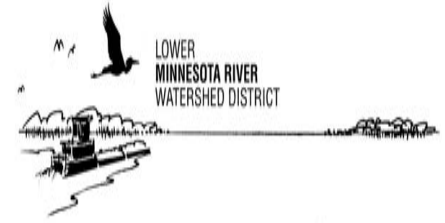


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# GUIDANCE TO IMPLEMENTATION

## Lower Minnesota River Watershed District

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May 2004



Looking south at the Minnesota River Valley from Flying Cloud Airport in Eden Prairie

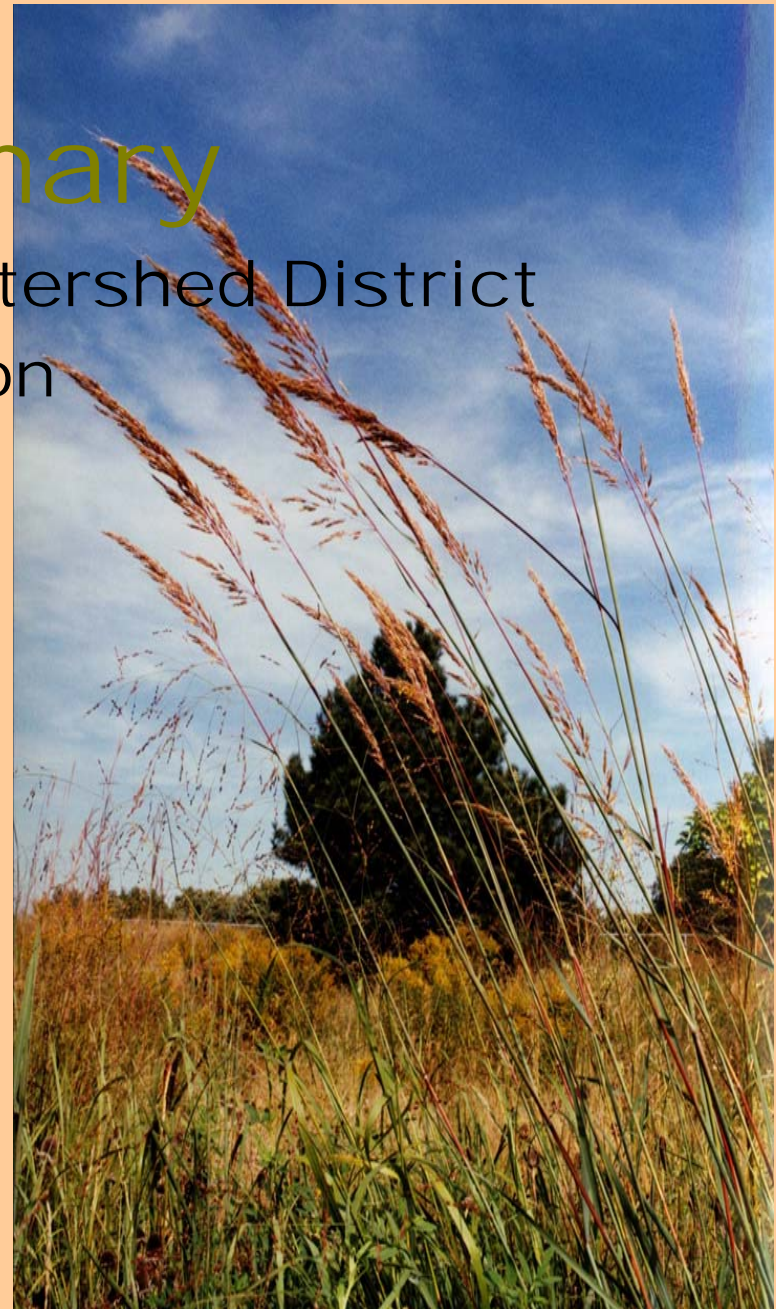
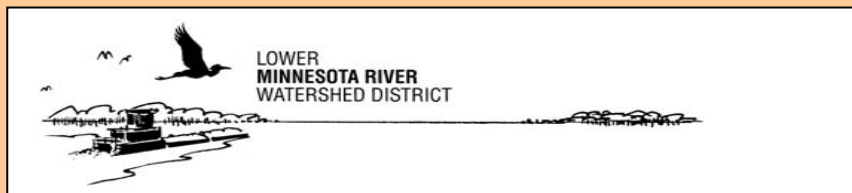
# Executive Summary

## Lower Minnesota River Watershed District Guidance to Implementation

May 2004

Overview

Recommendations





## OVERVIEW

The Lower Minnesota River Watershed District (LMRWD) comprises a diverse landscape that spans the Minnesota River from bluff line to bluff line from Carver Creek to the Mississippi River. Both upland and floodplain features occupy a dominant position among its list of unique resources. The goals of the LMRWD are to:

- Cooperate with the state and federal government in providing river navigation,
- Work in partnership with citizens and local governments to provide evaluation and management of its important natural resources.

The goal of the Guidance to Implementation is to move the LMRWD's implementation agenda forward. It does this by:

- Assessing the current status of resource management within the watershed,
- Identifying and prioritizing specific actions the LMRWD can take to proceed with management of its natural resources.

As part of the study, a comprehensive survey and review of ongoing resource management and monitoring efforts in the watershed was performed. This included a written survey and follow-up discussions with the multiple cities, counties, agencies, and individuals working on resource management within the watershed.

The implementation strategy in the LMRWD's 1999 Water Management Plan was then reviewed in the context of the resource management assessment. Specific activities in the 1999 Plan were refined and prioritized, and additional activities were added based on discussions with stakeholders in the watershed. The result was a prioritized Implementation Guidance table, to allow the LMRWD to move forward in a proactive, systematic fashion.



# RECOMMENDATIONS

The Implementation Guidance table is attached. It contains prioritized actions, discussion, estimated costs, and potential partners. The prioritized actions are referenced on the attached watershed map. Key natural resources identified as High priorities for management and protection in the Implementation Guidance table include:

Courthouse, Firemen's, and Clay Hole Lakes  
Assumption Creek  
Dean Lake  
Minnesota River  
Nicols Fen  
Harnack and Kennealy Creeks

At this point, it is recommended that the LMRWD move forward with the High priority actions in the Implementation Guidance table. The LMRWD's role can take two forms:

- Partner with and enable others to take the lead on activities by providing financial and/or technical resources
- Initiate and take the lead on activities, particularly those that extend across multiple local government boundaries.

The next steps in the process will be to:

- Finalize the priorities for implementation,
- Seek partnerships for management among the various stakeholders in the watershed,
- Identify funding needs and sources,
- Proceed with implementation activities.

**Implementation Guidance Table**

Priority	Map Index	Action	Comments	Estimated Cost	Potential Partners
High	1A(1,2,3)	Develop management plans for Courthouse Lake 1A(1), Firemen’s 1A(2) and Clay Hole Lake 1A(3) that outlines a strategy for protection and/or improvements as may be appropriate for each waterbody	<p>All three resources are currently of good quality. In 2004 (CCES Water Quality report), the three rated mesotrophic as per Carlson’s TSI.</p> <p>Courthouse Lake is a designated trout Lake, while Firemen’s Lake has a public swimming beach, Clay Hole Lake serves as a stormwater pond for a large watershed</p> <p>Each lake is governed by a set of unique conditions and uses and requires a strategy that reflects these conditions and uses. Work to develop a plan for Courthouse Lake is expected to be minimal (~\$2,000) because the Lake has been well-protected through past efforts.</p>	\$20,000 - \$35,000	City of Chaska, Carver County Environmental Services, Carver County SWCD
High	1B	Outline the watershed, identify stakeholders and initiate efforts for the development of a management plan for Assumption Creek and watershed	<p>Macroinvertebrate monitoring suggests resource is in good shape. However, monitoring by DNR from May 2000 through December 2001 downstream of Highway 212 indicates periodic problems with high water temperatures and low dissolved O2 that violate accepted trout tolerances. Measured discharges ranged from zero to 4.2 cfs above fen/wetland complex and from 0.64-1.1 cfs below fen/wetland confluence.</p> <p>Management plan should address:</p> <ul style="list-style-type: none"> <li>➤ Collection, analysis, and interpretation of baseline data on stream flow, temperature, macroinvertebrates, fish, and channel stability as well as groundwater contributions.</li> <li>➤ Recommendations on additional monitoring needed.</li> <li>➤ Current and expected future watershed land uses and how the stream would be affected. Estimate impact of Highway 41 crossing.</li> <li>➤ Delineate watershed and identify the percentage under jurisdiction of each land owner/manager.</li> <li>➤ A mitigation strategy to protect creek from land use changes, including possible application of low impact development measures and/or adaptation of thermal mitigation / runoff volume control to new developments by communities, land acquisition for open space preservation.</li> </ul>	\$20,000 - \$40,000	Cities of Chanhassen, Chaska, MNDNR, Trout Unlimited, Chaska High School

