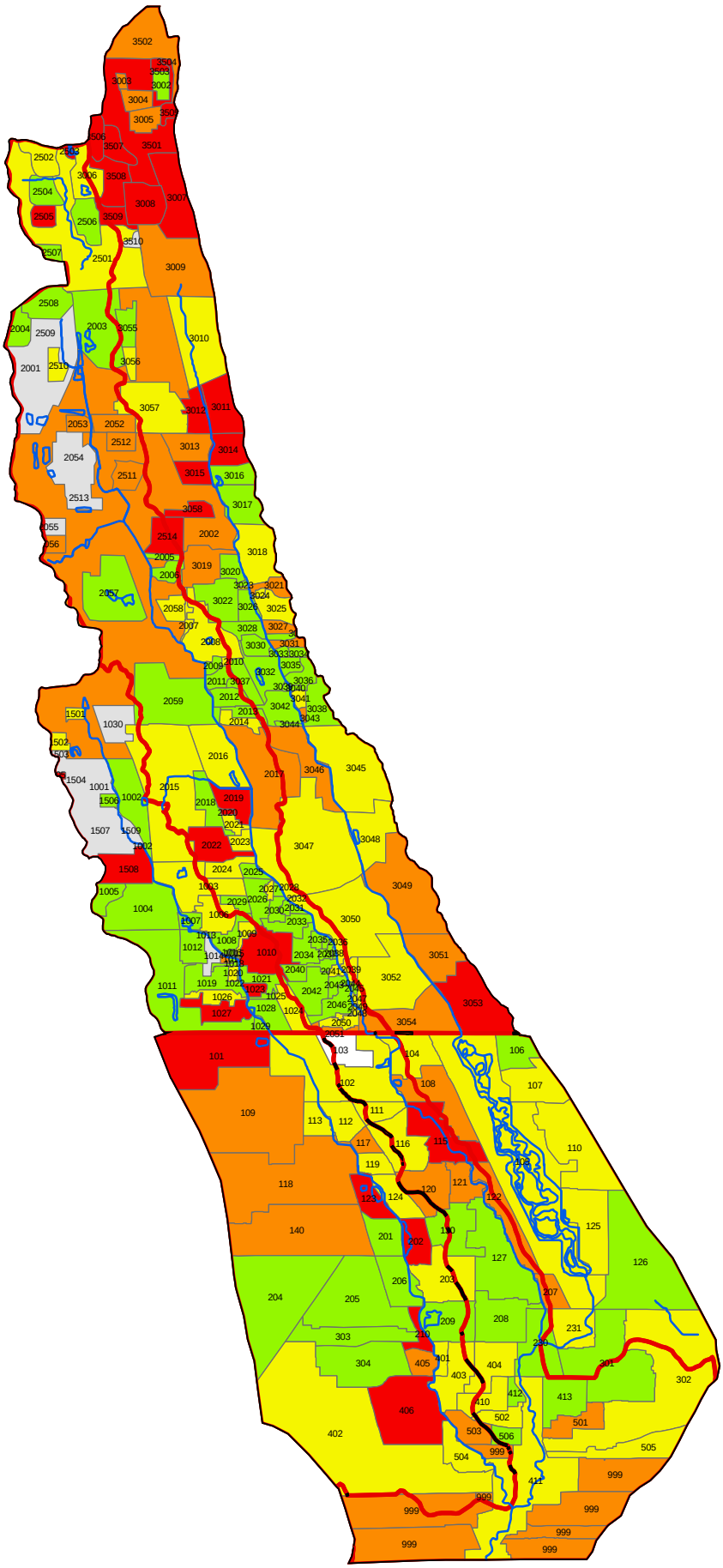


Figure F-4

Pollutant Loading Total Dissolved Solids in Lake & Cook Counties

Legend

- Water
- Major Highways
- Watershed Boundary

Total Dissolved Solids (lbs./acre)

- 0.000 - 73.800
- 73.801 - 614.500
- 614.501 - 947.600
- 947.601 - 1428.670
- 1428.671 - 3500.000

Source:
Lake County Department of Information and Technology, GIS and Mapping Division

LAKE COUNTY
STORMWATER MANAGMENT COMMISSION

North Branch Chicago River Watershed

0 3 Miles

Maps to be used for Planning Purposes only.

Produced by V3 Companies

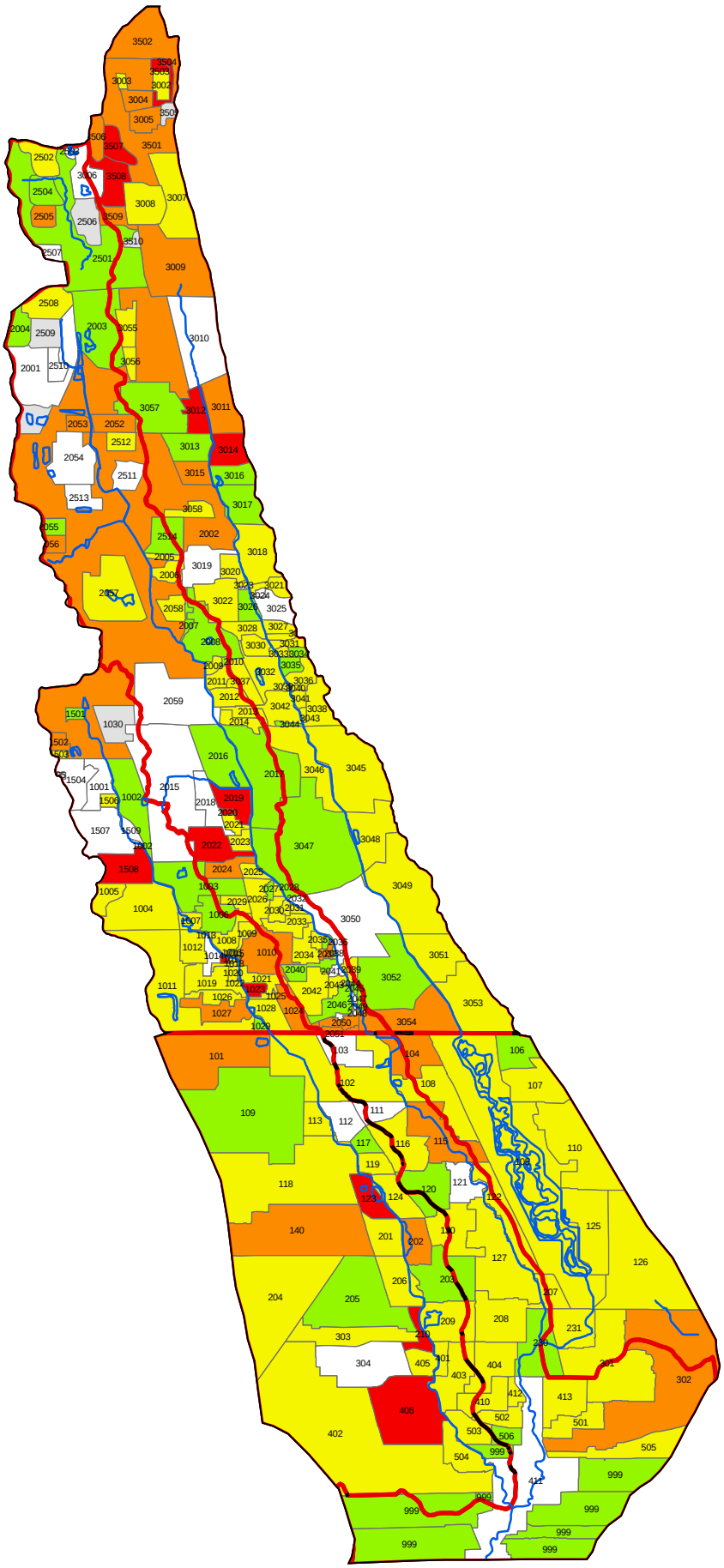


Figure F-5

Pollutant Loading Total Nitrogen in Lake & Cook Counties

Legend

- Water
- Major Highways
- Watershed Boundary

Total Nitrogen (lbs./acre)

- 0.000 - 3.550
- 3.551 - 5.570
- 5.571 - 8.330
- 8.331 - 12.620
- 12.621 - 18.610

Source:
Lake County Department of Information and Technology, GIS and Mapping Division

LAKE COUNTY
STORMWATER MANAGMENT COMMISSION

North Branch Chicago River Watershed

0 3 Miles

Maps to be used for Planning Purposes only.

Produced by V3 Companies

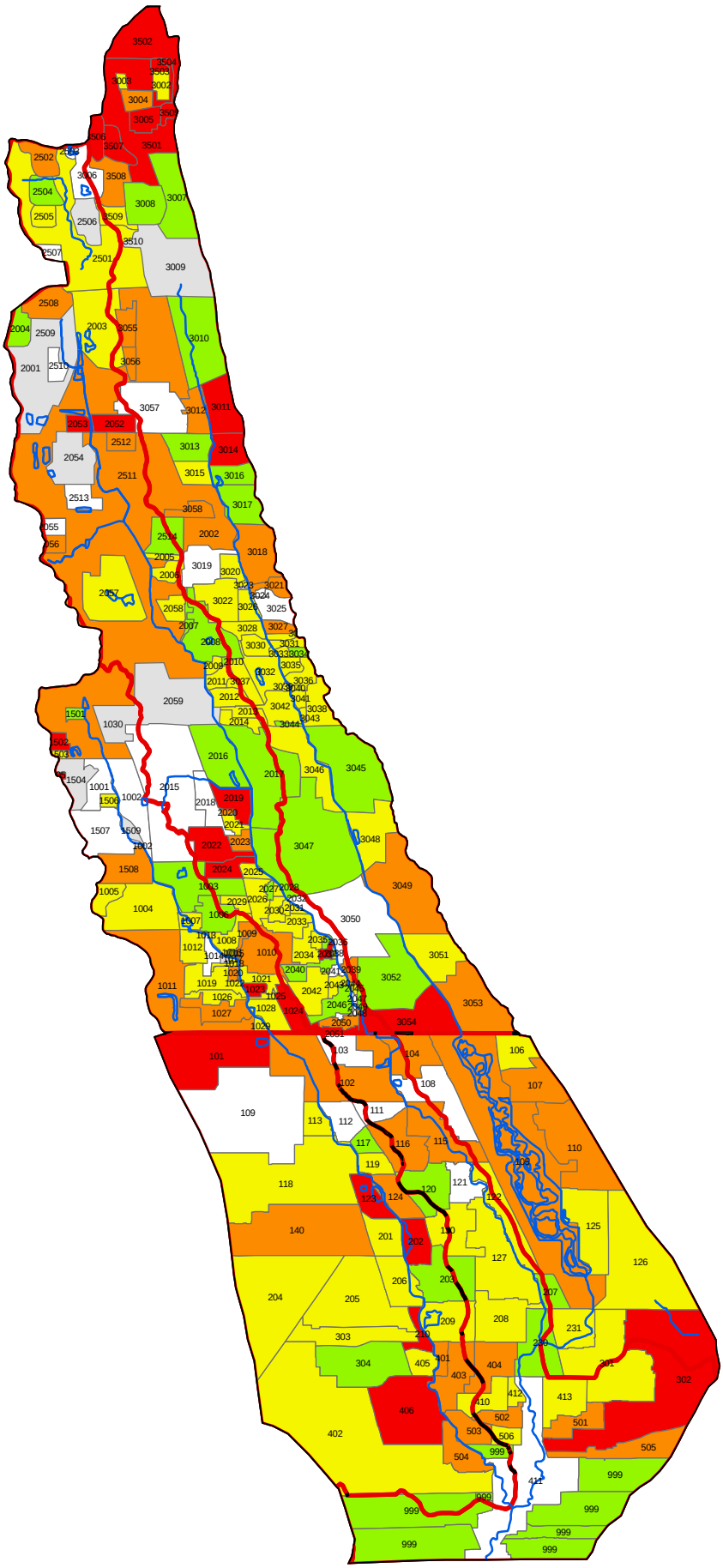


Figure F-6

Pollutant Loading Total Phosphorus in Lake & Cook Counties

Legend

- Water
- Major Highways
- Watershed Boundary

Total Phosphorus (lbs./acre)

- 0.000 - 0.570
- 0.571 - 0.740
- 0.741 - 0.880
- 0.881 - 1.080
- 1.081 - 1.420

Source:
Lake County Department of Information and Technology, GIS and Mapping Division

LAKE COUNTY
STORMWATER MANAGMENT COMMISSION

North Branch Chicago River Watershed

0 3 Miles

Maps to be used for Planning Purposes only.

Produced by V3 Companies

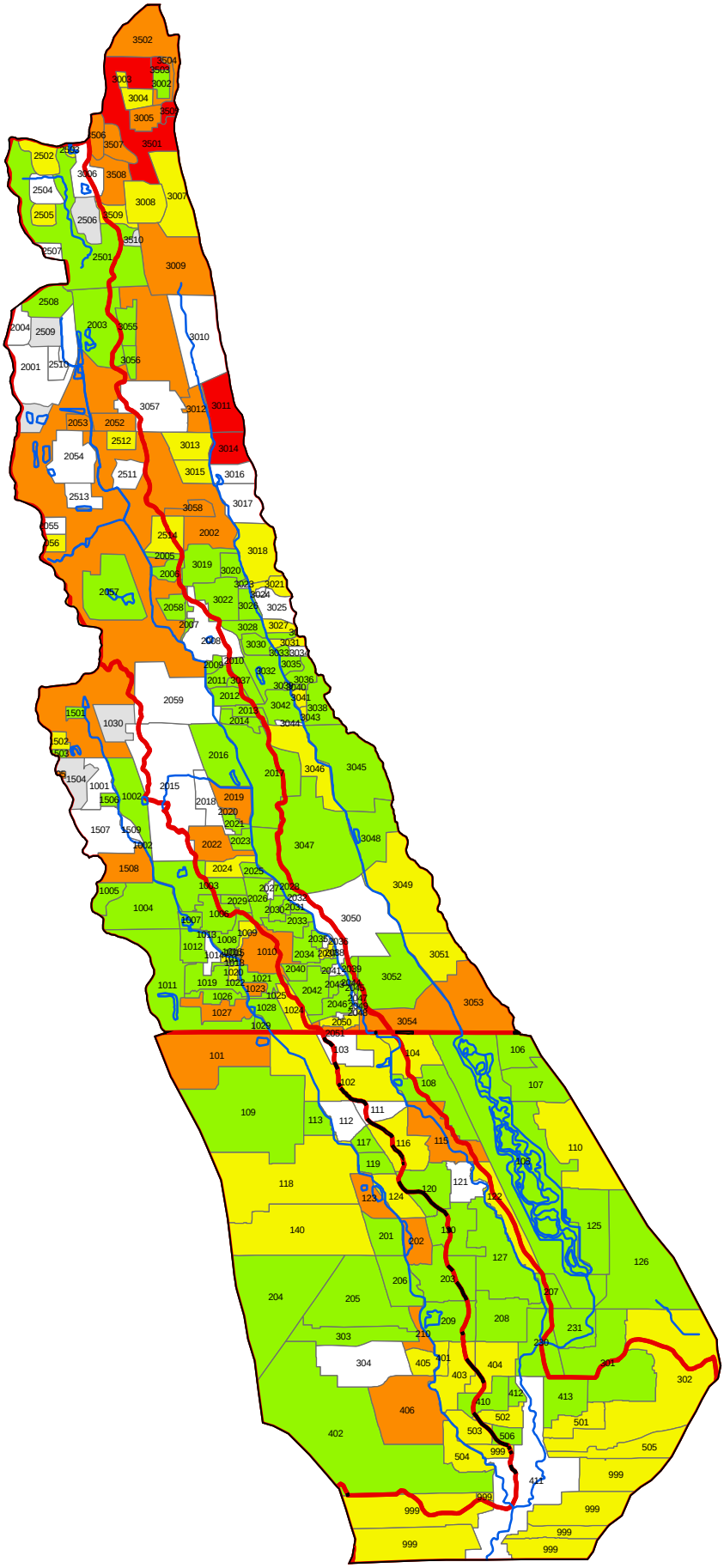


Figure F-7

Pollutant Loading Total Copper in Lake & Cook Counties

Legend

- Water
- Major Highways
- Watershed Boundary

Total Copper (lbs./acre)

- 0.000 - 0.040
- 0.041 - 0.070
- 0.071 - 0.130
- 0.131 - 0.200
- 0.201 - 0.260

Source:
Lake County Department of Information and Technology, GIS and Mapping Division

LAKE COUNTY

STORMWATER MANAGMENT COMMISSION

North Branch Chicago River Watershed

0 3 Miles

Maps to be used for Planning Purposes only.

Produced by V3 Companies

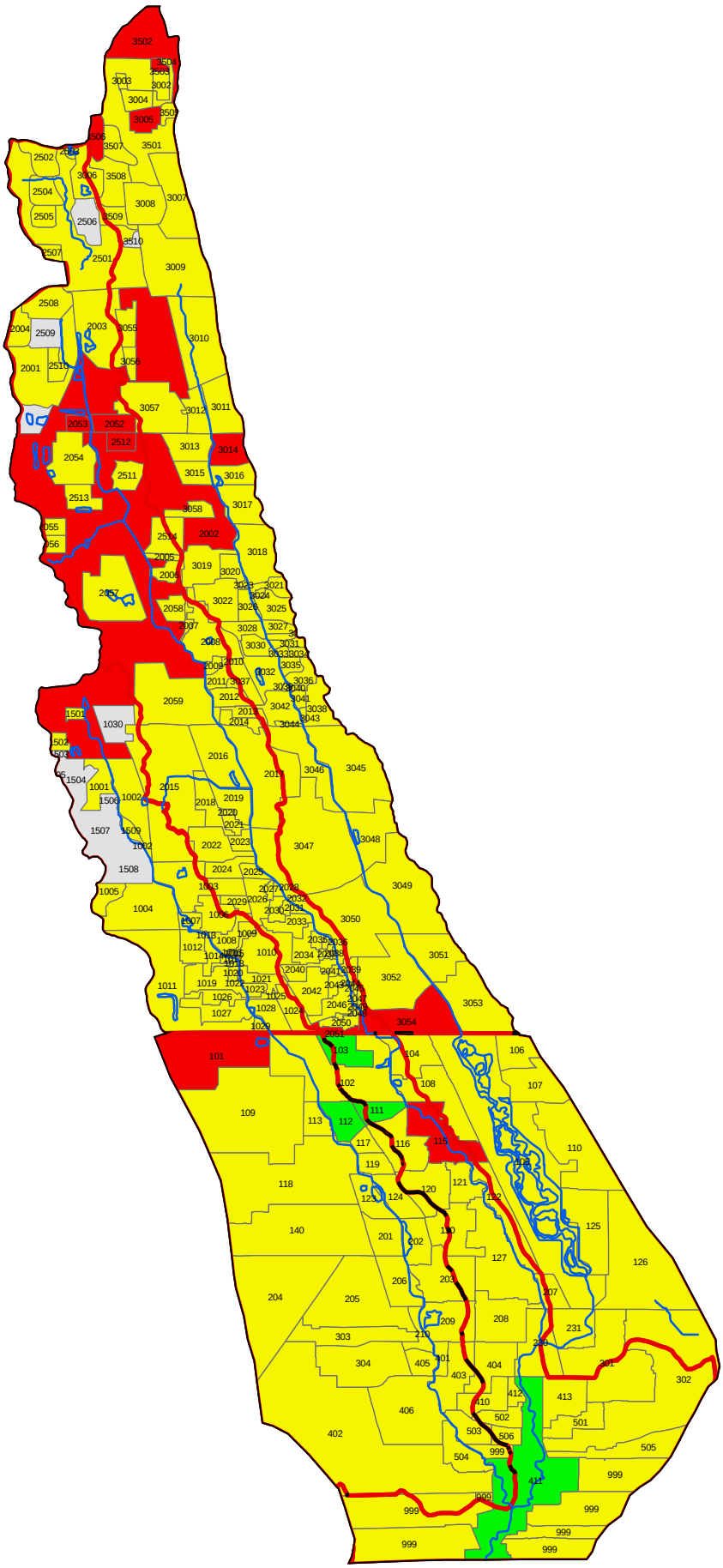


Figure F-10

Pollutant Loading Total Cadmium in Lake & Cook Counties

Legend

- Water
- Major Highways
- Watershed Boundary

Total Cadmium (lbs./acre)

- 0.000
- 0.001 - 0.010
- 0.011 - 0.025

Source:
Lake County Department of Information and Technology, GIS and Mapping Division

LAKE COUNTY

STORMWATER MANAGMENT COMMISSION

North Branch Chicago River Watershed

0 3 Miles

Maps to be used for Planning Purposes only.

Produced by V3 Companies

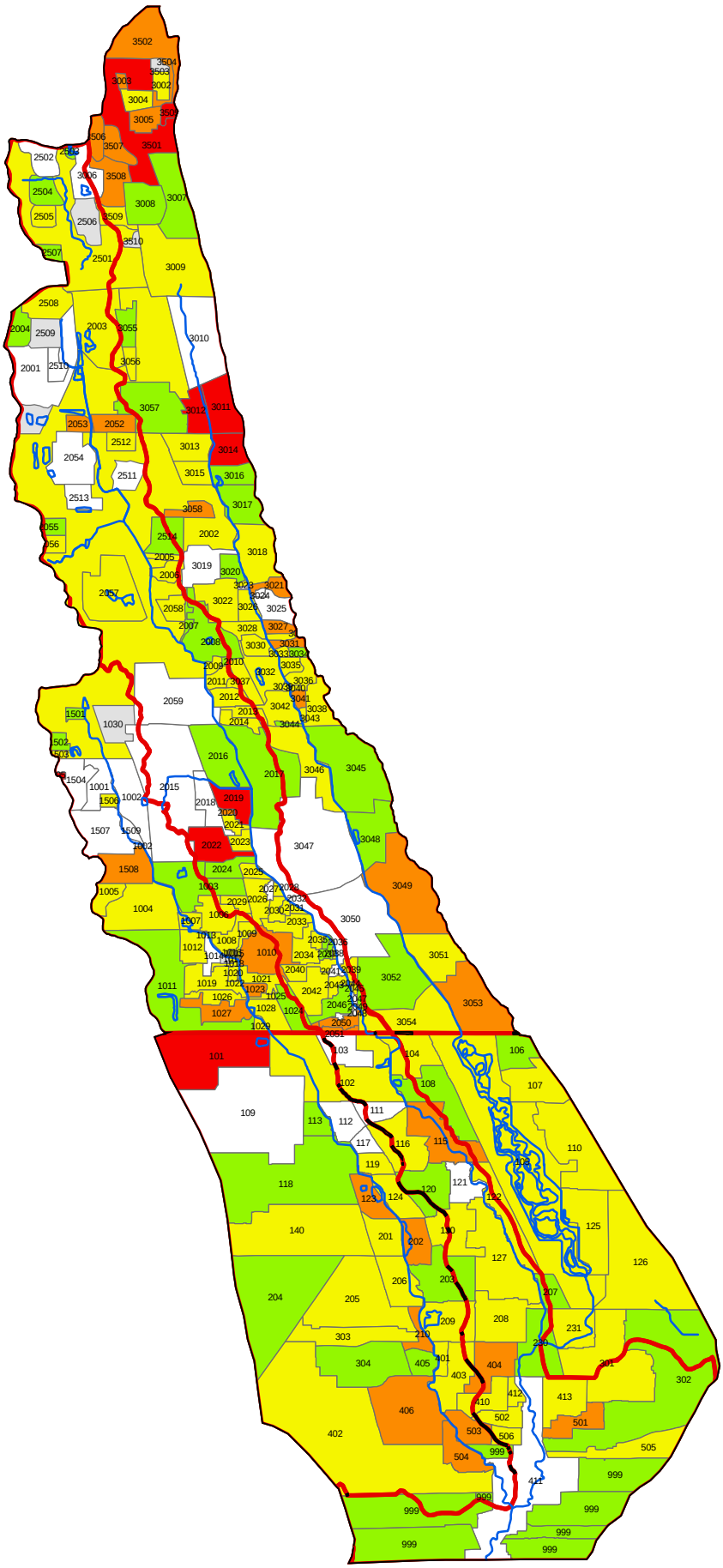


Figure F-9

Pollutant Loading Total Zinc in Lake & Cook Counties

Legend

- Water
- Major Highways
- Watershed Boundary

Zinc (lbs./acre)

- 0.000 - 0.470
- 0.471 - 0.760
- 0.761 - 1.000
- 1.001 - 1.340
- 1.341 - 1.790

Source:
Lake County Department of Information and Technology, GIS and Mapping Division

LAKE COUNTY
STORMWATER MANAGMENT COMMISSION

North Branch Chicago River Watershed

0 3 Miles

Maps to be used for Planning Purposes only.

Produced by V3 Companies

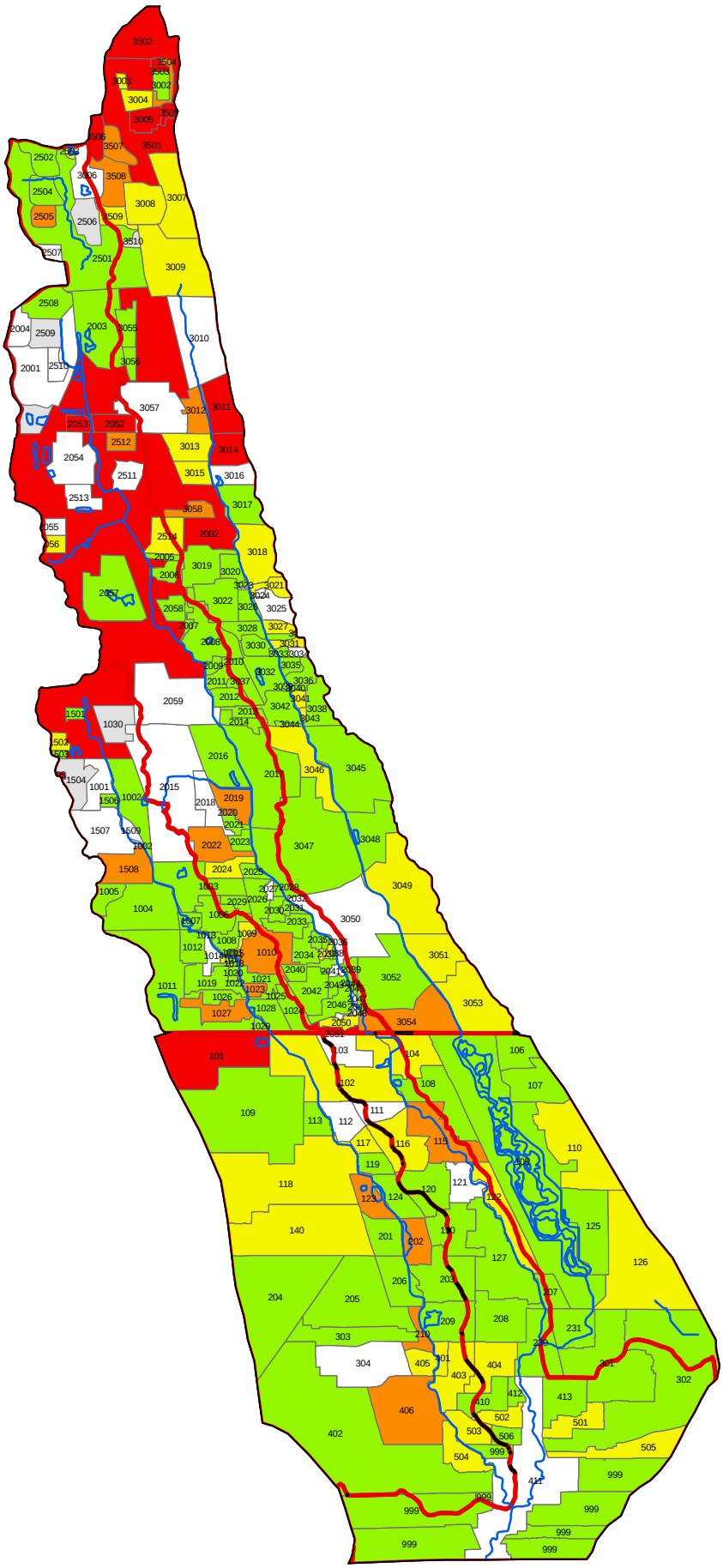


Figure F-8

Pollutant Loading Total Lead in Lake & Cook Counties

Legend

- Water
- Major Highways
- Watershed Boundary

Lead (lbs./acre)

- 0.000 - 0.170
- 0.171 - 0.350
- 0.351 - 0.650
- 0.651 - 0.990
- 0.991 - 1.540

Source:
Lake County Department of Information and Technology, GIS and Mapping Division

LAKE COUNTY
STORMWATER MANAGMENT COMMISSION

North Branch Chicago River Watershed

0 3 Miles

Maps to be used for Planning Purposes only.

Produced by V3 Companies

APPENDIX G: DETENTION BASIN INVENTORY SUMMARY TABLE

During summer 1998, the Lake County Stormwater Management Commission (SMC) conducted a detention basin inventory of all basins located within the municipalities in the Lake County portion of the North Branch watershed. Each of the respective municipalities identified the locations of basins in their jurisdictions. Over 200 basins in 8 of the 14 North Branch municipalities were inventoried during 1998. Of the remaining six municipalities, four (Mettawa, Highwood, Gurnee and Riverwoods) currently do not have any detention basins located in the North Branch watershed. The remaining basins in Bannockburn and Highland Park were inventoried by SMC in 1999.

In the summer of 2006, the SMC supplemented the original detention basin inventory to include basins constructed since the original inventory. A total of 469 detention basins were inspected during the inventories of 1998, 1999, and 2006.

During the detention basin inventory, data was collected on the following general basin characteristics:

- type of basin (wet, dry, or wetland);
- sizes and types of inlets and outlets;
- slopes of basin sides;
- vegetation on basin slopes and bottom; and
- surrounding land use and buffer widths.

In addition to these general characteristics, the North Branch detention basin inventory was undertaken to identify maintenance and design problems with existing basins such as shoreline erosion, clogged inlets or outlets, short-circuiting, or the presence of a concrete low-flow channel. Based on the field inspections, SMC also sought to identify potential retrofit opportunities to rectify design and maintenance problems as well as to increase the water quality functions, pollutant removal effectiveness, and habitat and other values of the existing basins. Detention basins recommended for water quality retrofits are mapped in Figure 5-3.

Table G-1

West Fork Detention Basin Summary

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
26-1	Anvil Farms Sub.	Lincolnshire	Residential Single	Wet	Fair	inlet/outlet orientation; rip rap side slopes; moderate algae; geese	replace turf grass and rip rap with native vegetation shoreline
26-2	Bishop's Gate Sub	Lincolnshire	Residential Single	Wet	Fair	inlet/outlet orientation	prevent A-C short circuiting replace turf grass with native vegetation
26-3	Brampton Woods Sub.	Lincolnshire	Residential Single	Dry	Poor		replace turf grass with native vegetation, create wetland is basin bottom, remove concrete underground channels
26-4	Briarwoods Sub	Lincolnshire	Residential Single	Dry	Poor		vegetate with native vegetation, remove trees, create wetland in basin bottom
26-5	Brittany Lane Sub.	Lincolnshire	Residential Single	Wetland	Good	outlet problems	install grate, B outlet
26-6	Dukes Lane	Lincolnshire	Residential Single	Wetland	Good		
26-7	Surrey Lane, West Basin	Lincolnshire	Residential Single	Wet	Good	inlet problems	D swale vegetate with native vegetation, reduce erosion B inlet with native vegetation
26-8	Surrey Lane East Basin	Lincolnshire	Residential Single	Wet	Good	outlet problem and duckweed	replace rip rap with native vegetation, deepen and/or increase basin capacity
26-9	Lincolnshire Woods III	Lincolnshire	Residential Single	Wetland	Good	inlet/outlet problems	replace concrete swale with native vegetation, unclog D manhole outlet
26-10	Whytegate III Sub	Lincolnshire	Residential Single	Dry	Poor	outlet problems	replace turf grass and underground concrete channels with wet basin and wetland
26-11	Whytegate Park Sub	Lincolnshire	Residential Single	Dry	Poor	outlet problems	replace turf grass and outlets with wet basin and wetland
26-12	Sherwood Forest Sub	Lincolnshire	Residential Single	Dry	Poor		replace turf grass with native vegetation
26-13	Sherwood Forest Sub	Lincolnshire	Residential Single	Dry	Poor		remove landscaping from around outlets replace turf grass with native vegetation
26-14	Sherwood Sub	Lincolnshire	Residential Single	Dry	Poor	inlet/outlet problems and orientation	replace turf grass and manholes with native vegetation, prevent short circuiting B-A with berm
26-15	Sherwood II Sub	Lincolnshire	Residential Single	Dry	Poor	outlet problems	replace turf grass and manholes with native vegetation
26-16	Westminster Woods	Lincolnshire	Residential Single	Wet	Good	outlet problems	replace turf grass and landscaped trees, bushes with native vegetation

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
26-17	Westminster Woods II	Lincolnshire	Residential Single	Wet	Good	inlet/outlet problems and moderate shoreline erosion	replace turf grass with native vegetation, install grates D, F outlets
26-18	Lincolnshire Woods	Lincolnshire	Residential Single	Dry	Poor		replace turf grass with native vegetation, install grate A outlet
26-19	Hyatt Hotel - west side	Deerfield	Commercial	Wetland	Fair	inlet/outlet problems and orientation	unclog A, B inlets and C outlet, prevent B-C short circuiting, replace uncut turf grass with native vegetation
26-20	Parkway North	Deerfield	Commercial	Wet	Good	inlet problems and rip rap side slopes	replace E inlet, G outlet may be inlet
26-21	Caruso Jr. High	Deerfield	Institution	Dry	Poor		replace turf grass with native vegetation install wet/wetland basin
26-22	Bnai Tikvah	Deerfield	Institutional	Wet	Good	inlet problems	unclog A inlet, stabilize C inlet
26-23	Shepard Jr. High	Deerfield	Institutional	Dry	Poor	inlet problems	replace turf grass with native vegetation, install wet/wetland basin, stabilize/unclog A inlet
26-24	1650 Lake Cook Rd	Deerfield	Commercial	Wet	Fair	concrete bottom	replace part of parking lot with a wet basin, parking lot has lots of unused spaces
26-25	Flodstrom - Fountains of Deerfield	Deerfield	Residential Multi	Wet	Good	inlet problems; rip rap side slopes; moderate shoreline erosion; geese	replace rip rap/turf grass with native vegetation, stabilize inlets, install fence on retaining wall
26-26	Kogen Projects - Bristol Place	Deerfield	Residential Single	Wet	Good	inlet/outlet problems	replace turf grass with native vegetation, stabilize inlets, install grate H outlet
26-27	Corporate 500	Deerfield	Commercial	Wet	Fair	inlet/outlet problems and orientation; moderate shoreline erosion	vegetate basin bottom with native vegetation replace turf grass with native vegetation, unclog B outlet, stabilize inlet
26-28	Whitehall	Deerfield	Commercial	Dry	Poor	inlet/outlet orientation and rip rap side slopes	install wet/wetland basin, prevent short circuiting
26-29	McDonalds	Deerfield	Commercial	Underground	Poor		
26-30	Laurel Hill North	Deerfield	Residential Single	Underground	Poor		
26-31	Baker's Square	Deerfield	Commercial	Underground	Poor		
26-32	Renu Spa	Deerfield	Commercial	Dry	Poor		
26-33	Public Works Facility	Deerfield	Institutional	Underground	Poor		

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
26-34	Flodstrom-Brickyards	Deerfield	Commercial	Wet	Fair	inlet/outlet problems and orientation; moderate algae	prevent short circuiting, replace turf grass with native vegetation, increase native vegetation on basin bottom
26-35	Coromandel	Deerfield	Residential Multi	Wet	Good	inlet/outlet problems	replace turf grass with native vegetation, install native vegetation basin bottom, stabilize inlets
26-36	Coromandel	Deerfield	Residential Multi	Wet	Good	inlet/outlet problems	stabilize inlets, outlets, replace turf grass with native vegetation, install native vegetation on basin bottom, replace rip rap swale with native vegetation
26-37	Coromandel	Deerfield	Residential Multi	Wet	Good	outlet problems	replace turf grass with native vegetation install native vegetation basin bottom
26-38	Coromandel	Deerfield	Residential Multi	Wet	Good		replace turf grass with native vegetation, install native vegetation in basin bottom
26-39	Conway Farms Phase 2B & 2C	Lake Forest	Residential - Single	Wet	Fair	inlet problems; inlet/outlet orientation; rip rap side slopes	replace turf grass/riprap with native vegetation prevent short circuiting, stabilize D outlet
26-40	Conway Farms Phase 2B & 2C	Lake Forest	Residential Single	Wet	Fair	inlet/outlet problems and orientation; rip rap side slopes; moderate shoreline erosion	replace riprap with native vegetation, stabilize inlets, stabilize riprap slope
26-41	Conway Farms Phase 2B & 2C	Lake Forest	Residential Single	Wet	Good	outlet problems; rip rap side slopes; high shoreline erosion	replace rip rap with native vegetation stabilize shoreline/slope
26-42	Villa's of the Trillium Sub	Lake Forest	Residential Single	Wet	Fair	outlet problems; inlet/outlet orientation; moderate algae	stabilize B outlet
26-43	Villa's of the Trillium Sub	Lake Forest	Residential Single	Wet	Good	inlet problems and moderate algae	replace turf grass with native vegetation. Unclog G, H inlets
26-44	Arthur J. Greene Sub	Lake Forest	Residential Single	Wet	Fair	inlet problems and rip rap side slopes	replace turf grass/riprap with native vegetation, unclog F inlet
26-45	Little Field Sub	Lake Forest	Residential Single	Wet	Good	rip rap side slopes and moderate algae	replace turf grass with native vegetation
26-46	Littlefield Sub	Lake Forest	Residential Single	Dry	Poor		install wet/wetland basin, replace turf grass with native vegetation.
26-47	Wedgewood Sub	Lake Forest	Residential Single	Wet	Good	outlet problems and moderate algae	A outlet unclog & install grate

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
26-48	Wedgewood Sub	Lake Forest	Residential Single	Wet	Good	inlet/outlet problems	replace turf grass with native vegetation unclog B outlet & C inlet, stabilize & fix outlet, replace A riprap concrete overflow with native vegetation
26-49	Conway Farms Golf Course	Lake Forest	Recreational	Wet	Fair	inlet problems; inlet/outlet orientation; rip rap side slopes	prevent short circuiting, replace turf grass & riprap with native vegetation
26-50	Conway Farms Golf Course	Lake Forest	Recreational	Wet	Good		
26-51	Conway Farms Golf Course	Lake Forest	Recreational	Wet	Good	rip rap side slopes	replace turf grass/riprap with native vegetation
26-52	Cibon	Bannockburn	Residential	Wet	Good	inlet problems; moderate shoreline erosion; moderate algae; geese; purple loosestrife	Install riprap A inlet & B swale, install native vegetation buffer, remove some woody vegetation
26-53	Doetsch	Bannockburn	Residential	Wet	Good	moderate algae	Install native vegetation buffer
26-54	Campbell	Bannockburn	Residential	Wet	Good	inlet/outlet problems	Replace broken pipe of A outlet & C inlet, install native vegetation in greater depth
26-55	Anderson	Bannockburn	Residential	Wet	Good	outlet problems and moderate algae	Install native vegetation buffer, install grate D outlet
26-56	College Park Subdivision II	Bannockburn	Commercial	Wet	Fair	inlet problems; inlet/outlet orientation; moderate shoreline erosion	A, C inlets prevent scour with riprap, D swale control erosion with riprap or native vegetation, F inlet reconnect, install native vegetation buffer
26-57	College Park Subdivision II	Bannockburn	Commercial	Wet	Good	outlet problems; moderate algae; geese	Install native vegetation buffer, prevent B overflow erosion with riprap or native vegetation
26-58	College Park Subdivision II	Bannockburn	Commercial	Wet	Good	inlet/outlet problems; geese; purple loosestrife	B, I inlets install riprap, H inlet install native vegetation, install native vegetation buffer, D outlet unclog
26-59	College Park Athletic Club	Bannockburn	Commercial	Wet	Fair	outlet problems; inlet/outlet orientation; high algae; purple loosestrife	A outlet reconnect, install native vegetation buffer in greater depth, prevent short circuiting B swale to A outlet
26-60	LTD Commodities	Bannockburn	Commercial	Wet	Good	inlet problems and rip rap side slopes	E inlet install riprap, install native vegetation buffer
26-61	LTD Commodities	Bannockburn	Commercial	Wet	Good	inlet/outlet problems and rip rap side slopes	A inlet install riprap, D outlet install grate, install native vegetation buffer
26-62	LTD Commodities	Bannockburn	Commercial	Wet	Good	inlet problems	A inlet reconnect, remove some willows, install native vegetation

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
26-63	LTD Commodities	Bannockburn	Commercial	Unknown	Poor	inlet problems; moderate shoreline erosion; high algae; muskrats	A inlet reconnect, D outlet unclog, install native vegetation buffer
26-64	100 Corporate North Bldg	Bannockburn	Commercial	Wet	Fair	inlet problems; inlet/outlet orientation; rip rap side slopes; geese	Prevent short circuiting T,V inlets to U outlet, install native vegetation buffer, T inlet install riprap
26-65	Trinity College	Bannockburn	Institutional	Wet	Good	inlet problems	A, C inlets reconnect, install native vegetation buffer
V3_26-01	Corporate North- LTD Commodities LLC	Bannockburn	Commercial	Wet	Good	inlet problems and rip rap side slopes	replace rip-rap w native veg., plant natives on bottom
V3_26-02	Bannockburn Corporate Center	Bannockburn	Commercial	Wet	Good	rip rap side slopes	replace rip-rap + brick wall w/ native veg., plant natives on bottom, clean up garbage
V3_26-03	Banner Day Camp	Uninc.	Commercial/ Recreational	Wet	Good	inlet problems and rip rap side slopes	replace rip-rap w/ native veg.
V3_26-04		Mettawa	Transportation	Unknown	Poor		
V3_26-05		Lincolnshire	Residential	Wet	Good	moderate algae	clean up algae
V3_26-06		Lincolnshire	Residential	Wet	Good		none, very nice basin
V3_26-07		Lake Forest	Residential	Wet	Good	moderate algae	plant native veg in buffer zone, clean up algae
V3_26-08	Hewitt Associates	Lincolnshire	Commercial	Wet	Good		native veg buffer zone around entire basin to replace shrubs, plant natives on bottom
V3_26-09	Hewitt Associates	Lincolnshire	Commercial	Wet	Good	moderate shoreline erosion	native veg. To replace some of the trees and shrubs, plant native veg. On bottom
V3_26-11	Hewitt Associates	Lincolnshire	Commercial	Wet	Good	inlet/outlet problems; moderate shoreline erosion; high algae	remove excess leaves, branches, & algae, plant native veg.
V3_26-12	Hewitt Associates	Lincolnshire	Commercial	Wet	Fair	inlet problems; inlet/outlet orientation; rip rap side slopes; high shoreline erosion; moderate algae	plant native vegetation on bottom & establish buffer zone
V3_26-13	off highway on-ramp	Uninc.	Transportation	Wet	Good	inlet problems	
V3_26-14	Sutton Place	Lincolnshire	Commercial	Wet	Good	inlet problems; rip rap side slopes; moderate shoreline erosion	plant native veg., add sediment basin

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
V3_26-15	Sutton Place	Lincolnshire	Commercial	Wet	Good	inlet/outlet problems; rip rap side slopes; moderate shoreline erosion	plant native veg. on bottom and to establish buffer zone, add sediment basins
V3_26-16	Windfall Lake	Riverwoods	Residential	Wet	Good		native veg on shoreline replacing turf grass and woodchips
V3_26-17	College Park	Bannockburn	Commercial	Wet	Good	outlet problems	stabilize shoreline with matting + more native veg, fill in erosion holes around MH, replace turf grass w/ native veg, reduce sediment
V3_26-18		Bannockburn		Unknown	Poor		
V3_26-19	Lake Eleanor	Deerfield	Residential	Wet	Fair	inlet/outlet orientation	replace vertical side w/ 4:1 slope, plant native veg along slope, remove excess sediment
V3_26-20	IDOT	Riverwoods	Transportation	Wet/Wetland	Fair		dig out sediment, clean up trash
V3_26-21	Parkway North	Deerfield	Commercial	Wet	Good		replace turf grass w/ native veg.
V3_26-22	Baxter	uninc.	Commercial	Wet	Good	rip rap side slopes	replace turf grass & rip-rap with native veg
V3_26-23	Baxter	uninc.	Commercial	Wet	Good	rip rap side slopes	replace turf grass and rip-rap with native veg.
V3_26-24	Baxter	uninc.	Commercial	Wet	Good	inlet/outlet problems and high algae	replace rip-rap and turf grass with native veg., clean up algae
V3_26-25		Deerfield	Residential	Wet	Good	inlet/outlet problems; rip rap side slopes; moderate algae	plant native veg, clean up algae
V3_26-26		Mettawa	Residential	Wet	Good	inlet problems	re-bury pipe, increase buffer zone + replace sand W/ native veg.
V3_26-27	CDW	Mettawa	Commercial	Wet	Good		establish buffer zone with native veg., plant natives on basin bottom, add sediment basins
V3_26-28		Lake Forest	Commercial	Wet	Good	outlet problems and moderate algae	establish native veg. buffer zone where there is none, trash rack on outlet, and clean out dead cattails
V3_26-30	Parkway North	Deerfield	Commercial	Wet	Good		stabilize banks

Table G-2

Middle Fork Detention Basin Summary

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
25-1	Saddle Hill I	Green Oaks	Residential Single	Wetland	Good		
25-2	Saddle Hill #3/Woodhaven	Green Oaks	Residential Single	Wet	Good	inlet problems and geese	N/A new subdivision under construction
25-3	Saddle Hill #2 Basin North	Green Oaks	Residential Single	Wet	Good	inlet problems and geese	establish buffer on turf shoreline, remove woody vegetation from C inlet swale
25-4	Saddle Hill #2 Basin South	Green Oaks	Residential Single	Wet	Good	inlet problems and geese	establish buffer on turf shoreline remove woody vegetation from C inlet
25-5(basin south) + 6(basin north)	Forest Glen	Green Oaks	Residential Single	Wet	Good	inlet/outlet problems	replace rip rap overflow with vegetation
25-7	Forest Lake	Green Oaks	Residential Single	Wet	Fair		replace rip rap with native vegetation, replace turf buffer with native vegetation
25-8	Forest Lake	Green Oaks	Residential Single	Wet	Good	rip rap side slopes	replace rip rap swale with native vegetation, replace rip rap with native vegetation, replace broken concrete with native vegetation
25-9	Brookhaven	Green Oaks	Residential Single	Wet	Good	high shoreline erosion and geese	site still under construction
25-10	Viking Park	Green Oaks	Commercial	Wet	Good	inlet problems and high algae	replace turf grass shoreline with native vegetation, reconnect F inlet
25-11	Lucky Lake	Green Oaks	Residential Single	Wet	Good	outlet problems and rip rap side slopes	install grate on A outlet, replace rip rap and turf grass with native vegetation
25-12	Polo Park/Lake Trails Industrial Park South basin	Green Oaks	Commercial/ Industrial	Wet	Good	inlet problems and rip rap side slopes	plant native vegetation around C inlet, improve shorelines with native vegetation
25-13	Polo Park/Lake Trails North Basin	Green Oaks	Commercial/ Industrial	Wet	Good		improve shoreline vegetation, replace rip rap overflow from street with native vegetation
25-14	Green Oaks Distribution	Green Oaks	Commercial/ Industrial	Wet	Fair	inlet problems; inlet/outlet orientation; high shoreline erosion	replace turf grass shoreline with native vegetation, replace rip rap overflow with native vegetation, replace turf grass swale with native vegetation prevent short circuiting

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
25-15	Glenmore Woods	Green Oaks	Residential Single	Wet	Fair	rip rap side slopes and concrete bottom	replace turf/Rip Rap shoreline and rip rap basin bottom with native vegetation, Is sanitary sewer connected to basin?
25-16	Glenmore Woods	Green Oaks	Residential Single	Wet	Good		replace turf/rip rap shoreline and rip rap basin bottom with native vegetation, stabilize west bank with vegetation
25-17	Coventry Woods	Waukegan	Residential Single	Wet	Good	inlet/outlet problems and rip rap side slopes	replace rip rap basin bottom and turf grass slope with native vegetation
25-18	Windwood Sub	Waukegan	Residential Single	Wet	Fair	inlet/outlet problems and orientation; moderate shoreline erosion	prevent short-circuiting, replace turf grass with native vegetation
25-19	Windwood Sub	Waukegan	Residential Single	Wet	Good	outlet problems and moderate algae	replace turf grass with native vegetation clear debris from A, C outlets
25-20	Windwood Sub	Waukegan	Residential Single	Wet	Good	outlet problems	install grate B outlet
25-21	Windwood Sub	Waukegan	Residential Multi	Wet	Good	inlet/outlet problems	replace turf grass with native vegetation, install new B outlet with grate
25-22	Meadow Woods Sub	Waukegan	Residential Single	Wetland	Good		Not sure this is a basin
25-23	Meadow Woods Sub	Waukegan	Residential Single	Wetland	Good		N/A Natural wetland if fed by 25-22
25-24	Regency Woods Sub	Waukegan	Residential Single	Wet	Good	inlet problems and moderate shoreline erosion	stabilize shoreline with native vegetation, install new B inlet, replace uncut turf grass, replace rip rap overflow with native vegetation
25-25	United Center for Commerce	Waukegan	Industrial	Wet	Fair	inlet/outlet problems and orientation; moderate shoreline erosion; geese	replace turf grass with native vegetation, prevent short-circuiting (basin may be large enough and inlets/outlets far enough apart), site still under construction and probable cause of moderate turbidity
25-26	Cadwell Corner's	Deerfield	Commercial	Underground	Poor		
25-27	Kogen Projects - Deerfield Estates	Deerfield	Residential Single	Dry	Poor	inlet/outlet orientation and outlet problems	install wet/wetland basin, prevent short circuiting, install grates on A, B, C outlets and unclog, replace turf grass with native vegetation
25-28	Deer Run	Deerfield	Residential Single	Dry	Poor	outlet problems	install wet/wetland basin, replace turf grass with native vegetation, stabilize inlets
25-29	Kilpling School	Deerfield	Institutional	Dry	Poor		install wet/wetland basins, replace turf grass with native vegetation

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
25-30	Summit Drive Extension	Deerfield	Residential Single	Dry	Poor	inlet/outlet problems and rip rap side slopes	install wet/wetland basin, unclog A D inlets and B outlet, replace rip rap overflow with native vegetation
25-32	Summerfield Sub	Lake Forest	Residential Single	Wet	Good	inlet problems and moderate algae	replace turf grass with native vegetation fix A inlet
25-33	Meadowood	Lake Forest	Residential	Wet	Good		
25-34	Meadowood	Lake Forest	Residential Single	Wet	Fair	inlet/outlet problems and orientation	prevent short circuiting, stabilize inlet, outlets
25-35	Meadowood	Lake Forest	Residential Single	Wet	Good	outlet problems and moderate shoreline erosion	replace turf grass with native vegetation - stabilize A - outlet
25-36	Newell's Reserve	Lake Forest	Residential Single	Wet	Good	inlet/outlet problems and moderate shoreline erosion	replace turf grass with native vegetation - stabilize inlets, do not mow native vegetation
25-37	Dieu Forest Sub	Lake Forest	Residential Single	Wet	Good		replace turf grass with native vegetation, remove woody vegetation
25-38	Lake Forest High School - West Campus	Lake Forest	Institutional	Wet	Good	inlet problems; moderate shoreline erosion; moderate algae	replace riprap & soil with native vegetation stabilize C channel
25-39	Lake Forest High School - West Campus	Lake Forest	Institutional	Wet	Fair	inlet/outlet problems and orientation	replace uncut turf with native vegetation - stabilize B inlet, prevent short circuiting
25-40	North Carroll Meadow Sub	Lake Forest	Residential Single	Wetland	Good	inlet problems	site under construction
25-41	McIlvaine Meadows Sub	Lake Forest	Residential Single	Dry	Poor		install wet/wetland basin
25-42	Albert Moore Sub	Lake Forest	Residential Single	Wet	Good	inlet/outlet problems	replace turf grass with native vegetation, install native vegetation basin bottom, stabilize D inlet, install grate A outlet
25-43	Country Place Sub	Lake Forest	Residential Single	Wet	Good	inlet/outlet problems and geese	replace turf grass with native vegetation install grate B outlet, stabilize A inlet & fix A inlet
25-44	Old Elm Estates	Lake Forest	Residential Single	Wetland	Good	inlet/outlet problems	remove concrete channels install wet basin or improve wetland basin, install grates on C, D outlet
25-45	Andover Village	Lake Forest	Residential Single	Wet	Good		
25-46	Conway Park	Lake Forest	Commercial	Wet	Good	outlet problems; rip rap side slopes; geese	replace turf grass with native vegetation, install fence concrete wall, install grate D outlet

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
25-47	Conway Park	Lake Forest	Commercial	Wet	Fair	inlet/outlet problems and orientation	replace turf grass with native vegetation prevent short circuiting
25-48	Conway Park	Lake Forest	Commercial	Wet	Good	outlet problems	replace turf grass with native vegetation, install grate C outlet
25-49	Conway Park	Lake Forest	Commercial	Wet	Good	inlet/outlet problems	replace turf grass with native vegetation stabilize D inlet, install grate A outlet & unclog
25-50	Chicago Bears Training Facility	Lake Forest	Recreational	Dry		inlet/outlet problems and orientation; rip rap side slopes	Replace riprap with native vegetation, prevent short circuiting, install wet basin
25-51	Chicago Bears Training Facility	Lake Forest	Recreational	Dry		inlet/outlet problems	replace riprap with native vegetation, install wet/wetland basin, stabilize inlets
25-52	Chicago Bears Training Facility	Lake Forest	Recreational	Dry		inlet/outlet problems and orientation	replace riprap with native vegetation, stabilize inlet & outlets, install wet/wetland basin
25-53	Academy Woods	Lake Forest	Residential Single	Wet	Good	inlet/outlet problems	replace turf grass with native vegetation stabilize inlet, unclog A outlet B inlet, install grate A outlet
25-54	Academy Woods	Lake Forest	Residential Single	Wet	Good	moderate algae	replace turf grass with native vegetation
25-55	Academy Woods Sub	Lake Forest	Residential Single	Wet	Fair	inlet/outlet problems and orientation; moderate algae	replace turf grass with native vegetation stabilize inlets, prevent short circuiting
25-56	Conway Farms IA	Lake Forest	Residential Single	Wet	Good	inlet problems	replace turf grass with native vegetation stabilize A & C inlets
25-57	Conway Farms IA	Lake Forest	Residential Single	Wet	Good	inlet problems and geese	replace turf grass native vegetation stabilize inlets
25-58	Conway Farms 1B	Lake Forest	Residential Single	Wet	Fair	inlet/outlet problems and orientation; geese	replace turf grass with native vegetation prevent short circuiting, stabilize outlet
25-59	Conway Farms IC	Lake Forest	Residential Single	Wet	Good	outlet problems	replace turf grass with native vegetation
25-60	Conway Farms IC	Lake Forest	Residential Single	Wetland	Good	outlet problems	
25-61	Larson-Michael-Ross Sub	Lake Forest	Residential Single	Wet	Good	inlet problems	unclog A inlet & stabilize, remove woody vegetation
25-62	Larson-Michael-Ross	Lake Forest	Residential Single	Wet	Good	inlet/outlet problems	replace turf grass with native vegetation stabilize A inlet, fix E outlet
25-63	Gavin Woods	Lake Forest	Residential Single	Wet	Good	inlet/outlet problems	fix B inlet, unclog & install grate A, C outlets
25-64	Gavin Woods	Lake Forest	Residential Single	Wet	Good	inlet/outlet problems and moderate algae	replace turf grass with native vegetation, stabilize inlets, install grates C,D outlets

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
25-65	South Carroll Meadow	Lake Forest	Residential Single	Wet	Good	inlet problems	stabilize inlets
25-66	Ridgewood	Lake Forest	Residential Single	Wet	Good	inlet/outlet problems and geese	replace turf grass with native vegetation stabilize inlet, unclog outlet
25-67	Stanton	Lake Forest	Residential Single	Wet	Good	inlet/outlet problems	unclog inlet - outlet
25-68	Stanton	Lake Forest	Residential Single	Wet	Fair	inlet/outlet problems and rip rap side slopes	replace riprap with native vegetation, unclog C outlet
25-69	Westlake	Lake Forest	Residential Single	Wet	Good	inlet/outlet problems; rip rap side slopes; moderate algae	replace turf grass/riprap with native vegetation, stabilize inlets & outlets, install grate G outlet
25-70	West Lake Forest Train Station	Lake Forest	Commercial	Wet	Good	inlet problems	stabilize inlets, replace riprap with native vegetation.
25-71	Woodland Creek	Lake Forest	Residential Single	Wet	Fair	inlet problems; inlet/outlet orientation; rip rap side slopes	replace turf grass/riprap with native vegetation, stabilize & fix A inlet
25-72	Woodland Creek	Lake Forest	Residential Single	Wet	Good	inlet/outlet problems and moderate shoreline erosion	stabilize inlets, replace turf grass/riprap with native vegetation
25-73	Woodland Creek	Lake Forest	Residential Single	Wet	Good	inlet/outlet problems	stabilize inlets
25-74	Lake Forest Chateau	Lake Forest	Residential Multi	Wet	Fair	inlet/outlet problems and orientation; rip rap side slopes; geese	replace turf/riprap with native vegetation stabilize inlets, install fence or retaining wall
25-75	Evergreen II	Lake Forest	Residential Single	Wet	Fair	inlet/outlet problems and orientation; rip rap side slopes; moderate algae; geese	replace turf grass & riprap & concrete swales with native vegetation, prevent short circuiting, stabilize inlets, A & D channel replace concrete with native vegetation
25-76	Evergreen II	Lake Forest	Residential Single	Wet	Good	inlet/outlet problems; rip rap side slopes; moderate algae	replace turf grass/riprap with native vegetation, unclog J outlet, stabilize & fix inlets, E channel concrete replace with native vegetation.
25-77	Evergreen II	Lake Forest	Residential Single	Wet	Good	inlet/outlet problems; rip rap side slopes; moderate algae	replace turf grass/riprap with native vegetation, unclog A inlet & E outlet, A channel replace with native vegetation.
25-78	Evergreen II	Lake Forest	Residential Single	Wet	Good	inlet/outlet problems; rip rap side slopes; geese	replace turf grass/riprap with native vegetation, unclog H inlet