Priority	Map Index	Action	Comments	Estimated Cost	Potential Partners
High	1C	Keep the integrity of Dean Lake intact by maintaining existing conditions. Work with City and Prior Lake/Spring Lake Watershed District (PLSLWD) to maintain a wildlife corridor around lake	<p>City of Shakopee completed a baseline water quality study on the lake in 2001.</p> <p>Lake is shallow (mean depth = 3') and hypereutrophic (water clarity ~1.5').</p> <p>Not listed as impaired water on 2002 303(d) list.</p> <p>Will work with PLSLWD as necessary to ensure PLSL channel restoration and outlet maintenance and upgrade.</p> <p>SRF is preparing an EIS for proposed County Road 21 that goes through the area. This report will be available with Scott County in spring of 2004.</p>	< \$10,000	City of Shakopee, PLSLWD
High	1D, 1E	Work with the MNRB to compile loading comparisons / summaries for monitored tributaries as data allows (MNRB takes technical lead)	<p>Purpose would be to provide easily interpreted information to provide regional context to LMRWD management efforts and priorities.</p> <p>Use simultaneous period of record to estimate annual loads of water and key pollutants for:</p> <ul style="list-style-type: none"> <li>➤ Minnesota River near its entry to LMRWD.</li> <li>➤ Minnesota River near its exit from the LMRWD.</li> <li>➤ Tributaries monitored under WOMP program that enter between the two points.</li> </ul> <p>Also generate loads per unit or of watershed as well as flow-weighted mean concentrations and key pollutants to help identify “hot spot” tributary watersheds.</p> <p>The LMRWD has assumed costs for the installation, operation, and maintenance of the Flow Gauging Station for the Minnesota River at Ft. Snelling at a cost not to exceed \$41,450 for 3 years.</p>	\$10,000 - \$20,000	Met Council, Minnesota River Board

Priority	Map Index	Action	Comments	Estimated Cost	Potential Partners
High	1F	Act as facilitator to bring together various stakeholders in Nicols Fen, Harnack and Kennealy Creeks (and possibly unnamed trout stream #1)	<p>High priority is restoration of eroded channel adjacent to Nicols Fen.</p> <p>MNDNR Parks may have up to \$25,000 to contribute as cost-share on restoration of incised channel adjacent to Nicols Fen.</p> <p>USACE has up to \$5 million (discretionary funds) available for aquatic ecosystem restoration and wildlife habitat restoration.</p>	<\$10,000	City of Eagan, MNDNR, USACE, Gun Club WMO, USFWS
High	1G	Assist City of Burnsville in assessing and possibly devising approach to remediate bank erosion problems along Minnesota River	<p>Highest priority erosion problems are threatening infrastructure such as roads.</p> <p>Inventory of problem areas and field assessment are desirable to evaluate potential remedial measures and determine cost-effectiveness. City would prefer to take bioengineering approach if appropriate.</p>	\$5,000-\$15,000	City of Burnsville, USACE, Dakota Co. SWCD
Medium	2A	Support City of Eagan in implementation of infiltration features In Cedar Grove	Cedar Grove redevelopment AUAR identifies infiltration and LID as measures to protect Harnack and Kennealy Creek. LMRWD could provide technical or financial assistance in monitoring efficiency of the infiltration unit installed at the Cedar Grove site when needed.	\$15,000 - \$50,000	City of Eagan, MNDNR, Met Council, Dakota County SWCD
Medium	2B	Assist in implementing Credit River Erosion Control Plan	<p>Forty erosion problem areas along the Credit River were identified by the City of Savage (1996). Fifteen areas are within the LMRWD boundary.</p> <p>Role of rate control may not have been addressed.</p> <p>City has identified corrective actions and planning level cost estimate for improvements in each area. Total estimated construction cost to fix all areas is \$660,000.</p> <p>City proposes completion of feasibility study for each project. LMRWD could assist financially or technically with feasibility studies and/or design/construction.</p>	Undetermined	City of Savage

Priority	Map Index	Action	Comments	Estimated Cost	Potential Partners
Medium	---	Develop overall TMDL strategy for all impaired stream reaches within the LMRWD	Identify impaired waters within the LMRWD and contact stakeholders to jointly develop a plan for the development of an overall TMDL strategy.  USACE has discretionary funds for planning assistance.	\$10,000- \$15,000	Various stakeholders, depending on location and jurisdictions affected
Medium	2C	Assist in design / construction of stormwater quality retrofit improvements in downtown Chaska	City expects to install 5 – 10 manufactured BMPs for stormwater quality improvement as part of downtown street reconstruction effort.  Feasibility study presenting information on size, location, timeline and cost estimate expected by April 2004.  Financial assistance from LMRWD could be used to secure higher and/or larger units to maximize treatment.	Undetermined pending outcome of feasibility study	City of Chaska
Medium	2D	Assist City of Burnsville in assessing restoration potential of unnamed trout streams 4 and 7	Some work done already by City to evaluate resource, including monitoring of stream temperatures. Data suggests that during some times of the year, stream temperatures may be too high to support trout.  Beaver activity and channelization are issues as are urban stormwater inputs.	\$3,000 – \$7,000	City of Burnsville, MnDNR, Dakota Co. SWCD
Medium	2E	Conduct lake and watershed assessment for Black Dog Lake	Data on which to base lake assessment may already have been collected by power company that uses the lake for cooling water. Main task may be to gather and interpret data.  Assessment would form basis to scope development of management plan.	\$10,000- \$15,000	City of Burnsville
Medium	2F	Develop linked P8 model for that portion of the Black Dog watershed within the LMRWD	Black Dog WMO plans to develop P8 model for its part of the watershed starting in 2005. Intent is to get ahead of any TMDLs that could affect the area.  LMRWD could cooperate with Black Dog WMO to develop linked model so that entire watershed to MN River is covered. This effort could help the LMRWD develop its TMDL strategy as well.	\$10,000 - \$15,000	Black Dog WMO, City of Burnsville

Priority	Map Index	Action	Comments	Estimated Cost	Potential Partners
Medium	---	Evaluate further potential implementation opportunities for Wedgewood Marsh, Blue Lake, Colman Lake, Nine Mile Lake, Gun Club Lake, Fisher Lake, Nyssens Lake, Gillford Lake, Cyess Lake, Rice Lake, Long Meadow Lake, Snelling Lake, Riley Creek, Bluff Creek, Carver Creek, East Chaska Creek, Chaska Creek	Could be considered as part of subsequent project/phase.	Undetermined	Various cities, watersheds, counties

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Minnesota River at Savage

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- Recommendations

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- E. List of Abbreviations

# Acknowledgments

## Stakeholders and Contributors

### AGENCIES

Metropolitan Council  
Minnesota Department of Natural Resources  
Minnesota Pollution Control Agency  
United States Army Corps of Engineers  
United States Geological Survey

### COUNTIES

Carver County  
Dakota County  
Hennepin County  
Scott County

### CITIES

Bloomington  
Burnsville  
Carver  
Chanhausen  
Chaska  
Eagan  
Savage  
Shakopee

### WATERSHED MANAGEMENT DISTRICTS/ORGANIZATIONS

Nine Mile Creek  
Prior Lake-Spring Lake  
Riley-Purgatory-Bluff Creek

### OTHER ORGANIZATIONS

Metropolitan Airports Commission  
Friends of the Minnesota River Valley  
Minnesota River Board  
Chaska Public Schools

# Lower Minnesota River Watershed District Contact Information

## **Contact information**

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Terry Schwalbe  
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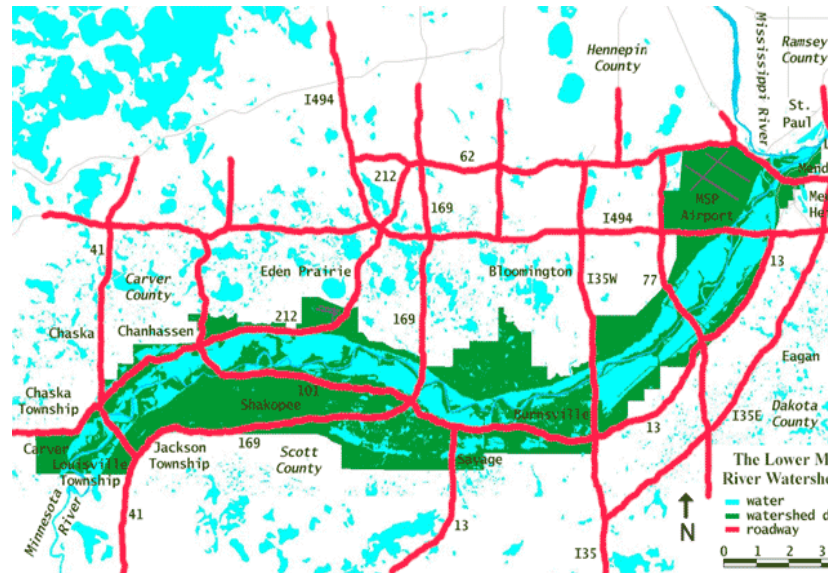
## **Board of Managers**

Edward A. Schlamp, President/Treasurer  
Hennepin County

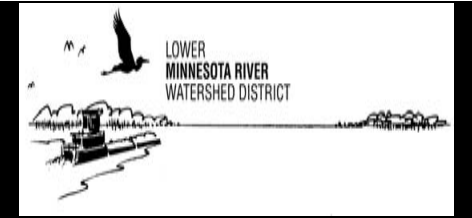
Ron Kraemer, Vice President  
Dakota County