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
25-79	Evergreen II	Lake Forest	Residential Single	Wet	Fair	inlet/outlet problems and orientation; rip rap side slopes; moderate shoreline erosion	replace riprap/turf grass with native vegetation, stabilize inlets, stabilize & fix N outlet, replace concrete D channel with native vegetation.
25-80	White Oaks	Lake Forest	Residential Single	Wet	Good	outlet problems and high algae	stabilize & fix A outlet, replace turf grass with native vegetation, control algae.
25-81	Palmer Woods	Lake Forest	Residential Single	Dry	Poor	outlet problems and inlet/outlet orientation	replace turf grass with native vegetation prevent short circuiting
25-83	Windridge	Lake Forest	Residential Single	Wet	Good	inlet problems	replace turf grass with native vegetation, fix & stabilize A inlet
25-84	Everett Farm	Lake Forest	Residential	Unknown			
25-85	Wood of the Estate Lane	Lake Forest	Residential Single	Dry	Poor	outlet problems	replace turf grass/riprap with native vegetation, install wet/wetland basin
25-86	Arbor Ridge	Lake Forest	Residential Single	Wet	Fair	inlet/outlet problems and orientation; rip rap side slopes	stabilize inlets, replace turf grass/riprap with native vegetation, unclog K outlet
25-87	Arbor Ridge	Lake Forest	Residential Single	Wet	Fair	outlet problems and inlet/outlet orientation	replace uncut turf grass with native vegetation, prevent short circuiting
25-88	Arbor Ridge	Lake Forest	Residential Single	Wet	Good	inlet problems	stabilize inlets, replace turf grass with native vegetation.
25-89	Arbor Ridge	Lake Forest	Residential Single	Wet	Good	inlet/outlet problems and moderate algae	stabilize inlets, unclog outlets, replace turf grass with native vegetation
25-90	Arbor Ridge	Lake Forest	Residential Single	Wet	Fair	outlet problems; inlet/outlet orientation; moderate algae	install native vegetation unclog outlet, prevent short circuiting
25-91	Conway Farms Golf Course	Lake Forest	Recreational	Wet	Good		install native vegetation
25-92	2090 Windy Hill Ln	Highland Park	Residential	Dry	Poor	outlet problems	NA
25-93	2094 Windy Hill Ln	Highland Park	Residential	Dry	Poor		NA
25-94	2070 Clavey Rd	Highland Park	Residential	Dry	Poor		NA
25-95	The Villas of Highland Park	Highland Park	Residential	Dry	Poor		Install native vegetation buffer

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
25-96	The Villas of Highland Park	Highland Park	Residential	Dry	Poor	outlet problems	A outlet fix erosion, install native vegetation
25-97	990 Coventry Ln	Highland Park	Residential	Dry	Poor	outlet problems	A & B outlets unclog & install grate, install native vegetation
25-98	2070 Hidden Ridge Ln	Highland Park	Residential	Dry	Poor		Install native vegetation, remove fences
25-99	Painter's Lake Homeowners Assoc	Highland Park	Residential	Wet	Good	outlet problems and geese	Install native vegetation buffer, install grate E outlet
25-100	Roth	Highland Park	Residential	Wet	Good	outlet problems and purple loosestrife	Install riprap or native vegetation at A outlet, install native vegetation buffer
25-101	2600 Kelly Rd	Highland Park	Residential	Wet	Fair	outlet problems; inlet/outlet orientation; geese; purple loosestrife	Install B outlet grate, install native vegetation buffer
25-102	2555 Tennyson Ln	Highland Park	Residential	Wet	Good	rip rap side slopes	Install native vegetation buffer
25-103	Fisher	Highland Park	Residential	Wet	Good	outlet problems and rip rap side slopes	Install native vegetation buffer, C outlet install grate
25-104	Creasman	Bannockburn	Residential	Wet	Good	inlet/outlet problems and rip rap side slopes	Install vegetation buffer, prevent B inlet scour, C outlet unclog & install grate
25-105	Levitt	Bannockburn	Residential	Wet	Good	inlet/outlet problems and rip rap side slopes	Install native vegetation buffer, remove some woody vegetation, install concrete outlet, install riprap A, B & C inlets
25-106	Theodosakis	Bannockburn	Residential	Wet	Good	inlet problems; high shoreline erosion; purple loosestrife	Install native vegetation buffer, remove some woody vegetation
25-107	Beeson	Bannockburn	Residential	Wet	Good	inlet problems	Install native vegetation buffer, replace B inlet
25-108	Tomaszewicz	Bannockburn	Residential	Wet	Good		Remove some woody vegetation, install more native vegetation, remove bricks install native vegetation
25-109	Mehta	Bannockburn	Residential	Wet	Fair	inlet/outlet problems and orientation	Prevent scour B, D, E, f, G, H inlets with riprap or native vegetation, A outlet unclog & install grate, install native vegetation buffer
25-110	Ansarri/Fettero	Bannockburn	Residential	Wet	Good	inlet/outlet problems; muskrats; purple loosestrife	A inlet install riprap, B, E, F inlets lengthen pipe, C, D outlets unclog & install grates, install native vegetation buffer

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
25-111	Chen	Bannockburn	Residential	Wet	Good	outlet problems	C outlet install grate & unclog, install native vegetation buffer
25-112	Bannockburn Green Retail Center	Bannockburn	Commercial	Wet	Good	inlet/outlet problems	Install native vegetation buffer, replace landscaping with native vegetation, B outlet unclog, E inlet reconnect
25-113	Putorian Furniture	Bannockburn	Commercial	Dry	Poor	inlet/outlet problems and purple loosestrife	Remove some woody vegetation, install native vegetation on bottom 7 slopes, B, C inlets & D outlet unclog
25-114	Bannockburn Lake Office I	Bannockburn	Commercial	Wet	Fair	outlet problems; inlet/outlet orientation; rip rap side slopes	Install native vegetation buffer, B outlet unclog & install grate, prevent short circuiting A swale to B outlet
25-115	Bannockburn Lake Office I	Bannockburn	Commercial	Wet	Good	inlet/outlet problems and geese	aerator hose next to G inlet has a hole needs to be repaired, E inlet reconnect, F swale line with riprap or native vegetation, install vegetation buffer, prevent short circuiting B inlet to A outlet, install new pipe C inlet
25-116	Bannockburn Lake Office II	Bannockburn	Commercial	Wet	Good	inlet/outlet problems; rip rap side slopes; moderate shoreline erosion	C swale install riprap or native vegetation, install native vegetation buffer, F outlet install grate, install new pipe E inlet
25-117	Bannockburn Tennis Club	Bannockburn	Commercial	Wet	Good	outlet problems and moderate algae	Install grate B outlet, install native vegetation buffer, remove landscaping, remove debris, remove some willows, install riprap or native vegetation C & D swales
25-118	Bannockburn Lake Office III	Bannockburn	Commercial	Wet	Good	inlet problems; rip rap side slopes; geese; purple loosestrife	Install native vegetation buffer, F inlet install riprap
25-119	Bannockburn Lake Office III	Bannockburn	Commercial	Wet	Good	rip rap side slopes; moderate algae; purple loosestrife	Install native vegetation buffer
25-121	Bannockburn Lake Office III	Bannockburn	Commercial	Wet	Good	outlet problems and rip rap side slopes	B outlet install grate, install native vegetation buffer
25-122	Bannockburn Lake Office IV	Bannockburn	Commercial	Wet	Good	inlet problems	F inlet install native vegetation, install native vegetation buffer
25-123	Bannockburn Lake Office	Bannockburn	Commercial	Wet	Good	inlet/outlet problems and purple loosestrife	B inlet prevent scour with riprap, D inlet unclog, A outlet install grate
25-124	Bannockburn Lake Office	Bannockburn	Commercial	Wet	Good	outlet problems; rip rap side slopes; purple loosestrife	Install native vegetation buffer, A outlet unclog & install grate
25-125	Bannockburn Lake Office	Bannockburn	Commercial	Wet	Good	outlet problems; moderate algae; purple loosestrife	A outlet install grate, remove some willows, install native vegetation buffer

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
25-126	Farschi	Bannockburn	Residential	Wet	Good	moderate algae and purple loosestrife	Install native vegetation buffer
25-127	Harris	Bannockburn	Residential	Wet	Fair	rip rap side slopes; concrete bottom; moderate algae; water hyacinth	Install native vegetation buffer
25-128	Chapp	Bannockburn	Residential	Wet	Fair	rip rap side slopes; concrete bottom; duckweed	Replace concrete basin with native vegetation bottom, increase depth of native vegetation
25-129	Theodosakis	Bannockburn	Residential	Wet	Good	inlet/outlet problems; moderate shoreline erosion; geese	Install native vegetation bottom & buffer, install grate A outlet
25-130	Theodosakis	Bannockburn	Residential	Wet	Good	outlet problems and moderate shoreline erosion	Install native vegetation bottom & buffer, install grate A outlet
25-131	Hammerberg	Bannockburn	Residential	Wet	Good	moderate algae	Install native vegetation buffer
25-132	Roth	Highland Park	Residential	Unknown	Poor		
V3_25-01	Lakehurst Apartment Complex	Waukegan	Residential	Wet	Good	inlet/outlet problems; rip rap side slopes; high shoreline erosion; geese	*need to stabilize bank* by planting native vegetation and establishing buffer zone, clean out algae + trash
V3_25-02	The Fields of Cambridge	Waukegan	Residential	Wet	Good	moderate algae	clean up algae
V3_25-03		Waukegan	Residential	Wet	Good	inlet problems	clean up algae
V3_25-04		Waukegan	Residential	Wet	Good	moderate algae	clean out algae, add sediment basins
V3_25-05	The Fields of Cambridge	Waukegan	Residential	Wet	Good		very nice basin
V3_25-06	Cardinal Health, Shmidt Lake	McGaw Park, IL (uninc. Waukegan)	Commercial	Wet	Good	inlet problems; rip rap side slopes; geese	replace turf grass with native veg, remove concrete channel in woods and replace w/ stilling basin & veg, repair
V3_25-07	Brookhaven	Green Oaks	Residential	Wet/Wetland	Fair		nice basin
V3_25-08	Brookhaven	Green Oaks	Residential	Wet/Wetland	Fair	inlet problems and high algae	clean up algae + sediment
V3_25-09	Brookhaven	Green Oaks	Residential	Wet/Wetland	Fair	high algae	nice basin
V3_25-10	Brookhaven	Green Oaks	Residential	Wet/Wetland	Fair	moderate algae	clean up algae

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
V3_25-11		Green Oaks	Residential	Wet/Wetland	Fair	moderate shoreline erosion	native veg buffer around banks, stabilize banks, clean up algae
V3_25-12 A		Green Oaks	Residential	Wet	Good	rip rap side slopes	replace stones + turf grass w/ native veg, increase bank height
V3_25-12 B	Oak Grove School	Green Oaks	Institutional	Dry/Wetland	Fair	inlet/outlet problems	plant native veg on shoreline, replace turf grass on bottom w/ native veg, clear out trees from bottom of basin
V3_25-14	Abbott Labs	Uninc.	Commercial	Wet	Good	inlet problems and rip rap side slopes	replace rip-rap and turf grass w/ native veg
V3_25-15	Abbott Labs	Uninc.	Commercial	Wet	Good	inlet problems and rip rap side slopes	replace turf grass and rip-rap with native veg
V3_25-16	Abbott Labs	Uninc	Commercial	Wet	Good	rip rap side slopes	replace rip-rap + turf grass w/ native veg
V3_25-17	Abbott Labs	Uninc.	Commercial	Wetland	Good		nice basin
V3_25-18	Abbott Labs	Uninc.	Commercial	Wet	Good	rip rap sides slopes	clear veg from in front of pipes
V3_25-19	Abbott Labs	Uninc.		Wet	Good		
V3_25-20	Fox Run	Green Oaks	Residential	Wet	Good	moderate shoreline erosion	plant native buffer around entire perimeter and on bottom, add stilling basins
V3_25-21	20th Century Lake, Old Rockland rd.	Green Oaks	Residential	Wet	Good	inlet/outlet problems and rip rap side slopes	native veg. Buffer all around lake, replace rip-rap and sand with native veg., trash rack on outlet
V3_25-22		Green Oaks	Commercial	Wet	Good		clean up trash
V3_25-23		Green Oaks	Commercial	Wet	Good	inlet/outlet problems; rip rap side slopes; moderate shoreline erosion; moderate algae	replace concrete slabs with native veg & establish buffer zone, fix pipe F, clean up trash & sediment
V3_25-24	Parson Pond	Green Oaks	Commercial	Wet	Good	inlet problems	plant native veg on shoreline, fix pipes & erosion around inlets
V3_25-25		Green Oaks	Commercial	Wet	Good	outlet problems	establish buffer zone, clean up trash, cover MH w/ inlet behind A, clean up sediment
V3_25-26		Green Oaks	Agriculture	Wet	Good		
V3_25-27	Abbott Labs	Uninc.		Wet	Good		nice basin
V3_25-28		Green Oaks	Residential	Wet	Good	rip rap side slopes	native veg on side slopes

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
V3_25-29		Green Oaks	Residential	Wet	Fair	inlet/outlet orientation and rip rap side slopes	add sediment basins at inlets, plant native veg on side slopes
V3_25-30	Green Oaks business district	Green Oaks	Commercial/ Industrial	Wet	Good	high algae	remove algae
V3_25-31		Green Oaks	Commercial/ Industrial	Wetland	Good		increase native veg buffer zone
V3_25-32	Lambs Farm Lake	Green Oaks	Residential/ Institutional	Wet	Good	inlet problems; moderate shoreline erosion; geese	stabilize shoreline (west side esp.), replace concrete slabs + turf grass w/ native veg
V3_25-33	Old School Lake	Uninc.	Forest Preserve	Wet	Good	inlet problems and high algae	remove algae, clean out pipe B
V3_25-34	Jamaican Gardens	Green Oaks	Commercial	Wet	Good	inlet problems; moderate shoreline erosion; high algae	stabilize shoreline, lessen slopes, fill in under pipes, clean up algae
V3_25-35	Jamaican Gardens	Green Oaks	Commercial	Wet	Good	inlet problems and moderate shoreline erosion	clean out sediment, stabilize banks
V3_25-36	Jamaican Gardens	Green Oaks	Commercial	Wet	Good	outlet problems; moderate shoreline erosion; high algae	clean up algae, stabilize shoreline
V3_25-37		Uninc. Green Oaks	Commercial	Dry	Poor	inlet problems	remove trees from basin bottom, remove debris, stabilize shoreline in areas
V3_25-38		Lake Forest	Residential	Wet	Good	outlet problems	clean out pipe, remove algae
V3_25-39		Lake Forest	Residential	Wet	Good	inlet problems	clean up algae
V3_25-40	Chicago Bears practice field	Lake Forest	Commercial	Wet	Good		establish buffer zone, plant native vegetation on bottom
V3_25-42		Mettawa		Unknown			
V3_25-44	Abbott Nutrition	Lake Forest	Commercial	Wet	Good		very nice basin
V3_25-45		Lake Forest	Residential	Wet	Good	rip rap side slopes	add a larger variety of native plants in buffer zone
V3_25-45		Lake Forest	Residential	Wet	Good	outlet problems; rip rap side slopes; moderate algae; cattails	remove cattails, plant native vegetation to replace and establish a buffer zone
V3_25-46		Lake Forest	Residential	Wet	Good	inlet problems and rip rap side slopes	plant a larger variety of native plants, clean out inlet A

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
V3_25-49		Lake Forest	Residential	Wet	Good	inlet problems and high algae	plant native veg, increase buffer zone, clean up algae
V3_25-50		Lake Forest	Residential	Wet	Good		very nice basin

Table G-3

Skokie River Detention Basin Summary

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
24-1	Aldi Grocery Store	Park City	Commercial	Dry	Poor	inlet/outlet problems and orientation; geese	N needs settling basins, berm to prevent short circuiting
24-2	Stardust Hotel	Park City	Commercial	Unknown	Poor		if built should be designed with water quality component such as a sand fitter
24-3	Lundberg Enterprises	Lake Bluff	Commercial	Dry	Poor	inlet problems	replace turf grass with native vegetation, install grate on A outlet, Basin still under construction
24-4	Office Bldg.	Lake Bluff	Commercial	Dry	Poor	outlet problems	replace turf grass and rip rap with native vegetation, install grate on B outlet
24-5	Deer Path Medical	Lake Bluff	Commercial Industrial	Dry	Poor	inlet problems	replace turf grass and rip rap with native vegetation
24-6	Profile Plastics	Lake Bluff	Industrial	Dry	Poor	inlet problems and inlet/outlet orientation	remove trees/woody vegetation from slopes, prevent short-circuiting with berms, remove manhole outlets, replace rip rap inlets with native vegetation
24-7	Warehouse	Lake Bluff	Industrial	Wetland	Good	outlet problems	replace rip rap inlets and overflows with native vegetation
24-8	Liquid Controls	Lake Bluff	Industrial	Wet	Fair	outlet problems; inlet/outlet orientation; rip rap side slopes; moderate shoreline erosion	install grate on B outlet, replace rip rap with native vegetation
24-9	U Line, Inc.	Lake Bluff	Industrial	Dry	Poor	outlet problems and inlet/outlet orientation	improve berms to prevent short-circuiting unclog A, C, F outlets. Replace turf grass with native vegetation.
24-10	ELE International	Lake Bluff	Industrial	Dry	Poor	inlet/outlet problems	replace rip rap inlet and turf grass native vegetation, replace D outlet
24-11	Assoc Research	Lake Bluff	Industrial	Dry	Poor	inlet/outlet problems and orientation	lower inlets and replace rip rap and turf grass with native vegetation, install berm to prevent short-circuiting B-A install grate A outlet
24-12	Carriage Way Shopping Center	Lake Bluff	Commercial	Dry	Poor	inlet/outlet orientation	install grate over B, C outlets, replace turf grass with native vegetation, prevent short-circuiting
24-13	Carriage Point	Lake Bluff	Commercial/ Industrial	Dry	Poor	outlet problems	unclog B, E outlets, replace rip rap with native vegetation, replace turf grass with native vegetation

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
24-14	Knauz Auto Park	Lake Bluff	Commercial	Wet	Fair	inlet/outlet problems and orientation; rip rap side slopes; high shoreline erosion; geese	vegetate shoreline and inlets with native vegetation, remove rip rap A, B, D, E inlets, prevent D-C short-circuiting
24-15	Central Lake County JAWA	Lake Bluff	Commercial	Wet	Fair	inlet problems; inlet/outlet orientation; rip rap side slopes; geese	replace rip rap shoreline with native vegetation, prevent D-A short-circuiting, repair erosion around D inlet
24-16	LB Public Works Facility	Lake Bluff	institutional	Wet	Good	inlet problems	replace turf grass with native vegetation replace rip rap with native vegetation
24-17	Belle Foret Sub	Lake Bluff	Residential Single	Wetland	Good		
24-18	Continental Properties	Lake Bluff	Commercial	Wet	Fair	inlet problems; inlet/outlet orientation; high shoreline erosion	stabilize shoreline with native vegetation, site still under construction, prevent F, G-E short-circuiting
24-19	Amhurst Business Park	Waukegan	Industrial	Wet	Fair	inlet/outlet problems and rip rap side slopes	replace turf grass with native vegetation install grate A outlet
24-20	Amhurst Business Park	Waukegan	Industrial	Wet	Good		
24-21	Amhurst Business Park	Waukegan	Industrial	Wet	Good	inlet problems; rip rap side slopes; geese	replace turf grass with native vegetation
24-22	Amhurst Business Park	Waukegan	Industrial	Wet	Good	inlet problems; rip rap side slopes; moderate algae	replace turf grass with native vegetation, install grate on A outlet
24-23	Amhurst Business Park	Waukegan	Industrial	Wet	Good	inlet/outlet problems and rip rap side slopes	replace turf grass with native vegetation stabilize inlets
24-24	Amhurst Business Park	Waukegan	Industrial	Wet	Fair	outlet problems; inlet/outlet orientation; rip rap side slopes	replace turf grass/rip rap with native vegetation, stabilize B inlet
24-25	Amhurst Business Park	Waukegan	Industrial	Wet	Fair	inlet problems; inlet/outlet orientation; rip rap side slopes; geese	replace turf grass/rip rap with native vegetation, prevent A-D short circuiting
24-26	Amhurst Business Park	Waukegan	Industrial	Wet	Fair	inlet/outlet problems and rip rap side slopes	replace turf grass with native vegetation stabilize inlets, basin bottom with native vegetation
24-27	Amhurst Business Park	Waukegan	Industrial	Wet	Good	inlet problems and moderate algae	stabilize A, E inlets, remove trees from is swale and stabilize banks

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
24-28	Amhurst Business Park	Waukegan	Industrial	Wet	Fair	inlet/outlet problems and orientation; geese	replace turf grass with native vegetation replace rip rap inlets, basin bottom with native vegetation, stabilize inlet C, outlet B unclog inlet E
24-29	Amhurst Business Park	Waukegan	Industrial	Wet	Fair	inlet/outlet problems and orientation	replace turf grass with native vegetation, stabilize A, F G inlets, unclog F inlet, replace broken grate/pipe C outlet
24-30	Amhurst Business Park	Waukegan	Industrial	Wet	Good	inlet/outlet problems and moderate shoreline erosion	replace turf grass with native vegetation stabilize inlets and outlets, replace D inlet, unclog C inlet
24-31	Northern Crossings	Waukegan	Residential Multi	Wet	Fair	inlet problems; inlet/outlet orientation; rip rap side slopes	replace turf grass with native vegetation, prevent short circuiting, stabilize inlets
24-32	Northern Crossings	Waukegan	Residential Multi	Wetland	Good	inlet problems	stabilize inlets, install wet basin
24-33	Northpoint Business Center	Waukegan	Industrial	Wet	Good	inlet problems; rip rap side slopes; moderate shoreline erosion	replace rip rap and turf grass with native vegetation, stabilize inlet, control runoff form disturbed field NW of basin - 4 gullies entering basin
24-34	Northpoint Business Center	Waukegan	Industrial	Wet	Fair	inlet problems; inlet/outlet orientation; moderate shoreline erosion	replace turf grass with native vegetation replace inlets and stabilize, install grates on outlets, prevent short-circuiting
24-35	Northpoint Business Center	Waukegan	Industrial	Wet	Good	inlet problems and moderate algae	stabilize inlets, install grate outlet B
24-36	Buckingham Place	Waukegan	Residential Multi	Dry	Poor	inlet/outlet problems	install wet/wetland basin, replace turf grass with native vegetation, replace rip rap with native vegetation
24-37	Amhurst Business Park	Waukegan	Industrial	Wet	Fair	inlet problems; inlet/outlet orientation; rip rap side slopes; geese	replace turf grass/rip rap with native vegetation, prevent short-circuiting
24-38	Amhurst Business Park	Waukegan	Industrial	Wet	Good		replace turf grass and rip rap with native vegetation, install outlet
24-39	Amhurst Business Pkwy	Waukegan	Industrial	Wet	Good	rip rap side slopes and moderate shoreline erosion	replace turf grass with native vegetation deepen basin to control turbidity
24-40	Hamptons	North Chicago	Residential Multi	Wet	Good	rip rap side slopes and inlet problems	replace turf grass with native vegetation stabilize inlets
24-41	Hamptons	North Chicago	Residential Multi	Wet	Fair	moderate shoreline erosion	vegetate basin bottom with more native vegetation
24-42	Hamptons	North Chicago	Residential Multi	Wet	Fair	inlet problems; rip rap side slopes; moderate shoreline erosion; moderate algae	replace turf grass/rip rap with native vegetation

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
24-43	Hamptons	North Chicago	Residential Multi	Wet	Fair	inlet/outlet problems and orientation; rip rap side slopes	replace turf grass/rip with native vegetation, vegetate basin bottom with native vegetation, prevent short-circuiting
24-44	Hamptons	North Chicago	Residential Multi	Wet	Fair	outlet problems and rip rap side slopes	replace turf grass/rip rap with native vegetation, install grate C outlet
24-45	Deer Valley	North Chicago	Residential Multi	Wet	Fair	inlet/outlet problems; rip rap side slopes; moderate shoreline erosion	replace turf grass and rip rap with native vegetation stabilize A inlet
24-46	Flanagan's	North Chicago	Commercial	Wetland	Fair	inlet/outlet orientation and outlet problems	replace turf grass with native vegetation, prevent short circuiting
24-47	Speedway	North Chicago	Commercial	Wet	Good		vegetate basin bottom with native vegetation, replace turf grass with native vegetation
24-48	Bittersweet	North Chicago	Commercial	Wet	Good	moderate shoreline erosion	stabilize parts of shoreline with native vegetation
24-49	Gillette	North Chicago		Unknown	Poor		
24-50	Lake County	North Chicago		Unknown	Poor		
24-51	Chalet Nursery	North Chicago	Commercial	Wet	Fair	rip rap side slopes	replace turf grass with native vegetation, replace concrete overflow with native vegetation
24-52	2300 Green Bay lake Sally	North Chicago	Commercial	Wet	Good	outlet problems; rip rap side slopes; geese	replace turf grass/rip rap with native vegetation
24-53	Abbott Labs	North Chicago	Industrial	Wet	Good	moderate shoreline erosion	vegetate basin bottom/slopes/rip rap with native vegetation, stabilize inlets
24-54	Woodlands	North Chicago	Industrial	Unknown	Poor		
24-55	Forest Pointe	North Chicago	Residential Multi	Wet	Good	inlet/outlet problems	replace turf grass with native vegetation, stabilize inlet, remove woody vegetation from overflow, install grate - B outlet
24-56	Park Lane Sub	Lake Forest	Residential	Wet	Fair	inlet/outlet problems and orientation; moderate shoreline erosion	vegetate slopes with native vegetation, prevent short circuiting F - E, unclog E, reconnect grate D
24-57	Park Lane Sub	Lake Forest	Residential	Wet	Good	outlet problems and moderate shoreline erosion	plant native vegetation on slopes, unclog + reconnect C
24-58	Lake Forest Place	Lake Forest	Residential Multi	Wet	Good	outlet problems; rip rap side slopes; moderate shoreline erosion	vegetate basin bottom + slope with native vegetation, repair + unclog A

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
24-59	Lake Forest Place	Lake Forest	Residential Multi	Dry	Poor		install wet/wetland basin, vegetate with native vegetation
24-60	Lake Forest Place	Lake Forest	Residential Multi	Dry	Poor		install wet/wetland basin, replace soil/turf grass with native vegetation, remove trees
24-61	Lake Forest Place	Lake Forest	Residential Multi	Dry	Poor		install wet/wetland basin, replace turf grass with native vegetation, remove trees
24-62	Lake Forest Hospital Fitness Ctr	Lake Forest	Institutional	Wet	Good	outlet problems and rip rap side slopes	replace turf grass/riprap with native vegetation, install grate on C
24-63	Lake Forest Hospital Fitness Ctr	Lake Forest	Institutional	Wetland	Fair	outlet problems and inlet/outlet orientation	install grates on B + C, prevent short circuiting A - B
24-64	Lake Forest Hospital	Lake Forest	Institutional	Wet	Fair	rip rap side slopes; geese	replace turf grass/riprap with native vegetation
24-65	291 W Deerpath Rd	Lake Forest	Residential Single	Wet	Good	outlet problems and rip rap side slopes	replace riprap/turf grass with native vegetation, install grate on A
24-66	Onwentsia Gardens	Lake Forest	Residential Single	Dry	Poor	outlet problems	install wet/wetland basin, stabilize A, replace turf grass with native vegetation
24-67	Lock-Up Storage	Lake Forest	Commercial	Dry	Poor	inlet/outlet problems; concrete bottom	install wet/wetland basin, replace gabions with native vegetation
24-68	Brit Carter Interior Design Group	Lake Forest	Commercial	Dry	Poor		install wet/wetland basin, replace turf grass with native vegetation
24-69	Kendler Ponds	Lake Forest	Residential Single	Wet	Good	inlet problems and geese	replace riprap overflow with native vegetation, stabilize inlets
24-70	Kendler Ponds	Lake Forest	Residential Single	Wet	Good		remove woody vegetation, replace B riprap with native vegetation
24-71	Kendler Ponds	Lake Forest	Residential Single	Wet	Good	inlet problems	replace turf grass with native vegetation, remove trees, stabilize D + G, replace riprap with native vegetation
24-72	15 Hemlock Ln	Highland Park	Residential	Dry	Poor	outlet problems	A outlet unclog, install native vegetation
24-73	Americana Apartments	Highland Park	Residential	Dry	Poor		Install native vegetation
24-74	Mariott Courtyard Hotel	Highland Park	Commercial	Wetland	Good		Install deeper vegetative buffer
24-75	Erich Foreign Car Service	Highland Park	Commercial	Wetland	Fair	outlet problems and inlet/outlet orientation	Install grate B outlet

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
24-76	Highland Park Lincoln Mercury Dealer	Highland Park	Commercial	Underground	Poor		
24-77	Highland Park Pontiac	Highland Park	Commercial	Underground	Poor	outlet problems	Repair A outlet erosion
24-78		Highland Park		Underground	Poor		
24-79		Highland Park		Underground	Poor		
24-80	Carx Mufflers	Highland Park	Commercial	Underground	Poor		
24-81	Anton's Fruit Ranch	Highland Park	Commercial	Underground	Poor		
24-82	Fuddruckers	Highland Park		Underground	Poor		
24-83	Barberry Rd	Highland Park	Residential	Dry	Poor	inlet/outlet orientation	Fix short circuiting C to B, install native vegetation
24-84	Gregory Dodge	Highland Park	Commercial	Underground	Poor		
24-85	636 Crofton Ave South	Highland Park	Residential	Wet	Good	inlet/outlet problems; rip rap side slopes; geese	Install native vegetation buffer, repair B outlet, replace F inlet
24-86	740 Ravinia Glen	Highland Park	Residential	Dry	Poor	outlet problems	Install native vegetation, repair B outlet erosion
24-87	1111 Crofton Ave North	Highland Park	Residential	Dry	Poor	outlet problems	Install native vegetation, install grate and unclog A outlet
24-88	880 Great Elm Ln	Highland Park	Residential	Dry	Poor	outlet problems	Install native vegetation, repair A outlet erosion
24-89	835 Croftridge Ln	Highland Park	Residential	Wet	Good	inlet problems; rip rap side slopes; moderate algae	Install native vegetation buffer, prevent scour and unclog B inlet
24-90	1670 Strath Erin	Highland Park	Residential	Dry	Poor	outlet problems and rip rap side slopes	A outlet install grate, install native vegetation
24-91	685 Red Oak Terrace	Highland Park	Residential	Dry	Poor	outlet problems and inlet/outlet orientation	relocate B inlet, A outlet install grate, install native vegetation
24-92	The Manors of Highland Park	Highland Park	Residential	Wet	Good	inlet/outlet problems; rip rap side slopes; geese	Install native vegetation buffer, replace A inlet, repair C inlet erosion, replace D inlet, G inlet unclog & repair erosion, replace J outlet grate
24-93	Solo Cup Company	Highland Park	Commercial	Wetland	Good	inlet problems	Install native vegetation, remove some woody vegetation, remove litter/debris
24-94	White Hen Pantry	Highland Park	Commercial	Underground	Poor		
24-95	Amoco	Highland Park	Commercial	Underground	Poor		

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
24-96	991 Coventry Ln	Highland Park	Residential	Wet	Good	inlet/outlet problems	Replace broken A, C inlets, install grates on B, E, F, G outlets, C inlet unclog, install native vegetation buffer
24-97	Jewel	Highland Park	Commercial	Dry	Poor	inlet problems	Install native vegetation buffer, repair scour B,C inlets
24-98	Bishop Heating	Highland Park	Commercial	Underground	Poor		
24-99	Superior Pool & Spa	Highland Park	Commercial	Dry	Poor	inlet/outlet problems	Install native vegetation, repair B inlet scour & erosion, install A outlet grate
24-100	Opportunity	Highland Park	Commercial	Wetland	Good	inlet/outlet problems and orientation; purple loosestrife	Repair B, C, D, E inlets scour, F inlet install grate
24-101	Hidden Creek Aqua Park	Highland Park	Recreational	Dry	Poor	inlet/outlet problems and orientation	Install native vegetation, unclog F inlet, prevent erosion E outlet
24-102	Hidden Creek Aqua Park	Highland Park	Recreational	Underground	Poor		
24-103	1000 Deerfield Rd	Highland Park	Residential	Underground	Poor		
24-104	McDaniels Square	Highland Park	Residential	Underground	Poor		
24-105	Immaculate Conception Church	Highland Park	Institutional	Underground	Poor		
24-106	Laurel Hill	Highland Park	Commercial	Underground	Poor		
24-107	On the Go	Highland Park	Commercial	Underground	Poor		
24-108	Ort	Highland Park	Commercial	Underground	Poor		
24-109	First Midwest Bank	Highland Park	Commercial	Underground	Poor		
24-110	Central Ave Synagogue	Highland Park	Institutional	Unknown	Poor		
24-111	Sunset Woods Park	Highland Park	Recreational	Underground	Poor		
24-112	886 Central Ave	Highland Park	Residential	Underground	Poor		

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
24-113	900 Place	Highland Park	Residential	Underground	Poor		
24-114	949 Central Ave	Highland Park	Residential	Underground	Poor		
24-115	Highland Lakes	Highland Park	Residential	Wet	Good	inlet/outlet problems; rip rap side slopes; moderate shoreline erosion; moderate algae; geese; muskrats	Install native vegetation buffer, replace A inlet, repair D inlet erosion, unclog E inlet, repair I outlet grate
24-116	Cellular One	Highland Park	Commercial	Wet	Good	inlet/outlet problems; moderate algae; purple loosestrife	Install native vegetation buffer, prevent B inlet scour, install D outlet grate
24-117	TCI	Highland Park	Commercial	Underground	Poor		
24-118	Dominick's	Highland Park	Commercial	Wet	Good	inlet problems; moderate shoreline erosion; purple loosestrife	Control side slope erosion with native vegetation & matting, D & E inlets unclog
24-119	Emerald Woods Subdivision	Highland Park	Residential	Dry	Poor	inlet problems and inlet/outlet orientation	Install native vegetation, B inlet unclog, move H inlet to prevent short circuiting to G outlet
24-120	Hybernia	Highland Park	Residential	Wet	Good	rip rap side slopes	Install native vegetation buffer
24-121	Hybernia	Highland Park	Residential	Wet	Good	rip rap side slopes and purple loosestrife	Install native vegetation buffer
24-122	Hybernia	Highland Park	Residential	Wet	Good	rip rap side slopes	Install native vegetation buffer
24-123	Hybernia	Highland Park	Residential	Wet	Good	outlet problems and rip rap side slopes	Install vegetative buffer, B outlet unclog & install grate
24-124	Hybernia	Highland Park	Residential	Wet	Good		Install native vegetation buffer, install fence on stonewall
24-125	Hybernia	Highland Park	Residential	Wet	Good		Install native vegetation buffer, install fence on stonewall
24-126	Hybernia	Highland Park	Residential	Wet	Good	outlet problems and purple loosestrife	Install native vegetation buffer, install C outlet grate
24-127	Hybernia	Highland Park	Residential	Wet	Good	outlet problems	Install native vegetation buffer, install A outlet grate
24-128	Hybernia	Highland Park	Residential	Wet	Good	outlet problems	Install grate A outlet

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
24-129	Hybernia	Highland Park	Residential	Wet	Good	outlet problems and rip rap side slopes	Install native vegetation buffer, install B outlet grate
24-130	2625 Bentley Rd	Highland Park	Residential	Dry	Poor	outlet problems	install native vegetation, A outlet unclog
24-131	1500 Museum Dr	Highland Park	Residential	Wet	Good	outlet problems and purple loosestrife	Install native vegetation buffer, install C outlet grate
24-132		Highland Park		Underground	Poor		
24-133	Highland Park Restaurant	Highland Park	Commercial	Underground	Poor		
24-134	Boy Scouts of America	Highland Park	Commercial	Underground	Poor		
24-136		Highland Park		Underground	Poor		
24-137		Highland Park		Underground	Poor		
24-138	2895 Parkside Dr	Highland Park	Residential	Dry	Poor	outlet problems and geese	Install native vegetation, A outlet install grate & unclog
24-139		Highland Park		Underground	Poor		
24-140		Highland Park		Underground	Poor		
24-141	3167 Applewood Ct	Highland Park	Residential	Dry	Poor		Install native vegetation
24-142	3120 Cottonwood Ct	Highland Park	Residential	Dry	Poor		Install native vegetation
24-143	613 Western Ave	Highland Park	Residential	Wet	Good	inlet/outlet problems; moderate shoreline erosion; high algae	Install native vegetation buffer, replace broken concrete B, C swales with native vegetation or riprap, E outlet & G inlet unclog, repair H inlet, E outlet install grate
24-144	875 Greenwood Ave	Highland Park	Residential	Dry	Poor		Install native vegetation
24-145		Highland Park		Underground	Poor		
24-146		Highland Park		Underground	Poor		

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
24-147		Highland Park		Underground	Poor		
24-148		Highland Park		Underground	Poor		
24-149		Highland Park		Underground	Poor		
24-150		Highland Park		Underground	Poor		
24-151	Greenberg Radiology Institute	Highland Park		Wetland	Good	outlet problems	Remove woody vegetation, install more native vegetation slopes, unclog A outlet
24-152		Highland Park		Unknown	Poor		
24-153	Target	Highland Park	Commercial	Unknown	Poor		
24-154		Highland Park		Unknown	Poor		
24-155	Orthopedic Center	Highland Park	Commercial	Dry	Poor	outlet problems	Install native vegetation, A & B outlets erosion
24-156	Park Ave West Medical Plaza	Highland Park	Commercial	Dry	Poor	outlet problems	Install native vegetation, A outlet unclog, A & B outlets install grate
24-157	Department of Youth Services	Highland Park	Recreational	Dry	Poor	inlet/outlet problems	Install native vegetation buffer, A inlet & H outlet unclog, F overflow fix erosion
24-158	Sunset Foods	Highland Park	Commercial	Underground	Poor		
24-159	Hybernia	Highland Park	Residential	Wet	Good	rip rap side slopes	Install native vegetation buffer & outlet C swale
24-160	Hybernia	Highland Park	Residential	Wet	Good	inlet/outlet problems and rip rap side slopes	Install native vegetation buffer, install C outlet grate, prevent erosion & scour D inlet
24-161	Hybernia	Highland Park	Residential	Wet	Good	outlet problems and rip rap side slopes	Install native vegetation buffer, install B outlet grate, install fence on stonewall
24-162	Hybernia	Highland Park	Residential	Wet	Good	inlet/outlet problems	Install A outlet grate, B & C inlets unclog, install fence on timber & stonewall
24-163	Hybernia	Highland Park	Residential	Wet	Good	inlet/outlet problems and rip rap side slopes	Install native vegetation, unclog B outlet & install grate, unclog A inlet
24-164	Hybernia	Highland Park	Residential	Wet	Good	outlet problems; rip rap side slopes; and muskrats	Install native vegetation buffer, install A outlet grate, install fence on stonewall

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
24-165	Hybernia	Highland Park	Residential	Wet	Fair	outlet problems; inlet/outlet orientation; rip rap side slopes	Install native vegetation, install fence on stonewall, install grates G & H outlets
24-166	Hybernia	Highland Park	Residential	Wet	Good	outlet problems and purple loosestrife	Install native vegetation, install grate & remove tree E outlet, install fence on stonewall
24-167	Hybernia	Highland Park	Residential	Wet	Good	inlet problems and purple loosestrife	Install native vegetation buffer, unclog I & P inlets
24-168	Hybernia	Highland Park	Residential	Wet	Good	inlet problems; rip rap side slopes; moderate shoreline erosion	install native vegetation buffer, Q inlet repair erosion, install fence on stonewall
24-169	Hybernia	Highland Park	Residential	Wet	Good	outlet problems and rip rap side slopes	Install native vegetation, install grates F outlet & C & D overflows
24-170	Hybernia	Highland Park	Residential	Wet	Good	outlet problems; rip rap side slopes; moderate algae	Install native vegetation, B outlet install grate, install fence on stonewall
24-171	Hybernia	Highland Park	Residential	Wet	Good	outlet problems and rip rap side slopes	Install native vegetation buffer, A outlet install grate
24-172	Hybernia	Highland Park	Residential	Wet	Good	outlet problems; rip rap side slopes; purple loosestrife	Install native vegetation, install grate C outlet
24-173	Hybernia	Highland Park	Residential	Wet	Good	outlet problems; rip rap side slopes; purple loosestrife	Install native vegetation buffer, install grate F outlet, install fence on stonewall above G inlet
V3_24-01	IDOT	Park City	Institutional	Wet	Good		clean up trash
V3_24-02	Northpoint Business Center	Waukegan	Commercial	Dry	Poor		remove small trees + large shrubs that have begun to grow, add stilling basin
V3_24-03	Northpoint Business Center	Waukegan	Commercial	Dry	Poor		turn into retention pond
V3_24-04	Northpoint Business Center	Waukegan	Commercial	Wet	Good		establish native vegetation buffer around basin, fill in erosion around manhole
V3_24-05	Cardinal Health	Waukegan	Commercial	Wet	Good	rip rap side slopes	plant native vegetation on bottom, replace rip-rap with native vegetation
V3_24-06	Cardinal Health	McGaw Park	Commercial	Wet	Good	inlet problems and rip rap side slopes	reattach FES to pipe A and fill in erosion around pipe, plant native vegetation on bottom and replace rip-rap with native veg.
V3_24-07	Naval Base Food Mart	N. Chicago	Institutional/ Commercial	Dry	Poor	outlet problems	establish buffer zone, replace turf grass with native veg on side slopes and basin bottom

Basin Number	Basin Name	Political Jurisdiction	Predominant Landuse	Basin Type	Pollutant Removal Effectiveness	Problems and Concerns	Preliminary Retrofit Opportunities
V3_24-08	Whispering Lake	Uninc.	Residential	Wet	Good	inlet/outlet problems and rip rap side slopes	trash rack on outlet, increase native vegetation buffer, place fill on top of C and plant nat. veg. to stop erosion
V3_24-09	Whispering Lakes	Uninc.	Residential	Wet	Fair	outlet problems; inlet/outlet orientation; rip rap side slopes	increase native vegetation buffer, replace rip-rap with native vegetation, add settling basins at each inlet
V3_24-10		Lake Bluff	Residential	Wet	Good	rip rap side slopes	replace rip-rap with native vegetation, plant native veg on bottom
V3_24-11		Lake Bluff	Residential	Wet	Good	outlet problems and rip rap side slopes	add trash rack to outlet
V3_24-12		Lake Bluff	Residential	Wet	Good	outlet problems; rip rap side slopes; moderate algae	plant native vegetation on bottom, establish native veg. buffer, clean up algae and debris from outlet pipe
V3_24-13	Sanctuary	Lake Bluff	Residential	Wet	Good	rip rap side slopes	plant native vegetation on bottom and establish a buffer zone
V3_24-14	Sanctuary	Lake Bluff	Residential	Wet	Good	inlet/outlet problems and rip rap side slopes	plant native vegetation on bottom, establish buffer zone with native veg., and remove algae and trash
V3_24-15	Lake Bluff Public Works	Lake Bluff		Wet	Good		lessen side slopes
V3_24-17		Lake Forest	Residential/ Institutional	Wet	Good	inlet problems and rip rap side slopes	replace rip-rap area with native veg., Increase buffer zone in parts
V3_24-18		Lake Forest	Residential	Wet	Good		clean up algae
V3_24-19		Lake Forest	Residential	Wet	Good		very nice basin
V3_24-20		Lake Forest	Residential	Wet	Good		clean up algae
V3_24-21	Lake Forest Hospital	Lake Forest	Residential/ Institutional	Wet	Good	rip rap side slopes	extend native vegetation all the way to the water line replacing the rip-rap
V3_24-22		Lake Forest	Residential	Wet/Wetland	Fair	high algae and cattails	plant native plants in buffer zone, clean up algae & sediment, & remove trees on basin bottom
V3_24-23		Highland Park	Residential	Wet	Good	moderate shoreline erosion	lessen slopes & plant plants w/ more extensive root systems to stabilize banks
V3_24-24		Highland Park	Institutional (park)	Wet	Good	outlet problems	very nice basin
V3_24-25	Congregation Solel	Highland Park	Institutional	Wet	Good		replace some shrubs & trees w/ prairie grass

APPENDIX H: POTENTIAL REGIONALLY SIGNIFICANT STORAGE LOCATIONS

Floodplain maps, topographic data, Flood Problem Area Inventory (FPAI), land use mapping, aerial photos and the North Branch Open Space Plan (NBOSP) were used to identify and map regionally significant flood storage areas in the North Branch watershed. Areas of regional storage creation or enhancement were defined using the methods below.

- For the purposes of this Plan, "regionally significant storage" was assumed to be an area with more than 10 acre-foot storage or more than 100 acres of tributary area, and an area that provides a benefit to multiple communities or neighborhoods within the watershed. The area tributary to each storage location was estimated based on a cursory review of topographic mapping; detailed subbasin delineation was not performed.
- According to the FPAI, some flood problems are a result of local drainage problems such as blocked culverts or insufficient conveyance paths. Regional storage areas were not identified to reduce these local drainage problems.
- Depressional Storage areas to be preserved were identified using topographic mapping. Most of these depressional storage areas are located within identified wetlands; one goal of this plan is to preserve identified wetlands so the storage potential available in these depressional areas has not been quantified. A few depressional storage areas do not appear on the Wetland Inventory, these storage areas were quantified as shown in Table H-1.
- Depressional storage areas located within the floodplain were generally not identified in this analysis (unless identified as potential storage to mitigate problems in FPAI.) The existing storage volume within depressional areas in the floodplain is protected by the Lake County Watershed Development Ordinance (WDO), which requires compensatory storage for floodplain fill.
- Man-made storage facilities were generally not identified or included in this review. Exceptions include large regional-scale facilities such as the Atkinson Road reservoir and man-made storage facilities located in or near an area on the FPAI that could be enhanced to provide additional storage.
- Regional storage locations were generally identified by finding vacant land near flood problem areas and determining whether storage could be created within the undeveloped area.
- When analyzing storage potential, the normal water elevation was set equal to the lowest spot elevation or lowest contour in the identified area. The high water elevation was assumed to be equal to the base flood elevation for storage areas adjacent to or within the floodplain. A few regional storage areas are not adjacent to floodplain; these appear to have tributary areas greater than 100 acres. In these areas the high water level was set equal to the highest existing contour or spot elevation within the storage area.

Table H-1

Regionally Significant Storage Locations

ID Number	Existing Depress-ional?	Existing Wetland?	Existing Man-made Storage?	Within Flood-plain?	Near FPAI?	Local Drainage?	Land Use (2001 Land Use Map)	Estimated Existing Storage (ac-ft)	Estimated Potential Storage (created + existing) (ac-ft)	NWL	HWL	Comments
100	Y	100%	N	N	24-01, 05, 02	N	4120	PRESERVE EXISTING STORAGE				
101	Y	SOME	N	N	24-01, 05, 02	N	4110, 4120	30	85	694	697	
102	N	Y	N	N	24-01, 05, 02	N	4120	25	35	692	697	
103	N	100%	N	Y	24-01, 05, 02	N	4120	PRESERVE EXISTING STORAGE				
104	N	MINIMAL	N	N	24-03, 16	N	4110	5	15	692	694	
105	N	SOME	NEAR	Y	24-03, 16	N	4110	LOCAL, NOT REGIONAL, SOLUTION				
106	Y	Y	N	N	24-16	N	4110, 4120	45	85	684	688	Not adjacent to floodplain, may not utilize entire available storage
107	N	N	N	N	24-04	Y	4110	LOCAL DRAINAGE PROBLEMS				
108	Y	100%	N	N	N	N	4110, 4120	DO NOTHING TO PRESERVE ADID WETLAND				
110	Y	100%	N	N	24-14	Y	4110, 4120	LOCAL DRAINAGE PROBLEMS				
113	N	Y	Y	Y	24-25	N	1110, 5200	LOCAL, NOT REGIONAL, SOLUTION				
114	N	Y	N	Y	N	N	3100	LOCAL, NOT REGIONAL, SOLUTION				
118	N	SOME	N	N	24-10	N		0	10	634	638	Significant haul required
200	Y	100%	N	N	N	N	4110, 4120	PRESERVE EXISTING STORAGE				

ID Number	Existing Depress-ional?	Existing Wetland?	Existing Man-made Storage?	Within Flood-plain?	Near FPAI?	Local Drainage?	Land Use (2001 Land Use Map)	Estimated Existing Storage (ac-ft)	Estimated Potential Storage (created + existing) (ac-ft)	NWL	HWL	Comments
201	N	SOME	N	N	N	N	4110, 4120	DO NOTHING TO PRESERVE ADID WETLAND				
202	N	100%	N	N	N	N	4110	PRESERVE EXISTING STORAGE				
203	N	100%	N	N	N	N	3300	0	35	680	683	Significant haul required
204	N	SOME	N	N	25-07	N	4120, 2100	75	190	674	678	
205	Y	ADID 128	N	N	25-20, 25-04	N		PRESERVE EXISTING STORAGE				
206	N	ADID 146	N	N	25-20, 25-04	N	3300	DO NOTHING TO PRESERVE ADID WETLAND				
207	Y	ADID 146	N	Y	25-20, 25-04	N	3300	PRESERVE EXISTING STORAGE				
208	N	N	N	N	25-19	Y	3200, 1110	LOCAL, NOT REGIONAL, SOLUTION				
209	N	N	N	N	25-19	Y	3200, 1110	LOCAL, NOT REGIONAL, SOLUTION				
210	Y	Y	N	N	25-18	N	2100, 1110	PRESERVE EXISTING STORAGE				
211	Y	N	N	N	25-18	Y	1110	PRESERVE EXISTING STORAGE				
212	N	N	N	Y	25-14	N	4110	20	30	658	664	
207A	N	N	N	Y	25-20, 25-04	N	3300	70	100	662	668	
207B	N	N	N	Y	25-20, 25-04	N	3300	25	45	662	668	
215	Y	SOME	N	Y	25-14	N	3300	120	145	658	662	
219	Y	Y	N	N	N	N	1110	PRESERVE EXISTING STORAGE				

ID Number	Existing Depress-ional?	Existing Wetland?	Existing Man-made Storage?	Within Flood-plain?	Near FPAI?	Local Drainage?	Land Use (2001 Land Use Map)	Estimated Existing Storage (ac-ft)	Estimated Potential Storage (created + existing) (ac-ft)	NWL	HWL	Comments
300	N	ADID WETLANDS	N	N	N	N		PRESERVE EXISTING STORAGE				
303	N	Y	N	Y	26-03	Y		LOCAL, NOT REGIONAL, STORAGE				
305	N	N	N	N	NEAR STRUC-TURES	N	3100	LOCAL, NOT REGIONAL, STORAGE				

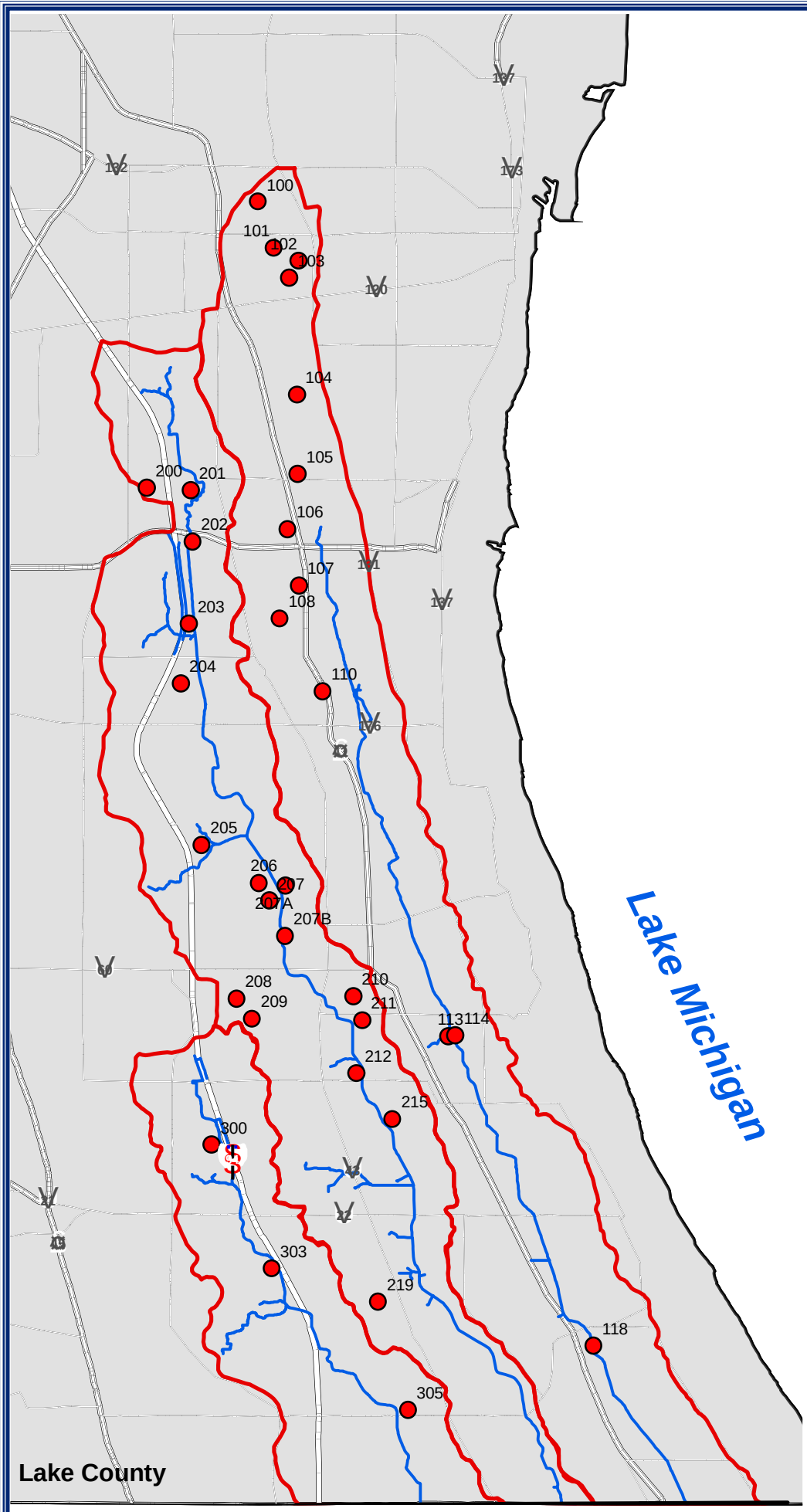


Figure H-1

Potential Regional Storage Locations

Legend

- Potential Regional Storage
- Water
- Cook County

Source:

Lake County Department of Information and Technology, GIS and Mapping Division

STORMWATER MANAGMENT COMMISSION

North Branch Chicago River Watershed

0 2 Miles

Maps to be used for Planning Purposes only.

Produced by V3 Companies

APPENDIX I: EXISTING STUDIES, REPORTS, MAPPING AND DATA

Stakeholder groups and local, state and federal agencies have completed studies and compiled data on various aspects of the North Branch of the Chicago River watershed. To avoid repeating these efforts and to gather historical data for trend analysis, a list of existing studies was compiled and the reports were collected from their sources. Past studies have a dual purpose in that they contain information on the watershed that can be used directly in ongoing watershed planning efforts and also provide background information for comparison to current conditions. The Lake County Stormwater Management Commission (SMC) compiled this list of existing resources for the North Branch by contacting stakeholders and government agencies. The first part of Appendix I contains the list of existing studies and reports on the North Branch. These reports are organized by the North Branch project goal categories: flooding, water quality, natural resources and other. The second part of the appendix contains the list of map resources for the watershed. Mapping is organized by scale: local/municipal, Lake County and watershed (in both Lake and Cook counties). Within each of the categories, the listings are organized in chronological order from oldest to newest.

I.1 Existing Studies, Reports and Raw Data

I.1.1 Flooding

Municipal Stormwater Studies

1. Deerfield Stormwater Management Study.
   By: Baxter & Woodman (date unknown)

2. Comprehensive Stormwater Analysis and Preliminary Design; Naval Training Center, Great Lakes.
   By: Donohue & Associates, Inc. (July 1989)

   This report gives the results of a base-wide comprehensive stormwater analysis. Included is a map of the Skokie River floodplain and floodway. Local detention to alleviate future flooding problems was suggested.

3. Stormwater Management Plan, Phase I, for the Village of Green Oaks.
   By: Rezek, Henry, Meisenheimer and Gende, Inc. (August 1988)

   Phase I evaluates the existing drainage system to identify the physical or hydraulic deficiencies, and develops a comprehensive improvement plan for the portions of Green Oaks which drain towards the east and into Middle Fork. A PIBS model was used. The study area was divided into twelve sub-basins. Lowering the bottom of the Tollway (I-94) culvert is recommended.

4. Village of Gurnee, Illinois: Stormwater Drainage System Master Plan
   By: Baxter & Woodman, (February 1989)

   Comprehensive analysis & evaluation of the existing stormwater drainage system in the Village with proposed program of improvements.

5. City of Highland Park Stormwater Management Plan.
   By: Epstein Civil Engineering, Inc. (1988)

   Responding to frequent flooding along the Skokie River, alternatives were compared on a cost-benefit basis. An improved channel and significantly improved on-line and off-line storage is suggested.

6. The City of Highland Park, Illinois: Stormwater Management Plan.
   By: Baxter & Woodman. (November 1989)

   Based on information for the existing stormwater drainage system and predicted future capacities, alternative improvements are evaluated. Included is a map of city drainage boundaries and recommended improvements.

7. The City of Highland Park Stormwater Management Plan: Joint Permit Application; Project Description and Hydraulic Application.
   By: Epstein Civil Engineering, Inc. (November 13, 1990)

   This document is a permit application for extensive improvements to the Skokie River between Old Elm Road and Lake-Cook Road designed to manage the 100-year flood event. The project includes HEC-1 and HEC-2 analyses. Also included is a list of the conditions that cause flooding.

8. City of Highland Park, Stormwater Management Plan
   By: Epstein Civil Engineers, Inc. (November 1990)

   Report is the Floodway Construction Permit Application for work on the Skokie River between Old Elm and Lake-Cook Road. Doesn't define actual work to be completed.

9. The City of Highland Park Stormwater Management Plan; Volume I - Preliminary Engineering Report, Volume II - Drawings, and Volume III - Aerial Mapping.
   By: Epstein Civil Engineering, Inc. (January 31, 1991)

   Based on the Stormwater Management Plan proposed by Epstein (#22) and adopted by the City of Highland Park in 1988, this report presents a Preliminary Engineering Design for the Skokie River watershed. Included are discussions about groundwater discharge into Highland Park Lake, general drainage information arranged by reach and floodplain boundaries.

10. The City of Lake Forest, Illinois: Stormwater Drainage Study.
    By: Baxter & Woodman, Inc. (October 1991)

    This report gives the results of an analysis and evaluation of the existing stormwater drainage system and presents a program to alleviate these problems. A list of river level related flooding problems is also included along with a map of recommended stormsewer improvements. Report also analyzed the water surface elevations in all 3 forks of the North Branch of the Chicago River.

11. Flood Study for the Skokie River Reach Adjacent to North Chicago.
    By: Soil Conservation Service (1972)

12. City of Park City Stormwater Management Plan
    By: Clark Dietz, Inc.

    Stormwater management plan for the City of Park City in the headwaters of Skokie River subwatershed.

<u>Other Flood Studies</u>

1. Floodwater Management Plan for the North Branch of the Chicago River.
   By: USDA Soil Conservation Service (October 1974)

The objectives of this study were to reduce flood damages, provide increased recreation by improving water quality, and provide watershed protection. The final plan consisted of seven excavated floodwater retarding structures and modification of the Willow Road Dam.