Lawrence Samstad, Secretary  
Scott County

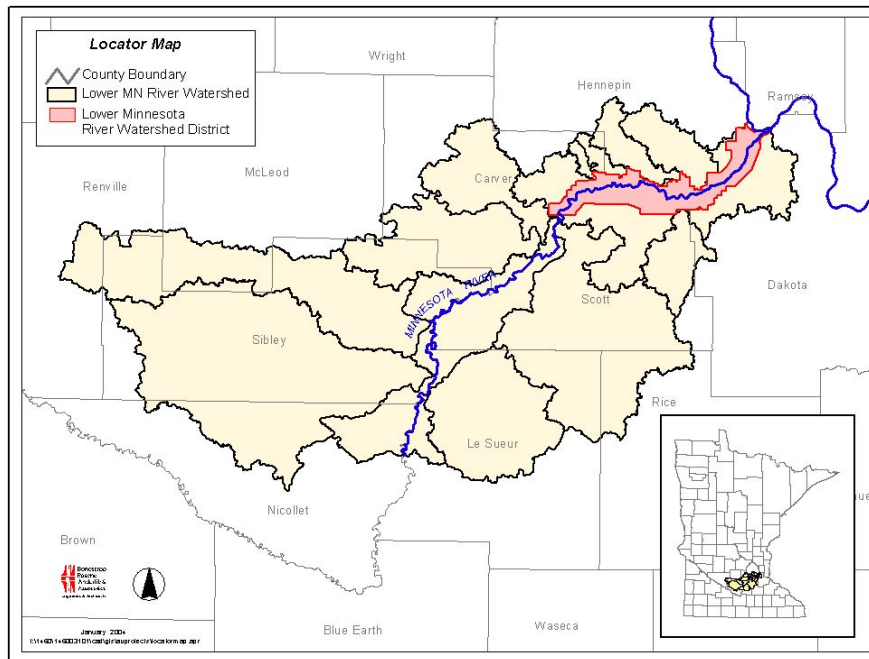
Leo Forner, Assistant Treasurer  
Carver County  
Len Kremer, Manager  
Hennepin County



# Introduction



## I. BACKGROUND



The Lower Minnesota River Watershed District (LMRWD) is located in the southwest portion of the Twin Cities Metropolitan Area. It runs along the Minnesota River and includes bluffs on both sides of the river channel. Portions of Carver, Hennepin, Dakota and Scott Counties are included within the watershed district boundaries (see Figure 1.1). Also included within the watershed district boundaries are portions of the following municipalities and townships: Mendota Heights, Lilydale, Eagan, Bloomington, Burnsville, Savage, Shakopee, Eden Prairie, Chanhassen, Chaska, Carver, Chaska Township, Louisville Township and Jackson Township. The total land area within the boundaries of the LMRWD is about 4,500 acres. The length of river within the boundaries is about 10 miles, from Carver Creek to the confluence with the Mississippi River.

The LMRWD shares boundaries with a number of other watersheds (under county jurisdiction) and Watershed Management Organizations (WMOs), including: the Lower Mississippi River WMO, Gun Lake Club WMO, Black Dog WMO, Credit River Watershed, South Shakopee Basin Watershed, Carver Creek Watershed, Chaska Creek Watershed, Hazeltine Bavaria Watershed, East Bloomington-Richfield WMO, Riley-Purgatory-Bluff Creek Watershed District, Nine Mile Creek Watershed District, and Prior Lake-Spring Lake Watershed District.

Figure 1.1 - Location of the LMRWD within the Lower Minnesota River Watershed

The goal of the LMRWD is to cooperate, assist and facilitate the State and/or Federal Government in providing river navigation, and to work in partnership with local units of government, private citizens and local organizations to provide strategic resource evaluation and management.

The watershed district's Water Management Plan (WMP) was approved and adopted by the Board of Water and Soil Resources (BWSR) and the Board of Managers of the LMRWD in 1999. The WMP is designed to meet requirements of Minnesota statutes 103B and D and Minnesota Rules 8410. The purpose of the WMP is to define water management issues and guide and define the watershed district's approach in addressing the issues. An important part of the WMP is to address implementation guided by the watershed district's preferred focus on: *commercial navigation; resource evaluation and management; project review and inspection; and public information.*

## 2. WATER QUALITY – CONTEXT AND CRITERIA

The watershed district includes a number of significant resources including floodplain lakes, creeks, floodplain wetlands, bluffs and designated natural areas (see Table 1.1, see Figure 2.1 at back of the report).

**Table 1.1 - Significant Surface Water Resources within the LMRWD**

<b>Streams and Rivers</b>	<b>Trout Streams</b>	<b>Lakes</b>	<b>Wetlands</b>
Minnesota River	Kennealy Creek	Courthouse Lake	Black Dog Preserve Fen
Spring Creek	Unnamed Stream #1	Dean Lake	Fort Snelling Fen
Nine Mile Creek	Unnamed Stream #4	Snelling Lake	Nicols Fen
Credit River	Unnamed Stream #7	Long Meadow Lake	Savage Fen
East Creek	Eagle Creek	Coleman Lake	Seminary Fen
Chaska Creek	Assumption Creek	Grass Lake	Long Meadow Marsh
Bluff Creek		Rice Lake (Hennepin County)	Coleman Marsh
Purgatory Creek		Lake Cy Ess	Grass Marsh
Riley Creek		Chaska Lake	Rice Marsh (Hennepin County)
Carver Creek		Gifford Lake	Chaska Marsh
Other minor streams (32)		Nyssens Lake	Blue Marsh
		Blue Lake	Fisher Marsh
		Fisher lake	Rice Marsh (Scott County)
		Rice Lake (Scott County)	Gun Club Marsh
		Black Dog Lake	
		Gun Club Lake	

**Note:** In the Implementation Section of the 1999 LMRWD Water Management Plan a smaller number of resources from among the ones listed in this table have been identified as priority resources. These are discussed in greater detail in Chapter 2.

Issues of concern within the LMRWD include poor water quality in the Minnesota River, the health of contributing tributaries, and lake and wetland quality. In general, the causes for many of the water quality issues within the watershed district are attributable to poor stormwater infrastructure in older developments, recent and continuing urbanization, upstream agricultural runoff, septic systems, and the constant ravine, bluff and bank erosion caused by the pressures on the landscape. In addition, barge traffic, existing waste water treatment plants (WWTPs) and the Minneapolis-St. Paul Airport are significant contributors of pollutants to the Lower Minnesota River.

The 1999 LMRWD Water Management Plan states that the Lower Minnesota River Watershed is a “small portion of the greater Minnesota River Watershed”. The MPCA’s visionary document titled **Minnesota River Basin Plan** (December 2001) is a watershed-level plan, designed to unify planning processes and to ensure consistency and harmony across various levels of government and organizations.

A number of milestones preceded the Basin Plan, including: MRAP (Minnesota River Assessment Project 1989-94), creation of the Citizens Advisory Committee (1994), and establishment of the Minnesota River Joint Powers Board (1995). In 1995, the MPCA adopted a basin management planning approach and subsequently published the Basin Information Document in 1997.

Watershed districts and watershed management organizations form an integral part of the Basin Plan by forming partnerships and acting as cooperators on projects that further the goals set for the Minnesota River Basin. Individual goals and objectives set by these organizations mirror the overall goals set for the entire Minnesota River Watershed, and their implementation plans bring the community closer to achieving these goals. One of the aims of the Basin Plan is to achieve coordination among other plans, to help avoid duplication, to aid prioritization, and to determine whether overall targets set in the Basin Plan are being achieved in the basin.

The authors of the Basin Plan have laid out a number of action strategies to achieve the plan goals. It is significant to note that the *first action strategy* includes efforts to remove water quality impairments in the river, and the use of monitoring and modeling as tools to achieve this. The *second action strategy* deals with prevention and limiting of pollution within the watershed through improvements, and the compliance of existing systems with established standards and proven BMPs. The *third action strategy* focuses on integration, coordination and encouragement of sustainable development, in addition to the support of education, watershed management and funding. The *fourth action strategy* recognizes the need for evaluating the effectiveness of the basin planning process through time.

Monitoring and modeling are a large part of the efforts undertaken by the MPCA and Metropolitan Council within the Greater Minnesota Basin and provide a larger context for all other activities within the watershed. A number of significant efforts are worth mentioning:

1. To address low dissolved oxygen and high ammonia concentrations in the lower 22 miles of the Minnesota River, a Waste Load Allocation (WLA) Study was completed in 1985 by the MPCA. This study provided the basis for establishing BOD and ammonia effluent limitations for dischargers to this reach of the River, and a 40% load reduction goal for oxygen-demanding materials from non-point sources upstream of Shakopee.
2. To fully realize the objectives of the WLA Study, and to allocate pollutant loads to sources upstream of Shakopee, the MPCA undertook the completion of Hydrologic Simulation Program-Fortran (HSPF) modeling. The model extends from Lac qui Parle dam in western Minnesota to Jordan, just southwest of the Metro area. It includes 13 major watersheds in the Upper Minnesota, which translate to about

260 miles of the main stem of the river. It excludes the Lac qui Parle, Pomme de Terre, Upper Minnesota watersheds and all of the lower 40 miles of the Lower Minnesota River mainstem.

3. The stretch of the Lower Minnesota River from Jordan to the confluence of the Minnesota with the Mississippi River represents a gap in water quality modeling efforts completed so far. The Metropolitan Council has initiated a Lower Minnesota River Model to bridge this gap by including the lower 40 miles of the river in a monitoring and modeling effort at a cost of \$750,000 over three years, starting in 2003. The completion of this study will provide information on loadings from various tributaries that feed the Lower Minnesota River, and help facilitate an assessment of the impact of these and the Lower Minnesota River on the Mississippi.

A large part of the effort within the Minnesota River Watershed is focused on recognizing and reducing or eliminating water quality impairments to water quality in the river. This has resulted in an **Impaired Waters List** (MPCA, 2002) for the state of Minnesota that provides a useful resource in identifying the lakes and reaches of streams that require special management action because they do not meet federal water quality standards (see Figure 1.2). A draft 2004 list was issued in January for public notice but has not yet been approved.

The Minnesota River Basin Plan has set target concentrations for common pollutants of surface waters based on beneficial uses as determined by Minnesota Rules Chapter 7050. The MPCA has also established lake ecoregion phosphorus criteria and determined swimmable use support classifications for most lakes. MPCA encourages the use of these criteria in prioritization and determination of protection or restoration status for surface water bodies. The LMRWD has established a parallel water resource classification system according to four categories of environmental characteristics which are further subclassified by five levels of human use (see Table 1.2). The classification criteria used by the Lower Minnesota River Watershed are based on standards and criteria already established by the Metropolitan Council, MPCA and the MNDNR (Water Management Plan, 1999).

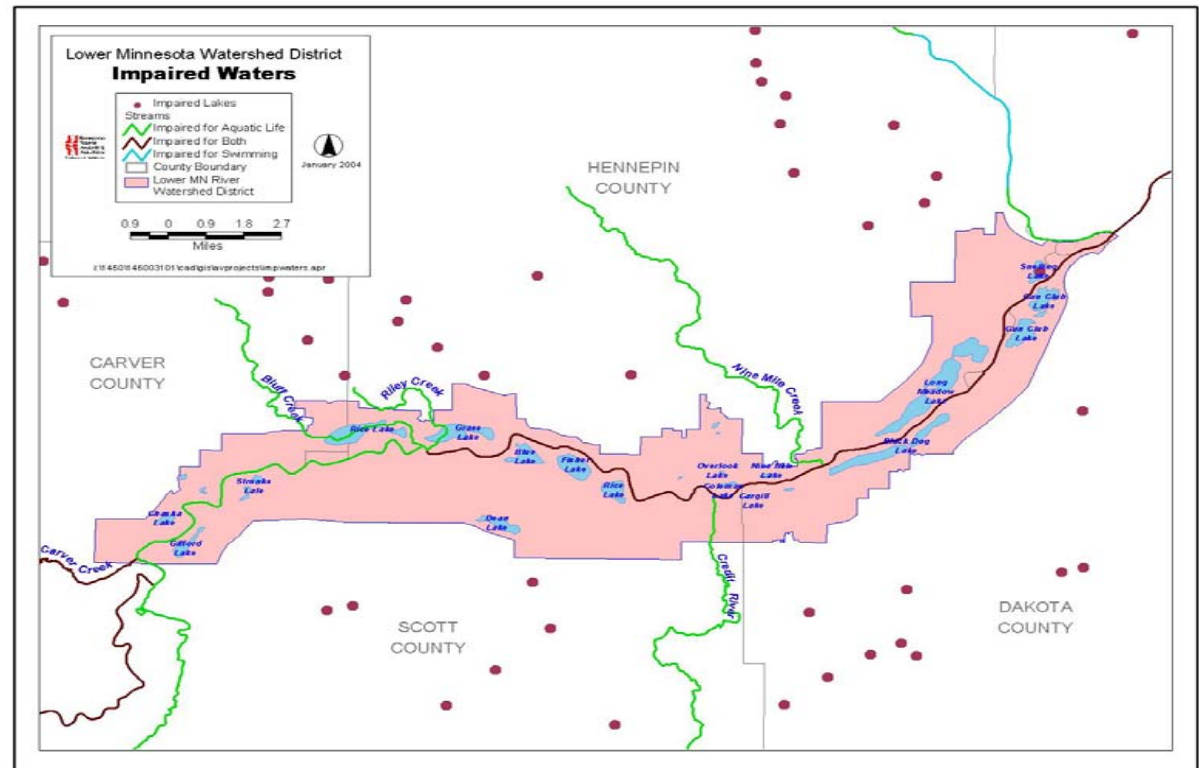


Figure 1.2 - Impaired Waters within the LMRWD (MPCA, 2002 CWA 303d TMDL list)

**Table 1.2 - Classification Criteria for Water Resources within the LMRWD (1999 LMRWD Water Management Plan)**

<b>Classification</b>	<b>Explanation</b>	<b>Threshold Limits (Summer average)</b>
Minnesota River	The Minnesota River has been assigned a special classification to reflect the special efforts underway to improve the river's quality	NA
Floodplain	Water resources located within the Minnesota River floodplain	NA
Upland	Water resources located outside the Minnesota River floodplain which are not a unique resource	NA
Unique Resources	Water resources such as calcareous fens and trout waters	NA
Level I Activities	Swimming, scuba diving and snorkeling	TP: 30 ug/L Chl-a: 10 ug/L SD: 7 feet
Level II Activities	Sail boating, waterskiing, motor boating, canoeing, hiking, picnicking, wind surfing and jet skiing	TP: 45 ug/L Chl-a: 20 ug/L SD: 3.3 feet
Level III Activities	Fishing, aesthetic viewing and observing wildlife	TP: 75 ug/L Chl-a: 40 ug/L SD: 2.0 feet
Level IV Activities	Aesthetic viewing and observing wildlife (typically wetlands)	NA
Level V Activities	Stormwater detention	TP: 75 ug/L Chl-a: 40 ug/L SD: 1.5 feet

TP: Total Phosphorus; Chl-a: Chlorophyll-A; SD: Secchi Depth; NA: Not applicable

The watershed district has set management objectives for water resources placed within each classification system. There are a number of unique resources within the watershed district boundary identified by Minnesota Rules Chapter 7050 (see Table 1.4) including:

- Courthouse Lake
- Black Dog Preserve Fen
- Fort Snelling Preserve Fen
- Nicols Fen
- Savage Fen, Seminary Fen
- Kennealy Creek
- Eagle Creek
- Assumption Creek
- Unnamed Streams #1, #4 and #7.

The goals and actions listed in the 1999 WMP incorporate recommendations and concerns expressed by local environmental and regulatory agencies. For example, Assumption Creek, Eagle Creek, Kennealy Creek and Courthouse Lake are identified both in the DNR's Metro Region Trout Stream Report as well as in the LMRWD's list of priority resources in their implementation program. The LMRWD's goals, objectives and implementation strategies mirror and support those of the agencies at large.

### 3. PURPOSE OF STUDY

The purpose of this study is to move the watershed district's implementation agenda forward by providing an update on the status of priority resources listed in their WMP and identifying new priority resources with potential for inclusion in the watershed districts implementation strategy. Using the materials and information available, and personal communications with managers and agencies, possible courses of action are outlined. The implementation guidance document will aid the LMRWD in moving on to the next step in their implementation plan, that is, laying the groundwork to implement projects and programs that will benefit the river, enhancing economic opportunities, and providing a forum for cooperation among the many public and private entities that share the watershed.

### 4. REVIEW OF THE LMRWD IMPLEMENTATION PROGRAM OBJECTIVES

Table 1.3 outlines the three main implementation categories identified by the watershed district.

**Table 1.3 – Description of Implementation Categories (1999 LMRWD Water Management Plan)**

<b>Projects</b>	<ul style="list-style-type: none"> <li>Typically one-time efforts, probably structural and done either as a LMRWD project or a cooperative project in response to a petition from a municipality.</li> <li>Projects would be funded according to the provisions of the applicable law (section 6.3 of WMP)</li> </ul>
<b>Programs</b>	<ul style="list-style-type: none"> <li>Mostly nonstructural and likely to be ongoing such as education, data collection and management, project review and inspections.</li> <li>Programs are mostly funded with an annual ad valorem levy over the entire watershed district</li> </ul>
<b>Special Studies</b>	<ul style="list-style-type: none"> <li>One time technical or data collection effort directed at acquiring specific information or achieving a specific goal.</li> <li>LMRWD will most likely fund special studies listed in its implementation program through the annual ad valorem levy. In some cases, the requester of the special study (public or private) may be required to pay for the cost for the study.</li> </ul>

Priorities are listed in Table 1.4 in the order that the LMRWD will assess the condition of the District's resources. Table 1.5 lists general categories of interest as expressed by the LMRWD. The mix of programs selected by the Board of Managers of the LMRWD represents a balanced approach to the stated preference by the LMRWD toward preventive, corrective and management efforts.