2. Environmental Assessment
Floodwater Management Plan for the North Branch of the Chicago River. Lake and Cook Counties, Illinois
By: USDA Soil Conservation Service (October 1974)

Environmental assessment for report in #1 above.

3. Report on Regulation of Construction within Floodplain of North Branch Chicago River, Cook & Lake Counties
By: Illinois Department of Transportation, Division of Water Resources, Springfield, Illinois (February 1975)

4. Urban Flood Damage Inventory, SCS Administrative Area #2
By: US Dept. of Agriculture, Soil Conservation Service (1982)

Study to identify communities with flooding or drainage problems, estimate annual dollar damages from flooding, and establish a priority rating system for funding for future studies.

5. North Branch Chicago River Phase 1 General Design Memorandum
By: US Army Corps of Engineers (August 1983)

Includes revised hydraulics and hydrology models. Reevaluated the economic analysis portion of the SCS study (#1 & #2 above), concentrating on flood damage reduction.

6. North Branch Chicago River Phase II General Design Memorandum
By: US Army Corps of Engineers (September 1986)

Report documents the design of and changes from the local protection plan recommended in the Phase I GDM dated August 1983.

7. North Branch Chicago River Environmental Assessment
By: Environmental and Social Analysis Branch, US Army Corps of Engineers (April 1987)
Supplement to Final Environmental Impact Statement for the North Branch flood control project (US Army Corps of Engineers 1983). This report covers proposed design changes in the project based on a request by Deerfield for a change in the location of the Deerfield reservoir.

8. Analysis and Preliminary Design of Structure 4 on the Skokie River at Lake Bluff
By: Donohue and Associates (March 1989)

Studied the hydrology and hydraulics for the northern portion of the Skokie River subwatershed. Contains preliminary design for the Structure 4 reservoir proposed south of Illinois 176 (Rockland Road) on the Skokie River.

9. Lake County Comprehensive Stormwater Management Plan
By: Lake County Department of Planning, Zoning and Environmental Quality (1990)

Plan includes description, assessment and action plan for the North Branch and other watersheds in Lake County.

10. West and Middle Fork Floodplain Re-mapping
Flood Insurance Study Report Lake County
By: Federal Emergency Management Agency and Lake Co. Stormwater Management Commission, Study Contractor: T.Y. Lin International BASCOR, Inc. (April 1994)

Hydrologic and hydraulic analysis of Lake County portion of the North Branch Chicago River. Comprehensive model includes the Skokie River analysis done by the Illinois Dept. of Transportation, Division of Water Resources in addition to the West and Middle Fork analysis.

11. North Branch Chicago River Skokie River,
Restudy for the Federal Emergency Management Agency, Lake County Study Narrative
By: Illinois Department of Transportation, Division of Water Resources (August 1994)

Hydrologic and hydraulic study performed on the Skokie for the FEMA restudy and re-mapping of the North Branch. Includes watershed description and describes the modeling done for the H & H.

12. Water Resources Data, Illinois, Water Year 1997, Volume 2. Illinois River Basin (USGS Water-Data Report IL-97-2)
By: USGS (1997)

Report contains daily mean discharges for Middle Fork at Lake-Cook Road, Skokie River at Westleigh Road (Lake Forest), Skokie River at Clavey Road (Highland Park) and West Fork at Dundee Road plus multiple other sites throughout the Chicago River system.

13. Skokie Headwaters and North Chicago Flood Damage Reduction Feasibility Study
By: STS Consultants, LTD. (2006)

This study seeks to supplement existing flood storage potential in this watershed in a way that also enhances existing environmental characteristics and functions. Additional flood storage areas were identified and analyzed.

14. Lake County Flood Insurance Study
By: FEMA (November 16, 2006)

This countywide FIS revises and updates a previous FIS/Flood Insurance Rate Map (FIRM) for the geographic area of Lake County.

15. Cook County Flood Insurance Study
By: FEMA (November 16, 2006)

This countywide FIS investigates the existence and severity of flood hazards in, or revises and updates previous FISs/Flood Insurance Rate Maps (FIRMs) for the geographic area of Cook County.

I.1.2 Water Quality

1. Areawide Water Quality Management Plan, Part II, Chapter 11, (North Branch Chicago River Basin), 208 Report
By: Northeastern Illinois Planning Commission (June 1978)

Report addresses water quality impacts from point and non-point sources. Includes summary sampling data and modeling results that define existing conditions and projected changes through the year 2000. Includes a recommended plan with an analysis of associated costs.

2. Great Lake Naval Training Center (GLNTC) Water Quality Data
By: various sources (1981, 1986, 1991, 1996)

Water quality sampling data on Skokie River up and downstream of closed landfill (Supply Side Landfill) at GLNTC. Sampling efforts made to ensure that landfill leachate is not entering the Skokie River.

3. Skokie Lagoons Lake Restoration Plan
By: Northeastern Illinois Planning Commission with the IEPA and Cook County Forest Preserve District (November 1983)

Investigated the water quality of the Skokie Lagoons and the aquatic habitat. Includes recommendations for dredging and deepening lagoons and channels.

4. Surface-Water Quality Assessment of the Upper Illinois River Basin in Illinois, Indiana and Wisconsin: Geochemical Data for Fine-Fraction Streambed Sediment from High and Low Order Streams, 1987
By: US Geological Survey, Open File Report 90-571 (1991)

Sampled and chemically analyzed sediments at approximately 20 sites along the North Branch in Lake and Cook Counties.

5. North Shore Sanitary District (NSSD) Water Quality Data
By: NSSD (1992-1997)

Annual means for large number of water quality parameters and organic priority pollutants sampled at 7 locations on the Skokie River from 1992 – 1997.

6. Proceedings: Assessment and Treatment of Contaminated Sediments in the North Branch
Sponsored by: US Dept. of Interior Bureau of Mines; Coordinated by: Northeastern Illinois Planning Commission (June 1993)

Conference proceedings including research papers covering sediment quality, contaminants, risk assessment, heavy metals, remediation, contaminated sediment treatment and bioremediation.

7. Lake Eleanor Lake Assessment Study
By: James K. Bland (1994)

Report is an assessment of the biology, chemistry and physical conditions of Lake Eleanor on the West Fork of the North Branch.

8. Surface-Water Quality Assessment of the Upper Illinois River Basin in Illinois, Indiana and Wisconsin: Major and Trace Elements in Water Sediment and Biota 1978-1990
By: US Geological Survey (USGS), Water Resources Investigation Report 95-4045 (1995)

Sampling data and analysis including sites on the North Branch Chicago River at Deerfield and Niles, and at the North Shore Channel.

9. Surface-Water Quality Assessment of the Upper Illinois River Basin in Illinois, Indiana and Wisconsin: Nutrients, Dissolved Oxygen and Fecal-Indicator Bacteria in Surface Water, April 1987 through August 1990
By: US Geological Survey, Water Resources Investigation Report 95-4005 (1995)

Sampling data and analysis included sites on the Skokie River at Northfield, the North Branch at Niles and the North Shore Channel.

10. A Biological Study of the NSSD Clavey Road WWTP Outfall Stream
By: NSSD (1995)

Biological field study of the outfall stream of the Clavey Road WWTP outfall at two sites in Cook County (Dundee Road and Willow Road). Goal was to characterize the biological resources of the outfall stream using protozoan, aquatic macroinvertebrate and fish communities present.

11. Illinois Water Quality Report 1994-1995, Volumes I and II
By: Illinois Environmental Protection Agency, Bureau of Water (September 1996)

305b report provides an assessment of the water quality of the state's surface and groundwater resources to meet the reporting requirements of the Federal Clean Water Act. Report is prepared every 2 years. Also have 1992-1993 report.

12. Report No. 97-20, 1995 Annual Summary Report, Water Quality Within the Waterways System of the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC)
By: MWRDGC (October 1997)

Summary report of water quality in waterways over which MWRDGC has jurisdiction. Includes data from 3 sampling sites on three forks of North Branch at Lake-Cook Road as well as 14 other sites on the Chicago River system. Also received 1997 mean data for all water quality parameters at same sites.

13. Draft Tollway Expansion Water Quality Monitoring Project for the Illinois State Toll Highway Authority
By: Lake County Health Department – Lakes Management Unit (LCHD-LMU) (December 1998)

Study will assess the impacts on water quality in the West Fork and Lake Eleanor of the removal of the Deerfield Toll Plaza. Completion of monitoring is expected in 1999.

14. Prairie Wolf Slough (PWS) Water Quality Monitoring
By: LCHD-LMU and James Montgomery (DePaul University)

One year water quality monitoring project (monthly grab samples) at several sites in and around Prairie Wolf Slough to assess the extent to which PWS improves water quality of urban runoff before discharging to the Middle Fork. First samples taken in November 1998.

15. North Branch of the Chicago River
By: U.S. Army Corps of Engineers (Chicago District)

This is a literature review of the river with emphasis on sediment contamination.

I.1.3 Natural Resources

1. Soil Survey, Lake County, Illinois
   By: US Dept. of Agriculture, Soil Conservation Service in cooperation with Illinois Agricultural Experiment Station (2005)
   Description, classification, uses and maps of soils in Lake County. Also includes February 1989 revisions to the Hydric Soils Legend.

2. Natural Resources Plan
   By: Lake County Department of Planning, Zoning and Environmental Quality (1980)

   Descriptive assessment of Lake County natural resources including wetlands, woodlands, floodplain, drainage ways, lakes and steep slopes. Includes recommendations to minimize the environmental impact of future development.

3. Skokie Lagoons Lake Restoration Plan, Phase 1
   By: Northeastern Illinois Planning Commission (November 1983)

   Background data on the lagoon restoration project.

4. Advanced Identification (ADID) Study, Lake County, Illinois
   Site Data Sheets and Final Report
   By: US Environmental Protection Agency (November 1992)

   Cooperative study with NIPC, SMC and USEPA to identify and map high quality wetlands in Lake County.

5. Skokie River Restoration Project Video
   By: Chicago Botanic Garden (1996)

   Video on various demonstration methods implemented along the mile stretch of river within the Chicago Botanic Garden to address streambank stabilization, in-stream habitat and function enhancement and riparian buffer enhancement.

6. Nature and the River
   A Natural Resources Report of the Chicago and Calumet Waterways
   By: US Fish & Wildlife Service (Chicago Field Office) for the ChicagoRivers Demonstration Project (1998)

   Natural resource inventory and assessment for 1 mile corridor along the entire length of the Chicago River. Inventory includes update of National Wetland Inventory Maps, fish and macroinvertebrate sampling, description of channel and habitat characteristics and identification of natural areas and open spaces.

7. Illinois Nature Preserve Management Plans
   By: various authors and dates

   Nature preserve management plans for the three dedicated Illinois Nature Preserves (INPs) in the Lake County North Branch. The three INPs are: Florsheim Park (Lincolnshire), Hybernia-Highmoor Prairie (Highland Park) and Skokie River Preserve (Lake Forest).

I.1.4 Other Reports

1. Inventory of Architecture before WW II in Lake County (except Highland Park and Lake Forest) and Inventory of Historic Landmarks in Lake County
   By: Illinois Historic Sites Survey (1973 and 1975 respectively)

   Reports contain locations and descriptions of historic landmarks and architecture within Lake County as of the report dates.

2. Chicago Metropolitan Basin Study for the North Branch of the Chicago River
   By: USDA Soil Conservation Service (October 1974)

3. Chicago Metropolitan Area River Basin Plan, Visual Resource Evaluation
   By: Steinitz Rogers Associates Inc. for the Soil Conservation Service (December 1975)

   Report analyzed the visual impacts of the reservoirs proposed by the SCS for the North Branch of the Chicago River.

4. Historic Resources of Northeastern Illinois
   By: Northeastern Illinois Planning Commission (1985)

   Document is an atlas of historic districts in northeastern Illinois listed on the National Register of Historic Places as of April 1985.

5. Technical Reference Manual
   By: Lake County Stormwater Management Commission (1992)

   Manual is an advisory document for permit applicants and reviewers for the Lake County Watershed Development Ordinance. The manual includes sections on the permit process and requirements, basic stormwater management requirements, water quality protection, floodplains and wetlands.

6. Lake County Framework Plan
   By: Lake County Department of Planning, Zoning and Environmental Quality (1994)

   Comprehensive land use plan through the year 2010, based on Lake County's vision for the future.

7. Resident Use and Perception of the Chicago and Calumet Rivers
   By: US Army Corps of Engineers and National Park Service (1995)

   Report summarizes the results of a large-scale telephone survey to characterize residents' uses, concerns and future visions for the Chicago and Calumet Rivers. Report is one of the series resulting from the ChicagoRivers Demonstration Project.

8. Summary: History and Historic Properties of FOCR Study Area (draft)
   By: Keith Ryder, Army Corps of Engineers (January 1997)

   Report is an inventory of historic properties and a sketch of historical development of communities in the Chicago River watershed using local information sources.

9. Watershed Assessment for the Cook County Portion of the North Branch of the Chicago River
   By: Kirk Gregory at Northeastern Illinois University (June 1998)

Report contains a watershed assessment of the Cook County portion of the North Branch watershed. Report focuses on the characteristics, conditions and problems in the watershed. The results of the Cook County assessment have been incorporated into the North Branch watershed plan for Lake County.

10. What's Working on Working Rivers: A Handbook for Improving Urban Rivers
By: Naomi Cohn for ChicagoRivers Demonstration Project (1998)

Handbook contains tips on improving urban rivers. Uses several examples from the Chicago region (including Prairie Wolf Slough) to illustrate the concepts. Report has extensive listing of resource references.

11. People and the River
Perception and Use of Chicago Waterways for Recreation
By: USDA Forest Service, North Central Research Station for ChicagoRivers Demonstration Project (1998)

Report describes a set of social science investigations completed as part of the ChicagoRivers Demonstration Project. The goal of the studies was to understand how users and interest groups perceive and use the Chicago and Calumet River corridors and how they would like to see the corridors improved for recreation and related values.

12. North Branch of the Chicago River Open Space Plan
By: Futurity, Inc. (2004?)

The intent of the open space plan is to identify high quality natural resources that should be preserved for their ecological value, and to identify open lands suitable for watershed improvement projects that should also be preserved.

I.1.5 Other Resources

1. Arendt, R.G. 1996. Conservation Design for Subdivisions: A Practical Guide to Creating Open Space Networks. Island Press. Washington, DC.

2. Association of State Floodplain Managers, Inc. 1996. Using Multi-Objective Management to Reduce Flood Losses in Your Watershed. Madison, WI.

3. Bertrand, W.A., R.L. Hite, and D.M. Day, Biological Stream Characterization. Biological Assessment of Illinois Stream Quality through 1993. A Report by the Biological Streams Characterization Workgroup. Printed by Illinois Environmental Protection Agency. 1996.

4. Brigham, W.U., D. McCormick, and M.J. Wetzel. The Watershed of Northeastern Illinois: Quality of the Aquatic Environment Based upon Water Quality and Fishery Data. Staff Paper No. 31, Northeastern Illinois Planning Commission. 1978.

5. Buslaff, J. Editor. 1997. Wild Ones Handbook: A Voice for the Natural Landscaping Movement. Wild Ones – Natural Landscapers Ltd. Milwaukee, WI.

6. Center for Watershed Protection. 1998. Better Site Design: A Handbook for Changing Development Rules in Your Community. Prepared for: the Site Planning Roundtable.

7. Center for Watershed Protection. *Sources of Urban Stormwater Pollutants Defined in Wisconsin*, Watershed Protection Techniques, Vol.1, No. 1, February 1994.

8. Claytor R.A. and T. R. Schueler. 1996. Design of Stormwater Filtering Systems. Prepared for: Chesapeake Research Consortium, Inc.

9. Cohn, Naomi. Voices of the Watershed: A Guide to Urban Watershed Management Planning. Friends of Chicago River. 1999.

10. Demissie, M. and A. Khan, Illinois State Water Survey. *Influence of Wetlands on Streamflow in Illinois*, Contract Report 561. Champaign, Illinois, 1993.

11. Dreher, D.W. 1994. Management Program Action Plan for the Lake Michigan Watershed. Northeastern Illinois Planning Commission. Chicago, IL.

12. Dreher, D.W. and L. Heringa. 1998. Restoring and Managing Stream Greenways: A Landowner's Handbook. Northeastern Illinois Planning Commission. Chicago, IL.

13. Dreher, D.W., T. Gray and H. Hudson. Demonstration of an Urban Nonpoint Source Planning Methodology for Butterfield Creek. Northeastern Illinois Planning Commission. 1992 (Reprinted 1997).

14. Dreher, D.W. and T.H. Price. 1997. Reducing the Impacts of Urban Runoff: The Advantages of Alternative Site Design Approaches. Northeastern Illinois Planning Commission. Chicago, IL.

15. Dreher, D.W. *Watershed Urbanization Effects on Stream Quality*. 1995-6 Northeastern Illinois Planning Commission Annual Water Quality Report. 1996.

16. DuPage County Stormwater Management Division Department of Environmental Concerns. 1995. Streambank Stabilization Program. Prepared by: Rust Environment & Infrastructure in cooperation with Applied Ecological Services.

17. Ely, Eleanor. *Urbanization and Water Quality: A Crash Course*. The Volunteer Monitor. Volume 7, No. 2. 1995.

18. Federal Emergency Management Agency. Flood Insurance Study Volumes 1-3 Lake County Illinois and Incorporated Areas. September 3, 1997.

19. Highland Park Environmental Commission. 1998. Habitats: A Guide to Natural Landscaping in Highland Park. Highland Park, IL.

20. Illinois Department of Natural Resources – Office of Water Resources. 1983. Stream Preservation Handbook. Springfield, IL.

21. Illinois Environmental Protection Agency. Illinois Water Quality Report 1992-1993. Bureau of Water. 1994.

22. Illinois Environmental Protection Agency. Illinois Water Quality Report 1998 Update. Water Resource Assessment Information of Data Collected through September 1996. Bureau of Water. 1998.

23. Illinois Environmental Protection Agency. 2007. Website: http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=114

24. Illinois Historic Sites Survey. Inventory of Historic Landmarks in Cook County. 1975.

25. Illinois State Water Survey. 1998. Field Manual of Urban Stream Restoration. Champaign, IL.

26. Labaree, J.M. 1992. How Greenways Work: A Handbook on Ecology. 2nd Edition. National Park Service and Atlantic Center for the Environment. Ipswich, MA.

27. Matsanuga, W.O. and P.M. Murphy. An Intensive Survey of the Skokie River, Segment AO-1 of the Des Plaines River Basin. Illinois Environmental Protection Agency, 1979.

28. Metropolitan Water Reclamation District. Annual Summary Reports for the years 1993-1999. Research and Development Department. MWRD report numbers: 94-18, 95-15, 97-20, 99-12, 99-22, and 2000-3.

29. Mierzwa, K.S. and E. Beltz. Habitat Associations and Distribution of Amphibians and Reptiles at Middle Fork Savanna, Lake County, Illinois. A Report to the Lake Forest Open Lands Association , The Nature Conservancy and the Lake County Forest Preserve District. 1994.

30. Mitchell, F. 1996. Vegetated Buffers for Wetlands and Surface Waters Guidance for New Hampshire Municipalities. Wetland Journal Vol. 8, No. 4.

31. Northeastern Illinois Planning Commission. 1997. Natural Landscapes for Public Officials: A Source Book. Chicago, IL.

32. Northeastern Illinois Planning Commission and Openlands Project. 1997a. Trails: An Amenity for Property Owners and Communities. Illinois Prairie Trail Authority. Chicago, IL.

33. Northeastern Illinois Planning Commission and Openlands Projects. 1997b. Regional Greenways and Trails Plan: Lake County (draft). Chicago, IL.

34. Pitt, R. and M. Lalor, J. Harper, C. Nix. 2000. *Potential New Tools for the Use of Tracers to Indicate Sources of Contaminants to Storm Drainage Systems*. National Conference on Tools for Urban Water Resource Management & Protection, Proceedings. Chicago, IL.

35. Price, T.H. and D.W. Dreher. 1995. Flossmoor Stormwater Detention Basin Retrofit: A Demonstration of Detention Basin Modifications to Improve Nonpoint Source Pollution Control. Northeastern Illinois Planning Commission. Chicago, IL.

36. Price, T.H. and D.W. Dreher. Assisted by CH2M Hill. 2000. Urban Stormwater Best Management Practices for Northeastern Illinois.

37. Price, T.H., D.W. Dreher and C.W. Schaal. 1994. Model Best Management Practice Selection Methodology and Lake County Decision-Making Framework. Northeastern Illinois Planning Commission and Lake County Stormwater Management Commission. Libertyville, IL.

38. Schmeelk, W.G., S.G. Dennison, and P. O'Brien. 1980 and 1981 Annual Summary Reports. Water Quality within the Waterways of the Metropolitan Sanitary District of Greater Chicago. Vol II. Biological. Metropolitan Sanitary District of Greater Chicago, 1984 and 1985.

39. Schueler, T.R. 1995. Site Planning for Urban Stream Protection. Metropolitan Washington Council of Governments. Washington, DC.

40. Schueler, T.R. 1997. Comparative Pollutant Removal Capability of Urban BMPs: A Reanalysis. Watershed Protection Techniques Technical Note 95, Vol. 2, No. 4.

41. Schueler, T. "The Importance of Imperviousness", *Watershed Protection Techniques,* The Center for Watershed Protection. Vol.1, No. 3, Fall 1994.

42. Stowe, R. and DuPage County Environmental Concerns Department. 1991. DuPage County Stream Maintenance Program Report. DuPage County Environmental Concerns Department. Wheaton, IL.

43. Terrene Institute. 1994. Urbanization and Water Quality: A Guide to Protecting the Urban Environment. Washington, DC.

44. US Army Corps of Engineers. *Phase I General Design Memorandum, North Branch Chicago River*. Chicago District. August 1983.

45. USDA Natural Resources Conservation Service. 1997. An Overview of Stormwater Management in the Portland, Oregon, Metro Area. Watershed Science Institute Technical Note 1.

46. USDA Natural Resources Conservation Service. 1997. Native Plant Guide for Streams and Urban Stormwater Facilities in Northeastern Illinois.

47. US Department of Agriculture Soil Conservation Service. Soil Survey Lake County, Illinois. 1970.

48. US Department of Agriculture Soil Conservation Service, Technical Release 55 (*Urban Hydrology for Small Watersheds*). 1986.

49. Wildlife Society and American Fisheries Society. 1983. Stream Obstruction Removal Guidelines. Bethesda, MD.

50. Wood, R. Editor. *Weather Almanac*, 7th Edition. Gale Research, NY, 1996.

I.2 Maps

I.2.1 Local/Municipal Scale Mapping

1. Municipal Stormsewer Maps (Various Dates)
   Received for all North Branch municipalities except Mettawa and Highwood, where they are not mapped.

2. Municipal Zoning Maps (Various Dates)
   Received for all North Branch municipalities.

3. Municipal Detention Basin Location Maps (1998)
   Received for all North Branch municipalities except Mettawa and Highwood (not mapped).

4. Deerfield Base Map (1974)

5. Deerfield topographic mapping, 1 = 100' (1981)

6. Gurnee topographic mapping, 1 = 50', 1' contours (1978-79)

7. Highland Park Topographic - 1 = 100', 2 foot contours (1976)

8. Lake Forest Topographic - 1 = 200', 2 foot contours. (1984)

9. Lake Forest Comprehensive Plan Land Use Map (1995)

10. City of North Chicago showing the Skokie River and approximate flood areas. (March 15, 1992)

11. City of North Chicago Sanitary & Stormsewer Problem Areas. (June 11, 1992)

12. North Chicago topographic mapping, Northern Illinois Survey Company

13. Waukegan Topographic Map - 1 = 200', 2 foot contours (1960)

14. Waukegan Street Map (1995)

15. Waukegan Storm and Sanitary Sewer Map. (date unknown).

I.2.2 Lake County Maps

Lake County SMC and Map Services Mapping

1. Stormsewers Highland Park Quadrangle (1976)

2. Stormsewers Waukegan Quadrangle (1976)

3. North Branch Aerial Photos 1 = 400' (1990 and 1995)

4. Surface Water Resources of Lake County (1993)

5. Lake County Advanced Identification Wetland Maps, 1 = 1000' (1993)

6. Lake County Framework Plan Map (1994)

7. North Branch Chicago River Watershed Map, 1 = 2000' (1994)

8. Lake County Forest Preserves and IL Dept. of Natural Resources Properties (1995)

9. Watershed map with municipal boundaries (1997)

10. Lake County North Branch Wetlands Map with ADID wetlands (1997)

11. Hydric Soils map for Lake County North Branch (1997)

12. SMC Open Space map for North Branch (1997)

13. USGS Hydrologic Atlas Flood of Record Boundary Map (1997)

14. 2001 NIPC Land Use (2006)

15. Hydrologic Soil Groups (1997)

16. Pre-Settlement Vegetation (1997)

17. NIPC 2030 Population Forecast Map (2005).

18. NIPC 2020 Households and Employment Forecast (2005).

19. Stormsewershed Map for North Branch (1998)

20. Pollutant Loading for 10 Pollutants (1998)

    Maps prepared for total nitrogen, total Kjeldahl nitrogen, total phosphorous, dissolved phosphorous, total suspended solids, biochemical oxygen demand, chemical oxygen demand, total dissolved solids, zinc, lead, cadmium and copper

21. Lake County Flood Problem Area Inventory Maps, 1 = 2000' (1998).
    Revised based on interviews with municipalities in the watershed.

22. FEMA dFIRM with floodway and 100- and 500- year floodplains (1998).

23. 1995 aerial photos of watershed with 100-year floodplain overlay (1998)

Drainage Districts Maps

1. James Anderson & Company. Topographic mapping on the Skokie River, north of EJ&E RR tracks. 84-87 aerial base, 2 foot contours; quality marginal.

2. East Skokie Drainage District, 1 = 400', 2' contours, James Anderson Co. (1991)

3. Drainage District Jurisdictional Maps (East Skokie, West Skokie and Union), various dates

I.2.3 Watershed Scale Mapping

1. North Branch Topography 1 = 400', 2 foot contours (1975)

2. North Branch Floodplain and Floodway Base Map (1994)

3. North Branch GIS watershed map including Lake and Cook Counties prepared by Northeastern Illinois University (1998).

APPENDIX J: FUNDING SOURCES FOR WATERSHED PROJECTS

This funding source list is an expanded adaptation of the *Grant Information Summary* compiled by Keith Eichorst of the Natural Resources Conservation Service Chicago Metro Urban and Community Assistance Office. It is intended to assist individuals, groups, and local units of government in search of funding or financial incentives for community-based watershed improvement projects in Illinois. The list includes sources of federal, state, and local public funds, as well as other public/private, and private sources.*

Internet access provides an opportunity to get the latest information on grants with a click of a button. The State of Illinois administers numerous programs relating to community and urban conservation. Some of the money for these programs originates at the federal level and is "pass-through" funding, but much comes directly from the State. For those with internet access, the Illinois Environmental Protection Agency (IEPA) and Illinois Department of Natural Resources (IDNR) web sites are good sources of information for financial assistance.

- IEPA can be reached at: http://www.epa.state.il.us/assistance.html
- IDNR is at: http://dnr.state.il.us/
- Education grants information: http://www.dnr.state.il.us/lands/education/classrm/grant

The Catalog of Federal Domestic Grants lists all federal funding sources. Check with your local library for a copy of this catalog. There are also a number of useful websites for federal agencies that provide grant funds.

- Environmental Protection Agency (EPA): http://www.epa.gov/ogd
- Wetlands funding: http://www.erols.com/wetlands/dollars.htm
- United States Department of Agriculture (USDA): http://www.usda.gov
- Federal Emergency Management Agency (FEMA): http://www.fema.gov
- Department of Transportation (DOT): http//www.dot.gov
- Department of Interior (DOI): http://www.doi.gov
- Fish and Wildlife Service (USFWS): http://www.fws.gov
- Department of Housing and Urban Development (HUD): http://www.hud.gov
- To find out more about other federal funding sources, a good place to start is www.gsa.gov/fdac/ or www.whitehouse.gov/omb/grants

---

* *Note: Disclaimer*

The intent of this document is to provide the reader with examples of supplemental funding sources and financial incentives available for watershed improvement programs and projects. This list is not comprehensive, many other funding alternatives exist that may better fit local needs. These sources are provided as a starting point for funding development, but the list does not constitute a recommendation or endorsement of any particular grant or program. In addition, the absence of any particular grant or program does not constitute a negative endorsement. While an effort has been made to provide an accurate listing, funding information is constantly changing and omissions or errors may occur.

Listed below are some specific grants available in Illinois. The letter(s) that follow the grant or program title in the following list indicate eligible applicants for the funds based on the following key:

Eligibility Key:

"I" individuals eligible
"G" local units of government
"O" all organizations eligible to apply
"P" private not-for-profit (501C3) groups eligible
"U" unknown or eligibility varies, need to call.
"E" educational institutions

J.1 Public/Private Programs and Grants

J.1.1 Community Development/Redevelopment

Brownfields Economic Redevelopment Initiative: G.

- Projects include those involving redevelopment of industrial sites perceived as environmentally unsuitable.
- Pilot projects awarded up to $200,000 over two years.
- Contact 1-800-424-9346 or visit http://www.epa.gov/brownfields/ for more information.

Certified Local Government Program [for historic preservation]: G.

- Eligible projects include historical surveys, education and historical preservation planning.
- October 1 deadline.
- 40% match required.
- Contact the Illinois Historic Preservation Agency at 217-785-5042 or visit http://www.cr.nps.gov/hps/

Community Development Assistance Program (Community Development Block Grant - CDBG): G.