**Table 1.4 – List of Specific Priority Resources Identified in the Implementation Program (1999 LMRWD Water Management Plan)**

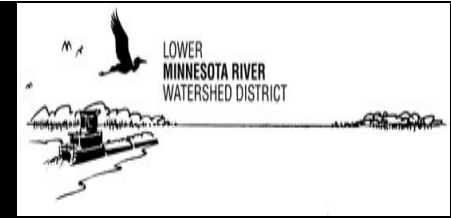
<b>Resource</b>	<b>Proposed Activities</b>	<b>Data Collection</b>	<b>Data &amp; Watershed Analysis</b>	<b>Develop Resource Plan</b>	<b>Capital projects</b>
Dean Lake	Data collection, data analysis, watershed analysis, developing goals and policies, resource plans and implementing projects	2000	2001	2002	2003 onward
Assumption Creek	Data collection, data analysis, watershed analysis, developing goals and policies, resource plans and implementing projects	2000	2001	2002	2003 onward
Courthouse Lake		2001	2002	200	2003 onward
Credit River		2001	2002	2003	2003 onward
Nine Mile Creek		2002	2003-2004	2004	2003 onward
Purgatory Creek		2002	2003-2004	2004	2003 onward
Riley Creek		2003			2003 onward
Bluff Creek		2003			2003 onward
East Chaska Creek		2004			2003 onward
Chaska Creek		2004			2003 onward
Carver Creek		2005-2009			2003 onward
Kennealy Creek		2005-2009			2003 onward
Unnamed #4					2003 onward

Resource	Proposed Activities	Data Collection	Data & Watershed Analysis	Develop Resource Plan	Capital projects
Unnamed #7					2003 onward
Eagle Creek					2003 onward
34 minor tributary streams		2005-2009			2003 onward

**Table 1.5 – General Categories of Interest Expressed in the Implementation Program (1999 LMRWD Water Management Plan)**

Activity	Timeline
Dredge material disposal	ongoing
Collect existing water quality, biological and physical data for priority resources	ongoing
MN River Floodplain redefinition	2000-2001
Collect & distribute hydrologic information about MN River	1999 onward
Inventory and document gully erosion and siltation sites	2000 onward
Participate in Met Council's WOMP	1999 onward
River bank erosion control	2001 onward
Greenbelts, buffers (sensitive natural areas)	2000 onward
Public access	1999 onward

# Survey And Results



## I. DATA COLLECTION

In the first phase of this project, a list of individuals or agencies that have actively contributed time, effort and expertise to resources within the watershed was compiled. A letter was sent out to all stakeholders, through regular mail and email. It expressed the Watershed District's interest in gathering information on past studies and reports, problem identification, status of efforts to execute improvements, special assessments and monitoring, as well as projects planned, desired or ready for construction within the watershed (see Appendix A for a list of contacts).

Mailings were followed up with phone conversations with almost all stakeholders in order to gather more information on their interests and concerns. Stakeholders sent in a completed Document Locator Sheet (see Appendix B) that provided information regarding available data, studies, and reports on management of resources within the Lower Minnesota River Watershed District boundaries.

Initial responses from stakeholders were encouraging and very informative. Some came in



Minnesota River at Carver

the form of completed Data Locator Sheets; other stakeholders wrote detailed emails listing resources and updated information. The most extended and detailed information came through telephone conversations that allowed stakeholders and managers to express concerns in detail and at length. All written communications were documented and all conversations logged for review at a later time.

A second survey was conducted to determine the status of the resources (see Appendix C). The survey was carried out with certain goals in mind, namely:

- Determining the current status of a resource
- Identifying trends in the quality of that resource
- Designing potential projects and/or programs to improve the resource

## 2. IDENTIFICATION OF IMPLEMENTATION OPPORTUNITIES

Based on information gathered and guidance provided by the Implementation Program, two lists were developed. List A comprised priority projects listed in the Implementation Program. List B was developed by comparing the Watershed District’s areas of interest (see Table 2.1) with ideas based on conversations with stakeholders. Stakeholders associated with list A were contacted and asked to provide details on the level of effort invested in the specific resource of interest (see Appendix C).

**Table 2.1 Priority Lists A and B**

LIST A	LIST B
<b>Resources identified in the 1999 LMRWD Water Management Plan</b>	<b>Opportunities identified in the course of this study</b>
Dean Lake (Shakopee)	Chaska Old Downtown Retrofit (Chaska)
Assumption Creek (Chaska)	Carver Old Downtown Retrofit (Carver)
Courthouse Lake (Chaska)	Airport S. Area Stormwater Study (Bloomington)
Credit River Erosion (Savage)	Pond C (Bloomington)
Kennealy Creek (Eagan)	Savage Fen (Savage)
Unnamed Creek # 1 (Eagan)	Nicols Fen (Eagan)
Bluff Creek Area (Chanhassen)	Bluffs Area (Mendota Heights)
Carver County Ravine and Bluff Area (Carver County)	Spring Creek Monitoring (Carver)
Eagle Creek Corridor (Chanhassen)	

Tables 2.2 and 2.3 outline the various stages of progress that have been made in the form of monitoring, studies or design of improvements for resources outlined in lists A and B (see Figure 2.1 at back of the report for location of monitoring sites and studies).

**Table 2.2 State of the Resource Survey- List A**

Resource	Monitoring		Diagnostic Study	Feasibility Study	Design of Improvements	Construction Status	Other
	Condition of resource	Watershed Inputs					
Assumption Creek (Chaska)	Yes	No	No	No	No	NA	<b>Reports:</b> Community Monitoring of Metro Trout Streams (MNDNR, 1998-2001), Fish Community Survey of TCMA (MNDNR, 2001) <b>Monitoring (Marcoinvertebrate):</b> Chaska High School students (MNDNR, 1998-2001) VSMP (2002-2003)
Deans Lake (Shakopee)	Information not available	Information not available	Information not available	Information not available	Information not available	Information not available	Contact City of Shakopee
Courthouse Lake (Chaska)	Yes	No	No	No	No	NA	<b>Reports:</b> Carver County 2000 Water Quality Report <b>Monitoring (Lake):</b> MPCA, CCES

Resource	Problem Areas Identified	Planning Level Study	Feasibility Study	Design of Improvements	Construction Status	Other
Credit River (Savage)	Yes	Yes	Yes	No	NA	<b>Reports:</b> Erosion Survey for the Credit River (Savage, 1996) <b>Monitoring (River):</b> MCES
Kennealy Creek (Eagan)	Yes	Yes	No	No	NA	<b>Reports:</b> Cedar Grove AUAR (2002); Nicols Fen, Kennealy and Harnack Creeks Project (2002, Eagan) <b>Monitoring (Groundwater):</b> USGS

Resource	Problem Areas Identified	Planning Level Study	Feasibility Study	Design of Improvements	Construction Status	Other
Unnamed trout stream #1(Eagan)	Yes	Yes	No	No	NA	<b>Reports:</b> Kennealy and Harnack Creeks Project (2002, Eagan)
Bluff Creek Natural Area (Chanhassen)	Yes	Yes	Yes	In discussion with Riley-Purgatory Bluff-Creek Watershed	NA	<b>Report:</b> Bluff Creek Natural Resources Mgmt Plan (1996, Chanhassen) <b>Monitoring (Creek):</b> MCES
Carver County Ravine and Bluff Area (Carver County)	Yes	Yes	No	NO	NA	<b>Report:</b> Carver County Ravine and Bluff Study (1999, Carver County) <b>Monitoring (Creek):</b> MCES, CCES
Eagle Creek (Chanhassen)	No	No	No	No	NA	<b>Reports:</b> Eagle Creek Corridor AUAR (1995, Chanhassen) <b>Monitoring (Creek):</b> MPCA, MCES , VSMP, Savage

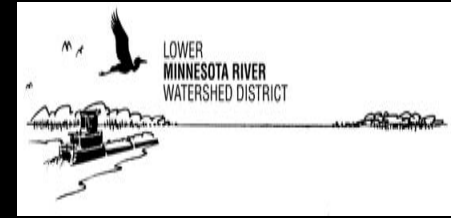
**Table 2.3 State of the Resource Survey- List B**

Resource	Problem Areas Identified	Planning Level Study	Feasibility Study	Design of Improvements	Construction Status	Other
Chaska Old Town Stormwater Retrofit (Chaska)	In process	No	Yes	No	NA	NA
Carver Old Town Stormwater Retrofit (Carver)	No	No	No	No	NA	NA

Resource	Problem Areas Identified	Planning Level Study	Feasibility Study	Design of Improvements	Construction Status	Other
Airport S. Area (Bloomington)	No	No	No	No	NA	<b>Report:</b> Airport South District AUAR (2002, Bloomington).
Pond C (Bloomington)	No	No	No	No	NA	<b>Report:</b> Report in process (Bloomington)
Savage Fen (Savage)	No	No	No	No	NA	<b>Report:</b> Fen Management Plan (1994, Savage)
Nicols Fen (Eagan)	No	No	No	No	NA	<b>Report:</b> Kennealy and Harnack Creeks Project (2002, Eagan)
Bluffs Area Mendota Heights	No	No	No	No	NA	<b>Report:</b> Bluff Area EAW (2003, Mendota Heights)
Spring Creek Monitoring (Carver)	No	No	No	No	NA	No

MNDNR: Minnesota Department of Natural resources; MPCA: Minnesota Pollution Control Agency; MCES: Metropolitan Council Environmental Services; CCES: Carver County Environmental Services; TCMA: Twin Cities Metropolitan Area; NA: Not applicable; AUAR: Alternative Urban Area-Wide Review; EAW: Environmental Assessment Worksheet

# Implementation – Guidance and Recommendations



Dredging operations at Savage

## 1. IMPLEMENTATION STRATEGY

The primary objective of this project was to identify project implementation opportunities consistent with LMRWD's 1999 plan that the District can pursue over the short to intermediate term.

Resource management efforts in which the LMRWD has a legitimate role break down into two broad types. The first is focused on the Minnesota River itself. The Minnesota River enters the LMRWD in a degraded condition and it leaves the LMRWD in a degraded condition. Thus, the degradation of the River is a far broader issue than just what happens within the boundaries of the District itself. However, the LMRWD can and must do its part to achieve the small incremental positive changes to benefit the River which, when combined with the efforts of the numerous other management units, will improve the overall condition of this important regional resource. The second role of the LMRWD - no less important – focuses on more local resources that lie within the District's boundaries. These resources have intrinsic value in and of themselves. Several are unique in the Metro area and receive special management protection in state statutes and rules.

The role of the LMRWD is also an important issue. For example, the LMRWD can choose to be an “enabler” of sorts by providing financial and/or technical resources in support of actions that are led by others. It can also be the initiator and take the lead in other types of projects that other local units of government are not well-positioned to assume, such as those that extend across local jurisdictional boundaries within the District, those that require specialized expertise that the LMRWD has better access to, and/or those that are important but no one is willing to initiate and lead on their own.

There were four guiding principles that were used to identify implementation opportunities for the LMRWD. These principles are as follows:

1. It is easier and less costly to protect a good quality resource than it is to restore a degraded resource. Therefore, potential threats to good quality resources should be identified early on, and proactive protection efforts executed.
2. For degraded resources, any rehabilitation effort needs to identify the true causes of degradation and what can be done to address those causes. It must also consider the feasibility of returning a resource to an acceptable condition. The first is important to make sure that the “fix” will be successful over the long term, while the second is important to set realistic expectations regarding what can be accomplished for a given level of investment.
3. Resource management actions undertaken by the LMRWD, especially those intended specifically to protect the Minnesota River, will benefit from a regional context. This can and should be provided by the collection and timely analysis, interpretation, and dissemination of data to estimate the pollutant load and concentration profiles for the mainstem where it enters and leaves the District as well as for the various tributary and other major inputs to the River within the District’s boundaries.
4. Establishing trusting and productive partnerships with other governing units within the districts is furthered by helping them achieve their resource management priorities where those priorities are consistent with the LMRWD objectives. In turn, developing a “track record” of cooperative project implementation efforts will generate other future opportunities that cannot at this time be identified with precision.

Guidance on implementation opportunities for the LMRWD is summarized in Table 3.1 (see Figure 2.1 at back of report for locations of implementation opportunities).

**Table 3.1 Implementation Guidance**

Priority	Map Index	Action	Comments	Estimated Cost	Potential Partners
High	1A(1,2,3)	Develop management plans for Courthouse Lake 1A(1), Firemen’s 1A(2) and Clay Hole Lake 1A(3) that outlines a strategy for protection and/or improvements as may be appropriate for each waterbody	<p>All three resources are currently of good quality. In 2004 (CCES Water Quality report), the three rated mesotrophic as per Carlson’s TSI.</p> <p>Courthouse Lake is a designated trout Lake, while Firemen’s Lake has a public swimming beach, Clay Hole Lake serves as a stormwater pond for a large watershed</p> <p>Each lake is governed by a set of unique conditions and uses and requires a strategy that reflects these conditions and uses. Work to develop a plan for Courthouse Lake is expected to be minimal (~\$2,000) because the Lake has been well-protected through past efforts.</p>	\$20,000 - \$35,000	City of Chaska, Carver County Environmental Services, Carver County SWCD
High	1B	Outline the watershed, identify stakeholders and initiate efforts for the development of a management plan for Assumption Creek and watershed	<p>Macroinvertebrate monitoring suggests resource is in good shape. However, monitoring by DNR from May 2000 through December 2001 downstream of Highway 212 indicates periodic problems with high water temperatures and low dissolved O2 that violate accepted trout tolerances. Measured discharges ranged from zero to 4.2 cfs above fen/wetland complex and from 0.64-1.1 cfs below fen/wetland confluence.</p> <p>Management plan should address:</p> <ul style="list-style-type: none"> <li>➤ Collection, analysis, and interpretation of baseline data on stream flow, temperature, macroinvertebrates, fish, and channel stability as well as groundwater contributions.</li> <li>➤ Recommendations on additional monitoring needed.</li> <li>➤ Current and expected future watershed land uses and how the stream would be affected. Estimate impact of Highway 41 crossing.</li> <li>➤ Delineate watershed and identify the percentage under jurisdiction of each land owner/manager.</li> <li>➤ A mitigation strategy to protect creek from land use changes, including possible application of low impact development measures and/or adaptation of thermal mitigation / runoff volume control to new developments by communities, land acquisition for open space preservation.</li> </ul>	\$20,000 - \$40,000	Cities of Chanhassen, Chaska, MNDNR, Trout Unlimited, Chaska High School

Priority	Map Index	Action	Comments	Estimated Cost	Potential Partners
High	1C	Keep the integrity of Dean Lake intact by maintaining existing conditions. Work with City and Prior Lake/Spring Lake Watershed District (PLSLWD) to maintain a wildlife corridor around lake	<p>City of Shakopee completed a baseline water quality study on the lake in 2001.</p> <p>Lake is shallow (mean depth = 3') and hypereutrophic (water clarity ~1.5').</p> <p>Not listed as impaired water on 2002 303(d) list.</p> <p>Will work with PLSLWD as necessary to ensure PLSL channel restoration and outlet maintenance and upgrade.</p> <p>SRF is preparing an EIS for proposed County Road 21 that goes through the area. This report will be available with Scott County in spring of 2004.</p>	< \$10,000	City of Shakopee, PLSLWD
High	1D, 1E	Work with the MNRB to compile loading comparisons / summaries for monitored tributaries as data allows (MNRB takes technical lead)	<p>Purpose would be to provide easily interpreted information to provide regional context to LMRWD management efforts and priorities.</p> <p>Use simultaneous period of record to estimate annual loads of water and key pollutants for:</p> <ul style="list-style-type: none"> <li>➤ Minnesota River near its entry to LMRWD.</li> <li>➤ Minnesota River near its exit from the LMRWD.</li> <li>➤ Tributaries monitored under WOMP program that enter between the two points.</li> </ul> <p>Also generate loads per unit or of watershed as well as flow-weighted mean concentrations and key pollutants to help identify “hot spot” tributary watersheds.</p> <p>The LMRWD has assumed costs for the installation, operation, and maintenance of the Flow Gauging Station for the Minnesota River at Ft. Snelling at a cost not to exceed \$41,450 for 3 years.</p>	\$10,000 - \$20,000	Met Council, Minnesota River Board

Priority	Map Index	Action	Comments	Estimated Cost	Potential Partners
High	1F	Act as facilitator to bring together various stakeholders in Nicols Fen, Harnack and Kennealy Creeks (and possibly unnamed trout stream #1)	<p>High priority is restoration of eroded channel adjacent to Nicols Fen.</p> <p>MNDNR Parks may have up to \$25,000 to contribute as cost-share on restoration of incised channel adjacent to Nicols Fen.</p> <p>USACE has up to \$5 million (discretionary funds) available for aquatic ecosystem restoration and wildlife habitat restoration.</p>	<\$10,000	City of Eagan, MNDNR, USACE, Gun Club WMO, USFWS
High	1G	Assist City of Burnsville in assessing and possibly devising approach to remediate bank erosion problems along Minnesota River	<p>Highest priority erosion problems are threatening infrastructure such as roads.</p> <p>Inventory of problem areas and field assessment are desirable to evaluate potential remedial measures and determine cost-effectiveness. City would prefer to take bioengineering approach if appropriate.</p>	\$5,000-\$15,000	City of Burnsville, USACE, Dakota Co. SWCD
Medium	2A	Support City of Eagan in implementation of infiltration features In Cedar Grove	Cedar Grove redevelopment AUAR identifies infiltration and LID as measures to protect Harnack and Kennealy Creek. LMRWD could provide technical or financial assistance in monitoring efficiency of the infiltration unit installed at the Cedar Grove site when needed.	\$15,000 - \$50,000	City of Eagan, MNDNR, Met Council, Dakota County SWCD
Medium	2B	Assist in implementing Credit River Erosion Control Plan	<p>Forty erosion problem areas along the Credit River were identified by the City of Savage (1996). Fifteen areas are within the LMRWD boundary.</p> <p>Role of rate control may not have been addressed.</p> <p>City has identified corrective actions and planning level cost estimate for improvements in each area. Total estimated construction cost to fix all areas is \$660,000.</p> <p>City proposes completion of feasibility study for each project. LMRWD could assist financially or technically with feasibility studies and/or design/construction.</p>	Undetermined	City of Savage

Priority	Map Index	Action	Comments	Estimated Cost	Potential Partners
Medium	---	Develop overall TMDL strategy for all impaired stream reaches within the LMRWD	Identify impaired waters within the LMRWD and contact stakeholders to jointly develop a plan for the development of an overall TMDL strategy.  USACE has discretionary funds for planning assistance.	\$10,000- \$15,000	Various stakeholders, depending on location and jurisdictions affected
Medium	2C	Assist in design / construction of stormwater quality retrofit improvements in downtown Chaska	City expects to install 5 – 10 manufactured BMPs for stormwater quality improvement as part of downtown street reconstruction effort.  Feasibility study presenting information on size, location, timeline and cost estimate expected by April 2004.  Financial assistance from LMRWD could be used to secure higher and/or larger units to maximize treatment.	Undetermined pending outcome of feasibility study	City of Chaska
Medium	2D	Assist City of Burnsville in assessing restoration potential of unnamed trout streams 4 and 7	Some work done already by City to evaluate resource, including monitoring of stream temperatures. Data suggests that during some times of the year, stream temperatures may be too high to support trout.  Beaver activity and channelization are issues as are urban stormwater inputs.	\$3,000 – \$7,000	City of Burnsville, MnDNR, Dakota Co. SWCD
Medium	2E	Conduct lake and watershed assessment for Black Dog Lake	Data on which to base lake assessment may already have been collected by power company that uses the lake for cooling water. Main task may be to gather and interpret data.  Assessment would form basis to scope development of management plan.	\$10,000- \$15,000	City of Burnsville
Medium	2F	Develop linked P8 model for that portion of the Black Dog watershed within the LMRWD	Black Dog WMO plans to develop P8 model for its part of the watershed starting in 2005. Intent is to get ahead of any TMDLs that could affect the area.  LMRWD could cooperate with Black Dog WMO to develop linked model so that entire watershed to MN River is covered. This effort could help the LMRWD develop its TMDL strategy as well.	\$10,000 - \$15,000	Black Dog WMO, City of Burnsville