- Eligible projects must include activities that improve community welfare, specifically in moderate or low income areas. Conservation-related projects can possibly include the acquisition of real property (e.g., flood-prone areas), construction of water or sewer facilities, and initiatives for energy conservation.
- Application deadline varies – visit http://www.hud.gov/offices/cdp/communitydevelopment/programs/
- Money originates at the federal level as the Community Development Block Grant and is administered directly to "entitlement" communities such as Waukegan and North Chicago. Other municipalities and units of local government should contact the county Planning and Development Department to apply for CDBG funds and funds from the state under the Community Development Assistance Program. Community groups should work through their local municipality in incorporated areas and the next level of local government (i.e. township or county) in other areas.

Environmental Justice Small Grants: E, P.

- Projects include those that use community-based approaches to environmental protection.
- Project grants do not exceed $20,000.
- Contact USEPA at 1-312-353-1440 or 1-800-962-6215 or visit http://www.epa.gov/compliance/environmentaljustice/grants/.

Illinois Transportation Enhancement Program: G.

- Eligible projects include those that support alternative modes of transportation (including trails) and that preserve visual and cultural resources, landscaping beautification. Call for deadlines.
- Local 20% match required, 50% match for land acquisition.
- Contact Illinois Dept. of Transportation (IDOT) at 1-800-493-3434 or visit http://www.dot.il.gov/opp/itep.html.

Sustainable Development Challenge Grant - US Environmental Protection Agency: G, P.

- These grants are intended to encourage communities to recognize and build upon the fundamental connection between environmental protection, economic prosperity and community well-being. Purpose is to provide place-based approaches to address current growth problems and slow the loss of open space.
- Strongly encourages partnering among community members, businesses and government.
- Call for application deadlines.
- Requires minimum 20% match from non-federal sources.
- Contact Juanita Smith USEPA at 312-886-4856 or 202-260-6812; smith.juanita@epa.gov.

J.1.2 Flood Hazard Mitigation

Flood Mitigation Assistance Program- Federal Emergency Management Agency funds through Illinois Emergency Management Agency: G.

- Provides grants to communities for projects that reduce the risk of flood damage to structures that have flood insurance. Communities must be enrolled and in good standing with the National Flood Insurance Program (NFIP).
- Provides funding for mitigation planning and mitigation projects implemented pursuant to a plan. Eligible projects include relocation or acquisition of structures and underlying real property subject to flood damage for open space uses.
- Provides up to 75% of project costs, 25% match required.
- Contact is the Illinois Emergency Management Agency (IEMA) at 217-782-8719.

Hazard Mitigation Grant Program (Section 404 Program) – Federal Emergency Management Agency through Illinois Emergency Management Agency: G, (some P).

- Provides funds for long-term hazard mitigation measures after a major disaster declaration. It has traditionally funded acquisition or elevation of flood damaged buildings.
- Covers 75% of total project costs.
- Contact is the Illinois Emergency Management Agency (IEMA) at 217-782-8719.

Increased Cost of Compliance Program – Federal Emergency Management Agency: G, (some P).

- Provides funds to help cover the cost of meeting building requirements to reduce future flood damage or repairs.
- Flood insurance policyholders in high-risk areas, also known as special flood hazard areas, can receive up to $30,000 to help cover the costs to bring their home or business into compliance with their community's floodplain ordinance long-term hazard mitigation measures after a major disaster declaration.
- Visit http://www.fema.gov/business/nfip/icc.shtm for information.

Section 205 Small Flood Control Projects – US Army Corps of Engineers: G, U.

- Section 205 gives the Corps authority to develop and construct small flood control projects. A project is adopted for construction only after a detailed economic feasibility and engineering study has been done.
- Federal funds may be used for feasibility studies, planning, engineering, construction, supervision and administration.
- Federal cost-share of up to $5 million available.
- 50% non-federal cost-share required for feasibility study, 35% non-federal cost-share required for project costs.
- Contact Planning Division Chief Chicago District Corps 312-353-6400.

Watershed Management Board (WMB) Cost-share Projects – Lake County Stormwater Management Commission: G, O.

- SMC provides cost-share funds to local units of government in Lake County for projects that reduce flood damage, improve water quality and/or protect natural resources. Cost-share fund ranges from approximately $20,000–50,000 annually for each of the four watersheds in Lake County.
- Minimum 50% local cost-share required. Cost-share includes cash or in-kind services provided from any other source.
- Application deadline is in October.
- Contact SMC Watershed Planner at 847-918-5269 for more information or visit http://www.co.lake.il.us/smc/projects/cost/default.asp.

J.1.3 Water Quality Improvement

Clean Water State Revolving Fund – US and IL Environmental Protection Agencies: G, O, I.

- The SRF has over $24 billion in assets available for loans to fund a wide variety of water quality projects including urban stormwater controls, wetland and riparian zone restoration and protection, ground water protection, stormwater and sewer overflows and alternative treatment technologies.
- EPA provides seed money to states to provide low interest loans to communities, individuals and others.
- Contact Ron Drainer IEPA 217-782-2027 or Gene Wojcik EPA Region V 312-886-0174 or visit http:www.epa.gov/owm/cwfinance/cwsrf/.

Great Lakes Commission -- Great Lakes Basin Program for Soil Erosion and Sediment Control: U.

- Eligible projects include protection of Great Lakes Water Quality by controlling erosion and sedimentation, or by limiting the input of nutrients and contaminants into the Great Lakes (only available in Lake & Cook Counties).
- Application deadline is January 15.
- Contact the Great Lakes Commission at 734-665-9135 or visit http://www.glc.org/basin/.

Illinois Clean Lakes Program - Illinois Environmental Protection Agency: G, O, I.

- Financial assistance available for lakes over 20 acres with public access.
- Application deadline is Aug. 31 (pre-approval) and Oct. 31 (final approval).
- Requires 40% match for phase I, 50% local match for phase II.
- Contact IEPA at 217-782-3362 or visit http://www.epa.state.il.us/water/conservation-2000.

Non-point Source Management Program (Section 319 grants) – US Environmental Protection Agency funds through Illinois Environmental Protection Agency: G, O.

- Eligible projects include controlling or eliminating non-point pollution sources.
- Application deadline is February 1.
- Requires 40% non-federal matching funds or in-kind services.
- Contact Illinois Environmental Protection Agency (IEPA) at 217-782-3362 or visit http://www.epa.gov/owow/NPS/cwact.html.

Priority Lake and Watershed Implementation Program - Illinois Environmental Protection Agency: E, P.

- Eligible projects include funding to implement protection/restoration practices that improve water quality
- Funding up to 100%, projects range from $5,000 to $30,000.
- Contact IEPA at 217-782-3362 or visit http://www.epa.state.il.us/water/conservation-2000/plwip.html.

J.1.4 Natural Resource Protection/Enhancement

American Greenways Awards Program – Eastman Kodak Company: P, G.

- Provides small grants for greenway and trail projects that can be used for all appropriate expenses needed to complete a greenway project (planning, technical, legal and other costs).
- Grants range from $500-2,500.
- Deadline is in June.
- Contact American Greenways Coordinator 703-525-6300 or visit http://www.conservationfund.org/node/245.

Conservation 2000 -- Ecosystems Program - IL Department of Natural Resources: G, O.

- The goal of the Ecosystem Project Grants Program is to provide funding for partnership projects that maintain and enhance the ecological and economic conditions of the region. Funds for projects are awarded on a competitive basis to applicants from designated ecosystem partnership areas.
- Eligible projects fit into one of the following categories: resource economics, habitat, outreach, research or capital.
- In addition to project funds, the Ecosystems Program provides financial and technical support to ecosystem partners.
- Application deadline is in February.
- Contact IDNR at 217-782-7940, or see website at http://dnr.state.il.us/orep/c2000/.

Conservation 2000 -- Streambank Stabilization & Restoration Program (SSRP): G, O, I.

- Eligible projects include vegetative streambank stabilization practices.
- Application deadline: Sept. 3.
- 25% match required / maximum payment per project is $7,500.
- Contact the county Soil & Water Conservation District Office. Lake County is: 847-223-1056.

Division of Wildlife Resources Special Funds Application – Illinois Department of Natural Resources: G, O, I.

- Habitat improvement or land acquisition/protection projects funded by Habitat Fund, Furbearer Fund or Pheasant Fund. Projects must preserve, protect, acquire or manage wildlife for future generations – by benefiting wildlife either directly or indirectly.
- Habitat, research, or education projects are considered.
- Cost-share not required, but preferred.
- Deadline is October 31.
- Contact Special Funds Coordinator IDNR-Wildlife Resources 217-782-6384 or visit http:dnr.state.il.us/orep/c2000/.

Five-Star Restoration Challenge Grant Program: G, O, P.

- Grant funding is available for community-based wetland and riparian areas restoration projects. The program combines environmental enhancement with employment opportunities for economically disadvantaged youth.
- Public and private entities may apply for grants up to $10,000.
- Call for deadlines.
- Encourages community partnerships that contribute in-kind or matching funds for the grant.
- Contact John Pai USEPA at 202-260-8076; pai.john@epa.gov or Abigail Friedman NACo at 202-942-4225; afriedman@naco.org or visit http://www.epa.gov/owow/wetlands/restore/5star/.

Great Lakes Aquatic Habitat Network and Fund: P, O.

- Small grants to support grass-roots initiatives to protect aquatic habitats throughout the Great Lakes basin. Examples of fundable activities include: development and enforcement of regulatory programs; information compilation/research; media campaigns; build coalitions; and build capacity of grassroots organizations.
- Grants Program includes grants from $500-$3,500. Two funding cycles/year.
- Call for deadlines.
- Opportunity Grants Program provides $500 grants anytime.
- For more information call: 231-347-1181, e-mail: greatlakes@nature.org, or website: http:www.glhabitat.org.

Great Lakes Protection Fund: E, G, I, O, P.

- Environmental action projects that benefit the Great Lakes ecosystem are eligible. Support for conferences, environmental education and basic research are only considered as part of a regional action strategy.
- Submit preproposal anytime – no deadline.
- For more information 312-201-0660 or http://www.glpf.org.

Illinois Nature Preserves Commission Programs (INPC)-IL Department of Natural Resources: E, O.

- The mission of INPC is to assist private and public landowners in protecting high quality natural areas and habitats of endangered and threatened species in perpetuity, through voluntary dedication or registration of such lands into the Illinois Nature Preserves System. The Commission promotes the preservation of these significant lands and provides leadership in their stewardship, management, and protection.

- Visit http://www.dnr.state.il.us/INPC/ for information.

Illinois Trails Grant Program- Illinois Department of Natural Resources: G, P, O.

- Eligible projects include acquiring or constructing non-motorized bicycle and snowmobile paths and facilities.
- Deadline is March 1 and May 1.
- 50% match required.
- Contact IDNR at 217-782-7481 or visit http://dnr.state.il.us/ocd/newtrail2.htm.

Illinois Wildlife Preservation Fund - IL Department of Natural Resources: O, U.

- Eligible projects include those that deal with management, site inventories or education.
- Deadline is April 14.
- Funding up to $1,000. Match preferred but not required.
- Contact IDNR at 217-785-8774 or visit http://www.dnr.state.il.us/orc/wpf/.

Land and Water Conservation Fund (LWCF)- IL Department of Natural Resources: O, U.

- A state financed grant program that provides funding assistance to local government agencies for acquisition and/ or development of land for public parks and open space.
- A similar program to OSLAD.
- Visit http://www.dnr.state.il.us/ocd/newoslad1.htm for information.

Matching Aid to Restore State Habitats (MARSH) – Ducks Unlimited: O, U.

- The goal of the MARSH Program is to develop, restore, maintain, enhance, and preserve wetland habitat for waterfowl conservation in the United States.
- Project requirements include that projects must lead to permanent protection and/or restoration of North American Waterfowl sites.
- Requires 1:1 matching funds.
- For more information about MARSH please contact the appropriate regional office at http://www.ducks.org/about/contact.asp#regional.

National Fish and Wildlife Foundation (NFWF) Challenge Grants: O.

- NFWF awards challenge grants for natural resource conservation projects. Priority areas are: wetland conservation, conservation education, fisheries, neotropical migratory bird conservation, conservation policy, and wildlife and habitat.
- NFWF promotes public/private sector partnerships.
- Requires minimum 1:1 non-federal match.
- Pre-proposal deadlines are July 1 and November 15.
- Contact NFWF 202-857-016, e-mail info2nfwf.org, or web http://www.nfwf.org.

North American Wetlands Conservation Act – U.S Fish and Wildlife Service: U.

- Eligible on-the-ground projects include acquisition, restoration, creation and/or enhancement of wetlands and wetland-associated uplands. Partnerships are encouraged. Conservation easements are required.
- Application deadline varies
- Requires 1:1 non-federal match, maximum grant amount is $50,000.

- Contact Small Grants Coordinator N. American Waterfowl & Wetlands Office USFWS at 703-358-1784 or email r9arw_nawwo@mail.fws.gov.

North American Wetlands Conservation Council -- Small Grants Program: U.

- Eligible on-the-ground projects include acquisition, restoration, creation and/or enhancement of wetlands and wetland-associated uplands. Partnerships are encouraged. Conservation easements are required.
- Application deadline is December 3.
- Requires 1:1 non-federal match, maximum grant amount is $50,000.
- Contact Small Grants Coordinator N. American Waterfowl & Wetlands Office USFWS at 703-358-1784 or visit http://www.fws.gov/birdhabitat/Grants/NAWCA/Small/index.shtm.

Northeastern Illinois Wetlands Conservation Account – US Fish & Wildlife Service, The Conservation Fund: I, G, O, P.

- Eligible projects include restoration, enhancement, and/or replacement of wetland functions and values which have been degraded or destroyed as a result of activities conducted in violation of the Clean Water Act. Other eligible projects include those that promote understanding, appreciation, and stewardship of wetlands. Permanent land protection and federal/state mitigation plan required on all project sites. Project partnerships encouraged.
- Limited to Northeastern Illinois area.
- Grant range is $5,000 -150,000.
- Application deadlines vary, need to call. (Usually November-December time-frame.)
- Matching funds preferred (1:1 cash, goods or in-kind) but not required.
- Contact the Fish and Wildlife Service (USFWS) at 847-381-2253 for information.

Open Lands Trust Program (OLT) - Illinois Department of Natural Resources: G.

- The OLT grant program can provide up to 50% cost-share to local units of government for the acquisition of open space. Economically "disadvantaged populations" may receive up to 90% cost-share. Land must be maintained in perpetuity for public open space and natural resource related recreation purposes only.
- Maximum award/unit of government/project is $2 million/year.
- Grant funding disbursed on a reimbursement basis.
- Eligible costs: property costs based on "fair market value"; appraisal fees; land survey and archeological reconnaissance work.
- Call for deadline
- For more information call 217-782-7481 or visit http://dnr.state.il.us/ocd/newolt2.htm.

Open Space Lands Acquisition And Development (OSLAD) Program- IL Department of Natural Resources: G.

- Eligible projects include money for acquisition and development of public parks and open space.
- Application deadline is July 1.
- Funding up to 50% of project costs, up to $400,000.
- Contact Illinois Dept. Of Natural Resources (IDNR) at 217-782-7481 or visit http://dnr.state.il.us/ocd/newoslad1.htm.

Property Tax Incentives for Conservation: O, I, E, G.

- Urban land that is environmentally sensitive may qualify for significant property tax reductions under one of the following programs:
  - Real Property Conservation Rights Act (765 ILCS 120/1 et seq.).
    - If land is qualified by having a conservation easement, it may be assessed at 8 1/3 fair market value.
  - Illinois Natural Areas Preservation Act (525 ILCS 30/1 et.seq)/17 Ill Adm. Code.
    - If land is qualified by being designated as an Illinois Nature Preserve, it may be assessed at $1/year in perpetuity.
  - Open Space Assessment (Illinois Property Tax Code Sections 10-155).
    - A lower use evaluation is used for land in open space, 10 acre minimum area, not applicable in Cook County.
  - Preferential Assessment of Common Areas (Illinois Property Tax Code Sections 10-35).
    - Purpose is to encourage open space in residential developments, if qualifying, assessment is reduced to $1/year.
- Other tax incentives may also apply, contact IDNR regarding the Real Property Conservation Rights Act and the Illinois Natural Areas Preservation Act at 217-785-8774. Contact your local township or county assessor to determine eligibility under the Open Space Assessment and Preferential Assessment of Common Areas.

Rivers and Trails Program – National Park Service: O.

- Provides technical assistance to help local communities achieve conservation objectives. It provides no direct funding.
- Contact Diane Banta at diane_banta@nps.gov or at 312-863-6287.

Section 1135 Project Modifications for Improvement of the Environment – US Army Corps of Engineers: U.

- Section 1135 gives the Corps authority to review water resource projects constructed by the Corps and determine the need for modifications to improve the quality of the environment. The objective is to restore ecosystem structure, function and dynamic processes to a less-degraded, more natural condition.
- Federal funds may be used for feasibility studies, planning, engineering, construction and supervision.
- Federal cost-share of up to $5 million available.
- 25% non-federal cost-share required.
- Contact Planning Division Chief Chicago District Corps 312-353-6400 or visit http://www.mvp.usace.army.mil/environment/default.asp?pageid=115.

Section 206 Aquatic Ecosystem Restoration – US Army Corps of Engineers: G, U.

- Section 206 gives the Corps authority to carry out an aquatic ecosystem restoration and protection project if the project will improve the quality of the environment, is in the public interest and is cost effective.
- Federal funds may be used for feasibility studies, planning, engineering, construction, supervision and administration.
- Federal cost-share of up to $5 million available.
- 35% non-federal cost-share required.
- Contact Planning Division Chief Chicago District Corps 312-353-6400 or visit http://www.mvp.usace.army.mil/environment/default.asp?pageid=113.

Stream Cleanup and Lakeshore Enhancement – US Environmental Protection Agency: G, P.

- The Streambank Cleanup and Lakeshore Enhancement (SCALE) program provides funds to assist groups that have established a recurring stream or lakeshore cleanup.
- Maximum award is $3,500 for implementation of streambank or lakeshore cleanup.
- Visit http://www.epa.state.il.us/water/watershed/scale.html for information.

Technical Assistance and Grants Program - Chicago Urban Resources Partnership: G, O.

- Eligible projects include those in the Chicago metro area that restores or enhances natural ecosystems through local community based partnerships, emphasis on citizen involvement and education.
- Application deadline varies.
- Requires 1:1 matching funds or in-kind services.
- Contact the partnership at 312-353-2473 for more information.

Urban & Community Forestry Grant Program - IL Department of Natural Resources: G.

- Purpose is to create or enhance local forestry programs in communities with a local forestry ordinance.
- Call for deadlines.
- 50% match required
- Contact IDNR at 217-782-2361 or visit http://dnr.state.il.us/conservation/forestry/urban/grantoppor.htm.

Wetlands Development Grant Program - US Environmental Protection Agency: G.

- The purpose of the Wetlands Development Grant Program is to assist state, tribal and local government agencies in their wetlands protection, management and restoration efforts. Grant funds can be used to develop new wetland programs or refine existing programs.
- Requires a public participation work plan.
- Requires minimum 25% match from non-federal sources.
- Contact EPA Wetlands Protection Hotline at 800-832-7828; or visit http://www.epa.gov/OWOW/wetlands/grantguidelines.

Wetlands Reserve Program – USDA Natural Resources Conservation Service: I, O.

- Property owner enrolls agricultural land with restorable wetlands, land adjacent to wetlands, wetlands restored under state or federal programs, Conservation Reserve Land or riparian areas in Wetland Reserve.
- Cost-share of up to $950/acre is provided for long-term easements and restoration agreements. In addition USDA will cost-share 75% of the average cost of establishing essential restoration practices within the easement for 30-year easements and restoration agreements.
- Enrollment deadline varies, contact NRCS at 815-338-0049 or visit http://www.nrcs.usda.gov/programs/.

Wildlife Links – National Fish & Wildlife Foundation (NFWF): I, G, O.

- Cooperative program that funds cutting edge research, management and education projects that will help golf courses become an important part of the conservation landscape. Areas of interest include: management and design techniques for increasing biodiversity on golf courses; management guidelines for specific species; research to determine habitat characteristics that serve as corridors or barriers on

golf courses; monitoring wildlife habitat conservation programs on golf courses; effects of golfer and maintenance activities on wildlife. The United States Golf Association provides $200,000 annually to fund these grants.

- Proposals should indicate that golf courses will be formal partners.
- Maximum request $25,000/project/year, multi-year proposals accepted.
- Pre-proposal deadline is July 16.
- Contact NFWF202-857-0166 or http://www.nfwf.org for more information

J.1.5 Environmental Education

Captain Planet Foundation: E, P.

- Eligible projects include environmental activities for children 6-18 such as urban gardens, water testing, and habitat restoration.
- Grants range from $500-$2,500.
- Contact at 1-800-KID-POWER.

Environmental Education Grants - US Environmental Protection Agency: E, P, G.

- Eligible projects include environmental education activities such as curricula dissemination, designing or demonstrating educational field methods, training educators, or fostering international cooperation.
- Varying application deadlines usually run the middle of November.
- Requires a minimum of 25% matching funds or in-kind services.
- Contact US Environmental Protection Agency (USEPA) at 312-353-3209 or visit http://www.epa.gov/enviroed/grants.html.

Lake Education Assistance Program- Illinois Environmental Protection Agency: E, P.

- Eligible projects include educational programs on inland lakes and lake watersheds.
- Maximum funding of $500 is reimbursed after completion. Deadlines are Sept. 30 & Jan 31.
- Contact IEPA at 217-782-3362 or visit http://www.epa.state.il.us/water/conservation-2000/leap.html.

Illinois Community-based Learn & Serve Grants: U.

- Eligible projects include those that combine community service with classroom learning.
- To see if your project qualifies, contact the Illinois Commission on Community Service at 1-800-592-9896.

Project WILD School Sites Grants- IL Department of Natural Resources: E, O.

- Eligible projects include enhancement of wildlife habitat, with emphasis on youth involvement and education.
- Project must involve a trained WILD educator or facilitator.
- Application deadline is September 15.
- Contact the IDNR at 217-782-1434.

School Yard Habitat Action Grants: E, O.

- Eligible applicants include only public schools as sponsors, projects included developing local habitat areas.

- Applications due mid-April.
- Requires 50% matching funds or in-kind services, funding up to $500.
- Contact the Illinois Resource Center at 847-803-3535 or visit http://www.dnr.state.il.us/lands/education/classrm/grants.htm.

J.1.6 Wildlife

Division of Wildlife Resources Special Funds Application (Habitat, Furbearer, and Pheasant Funds)-IL Department of Natural Resources: E, O .

- Habitat Improvement or land acquisition/protection projects funded by Habitat Fund, Furbearer Fund, or Pheasant Fund. Projects must preserve, protect, acquire, or manage wildlife for future generations- by benefiting wildlife either directly or indirectly.
- Habitat, research, or education projects preferred.
- Contact Office of Resource Conservation- Special Funds or visit http://dnr.state.il.us/grants/special_funds/wildgrant.htm.

Illinois Migratory Waterfowl Stamp Fund-IL Department of Natural Resources: E, O .

- Provides for the acquisition of public lands and/ or the development of habitat to attract and support waterfowl. Eligible projects must directly or indirectly benefit waterfowl hunting in Illinois.
- Projects involving education or research are not eligible.
- Visit http://dnr.state.il.us/grants/special_funds/wildgrant.htm for information.

Illinois Wildlife Preservation Fund-IL Department of Natural Resources: E, O.

- Eligible projects include those that deal with habitat enhancement, endangered and threatened species.
- Match preferred but not required.
- Contact Glen Kruse, Chief Division of Natural Heritage at 217 785-8774, email:DNR.SPECIALFUNDS@illinois.gov or visit http://dnr.state.il.us/orc/wpf/.

Partners for Fish and Wildlife-US Fish and Wildlife Service: E.

- Provides financial assistance for restoration or degraded wetland and other important fish and wildlife habitats such as grasslands, streams, and riparian habitats, and technical assistance for designing the restoration plans.
- 100% of the cost is provided for up to 10 years on private lands.
- Funded projects are often partnered with the Wetland Reserve Program (NRCS).
- Contact Jim Ruwalt at 608-221-1206 or james_ruwalt@fws.gov.

Private Land Wildlife Habitat Management Fund-IL Department of Natural Resources: E, O.

- A technical assistance program for private land owners that provide plans, field equipment, plant materials, and labor to develop, implement and maintain wildlife habitat management practices that require specialized training, equipment, or resources which would otherwise be unavailable to landowners.
- Eligible land is privately owned and is at least 0.25 acre in urban areas and 1 acre in rural areas.
- Contact IDNR at 217-782-6384.

Private Waters Program-IL Department of Natural Resources: E, O.

- Free field inspections and technical advice on fish habitat, fish population management, water quality, vegetation control, streambank stabilization, and habitat development in impounded waters and streams.
- Contact IDNR at 217-782-6424.

Trees, Shrubs and Seedlings at No Cost Program-IL Department of Natural Resources: E, O.

- The goal of the Trees, Shrubs, and Seedlings at No Cost Program is to encourage private landowners to increase wildlife habitat and erosion control functions by reforesting the land
- Provides seedlings at no cost to landowners with and IDNR approved management plan.
- Contact the District Forester or IDNR at 217-782-2361.

Wildlife Habitat Incentives Program (WHIP)- US Department of Agriculture (Natural Resources Conservation Service): E, O.

- Property owner enrolls private land to develop and improve wildlife habitat.
- Cost share of up to 75% of the cost of installing wildlife practices.
- Technical assistance for establishing habitat development projects.
- Continuous sign-up, visit http://www.nrcs.usda.gov/programs/whip.

J.1.7 Open Space Preservation/Management/Acquisition

Conservation Reserve Program (CRP)- US Department of Agriculture (Natural Resources Conservation Service): E, O.

- Pays farmers not to farm their highly erodible land for a period of 15 or 30 years (or permanently) and provides up to 90% cost-sharing.
- Visit http://www.nrcs.usda.gov/programs/crp/ for information.

Illinois Conservation Reserve Enhancement Program (CREP) - US Department of Agriculture (Natural Resources Conservation Service): E, O.

- The CREP program provides incentive payments and technical assistance to farm owners who plant grasses and trees, restore wetlands to reduce top soil loss, improve water quality, and enhance wildlife habitat in the Illinois River basin.
- Visit http://www.nrcs.usda.gov/programs/crep/ for information.

Environmental Quality Incentives Program (EQIP) - US Department of Agriculture (Natural Resources Conservation Service): E, O.

- Promotes conservation practices and environmental quality on agricultural land by providing financial and technical help to assist farmers with installation or implementation of structural and management practices.
- Provides up to 75% cost share for certain conservation practices up to 450,000 for a maximum of ten years.
- Visit http://www.nrcs.usda.gov/programs/eqip/ for information.

J.2 Private Sources

Private sources of funding for community and urban conservation projects include corporations and individuals that have established foundations for charitable purposes. Many corporate foundations focus their philanthropy in areas near their operations. Local retailers, businesses or the local chamber of commerce may also be a source of revenue for projects.

J.2.1 Examples of Local Private Grant Sources

Abbott Labs Fund: U.

- Provides fund support for community projects.
- General grants or matching grants awarded.
- Direct written requests for support to:
  Cindy Schwab, Dept 379, Bldg AP14C, 100 Abbott Park Rd, Abbott Park, IL 60064
- Call 847-937-7075 or visit WWW.ABBOTT.COM for more information.

Chicago Community Trust: P.
222 N. LaSalle St. Ste 1400 (Chicago area only)
Chicago, IL 60601 312-372-3356
www.cct.org

Exxon-mobile Educational Foundation: P, U.

- Emphasis is on conservation and education.
- Grants will not be available until Fall 2000.
- Contact is at exxonmobile.com for specific criteria.

Field Foundation of Illinois: U.

- Focus is on conservation and education.
- Call 312-831-0910 or visit http://www.fieldfoundation.org/general-guidelines.html.

Gaylord and Dorothy Donnelley Foundation: P, U.

- Eligible projects primarily conservation. Chicago area only.
- Deadlines are March 31, July 1.
- Contact is at 35 E. Wacker Drive, Ste. 2600, Chicago, IL 60601, ATTN: Judith Stockdale or visit http://www.gddf.org/.

Grand Victoria Foundation: P, O, E, I.

- Eligible projects include environmental proposals.
- Application deadlines are May 12, November 3, and May 14 (2001).
- Contact the foundation at 847-289-8575 or visit http://www.grandvictoriafdn.org/.

Motorola Foundation: P

- Eligible projects include environmental efforts.
- Contact is http://www.motorola.com/content.jsp?globalObjectId=355-4865 for more information.

Additional information about private foundation funding can be found through national or local organizations that specialize in grant information research. For "do-it-your-selfers," grant data collection centers are available throughout Illinois.

J.2.2 National Grant Information Organizations

Resources for Global Sustainability
P.O. Box 3665, Cary, NC 27519
1-800-724-1857
RGS publishes a yearly catalog called "Environmental Grantmaking Foundations"
Web site: www.environmentalgrants.com

The Foundation Center
79 Fifth Street, New York, New York 10003-3076
1-800-334-2564
Web site: http://fdncenter.org

J.2.3 Local Grant Data Collection Centers

The Donor's Forum of Chicago
208 S. LaSalle Street, Suite 735, Chicago, IL 60604
312-578-0175

University of Illinois at Springfield
Shepherd Road, Springfield, IL 62794
217-786-6633

Evanston Public Library
1703 Orrington Avenue, Evanston, IL 60201
847-866-0305

Rock Island Public Library
401 19th Street, Rock Island, IL
309-788-7627

APPENDIX K: MAINTENANCE, MANAGEMENT AND MONITORING PLANS FOR RECOMMENDED BMPS IN THE NORTH BRANCH WATERSHED

The following pages include guidelines or examples of maintenance, management, and monitoring plans for some of the best management practices (BMPs) recommended as action items. Some of the action item, such as installing multi objective detention basins and removing large debris blockages, have sample plans provided. Other action items, such as developing recommendation for planting native vegetation that increases stormwater infiltration and developing a non-point source pollution reduction program, do not have sample plans provided. In situations where sample plans have not been provided, maintenance and management issues may be too diverse and are project specific. However, monitoring plans may be as simple as tracking the status or monitoring the functionality of past projects. It is important to remember that without proper maintenance, the effectiveness of some projects may be moot. The provided plans are representative samples and should be refined as appropriate to fit each site specific project.