Priority	Map Index	Action	Comments	Estimated Cost	Potential Partners
Medium	---	Evaluate further potential implementation opportunities for Wedgewood Marsh, Blue Lake, Colman Lake, Nine Mile Lake, Gun Club Lake, Fisher Lake, Nyssens Lake, Gillford Lake, Cyess Lake, Rice Lake, Long Meadow Lake, Snelling Lake, Riley Creek, Bluff Creek, Carver Creek, East Chaska Creek, Chaska Creek	Could be considered as part of subsequent project/phase.	Undetermined	Various cities, watersheds, counties

# Appendix A - List of Persons Contacted

<b>CONTACT</b>	<b>TELEPHONE NUMBER</b>	<b>EMAIL ADDRESS</b>
<b>BLOOMINGTON</b>		
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Joe Swentek		<a href="mailto:jswentek@ci.shakopee.mn.us">jswentek@ci.shakopee.mn.us</a>
Bruce Loney	952-233-3800	<a href="mailto:bloney@ci.shakopee.mn.us">bloney@ci.shakopee.mn.us</a>
<b>USGS</b>		
Thomas Winterstein	763-783-3150	<a href="mailto:twinters@usgs.gov">twinters@usgs.gov</a>
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Mary Karius	612-625-6781	<a href="mailto:gulli021@umn.edu">gulli021@umn.edu</a>
<b>XCEL ENERGY</b>		
Jim Bodensteiner	612-330-6625	

# Appendix B – Sample Data Locator Sheet

## DOCUMENT LOCATION TABLE

Type of Document	Most Current (Year)	Description/Location (Website, hard copy only, electronically available)
Annual Report		
Surface Water Management Plan		
Watershed Management Plan		
<b>Note:</b> You only need to include information within the LMRWD boundary for the document types listed below		
Creek/Stream Management Plan		
Lake/Wetland Management Plan		
Natural Area Management Plan		
Monitoring Reports (e.g. water quality, watershed outlet, stream flow)		
Resource Assessment Report (e.g., natural resource, shoreline, stream bank, stream, land use, wetland function and value)		
Environmental Assessments (EAWs, AUARs)		
TMDL Report		
Surveys (e.g. aquatic vegetation, habitat, fish, macroinvertebrate, stream profile etc)		
Studies (e.g. diagnostic, feasibility, pollutant loading)		
Feasibility Studies		
Special Reports (flooding, hot spots, erosion, sedimentation and siltation)		

5 Yr Capital Improvement Budget		
<b>List miscellaneous documents below</b>		

Do you have monitoring sites in the LMRWD? <ul style="list-style-type: none"> <li>• Do you have the geographic locations (UTM coordinates, lat-long)? <b><u>OR</u></b></li> <li>• Do you have a shape file with the locations? (GIS)</li> </ul>	
May we please have a list of on-going natural resource management programs that have been completed within the confines of the LMRWD boundary? (e.g., education, resource improvement, operation and maintenance)	

**Comments/Suggestions:**

# Appendix C – Resource Status Update Checklist

## Checklist for Status of Work on Priority Resource from List A

Monitoring

Condition of resource

Watershed inputs

Diagnostic study and implementation plan in progress or completed (includes watershed modeling and identification of specific steps to take to protect/improve resource)

Feasibility Study of Proposed Improvements in progress or completed (includes estimated costs of specific improvements)

Design of Improvements in process or completed (includes plan sheets and engineers estimate)

Construction of improvements underway or ready to begin

Other (explain)

## Checklist for Status of Work on Priority Resource from List B

Problem areas only identified

Planning level study in progress or completed to identify specific problems and their cause, propose solution

Feasibility study in progress or completed (includes estimated costs of specific improvements)

Design of improvements in progress or completed

Construction ready to begin or underway

Other (explain)

# Appendix D - Technical Resources

1. Lower Minnesota River Watershed District. 1999. Water Management Plan (<http://www.watersheddistrict.org/plan.html>)
2. MPCA. 1997. Minnesota River Basin Information Document
3. Friends of the Minnesota valley. 2001. Strategic Action Plan (<http://wrc.coafes.umn.edu/lowermn/LMreport/Imrwhome.htm>)
4. MPCA. 1997. Lake Prioritization for Protecting Swimmable Use ([www.shorelandmanagement.org/depth/swim.pdf](http://www.shorelandmanagement.org/depth/swim.pdf))
5. MPCA. 2001. Minnesota's Nonpoint Source Management Program Plan (<http://www.pca.state.mn.us/water/nonpoint/mplan.html#plan>)
6. MNDNR. 2001. Fish Community Surveys of Twin Cities Metropolitan Area Streams ([files.dnr.state.mn.us/publications/fisheries/special\\_reports/156.pdf](http://files.dnr.state.mn.us/publications/fisheries/special_reports/156.pdf))
7. MRBDC. State of the Minnesota River – Summary of Surface Water Quality Monitoring ([mrbdc.mankato.msus.edu/mnbasin/fact\\_sheets/stateof%20river\\_2000.html](http://mrbdc.mankato.msus.edu/mnbasin/fact_sheets/stateof%20river_2000.html))
8. MCES. 2001. 2001 Stream Monitoring Report ([www.metrocouncil.org/environment/RiversLakes/Streams/Reports/CoverIntroFormat.pdf](http://www.metrocouncil.org/environment/RiversLakes/Streams/Reports/CoverIntroFormat.pdf))
9. MCES. 2003. Lower Minnesota River Model Project Proposal (not available online)

10. MCES. 1999. Biennial Progress Report, 1997-1999, Metropolitan Area Watershed Outlet Monitoring Program and Mercury and PCB Inputs to the Minnesota River Monitoring Program ([www.metrocouncil.org/environment/RiversLakes/Streams/Reports/97-99%20report.pdf](http://www.metrocouncil.org/environment/RiversLakes/Streams/Reports/97-99%20report.pdf))
11. MPCA. 2001. Minnesota River Basin Plan ([www.pca.state.mn.us/water/basins/mnriver/mnbasinplan.pdf](http://www.pca.state.mn.us/water/basins/mnriver/mnbasinplan.pdf))
12. MPCA. 2003. Minnesota's Impaired Waters – Report to the Legislature (<http://www.pca.state.mn.us/publications/reports/lrwq-s-lsy03.pdf>)
13. MPCA. 2003. Watershed Achievements – 2003 Annual Report to the U.S. Environmental Protection Agency on Clean Water Act Section 319 and Clean Water partnership Projects in Minnesota (<http://www.pca.state.mn.us/water/nonpoint/mplan.html>)
14. MPCA. 2002. Minnesota River Basin. Based on the 2002 305(b) Assessments of Stream Water Quality (Report to Congress of the United States) (<http://www.pca.state.mn.us/publications/reports/305b-stream-minnesota.pdf>)
15. MPCA. 2002. Minnesota River Basin. Based on the 2002 305(b) Assessments of Lake Conditions (Report to Congress of the United States) (<http://www.pca.state.mn.us/water/basins/305blake.html>)
16. Minnesota Rules Chapters 7050. Standards for Protection of Quality and Purity (<http://www.revisor.leg.state.mn.us/arule/7050/>)
17. MPCA Water Quality Standards (<http://www.pca.state.mn.us/water/standards/index.html>)
18. MNDNR. 2001. Community Monitoring of Metro Trout Streams (1998-2001)
19. City of Bloomington. 2002. Airport South District AUAR ([http://www.ci.bloomington.mn.us/cityhall/dept/commdev/planning/longrang/enreview/auar/images/main%20section/1\\_%20intro.pdf](http://www.ci.bloomington.mn.us/cityhall/dept/commdev/planning/longrang/enreview/auar/images/main%20section/1_%20intro.pdf))

20. Xcel Energy. 2003. Black Dog Generating Plant (NPDES permit #MN0000876). Thermal Discharge Assessment (316A Demonstration) Study Plan
21. Xcel Energy. Cooling Lake (Black Dog Lake) Environmental Study Report (NPDES Permit #MN0000876)
22. 2000-present. MAC. Minneapolis-St. Paul International Airport Monthly and Quarterly Discharge Monitoring Reports NPDES/SDS Permit MN0002101
23. 2000-present. MAC. Minneapolis-St. Paul International Airport Monthly Discharge Monitoring Reports NPDES/SDS Permit MN0065404
24. Carver County. 2000. Carver County 2000 - Water Quality Report
25. Carver County. 2000. Carver County Planning Study of Ravine and Bluff Areas Along the Minnesota River
26. Mendota Heights. 2003. Environmental Assessment Worksheet – The Bluffs
27. Savage. 1994. Alternative Urban Area-Wide Review and Fen Management Plan
28. Eagan. 2002. Nicols Fen, Kennealy and Harnack Creeks Project
29. Eagan. 2001. Cedar Grove AUAR
30. Chanhassen. 1996. Bluff Creek Watershed Natural Resources Management Plan
31. Chanhassen. Eagle Creek Corridor AUAR
32. Scott County. 2003. Comprehensive Water Resources Management Plan ([http://www.co.scott.mn.us/xpedio/groups/public/documents/web\\_files/ic\\_waterresourcesmgmtplanframe.html](http://www.co.scott.mn.us/xpedio/groups/public/documents/web_files/ic_waterresourcesmgmtplanframe.html))
33. Metropolitan Council. 1998. Regional Report. 1998 Study of the Water Quality in 70 Metropolitan Lakes