BMP 1.3: Replace Turfgrass in ROWs with Native Vegetation

Responsible Party: The Highway Department shall have primary responsibility. Local municipalities also share responsibility.

Frequency: The maintenance shall include periodic inspections and repairs as necessary and shall as a minimum occur on a quarterly basis.

Plan:

- The Owner shall visually inspect the ROW's and remove any debris which accumulates.
- The owner shall inspect the facility and supplement native plants if not well established.
- The owner shall inspect the facility for invasive species and remove where possible.
- The owner shall hire a professional for periodic prescribed burns (where practicable) to encourage native plant growth and discourage non-natives.

Required Recordkeeping: At a minimum, document inspector's name, date of inspection, inspection results, follow-up actions required, party responsible for follow-up actions, and proposed date to implement follow-up actions.

BMP 1.4: Retrofit Detention Basins for Improved Water Quality

Responsible Party: It shall be the owners responsibility to maintain and operate the stormwater detention facilities.

Frequency: The operation and maintenance shall include periodic inspections and repairs as necessary and shall as a minimum occur on a quarterly basis and within 48 hours following a storm of 1 or more inches of precipitation in a 24-hour period.

Plan:

- The Owner shall visually inspect the detention basin to determine if the water quality design objectives are being met.
- The Owner shall visually inspect the detention basins and remove any debris which accumulates.
- The Owner shall inspect the detention facilities for and make corrections for any signs of basin failure, including slope failures or inlet/outlet structure failures or restrictor failures.
- The Owner shall inspect the detention facilities to insure that there is no blockage at the overflow spillway.
- The Owner shall remove the lid to the detention pond outlet structure and shall verify that there is no build-up of debris which would affect the operation of the outfall.
- For naturalized/native basins or wetland basins:
- The owner shall inspect the facility and supplement wetland plants if not well established.
- The owner shall inspect the facility for invasive species and remove where possible.
- The owner shall hire a professional for periodic (bi-annual) prescribed burns to encourage native plant growth and discourage non-natives.

Required Recordkeeping: At a minimum, document inspector's name, date of inspection, inspection results, follow-up actions required, party responsible for follow-up actions, and proposed date to implement follow-up actions.

BMP 1.5: Retrofit Outfalls for Improved Water Quality

Responsible Party: The local Drainage District shall have the primary responsibility to maintain outfalls. Local municipalities and property owners also share responsibility.

Frequency: The maintenance shall include periodic inspections and removal of debris as necessary and shall as a minimum occur every six months and within one week following a storm of 3 or more inches of precipitation. Sites that frequently receive debris blockage or sediment accumulation shall be inspected quarterly and within three days following a storm of 2 inches or more of precipitation.

Plan:

- Visually inspect the outfall on the upstream and downstream side of the structure and inside the structure (if practicable).
- Remove any debris which accumulates.
- Inspect outfalls for erosion or structural damage. If erosion or damage is minor, repair. If erosion or damage is significant (threatening safety or compromising conveyance or water quality) make recommendations for replacement.
- For retrofits that include a filter (vegetative, sand, etc.)
- Remove any trash or debris that has accumulated on the filter.
- Periodic scraping and aeration of the filter media may be necessary to prevent clogging.

Required Recordkeeping: At a minimum, document inspector's name, date of inspection, inspection results, follow-up actions required, party responsible for follow-up actions, and proposed date to implement follow-up actions.

BMP 1.14: Install BMPs to Infiltrate and Treat All Stormwater Runoff

Responsible Party: It shall be the Owners responsibility to maintain and operate the stormwater infiltration devices.

Frequency: The operation and maintenance shall include periodic inspections and repairs as necessary and shall as a minimum occur on a quarterly basis and within 48 hours following a storm of 1 or more inches of precipitation in a 24-hour period.

Plan:

- The Owner shall visually inspect the infiltration facilities and remove any debris which accumulates.
- If specific sites are prone to debris accumulation, attempt to locate the source and remove accumulation point to ensure proper infiltration of runoff.
- The Owner shall inspect the facilities for and make corrections for any signs of failure or erosion.
- If specific sites are prone to erosion or lack natural vegetation, stabilize the site to mitigate the effects of runoff.
- Periodic scraping and aeration of the filter media may be necessary to prevent clogging.

Required Recordkeeping: At a minimum, document inspector's name, date of inspection, inspection results, follow-up actions required, party responsible for follow-up actions, and proposed date to implement follow-up actions.

BMP 1.17: Stabilize Eroded Streambanks

Responsible Party: The Local Drainage District shall have primary responsibility to maintain drainage ways. Local municipalities and property owners also share responsibility.

Frequency: The maintenance shall include periodic inspections and removal of debris as necessary and shall as a minimum occur every six months and within one week following a storm of 3 or more inches of precipitation.

Plan:

- Visually inspect the waterways for erosion.
- Inspect culvert outfalls and slopes leading to the river. Restore eroding or bare areas.
- Inspect structures for erosion or structural damage. If erosion or damage is minor, repair. If erosion or damage is significant (threatening safety or compromising conveyance or water quality) make recommendations for replacement.
- If specific sites are prone to debris accumulation, attempt to locate source of debris or reason for accumulation. Take action to stabilize debris source/remove accumulation point to prevent future debris accumulation.
- If specific sites are prone to erosion, make recommendations to permanently stabilize the site in an environmentally sensitive manner.
- Inspect outfalls to river and make sure there is no joint separation at flared end section, no blockage of pipes, no erosion around end section or outfall. If erosion or damage is minor, repair. If erosion or damage is significant (threatening safety or compromising conveyance or water quality) make recommendations for replacement.

Required Recordkeeping: At a minimum, document inspector's name, date of inspection, inspection results, follow-up actions required, party responsible for follow-up actions, and proposed date to implement follow-up actions.

BMP 1.18: Replace and Stabilize Failed Outfalls and Hydraulic Structures

Responsible Party: The local Drainage District shall have primary responsibility to maintain drainageways. Local municipalities and property owners also share responsibility.

Frequency: The maintenance shall include periodic inspections of hydraulic structures and removal of debris as necessary and shall as a minimum occur every six months and within one week following a storm of 3 or more inches of precipitation. Sites that frequently receive debris blockages shall be inspected quarterly and within three days following a storm of 2 inches or more of precipitation.

Plan:

- Visually inspect the hydraulic structures and outfalls on upstream and downstream side of structure and inside structure.
- Remove any debris which accumulates.
- Inspect for erosion or structural damage. If erosion or damage is minor, repair. If erosion or damage is significant (threatening safety or compromising conveyance or water quality) make recommendations for replacement.

Required Recordkeeping: At a minimum, document inspector's name, date of inspection, inspection results, follow-up actions required, party responsible for follow-up actions, and proposed date to implement follow-up actions.

BMP 2.2: Installation of New Multi-Objective Detention Basins

Responsible Party: It shall be the owners responsibility to maintain and operate the stormwater detention facilities.

Frequency: The operation and maintenance shall include periodic inspections and repairs as necessary and shall as a minimum occur on a quarterly basis and within 48 hours following a storm of 1 or more inches of precipitation in a 24-hour period.

Plan:

- The Owner shall visually inspect the detention basins and remove any debris which accumulates.
- The Owner shall inspect the detention facilities for and make corrections for any signs of basin failure, including slope failures or inlet/outlet structure failures or restrictor failures.
- The Owner shall inspect the detention facilities to insure that there is no blockage at the overflow spillway.
- The Owner shall remove the lid to the detention pond outlet structure and shall verify that there is no build-up of debris which would affect the operation of the outfall.
- For naturalized/native basins or wetland basins:
- The owner shall inspect the facility and supplement wetland plants if not well established.
- The owner shall inspect the facility for invasive species and remove where possible.
- The owner shall hire a professional for periodic prescribed burns to encourage native plant growth and discourage non-natives.

Required Recordkeeping: At a minimum, document inspector's name, date of inspection, inspection results, follow-up actions required, party responsible for follow-up actions, and proposed date to implement follow-up actions.

BMP 2.3: Installation of Smaller Restrictors on Detention Basins

Responsible Party: It shall be the owners responsibility to maintain and operate the stormwater detention facilities, including basins retrofitted with restrictors to meet the WDO.

Frequency: The operation and maintenance shall include periodic inspections and repairs as necessary and shall as a minimum occur on a quarterly basis and within 48 hours following a storm of 1 or more inches of precipitation in a 24-hour period.

Plan:

- The Owner shall visually inspect the detention basins and remove any debris which accumulates.
- The Owner shall inspect the detention facilities for and make corrections for any signs of basin failure, including slope failures or inlet/outlet structure failures or restrictor failures.
- The Owner shall inspect the detention facilities to insure that there is no blockage at the overflow spillway.
- The Owner shall remove the lid to the detention pond outlet structure and shall verify that there is no build-up of debris which would affect the operation of the outfall.
- For naturalized/native basins or wetland basins:
- The owner shall inspect the facility and supplement wetland plants if not well established.
- The owner shall inspect the facility for invasive species and remove where possible.
- The owner shall hire a professional for periodic prescribed burns to encourage native plant growth and discourage non-natives.

Required Recordkeeping: At a minimum, document inspector's name, date of inspection, inspection results, follow-up actions required, party responsible for follow-up actions, and proposed date to implement follow-up actions.

BMP 2.6: Retrofit Existing Sites to Include Infiltration Devices

Responsible Party: It shall be the Owners responsibility to maintain and operate the stormwater infiltration devices.

Frequency: The operation and maintenance shall include periodic inspections and repairs as necessary and shall as a minimum occur on a quarterly basis and within 48 hours following a storm of 1 or more inches of precipitation in a 24-hour period.

Plan:

- The Owner shall visually inspect the infiltration facilities and remove any debris which accumulates.
- If specific sites are prone to debris accumulation, attempt to locate the source and remove accumulation point to ensure proper infiltration of runoff.
- The Owner shall inspect the facilities for and make corrections for any signs of failure or erosion.
- If specific sites are prone to erosion or lack natural vegetation, stabilize the site to mitigate the effects of runoff.
- Periodic scraping and aeration of the filter media may be necessary to prevent clogging.

Required Recordkeeping: At a minimum, document inspector's name, date of inspection, inspection results, follow-up actions required, party responsible for follow-up actions, and proposed date to implement follow-up actions.

BMP 2.14: Remove Large Debris Blockages Obstructing Drainage Ways

Responsible Party: The local Drainage District shall have primary responsibility to maintain drainageways. Local municipalities and property owners also share responsibility.

Frequency: The maintenance shall include periodic inspections and removal of debris as necessary and shall as a minimum occur every six months and within one week following a storm of 3 or more inches of precipitation. Sites that frequently receive debris blockages shall be inspected quarterly and within three days following a storm of 2 inches or more of precipitation.

Plan:

- Visually inspect the waterways and remove any debris which accumulates.
- If specific sites are prone to debris accumulation, attempt to locate source of debris or reason for accumulation. Take action to stabilize debris source/remove accumulation point to prevent future debris accumulation.

Required Recordkeeping: At a minimum, document inspector's name, date of inspection, inspection results, follow-up actions required, party responsible for follow-up actions, and proposed date to implement follow-up actions.

BMP 2.15: Regular Stream Maintenance

Responsible Party: The local Drainage District shall have primary responsibility to maintain drainageways. Local municipalities and property owners also share responsibility.

Frequency: The maintenance shall include periodic inspections and removal of debris as necessary and shall as a minimum occur every six months and within one week following a storm of 3 or more inches of precipitation. Sites that frequently receive debris blockages shall be inspected quarterly and within three days following a storm of 2 inches or more of precipitation.

Plan:

- Visually inspect the waterways and remove any debris which accumulates.
- Inspect culvert outfalls and slopes leading to the river. Restore eroding or bare areas.
- Visually inspect the hydraulic structures on upstream and downstream side of structure and inside structure and remove any debris which accumulates.
- Inspect structures for erosion or structural damage. If erosion or damage is minor, repair. If erosion or damage is significant (threatening safety or compromising conveyance or water quality) make recommendations for replacement.
- If specific sites are prone to debris accumulation, attempt to locate source of debris or reason for accumulation. Take action to stabilize debris source/remove accumulation point to prevent future debris accumulation.
- If specific sites are prone to erosion, make recommendations to permanently stabilize the site in an environmentally sensitive manner.
- Perform visual inspection to make sure material is not being stored within floodplain of river.
- Inspect outfalls to river and make sure there is no joint separation at flared end section, no blockage of pipes, no erosion around end section or outfall. If erosion or damage is minor, repair. If erosion or damage is significant (threatening safety or compromising conveyance or water quality) make recommendations for replacement.

Required Recordkeeping: At a minimum, document inspector's name, date of inspection, inspection results, follow-up actions required, party responsible for follow-up actions, and proposed date to implement follow-up actions.

BMP 2.16: Inspect Hydraulic Structures

Responsible Party: The local Drainage District shall have primary responsibility to maintain drainageways. Local municipalities and property owners also share responsibility.

Frequency: The maintenance shall include periodic inspections of hydraulic structures and removal of debris as necessary and shall as a minimum occur every six months and within one week following a storm of 3 or more inches of precipitation. Sites that frequently receive debris blockages shall be inspected quarterly and within three days following a storm of 2 inches or more of precipitation.

Plan:

- Visually inspect the hydraulic structures on upstream and downstream side of structure and inside structure.
- Remove any debris which accumulates.
- Inspect for erosion or structural damage. If erosion or damage is minor, repair. If erosion or damage is significant (threatening safety or compromising conveyance or water quality) make recommendations for replacement.

Required Recordkeeping: At a minimum, document inspector's name, date of inspection, inspection results, follow-up actions required, party responsible for follow-up actions, and proposed date to implement follow-up actions.

BMP 3.2: Replace Turfgrass around Detention Basins with Natural Buffers

Responsible Party: It shall be the owners responsibility to maintain and operate the stormwater detention facilities.

Frequency: The operation and maintenance shall include periodic inspections and repairs as necessary and shall as a minimum occur on a quarterly basis and within 48 hours following a storm of 1 or more inches of precipitation in a 24-hour period.

Plan:

- The Owner shall visually inspect the detention basins and remove any debris which accumulates.
- The Owner shall inspect the detention facilities for and make corrections for any signs of basin failure, including slope failures or inlet/outlet structure failures or restrictor failures.
- The Owner shall inspect the detention facilities to insure that there is no blockage at the overflow spillway.
- The Owner shall remove the lid to the detention pond outlet structure and shall verify that there is no build-up of debris which would affect the operation of the outfall.
- For naturalized/native basins or wetland basins:
- The owner shall inspect the facility and supplement wetland plants if not well established.
- The owner shall inspect the facility for invasive species and remove where possible.
- The owner shall hire a professional for periodic prescribed burns to encourage native plant growth and discourage non-natives.

Required Recordkeeping: At a minimum, document inspector's name, date of inspection, inspection results, follow-up actions required, party responsible for follow-up actions, and proposed date to implement follow-up actions.

BMP 3.3: Convert Dry Bottom Detention Ponds to Wetland Design

Responsible Party: It shall be the owners responsibility to maintain and operate the stormwater detention facilities.

Frequency: The operation and maintenance shall include periodic inspections and repairs as necessary and shall as a minimum occur on a quarterly basis and within 48 hours following a storm of 1 or more inches of precipitation in a 24-hour period.

Plan:

- The Owner shall visually inspect the detention basins and remove any debris which accumulates.
- The Owner shall inspect the detention facilities for and make corrections for any signs of basin failure, including slope failures or inlet/outlet structure failures or restrictor failures.
- The Owner shall inspect the detention facilities to insure that there is no blockage at the overflow spillway.
- The Owner shall remove the lid to the detention pond outlet structure and shall verify that there is no build-up of debris which would affect the operation of the outfall.
- The owner shall inspect the facility and supplement wetland plants if not well established.
- The owner shall inspect the facility for invasive species and remove where possible.
- The owner shall hire a professional for periodic prescribed burns to encourage native plant growth and discourage non-natives.

Required Recordkeeping: At a minimum, document inspector's name, date of inspection, inspection results, follow-up actions required, party responsible for follow-up actions, and proposed date to implement follow-up actions.

APPENDIX L: GLOSSARY

Action Teams or Subcommittees: These are ongoing or temporary groups that are formed to carry out specific tasks of a more specialized nature such as planning special events or investigating specific issues such as wetlands preservation, best management practices (BMPs) or water quality issues.

ADID wetlands: Wetlands that were identified through the Advanced Identification (ADID) process. Completed in 1992, the ADID process sought to identify wetlands that should be protected because of their high functional value. The three primary functions evaluated were: 1. ecological value based on wildlife habitat quality and plant species diversity; 2. hydrologic functions such as stormwater storage value and/or shoreline/bank stabilization value; and 3. water quality values such as sediment/toxicant retention and/or nutrient removal/transformation function.

Aquatic habitat: The lakes, streams and other watercourses in which an organism normally lives or occurs. A habitat includes both living and nonliving components. The habitat of an organism includes its sources of food and shelter.

Base flood elevation (BFE): The elevation delineating the level of flooding resulting from the 100-year flood frequency elevation. (See also Floodplain.)

Base flow: The flow that a perennially flowing stream reduces to during the dry season. It is supported by groundwater seepage into the channel.

Benthic: Bottom dwelling.

Biodiversity: The variety of organisms (plants, animals and other life forms) that includes the totality of genes, species and ecosystems in a region.

Bio-infiltration (rain gardens): Excavated depressional areas where stormwater runoff is directed and allowed to infiltrate back into groundwater rather than allowing to runoff. . Infiltration areas are planted with appropriate vegetation. Rain gardens are especially suitable because they are aesthetically pleasing.

Biochemical oxygen demand (BOD): The amount of dissolved oxygen that is required by microscopic organism (e.g. bacteria) to decompose organic matter in waterbodies.

Biological stream characterization (BSC): A multi-tiered stream quality classification based primarily on the attributes of lotic fish communities. The predominant stream quality indicator used in this process is the Index of Biotic Integrity (IBI), comprised of 12 metrics, which form a basis for describing the health or integrity of the fish community. When insufficient fishery data are available for calculating an IBI value, BSC criteria allow the use of sport fishing information or macroinvertebrate data to rate streams. BSC provides a uniform process of characterizing streams statewide and is used by a variety of sources for stream protection, restoration and planning efforts.

Buffer: An area of vegetated land to be left open adjacent to drainageways, wetlands, lakes, ponds or other such surface waters for the purpose of eliminating or minimizing adverse impacts to such areas from adjacent land areas.

Best management practices (BMPs): Practices or programs that are used to prevent or ameliorate damage to natural resources, water quality or from flooding. Some BMPs used in urban areas may include stormwater detention ponds, restored wetlands, vegetative filter strips, porous pavement, silt fences and biotechnical streambank stabilization.

Bioengineering (or Soil Bioengineering): Also referred to as biotechnical slope protection. Techniques for stabilizing eroding or slumping stream banks that rely on the use of plants and plant materials such as live willow posts, brush layering, coconut logs and other "greener" or "softer" techniques. This is in contrast to techniques that rely on creating "hard" edges with riprap, concrete and sheet piling (metal and plastic).

Channel: Any river, stream, creek, brook, branch, natural or artificial depression, ponded area, lakes, flowage, slough, ditch, conduit, culvert, gully, ravine, swale, wash, or natural or man-made drainageway, in or into which surface or groundwater flows, either perennially or intermittently.

Channel modification: Alteration of a channel by changing the physical dimensions or materials of its bed or banks. Channel modification includes damming, riprapping or other armoring, widening, deepening, straightening, relocating and lining and significant removal of bottom or woody vegetation of the channel. Channel modification does not include the clearing of dead or dying vegetation, debris, or trash from the channel; these actions are referred to as channel maintenance.

Channelized stream: A stream that has been artificially straightened, deepened, or widened to accommodate increased stormwater flows, to increase the amount of adjacent land that can be developed or used for urban development, agriculture or for navigation purposes. In addition to being unsightly, channelized streams have a uniform gradient, no riffle and pool development, no meanders (curves) and very steep banks. The vegetation is frequently removed and replaced with riprap, concrete or other hard surfaces. During low flow periods in the summer, many channelized streams have low dissolved oxygen levels, in part due to shallow, slow-moving water. Under these conditions, they provide poor habitat for fish or other stream organisms such as benthic macroinvertebrates.

Cluster development: A pattern that arranges the layout of buildings on a compact area of a development site so as to preserve a portion of the site for common open space or green space that is protected in perpetuity.

Consensus: An inclusive form of decision making in which all of the parties discuss and debate the issues prior to reaching an agreement. All parties must either agree with the decision or at least agree that they can live with it. Any one party may block an agreement.

Conservation development: A development designed to protect open space and natural resources for people and wildlife while at the same time allowing building to continue. Conservation design developments designate half or more of the buildable land area as undivided permanent open space.

Conservation easement: The transfer of land use rights without the transfer of land ownership. Conservation easements can be attractive to property owners who do not want to sell their land at the present time, but would support perpetual protection from further development. Conservation easements can be donated or purchased.

Debris load: Natural and man-made debris including leaves, sticks, logs, lumber, trash and sediment.

Depressional storage: Non-riverine depressions where stormwater collects.

Detention facility: A man-made structure for the temporary storage of stormwater runoff with controlled release during or immediately following a storm.

Discharge (streamflow): The volume of water passing through a channel during a given time, usually measured in cubic feet per second.

Dissolved oxygen (DO): The amount of oxygen in water, usually measured in milligrams/liter.

Downcutting: The action of a stream to deepen itself, usually as a result from channelization.

Ecosystem: Combination of living things and the physical systems (geology, topography, moisture, climate, etc.) within which they must live.

Erosion: Displacement of soil particles on the land surface due to water or wind action.

Evapotranspiration: The total water loss from a particular area, being the sum of evaporation from the soil and transpiration from vegetation.

Filamentous algae: Simple one-celled or multi-celled organisms (usually aquatic) capable of photosynthesis. One-celled algae are extremely small and can be seen with the aid of a microscope. Multi-cellular algae appear in streams as long filaments. Both are an indicator of high nutrient levels in the water column.

Filter strip: A long narrow portion of vegetation used to retard water flow and collect sediment for the protection of watercourses, reservoirs, or adjacent properties.

Fish cover: Natural (trees, logs, boulders and undercut banks) and unnatural (tires and lunkers) structures in the stream that are available to fish for hiding, resting or egg laying.

Flood Insurance Rate Map (FIRM): A map prepared by the Federal Emergency Management Agency that depicts the special flood hazard area (SFHA) within a community. The FIRM includes zones for the 100-year and 500-year floodplains and may or may not depict Regulatory Floodways.

Flood Protection Elevation (FPE): The elevation of the base flood elevation plus two feet of freeboard. (Per Lake Co. WDO).

Flood of Record: The highest elevation recorded for the largest known flood event.

Flood problem area: One or more buildings, roads or other infrastructure in one location that are repeatedly damaged by flooding.

Flood-proofing: Any combination of structural and non-structural additions, changes or adjustments to structures or property which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

Floodplain (100-year): Land adjoining the channel of a river, stream, watercourse, lake or wetland that has been or may be inundated by floodwater during periods of high water that exceed normal bank-full elevations. The 100-year floodplain has a probability of 1% chance per year of being flooded.

Geographic information system (GIS): A computer system that inputs, assembles, stores, manipulates and displays (usually in the form of maps) geographically referenced information.

Greenways: A protected linear open space area that is either landscaped or left in its natural condition. It may follow a natural feature of the landscape such as a river or stream, or it may occur along an unused railway line or some other right of way. Provides wildlife corridors and recreational trails.

Hydraulic and hydrologic calculations: Engineering analysis that predicts expected flood flows and flood elevations based on land characteristics and rainfall events.

Hydraulic impoundments: Man-made reservoirs that provide flood protection. They are designed to store floodwater in excess of a bypass rate.

Hydraulic structures: Low head dams, weirs, bridges, levees, and any other structures along the course of the river.

Hydric soil: A soil that is saturated, flooded or ponded long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile.

Hydrograph: Plot of runoff (y-axis) versus time (x-axis).

Hydrologic soil groups: Soils are classified based on their infiltration and transmission rates into groups.

Hydrophytic vegetation: Plant life growing in water, soil or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content.

Illinois Natural Areas Inventory (INAI): A survey conducted by the Illinois Department of Natural Resources to catalogue high quality natural areas, threatened and endangered species and unique plant, animal and geologic communities for the purpose of maintaining biodiversity.

Illinois Nature Preserves: State-protected areas that are provided the highest level of legal protection, and have management plans in place.

Impervious surfaces: The land in a watershed, expressed in an area or percentage, covered by hard surfaces that prevent the infiltration of water into the soil. Impervious surfaces are the asphalt or concrete roads, parking lots, buildings, compacted lawns or other surfaces that are relatively impenetrable to the movement of water.

Incised channel: A stream that has degraded and cut its bed into the valley bottom. Indicates an accelerated and often destructive erosion.

Index of Biotic Integrity (IBI): The IBI is based on fish surveys with the rating dependent on the abundance and composition of the fish species in a stream. Fish communities are useful for assessing stream quality because fish represent the upper level of the aquatic food chain and therefore reflect conditions in the lower levels of the food chain. Fish population characteristics are dependent on the physical habitat, hydrologic and chemical conditions of the stream, and are considered good indicators of overall stream quality because they reflect stress from both chemical pollution and habitat perturbations. For example, the presence of fish species that are intolerant of pollution are an indicator that water quality is good. The IBI is calculated on a scale of 12 to 60, the higher the score the better the stream quality.

Illicit connections/infiltration (I&I): Any discharge to a municipal separate stormsewer that is not composed entirely of stormwater, not due to fire fighting activities or stormwater discharged to a sanitary line.

Infiltration: That portion of rainfall or surface runoff that moves downward into the subsurface soil.

Interception: The collection of precipitation on leaves and branches by vegetation and thus, preventing it from reaching the ground. It is then evaporated back into the atmosphere.

In-kind contribution: A condition of effort (labor or technical expertise) by a paid staff person or volunteer for a project that is documented and used to match other funding sources such as a government grant.

Invasive vegetation: Plant species that are not native to an area and tend to out-compete native species and dominate an area.

Macroinvertebrates: Invertebrates that can be seen by the unaided eye (macro). Most benthic invertebrates in flowing water are aquatic insects or the aquatic stage of insects, such as stonefly nymphs, mayfly nymphs, caddisfly larvae, dragonfly nymphs and midge larvae. They also include such things as clams and worms. The presence of benthic macroinvertebrates that are intolerant of pollutants is a good indicator of good water quality.

Macroinvertebrate Biotic Index (MBI): The MBI is very similar to the IBI except it is based on sampling macroinvertebrates (insects, worms etc.) that live in the stream rather than fish. The MBI scale is from 1 to 10, with 1 being the highest stream quality indicator and 10 being the worst. A MBI less than 6 indicates a good macroinvertebrate population. As with fish, the presence of pollution intolerant macroinvertebrate species is an indicator of good water quality. Since macroinvertebrates are less mobile than fish, the MBI is a good index to evaluate upstream/downstream impacts of point source discharges.

Meander (stream): A sinuous channel form in flatter river grades formed by the erosion on one side of the channel (pools) and deposition on the other (point bars).

Mitigation: Measures taken to eliminate or minimize damage from development activities, such as construction in wetlands or Regulatory Floodplain filling, by replacement of the resource.

Multi-objective management: Uses a planning process that incorporates and addresses multiple concerns-water quality, flooding, and natural resources-rather than attempting to address only on isolated issue.

National Pollutant Discharge Elimination System (NPDES): Acronym for the National Pollutant Discharge Elimination System, which regulates point source and stormwater discharges.

Native vegetation: Plant species that have historically been found in an area.

No-net-loss: A policy for wetland protection to stem the tide of continued wetland losses. The policy has generated requirements for wetland mitigation so that permitted losses due to filling and other alterations are replaced and the net quality wetland acreage remains the same.

Nonpoint source pollution: Refers to pollutants that accumulate in waterbodies from a variety of sources including runoff from the land, impervious surfaces, the drainage system and deposition of air pollutants.

Non-structural flood control: Practices including acquisition or relocation of floodprone buildings, floodproofing and use of runoff reduction techniques such as native landscaping.

Nutrients: Substances needed for the growth of aquatic plants and animals. The addition of too many nutrients (such as from sewage dumping and over fertilization) will cause problems in the aquatic ecosystem through excess algae growth and other nuisance vegetation.

Organic matter: Decomposing vegetative litter and animal matter.

Planning Committee: The group of stakeholders responsible for creating the watershed management plan.

Point Source: Refers to discharges from a single source such as an outfall pipe conveying wastewater from an industrial plant or wastewater treatment facility.

Pollutant load: The amount of any pollutant deposited into waterbodies from point source discharges, combined sewer overflows, and/or stormwater runoff.

Pool: A location in an active stream channel usually located on the outside bends of meanders, where the water is deepest and has reduced current velocities.

Preventative measures: Actions that reduce the likelihood that new watershed problems such as flooding or pollution will arise, or that those existing problems will worsen. Preventative techniques generally target new development in the watershed and are geared toward protecting existing resources and preventing degradation.

Regulatory Floodplain: Regulatory Floodplains may be either riverine or non-riverine depressional areas. Projecting the base flood elevation onto the best available topography delineates floodplain boundaries. A flood-prone area is Regulatory Floodplain if it meets any of the following descriptions:

1. Any riverine area inundated by the base flood where there is at least 640 acres of tributary drainage area.
2. Any non-riverine area with a storage volume of 0.75 acre-foot or more when inundated by the base flood.
3. Any area indicated as a Special Flood Hazard Area on the FEMA Flood Insurance Rate Map and located with the best available topography to be inundated by the base flood.

Regulatory Floodway: The channel, including on-stream lakes, and that portion of the Regulatory Floodplain adjacent to a stream or channel as designated by the Illinois Department of Natural Resource, Office of

Water Resources, which is needed to store and convey the existing and anticipated future 100-year frequency flood discharge with no more that a 0.1 foot increase in stage due to the loss of flood conveyance or storage, and no more than a 10% increase in velocities. Where interpretation is needed to determine the exact location of the Regulatory Floodway boundary, the IDNR/OWR should be contacted for the interpretation.

Reach (Stream): A stream segment having fairly homogenous hydraulic, geomorphic and riparian cover and land use characteristics (such as all ditched agriculture or all natural and wooded). Reaches generally should not exceed 2,000 feet in length.

Remedial measures: Used to solve known watershed problems or to improve current watershed conditions. Remedial measures include retrofitting drainage system infrastructure such as detention basins and stormsewer outfalls to improve water quality, adjust release rates, or reduce erosion.

Retention facilities: A facility designed to completely retain a specified amount of stormwater runoff without release except by means of evaporation, infiltration or pumping.

Retrofit: Refers to modification of existing stormwater control structures such as detention basins and conveyance systems such as ditches and stormsewers. These structures were originally designed to improve drainage and reduce flood risk, but they can also be retrofitted to improve water quality. Seeks to improve existing problems.

Riffle: Shallow rapids, usually located at the crossover in a meander of the active channel.

Riparian: Referring to the riverside or riverine environment next to the stream channel, e.g., riparian, or streamside, vegetation.

Riverine: Relating to, formed by, or resembling a stream (including creeks and rivers).

Sediment: Soil particles that have been transported from their natural location by wind or water action.

Sedimentation: The process that deposits soils, debris, and other materials either on other ground surfaces or in bodies of water or watercourses.

Short-circuiting: The passage of runoff through a BMP in a timespan or flowpath without adequate time for treatment.

Silt: Fine mineral particles intermediate in size between clay and sand.

Soil compaction: The process caused by continuous vehicular or human traffic that reduces the space between soil particles. The result is a reduction in the capacity of the land to hold water.

Source reduction: Changing everyday practices to reduce the quantity of pollutants that end up on the land and in the water.

Substrate (stream): The composition of the bottom of a stream such clay, silt or sand.

Structural flood control: Man-made reservoirs, levees, diversions or other structures that provide flood protection. Flood control measures are used to prevent floodwaters from reaching properties, thus preventing flood damage.

Stream corridor: The area of land that runs parallel to a stream.

Stream monitoring: Chemical, biological and physical monitoring used to identify the causes and sources of pollution in the river and to determine the needs for reduction in pollutant loads, streambank stabilization, debris removal and habitat improvement.

Streambank stabilization: Techniques for stabilizing eroding or slumping streambanks to reduce erosion.

Swale: A vegetated channel, ditch or low-lying or depressional tract of land that is periodically inundated by conveying stormwater from one point to another.

Steering committee: An executive committee, which forms the core leadership and decision-making group of stakeholders in the watershed management practices and policies of the action plan.

Stormwater management: A set of actions taken to control stormwater runoff with the objectives of providing controlled surface drainage, flood control and pollutant reduction in runoff.

Stormsewershed: An area of land whose stormwater drains into a common storm sewer system.

Stormwater management system: The collection of natural features and man-made facilities, through which stormwater is conducted to the nearest receiving river or lake.

Stormwater treatment train: Several BMPs used together to improve water quality, infiltration and reduce sedimentation.

Total dissolved solids (TDS): A measure of the dissolved solids in water sample.

Total suspended solids (TSS): A measure of the particulate matter suspended in a water sample. Used to estimate sedimentation rates.

Trash rack: A barrier placed at the upstream end of a culvert to trap debris but allow water to flow through.

Turbidity: Refers to the clearness or clarity of the water, which is a function of how much material including sediment is suspended in the water.

Urban runoff: Water from rain or snow events that runs over surfaces such as streets, lawns, parking lots and directly into storm sewers before entering the river rather than infiltrating the land upon which it falls.

Velocity (of water in a stream): The distance that water can travel in a given direction during a period of time. Usually expressed in feet per second.

Watershed: An area confined by topographic divides that drains a given stream or river. The land area above a given point on a waterbody (river, stream, lake, wetland) that contributes runoff to that point is considered the watershed.

Watershed Development Ordinance (WDO): One part of the adopted Lake County Comprehensive Stormwater Management Plan. It sets forth the minimum requirements for the stormwater management aspects of development in Lake County.

Watershed Development Permit (WDP): A permit established by the Lake County WDO and issued, through the SMC or Certified Communities, prior to the approval of a development signifying conformance with provisions of this ordinance.

Wetland: A wetland is considered a subset of the definition of the Waters of the United States. Wetlands are land that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support, under normal conditions, do support a prevalence of vegetation adapted for life in saturated soil conditions (known as hydrophytic vegetation). A wetland is identified based upon the three attributes: 1) hydrology, 2) hydric soils and 3) hydrophytic vegetation.

Wetland conversion: The practice of filling and/or draining wetlands for the purpose of commercial, residential or agricultural development.

Watershed Stakeholder: A person who has a personal, professional, legal, or economic interest in the watershed and the outcome of the watershed planning process.

Watershed Partner(s): Watershed stakeholders who take an active role in the watershed management planning process and implementing the watershed plan.

GLOSSARY REFERENCES:

American Public Works Association. 1998. Designing and Implementing an Effective Storm Water Management Program

Center for Watershed Protection. 1998. Better Site Design: A Handbook for Changing Development Rules in Your Community

Cohn, Naomi J. 1998. Voices of the Watershed. Illinois Environmental Protection Agency, Bureau of Water, Watershed Management Section. Springfield, Illinois.

French & Associates, LTD. 1995. Flood Hazard Mitigation In Northeastern Illinois: A Guidebook for Local Officials. Northeastern Illinois Planning Commission.

Hall, Diana L. Ensuring Citizens Have a Voice: A Guide to Watershed Management Planning. StarNet Digital Publishing.

Lake County Stormwater Management Commission. 1999. Watershed Development Ordinance.

Resource Coordination Policy Committee. 1998. Our Community and Flooding: A Report on the Status of Floodwater Management in the Chicago Metropolitan Area.

Riley, A. 1998. Restoring Streams in Cities. Island Press. Washington D.C. – Covelo, California.

Schueler, Tom. 1995. Environmental Land Planning Series: Site Planning for Urban Stream Protection. Metropolitan Washington Council of Governments & Center for Watershed Protection. Washington, D.C.

APPENDIX M: ACRONYMS AND ABBREVIATIONS

A

A&S- Assessment and Strategy
ADID- Advanced Identification (high quality wetland)
AIBI- Alternate Index of Biotic Integrity

B

BFE- Base Flood Elevation
BOD-Biochemical Oxygen Demand
BMP- Best Management Practices
BSC- Biological Stream Characterization
BSD- Better Site Design

C

CAP- Continuing Authorities Program
CATS- Chicago Area Transportation Study
CB- Lake County Board
CBG- Chicago Botanic Garden
CCFPD- Cook County Forest Preserve District
Cd- Cadmium
CMAP- Chicago Metropolitan Agency for Planning
COD-Chemical Oxygen Demand
Cu- Copper
CorLands- Corporation for OpenLands
Corp- Corporate Landowners
CRS- Community Rating System
CRSN- Chicago River School Network
C2000- The State of Illinois' Conservation 2000 Ecosystems Program
CWA- Clean Water Act

D

DAF- design average flow
DD- Drainage Districts
dFIRM- digital Flood Insurance Rate Map
DMF- design maximum flow
DO- Dissolved Oxygen
DWWTP- Deerfield Wastewater Treatment Plant

E

EQIP- Environmental Quality Incentives Program
ESDD- East Skokie Drainage District

F

FEMA- Federal Emergency Management Agency
FIRM- Flood Insurance Rate Maps
FIS- Flood Insurance Study
FMA- Flood Mitigation Assistance Program
FPAI- Flood Problem Areas Inventory
FPE- Flood Protection Elevation
Friends- Formally known as Friends of the Chicago River (FOCR)

G

G&O's- goals and objectives
GIS- Geographical Information System
GLNTC- Great Lakes Naval Training Center
Golf- Golf Courses

H

H&H- Hydrologic and Hydraulic
HBALC- Home Builders Association of Lake County
HOA-Homeowners Association
HQARs- High Quality Aquatic Resources

I

IBI- Index of Biotic Integrity
I&E- Information and Education
I&I- Infiltration and Inflows
ICC- Increased Cost of Compliance
IDNR-Illinois Department of Natural Resources
IDOT- Illinois Department of Transportation
IEMA- Illinois Emergency Management Agency
IEPA- Illinois Environmental Protection Agency
INAI- Illinois Natural Area Inventory
INPC- Illinois Natural Preserves Commission
ISTHA- Illinois State Toll Highway Authority
ISWS- Illinois State Water Survey
IWLC- Illinois Waters of Lake County

L

LBOLA- Lake Bluff Open Lands Association
LCDOT- Lake County Division of Transportation
LCEMA- Lake County Emergency Management Agency
LCFPD-Lake County Forest Preserve District
LCHD- Lake County Health Department
LCSWCD- Lake County Soil and Water Conservation District
LFOLA- Lake Forest Open Lands Association
LMU- Lake County Health Department Lake Management Unit
LTWP- Libertyville Township
LWCF- Land and Water Conservation Fund

M

MBI-Macroinvertebrate Biotic Index
MCTT- Multi-Chamber Treatment Train
MGD- million gallons per day
mg/L- milligrams per liter
MOM- multi-objective management
MUNIC- Municipalities
MWRD- Metropolitan Water Reclamation District of Greater Chicago

N

Nature Preserves- Illinois Nature Preserves
NBOSP- North Branch Chicago River Open Space Plan
NBPC- North Branch Planning Committee
NBWPC- North Branch Watershed Planning Council
NCCW-Non-Contact Cooling Water
NEIU- Northeastern Illinois University
NEIWCA-Northeast Illinois Wetland Conservation Account
NFIP- National Flood Insurance Program
NIPC- Northern Illinois Planning Commission
NPDES- National Pollutant Discharge Elimination System
NRCS- Natural Resource Conservation Service
NRIs- Natural Resource Inventories
NSSD- North Shore Sanitary District

O

OCD- Office of Capital Development
OP- Openlands Project
ORC- Office of Resource Conservation
OREP- Office of Realty and Environmental Planning
OSLAD- Open Space Lands Acquisition and Development
OSRA- Office of Scientific Research and Analysis

OWR- Office of Water Resources

P

PB&D-Planning Building and Development
P&D- Lake County Planning & Development Department
Pb- Lead
PD- Park Districts
PDRs- Purchase of Development Rights
PIBI- Potential index of biological integrity
PIN- property identification number
PMR-Physical Map Revision
PRD- Planned Residential Developments
PUD- Planned Unit Developments
PWFP- Prairie Wolf Forest Preserve

S

SCS- Soil Conservation Service
SIC- Standard Industrial Code
SMC- Lake County Stormwater Management Commission
SSS- stormsewershed
STP- Sewage treatment plant
SWCD- Lake County Soil & Water Conservation District

T

T&E- threatened and endangered
TDS- Total Dissolved Solids
TDRs- Transfer of Development Rights
TMDL- Total Maximum Daily Load
TN- Total Nitrogen
TP- Total Phosphorus
TSS-Total Suspended Solids
TWP- Townships

U

UDDMF- Union #1 Middle Fork
UDDWF- Union #1 West Fork
UDO- Unified Development Ordinance
UPRR- Union Pacific Railroad
USACE- US Army Corps of Engineers
USDA-United States Department of Agriculture
USEPA- United States Environmental Protection Agency

USFWS- US Fish and Wildlife Service
USGS- United States Geological Survey

W

WBP- Watershed-Based Plan
WDO- Watershed Development Ordinance
WMB- North Branch Chicago River Watershed Management Board
WRF- Wetland Restoration Fund
WRP- Wetland Reserve Program
WSDD- West Skokie Drainage District
WWTP-Wastewater Treatment Plant
WW II- World War Two

Z

Zn- Zinc

APPENDIX N: SAMPLE EDUCATION AND PARTICIPATION PLAN

Watershed Education and Participation Programs are an important component to any watershed planning effort. They raise awareness about the impacts that homeowners and businesses have on the watershed, and how changes in behavior can improve watershed conditions.

A successful education and participation program first raises awareness among the stakeholders and then educates them to address the issues and problems. The program should include the following information (EPA 2005):

- Define education goals and objectives
- Identify the target audience
- Create the message for each audience
- Package message to various audiences
- Distribute the message
- Evaluate the message

Several existing and proposed education plans within and around the North Branch watershed were evaluated. Several components of those plans were identified as being the most effective way to educate and encourage community participation. The following pages include a sample education plan that could be used to meet Goal 4 objectives.

Each of the education components can be modified to target specific audiences (i.e. homeowners, students, and developers) and specific topics (floodplain awareness, pollution prevention, and illicit discharges). This plan should be reviewed by the Stakeholders and refined to fit specific educational interests and objectives, and to reflect current publications and materials.

1.0 Public Education Program

The following activities, along with efforts previously initiated by Friends of the Chicago River and individual municipalities, encompass the public education and outreach program for the residents of the North Branch Watershed.

1.1 Stormwater Website

A stormwater website will be created to inform the constituents in the watershed about activities being held and stormwater quality in general. Much of the information placed on the Stormwater Website will be generated from existing sources pertaining to stormwater. Additional materials specific to local needs will be generated as necessary.

1.1.1 Implementation Schedule

The creation of a stormwater website shall be the implemented according to the following schedule:

Year 1: Approve the public education activity described above.

Year 2: Aided by the IT Departments of municipalities within the watershed, research the development of a stormwater webpage on each municipality's website to link to a single North Branch Watershed's webpage to be hosted on the SMC's website.

Year 3: Research stormwater material and work with Lake County's IT department for the design, creation, and maintenance of the stormwater webpage. Update the contents of the webpage regularly throughout the year.

Year 4: Update the website while adding at least one additional feature.

Year 5: Update the website while adding at least one additional feature.

1.1.2 Items to be Tracked

The following items will be recorded to determine the effectiveness of the stormwater website.

- Number of advertisements for the website;
- Number of visitors;
- Number of agencies involved in the development and continued maintenance of the website link;
- Number of features; and
- Number of inquiries (if upgrades are able to provide this particular feature)

1.2 Activity Book

Activity Books are typically produced with a target audience ranging from 2nd to 4th grade. They can include topics ranging from pet waste to point source pollution. Activity books provide a way of reaching out to the youth within the watershed while addressing a variety of topics. The activity books may be printed on recycled paper.

1.2.1 Implementation Schedule

The production of activity books shall be the implemented according to the following schedule:

Year 1: Approve the public education activity described above.

Year 2: Research estimated enrollments for the 2004/2005 school year, to be distributed in the spring.

Year 3: Develop, purchase and distribute the most appropriate and feasible version of the Activity Book to each second grader within the North Branch Watershed.

Year 4: Purchase and distribute the most appropriate and feasible version of the Activity Book to each second grader within the North Branch Watershed.

Year 5: Purchase and distribute the most appropriate and feasible version of the Activity Book to each second grader within the North Branch Watershed.

1.2.2 Items to be Tracked

The following items will be recorded in order to determine the effectiveness of the activity books.

- Number of 2nd graders in the watershed receiving activity books;
- Number of non-recycled Activity Books distributed; and
- Number of recycled Activity Books distributed.

1.3 Brochures and Fact Sheets

Brochures and fact sheets provide a direct marketing/teaching tool to the constituents on specific topics. Brochures and fact sheets will be distributed to targeted audiences.

1.3.1 Implementation Schedule

The distribution of brochures and fact sheets will be implemented according to the following schedule:

Year 1: Approve the public education activity described above.

Year 2: Identify at least four events at which promotional materials (in the form of magnets and posters for the first year only) on stormwater can be distributed to the general public.

Year 3: Produce at least one brochure or fact sheet and distribute them at the events identified in the previous year.

Year 4: Review the distribution (including events and target audiences) of the previous year's brochures and fact sheets and revise as necessary. Update the previous year's brochures and fact sheets and redistribute them based on the assessment of the previous year's distribution.

Year 5: Review the distribution (including events and target audiences) of the previous year's brochures and fact sheets and revise as necessary. Update the previous year's brochures and fact sheets and redistribute them based on the assessment of the previous years' distribution.

1.3.2 Items to be Tracked

The following items will be recorded in order to monitor the effectiveness of the brochures and fact sheets.

- Name and date of events;
- List of target audiences;
- Number of brochures or fact sheets produced; and
- List of brochures or fact sheets (with approx. quantities) distributed at events and to target audiences.

1.4 Ordinance Fact Sheets

General summaries of the WDO will be summarized, one page each, and made available to the general public.

1.4.1 Implementation Schedule

The distribution of ordinance fact sheets will be implemented according to the following schedule:

Year 1: Approve the public education activity described above.

Year 2: Summarize WDO and other municipal ordinances associated with stormwater and water quality. Ordinance fact sheets will be made available at selected public buildings.

Year 3: Update and redistribute ordinance fact sheets if necessary.

Year 4: Update and redistribute ordinance fact sheets if necessary.

Year 5: Update and redistribute ordinance fact sheets if necessary.

1.4.2 Items to be Tracked

The following items will be recorded to monitor the effectiveness of the ordinance fact sheets.

- Newly created fact sheet or copies of an existing fact sheet (New or Old);
- Distribution location;
- Number of ordinances summarized; and
- Total number of ordinance fact sheets distributed.

1.5 Educational Displays

Educational displays will be used to show stormwater information in non-traditional areas or areas not normally occupied by such material. These are typically high-traffic areas such as store front windows. Educational displays will also be made visible at more traditional locations such as local and countywide festivals and events.

1.5.1 Implementation Schedule

The completion of educational displays shall be implemented according to the following schedule:

Year 1: Approve the public education activity described above.

Year 2: Identify and confirm, at a minimum, two non-traditional, high traffic areas (i.e., vacant store fronts, the library, the mall, etc.) and four festivals or events to place educational displays.

Year 3: Display educational displays at a minimum of four public events. Update the previous year's displays. Rotate displays located at non-traditional, high traffic areas seasonally, or as otherwise permitted by the property owner.

Year 4: Display educational displays at a minimum of four public events. Identify a fifth non-traditional, high traffic area and update the previous year's displays. Rotate displays located at non-traditional, high traffic areas seasonally, or as otherwise permitted by the property owner.

Year 5: Display educational displays at a minimum of four public events. Update the previous year's displays. Rotate displays located at non-traditional, high traffic areas seasonally, or as otherwise permitted by the property owner.

1.5.2 Items to be Tracked

The following items will be recorded in order to monitor the effectiveness of the educational displays.

- Number of events in which stormwater material is displayed;

- Number of displays located at non-traditional, high traffic areas; and
- Number of rotations of the displays located at non-traditional, high traffic areas.

1.6 Stormwater and Water Quality Presentations

Stormwater and water quality presentations will be scheduled to inform residents, community groups, and public officials of various stormwater and water quality issues. They will target audiences not typically represented at any of the events where there would otherwise be a display and accompanying educational materials. Speakers from outside organizations may be contacted as necessary to assist with technical workshops.

1.6.1 Implementation Schedule

The implementation of stormwater presentations will be pursued according to the following schedule:

Year 1: Approve the public education activity described above.

Year 2: Develop a contact list of possible topics and speakers.

Year 3: Organize at least one presentation. Update contact list of possible topics and speakers as well as all contacts associated with stormwater presentations.

Year 4: Organize at least one presentation. Update contact list of possible topics and speakers as well as all contacts associated with stormwater presentations.

Year 5: Organize at least one presentation. Update contact list of possible topics and speakers as well as all contacts associated with stormwater presentations.

1.6.2 Items to be Tracked

The following items will be recorded in order to monitor the effectiveness of the stormwater and water quality presentations.

- Number of presentations;
- Attendance at each presentation;
- Number of speakers at each presentation; and
- List of presentation topics.

1.7 Newsletter Articles

There are several newsletters distributed throughout the North Branch Watershed. Newsletter articles will be prepared and incorporated into these existing newsletters to inform the public on various stormwater issues, including meetings and events, occurring within the North Branch Watershed. They may also expand to include meetings and events occurring within Lake and Cook Counties, as well.

1.7.1 Implementation Schedule

The implementation of newsletter will be pursued according to the following schedule:

Year 1: Approve the public education activity described above.

Year 2: Compile a list of possible publications willing to feature stormwater articles including the number of publications a year for each. Make note of how many issues per year each publication would be willing to feature stormwater articles.

Year 3: Publish a minimum of one article, placing them in as many different publications as possible. Update all contact information for newsletters and articles.

Year 4: Update the list of possible publications established in year one. Publish a minimum of one article, placing them in as many different publications as possible. Update all contact information for newsletters and articles.

Year 5: Update the list of possible publications established in year one. Publish a minimum of one article, placing them in as many different publications as possible. Update all contact information for newsletters and articles.

1.7.2 Items to be Tracked

The following items will be recorded in order to monitor the effectiveness of the newsletter articles.

- Number of publications featuring each article;
- Date of publications;
- Number of articles written/topics covered; and
- Estimated readership for each publication.

1.8 Media Advertisements

The North Branch Watershed will use media outlets such as cable and public access television, radio, and local newspapers as a means of circulating stormwater information. Focus will be given to public service announcements, which aim to inform the Watershed residents of why a particular activity is harmful to

stormwater quality; and advertisements, which aim to inform the watershed residents of upcoming stormwater activities in which they can become involved.

1.8.1 Implementation Schedule

The implementation of media advertisements will be pursued according to the following schedule:

Year 1: Approve the public education activity described above.

Year 2: Partner with agencies within the watershed to develop public service announcements and local advertisements.

Year 3: Air or publish at least one public service announcement and one local advertisement throughout the year.

Year 4: Air or publish at least one public service announcement and one local advertisement throughout the year.

Year 5: Air or publish at least one public service announcement and one local advertisement throughout the year.

1.8.2 Items to be Tracked

The following items will be recorded in order to monitor the effectiveness of the media advertisements.

- Number of public service announcements;
- Number of advertisements
- Medium used to air or publish media advertisements; and
- Estimated number of viewers or readers for all of the above.

2.0 Public Participation Program

The following activities, along with efforts previously initiated by Friends of the Chicago River and individual municipalities, encompass the public participation and involvement program for residents of the watershed.

2.1 Storm Drain Stenciling

While educational in nature, storm drain stenciling directly and indirectly involves the public in the prevention of non-point source pollution; those citizens involved in stenciling activities as well as those citizens who spot and are able to identify stenciled drains as stormwater drains.

Stenciling kits will be made available, for loan, at the SMC office. Stenciling kits may contain the following items:

- Storm drain stencils;
- Door hanger cards or flyers;
- Map of stenciling area(s);
- Parent or guardian permission slips;
- Letter or authorization from Public Works to stencil;
- Traffic zone latex spray paint (note: one can = about ten drains);
- Wire brush and whisk broom to clean grate before painting;
- Work gloves and safety goggles for kids;
- Traffic safety vests and cones;
- Garbage bags (one for wet stencils and one for litter);
- A large open box to shield against drifting overspray; and
- Clean up rags.

The stenciling group shall also be provided with pollutant-tracking forms to record potential instances of dumping or littering. Participants will note storm drains that are clogged with debris or otherwise show obvious signs of dumping. This will enable city crews to target their cleanup efforts. Volunteers will be instructed in advance on what kinds of pollutants to look for and how to fill out data cards. The city will track all findings by the volunteers.

2.1.1 Implementation Schedule

The implementation of storm drain stenciling will be pursued according to the following schedule:

Year 1: Approve the public participation activity described above.

Year 2: Begin the creation of a list of community groups, service organizations, home owner associations and youth groups to conduct stenciling projects. Begin to identify and record stenciling locations suitable for the safety of all volunteers. Create storm drain stenciling kits. Create pollutant-tracking forms.

Year 3: Begin a training program for group leaders. Stencil a portion of the city's storm drains.

Year 4: Stencil additional storm drains.

Year 5: If necessary, re-stencil the drains stenciled in year three.

2.1.2 Items to be Tracked

The following items will be recorded in order to monitor the effectiveness of the storm drain stenciling program.

- The number of drains stenciled;
- Number of community groups, service organizations, homeowner associations and youth groups to conduct stenciling projects;
- The number of stenciling kits used;
- Estimated number of participants in attendance; and
- Number and list of locations suspected of dumping or littering.

2.2 Stream-side and Litter Clean-up

The Friends of the Chicago River conducts its own River clean-up day each spring. Consider expanding to include a second clean-up day in the watershed each fall. Additionally, each municipality's sanitary/waste service contractor conducts neighborhood and area pick-ups on scheduled collection days.

2.2.1 Implementation Schedule

The implementation of stream-side and litter clean-up shall be the responsibility of the Friends of the Chicago River and the Watershed partnership who will pursue the following schedule:

Year 1: Approve the public participation activity described above.

Year 2: Begin tracking the measurable goals for this existing public participation activity in Year 3.

Year 3: Participate and record stream-side and litter clean-up activities within the Watershed at least two times a year.

Year 4: Participate and record stream-side and litter clean-up activities within the Watershed at least two times a year.

Year 5: Participate and record stream-side and litter clean-up activities within the Watershed at least two times a year.

2.2.2 Items to be Tracked

The following items will be recorded in order to monitor the effectiveness of the stream-side and litter clean-up.

- Estimated number of volunteers; and
- Number of Roll Off Bins filled.

2.3 Voluntary Stream Monitoring

Voluntary stream monitoring will provide high school and college students, and other volunteer groups, an opportunity to be involved in hands-on learning. Monitoring typically includes the completion of simple visual, chemical or biological sampling in various water quality parameters. The data will also serve as a baseline for future data collection efforts and be submitted to the Watershed partners to be considered in the annual re-assessment of this Plan.

2.3.1 Implementation Schedule

The Implementation schedule of stream monitoring is as follows:

Year 1: Approve the public participation activity described above.

Year 2: Contact interested parties and provide them with a protocol to assess identified stream segments, and a list of target pollutant sources. Obtain Riverwatch materials and kit for testing.

Year 3: Monitor at least one site utilizing multiple classes or groups, once in the fall and once in the spring.

Year 4: Monitor at least one site utilizing multiple classes or groups, once in the fall and once in the spring.

Year 5: Monitor at least one site utilizing multiple classes or groups, once in the fall and once in the spring.

2.3.2 Items to be Tracked

The following items will be recorded in order to monitor the effectiveness of the stream monitoring program.

- Number of classes or groups involved;
- Number of locations targeted;
- Number of monitoring locations; and
- Attendance.

2.4 Household Hazardous Waste Collection

The primary purpose of operating a household hazardous waste collection program is to minimize the effects of improper dumping of wastes into the MS4 conveyances by providing citizens with a well-publicized and feasible option for proper disposal.

Lake County's Household Hazardous Waste Program allows homeowners within the district the opportunity to drop off common items such as paints, household solvents, motor oil, car batteries, pesticides and herbicides, etc. These items are able to be dropped off, free of charge, at specific locations.

The landfill currently tracks the types and quantities of waste dropped off by households within the County.

2.4.1 Implementation Schedule

The implementation of household hazardous waste collection shall be the shared responsibility of the municipalities and the County and will pursue the following schedule:

Year 1: Approve the public participation activity described above.

Year 2: Coordinate efforts with the County to track the measurable goals listed below.

Year 3: Coordinate efforts with the County to track the measurable goals listed below.

Year 4: Coordinate efforts with the County to track the measurable goals listed below.

Year 5: Coordinate efforts with the County to track the measurable goals listed below.

2.4.2 Items to be Tracked

The following items will be recorded in order to monitor the effectiveness of the household hazardous waste collection.

- Identify Drop off location(s);
- Estimated number of participants (number of households); and
- Amount of waste collected.

2.5 Incident Reporting

The incident reporting hotline (###-###-####) serves as the incident reporting phone line providing the public a means of reporting illicit discharges and spills as well as to inquire, share concerns about or request information concerning local construction activities. In addition, all written reports, concerns, comments and requests will be tracked through the same departmental office. Both written and verbal communication will be tracked and routed to the appropriate party if action is required to be taken.

2.5.1 Implementation Schedule

The implementation of an incident reporting shall be the shared responsibility of the County and each municipality and will pursue the following schedule:

Year 1: Approve the public participation activity described above.

Year 2: Advertise the phone number and address in newspapers, on the Municipality/County's website, as well as, other feasible means of communication. Begin tracking the measurable goal listed below.

Year 3: Advertise the phone number and address in newspapers, on the Municipality/County's website, as well as, other feasible means of communication. Track the measurable goal listed below.

Year 4: Advertise the phone number and address in newspapers, on the Municipality/County's website, as well as, other feasible means of communication. Track the measurable goal listed below.

Year 5: Advertise the phone number and address in newspapers, on the Municipality/County's website, as well as, other feasible means of communication. Track the measurable goal listed below.

2.5.2 Items to be Tracked

The following items will be recorded in order to monitor the effectiveness of the incident reporting hotline.

- Number and type of advertisements for the incident reporting phone line;
- Number of illicit discharges and spills reported by constituents; and
- Number of public informational requests received related to construction sites.