34. Metropolitan Council. 2001. Regional Report. 1998 Study of the Water Quality in 70 Metropolitan Lakes
35. Savage. 1996. Erosion Survey for the Credit River.
36. USACE. 2000. Dredged Material Plan (Minnesota River above I-35W Bridge)
37. Savage. 2002. Natural Community Inventory
38. NMCWD. 1996. Nine Mile Creek Watershed District Water Management Plan
39. RPBCWD. 1996. Riley-Purgatory Bluff Creek Water Management Plan
40. Savage. 1996. Comprehensive Water Resource Management Plan
41. Eagan. 1990. Stormwater Management Plan
42. Chaska. Stormwater Management Plan
43. GCLWMO. 1996. Gun Club Lake Watershed Management Plan
44. Chanhassen. 1994. Surface Water Management Plan
45. Carver. 2004. Surface Water Management Plan (in review)
46. Eden Prairie. 2004. Surface Water Management Plan
47. Carver County. 2001. Water Management Plan (<http://www.co.carver.mn.us/water/wmp.asp>)
48. Burnsville. 2001. Stormwater Management Plan (<http://www.burnsville.org/ftpfiles/wpstorm.pdf>)

49. Bloomington. 2000. Comprehensive Surface Water Management  
Plan <http://www.ci.bloomington.mn.us/cityhall/dept/pubworks/engineer/wetland/mgmtplan/mgmtplan.htm>

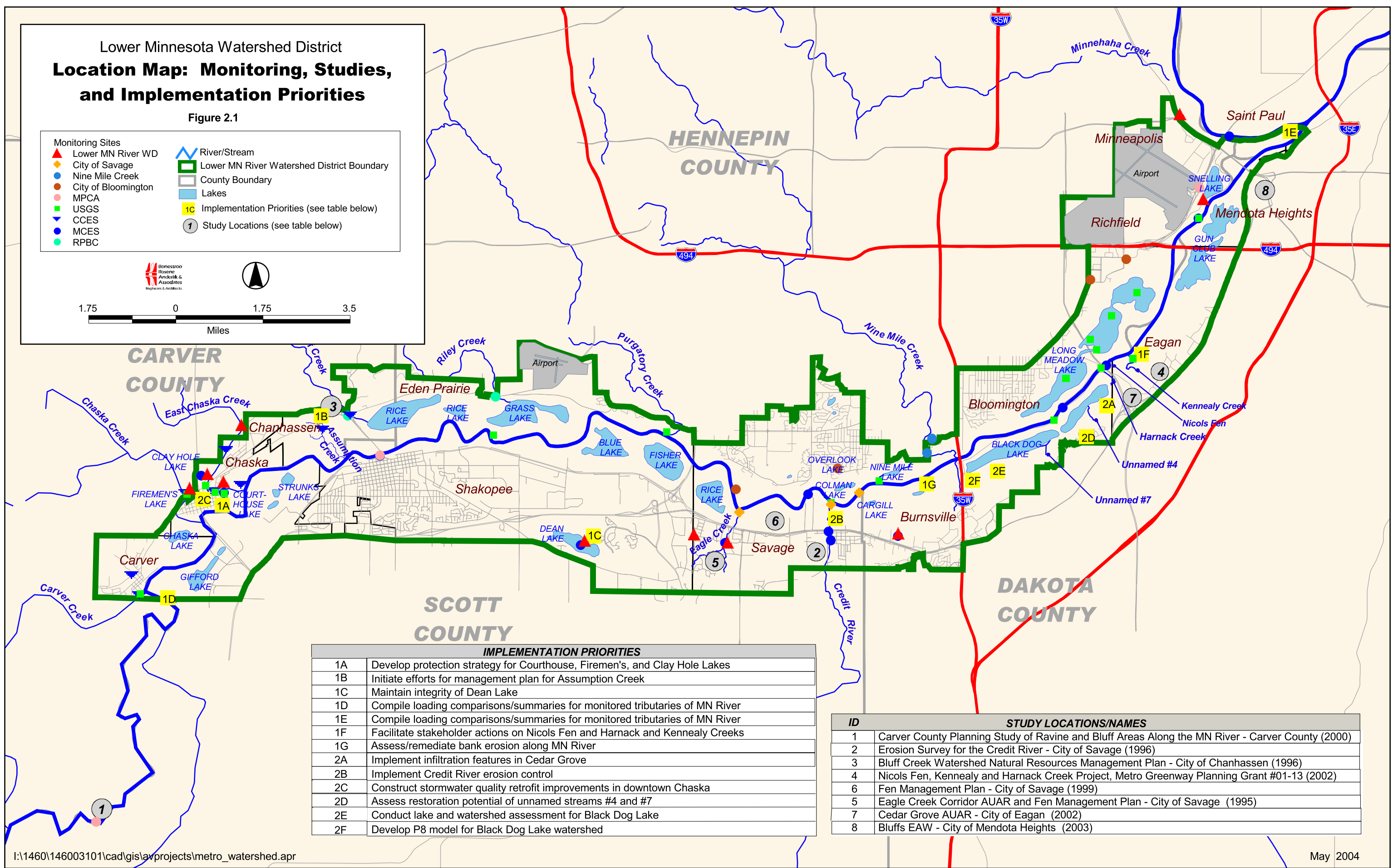
# Appendix E - List of Abbreviations

**LMRWD** – Lower Minnesota Watershed District  
**WMP** – Lower Minnesota Watershed District Water Management Plan  
**MPCA** – Minnesota Pollution Control Agency  
**PCA** – Minnesota Pollution Control Agency  
**USACE** – United States Army Corps of Engineers  
**MNDNR** – Minnesota Department of Natural Resources  
**MNDOT** – Minnesota Department of Transportation  
**MDA** Minnesota Department of Agriculture  
**MCES** – Metropolitan Council Environmental Services  
**Met Council** – Metropolitan Council  
**MRBDC** – Minnesota River Basin Data Center  
**BWSR** – Board of Water and Soil Resources  
**CCES** – Carver County Environmental Services  
**TCMA** – Twin Cities Metropolitan Area  
**WMOs** – Watershed Management Organizations  
**GCLWMO** – Gun Club Lake Watershed Management Organization  
**NMCWMD** – Nine Mile Creek watershed Management District  
**RPBWMD** – Riley-Purgatory Bluff Watershed Management District  
**PLSLWMD** – Prior Lake Spring Lake Watershed Management District  
**NPDES** – National Pollutant Discharge Elimination System  
**SDS** – State Disposal System  
**EAW** – Environmental Assessment Worksheet  
**AUAR** – Alternative Urban Area-Wide Review  
**WLA** Waste Load Allocation  
**NA** – Not Applicable  
**TP** – Total Phosphorus  
**Chl-a** – Chlorophyll-A  
**SD** – Secchi depth  
**WWTP** – Waste Water Treatment Plants  
**LID** – Low Impact Development  
**WOMP** – Watershed Outlet Monitoring Project  
**BMPs** – Best Management Practices

# Lower Minnesota Watershed District Location Map: Monitoring, Studies, and Implementation Priorities

Figure 2.1

- Monitoring Sites**
- ▲ Lower MN River WD
  - City of Savage
  - Nine Mile Creek
  - City of Bloomington
  - MPCA
  - USGS
  - ▼ CCES
  - MCES
  - RPBC
- Other Features**
- ▬ River/Stream
  - ▭ Lower MN River Watershed District Boundary
  - ▭ County Boundary
  - ▭ Lakes
  - 1C Implementation Priorities (see table below)
  - ① Study Locations (see table below)



IMPLEMENTATION PRIORITIES	
1A	Develop protection strategy for Courthouse, Firemen's, and Clay Hole Lakes
1B	Initiate efforts for management plan for Assumption Creek
1C	Maintain integrity of Dean Lake
1D	Compile loading comparisons/summaries for monitored tributaries of MN River
1E	Compile loading comparisons/summaries for monitored tributaries of MN River
1F	Facilitate stakeholder actions on Nicols Fen and Harnack and Kennealy Creeks
1G	Assess/remediate bank erosion along MN River
2A	Implement infiltration features in Cedar Grove
2B	Implement Credit River erosion control
2C	Construct stormwater quality retrofit improvements in downtown Chaska
2D	Assess restoration potential of unnamed streams #4 and #7
2E	Conduct lake and watershed assessment for Black Dog Lake
2F	Develop P8 model for Black Dog Lake watershed

ID	STUDY LOCATIONS/NAMES
1	Carver County Planning Study of Ravine and Bluff Areas Along the MN River - Carver County (2000)
2	Erosion Survey for the Credit River - City of Savage (1996)
3	Bluff Creek Watershed Natural Resources Management Plan - City of Chanhassen (1996)
4	Nicols Fen, Kennealy and Harnack Creek Project, Metro Greenway Planning Grant #01-13 (2002)
6	Fen Management Plan - City of Savage (1999)
5	Eagle Creek Corridor AUAR and Fen Management Plan - City of Savage (1995)
7	Cedar Grove AUAR - City of Eagan (2002)
8	Bluffs EAW - City of Mendota Heights (2003)