

# Le Sueur River Watershed Priority Management Zone Identification Project



**Minnesota Pollution Control Agency**

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**Minnesota Pollution Control Agency**

520 Lafayette Road North  
St. Paul, MN 55155-4194

Final Report Format  
Section 319 and Clean Water Partnership Projects or  
Final Progress Report for TMDL Development and TMDL  
Implementation Projects

**Grant Project Summary**

Project title: Le Sueur River Watershed - Priority Management Zone Identification Project

Organization (Grantee): Greater Blue Earth River Basin Alliance

Project start date: May 23,2011 Project end date: June 30, 2013 Report submittal date: 8-1-2013

Grantee contact name: Kay Clark Title: Administrative Coordinator

Address: 339 9<sup>th</sup> Street

City: Windom State: MN Zip: 56101

Phone number: 507-831-1153 Ext 3 Fax: 507-831-2928 E-mail: kay.clark@windomnet.com

Basin (Red, Minnesota, St. Croix, etc.): Minnesota County: Waseca Blue Earth, Faribault, Freeborn and

**Project type (check one):**

- Clean Water Partnership (CWP) Diagnostic
- CWP Implementation
- Total Maximum Daily Load (TMDL) Development
- 319 Implementation
- 319 Demonstration, Education, Research
- TMDL Implementation

**Grant Funding**

Final grant amount: \$84,403.37 Final total project costs: \$84,403.37

Matching funds: Final cash: \$0.00 Final in-kind: \$0.00 Final Loan: \$0.00

Contract number: CFMS No. B56179 MPCA project manager: Paul Davis

## For TMDL Development or TMDL Implementation Projects only

Impaired reach name(s): Le Sueur River; Unnamed creek (Little Beauford Ditch); Little Cobb River; Rice Creek; Maple River; Cobb River; Eagle (North) Lake; Elysian Lake and Madison Lake

AUID or DNR Lake ID(s): 07020011-501; 07020011-503; 07020011-504; 07020011-507; 07020011-531; 07020011-534; 07020011-556; 07020011-568; 07-0060-01; 81-0095-00; 07-0044-00

Listed pollutant(s): Acetochlor; Fish Bioassessments; Fecal Coliform; Oxygen, Dissolved; Escherichia coli; Nutrient /Eutrophication Biological Indicators

303(d) List scheduled start date: \_\_\_\_\_ Scheduled completion date: \_\_\_\_\_

*AUID = Assessment Unit ID*

*DNR = Minnesota Department of Natural Resources*

### Executive Summary of Project (300 words or less)

This summary will help us prepare the Watershed Achievements Report to the Environmental Protection Agency. (Include any specific project history, purpose, and timeline.)

The Minnesota Pollution Control Agency (MPCA) and Soil and Water Conservation Districts (SWCD) located in the Le Sueur watershed partnered to identify priority management zones (PMZ), for the purposes of water quality restoration and protection. As the MPCA has begun the Total Maximum Daily Load (TMDL) studies the surface waters in Minnesota on a watershed basis, it had become apparent that without local community support from landowners and residents our waters will not be restored and protected. As part of the TMDL study, the MPCA felt that acquiring the local landowner's perspective on water quality issues, erosion concerns, and the potential implementation needs to "fix" the concerns was required to obtain an accurate representation of the watershed.

The identification of the PMZs will be accomplished through the local application of SWCD/County staff using technical resources, including Geographic Information Systems (GIS) and watershed modeling, which defined areas contributing disproportionately to water quality concerns. The staff made efforts to contact community members from all areas in the watershed including urban residents, rural residents, lake association members, etc. to obtain as diverse of a perspective as possible on water quality concerns. Staff utilized initial contact methods such as, letters, phone calls, site visits, meetings, and local representatives (e.g. crop consultants) and then set up more extensive interviews from that point.

The goal of identifying the PMZs and performing the interviews was to determine the local perspective on water quality and have a "list" of programs or practices that local landowners believe would best work to reduce water pollution. It has come to many of the agencies in Minnesota that it will not be their actions that will ultimately restore our waters, but the work and actions of the community members who own and use the land that will restore and protect our waters.

### Goals (Include three primary goals for this project.)

Goal: Provide a geographically targeted set of land and water management strategies to improve water quality for use by agencies, organizations, landowners and citizens. We will engage landowners for input based on technical and local land use information that narrows focus of efforts that show potential for highest impact on water quality improvement.

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1 Objective Compile/Review Watershed Information at 12-digit Scale

2 Objective Landowner Consultation, Data Collection and Analysis

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**Results that count** (Include the results from your established goals.)

Blue  
Earth  
County Result: 101 contacts with 89 completing the interview process

Faribault  
County Result: 67 contacts with 4 completing the interview process

Freeborn  
County Result: 31 contacts with 20 completing the interview process

Waseca  
County Result: 107 contacts with 112 completing the interview process

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**Picture** (Attach at least one picture, do not imbed into this document.)

Description/location:

Please see attachment for photos.

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**Acronyms** (Name all project acronyms and their meanings.)

GBERBA	Greater Blue Earth River Basin Alliance
PMZ	Priority Management Zones
GIS	Geographic Information System
TMDL	Total Maximum Daily Load
HUC	Hydrologic Unit Cod
AgBMPs	Agricultural Best Management Practices
BMPs	Best Management Practices
TISWA	Tailored Integrated Stream Watershed Assessment
CWF	Clean Water Fund
LGU	Local Governmental Unit
RFP	Request for Proposal
SWCD	Soil and Water Conservation District
MPCA	MN Pollution Control Agency
BWSR	Board of Water and Soil Resources
UofM	University of Minnesota
NRCS	Natural Resources Conservation Service
MDA	MN Department of Agriculture
MDH	MN Department of Health
DNR	Department of Natural Resources
USF&WS	US Fish and Wildlife Service
MSU-WRC	Minnesota State University –Water Resource Center
CRP	Conservation Reserve Program
EQIP	Environmental Quality Incentive Program
HUC	Hydrologic Unit Code

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**Partnerships** (Name all partners and indicate relationship to project)

Greater Blue Earth River Basin Alliance	Joint Powers Board Organization
Blue Earth, Faribault, Freeborn and Waseca Soil and Water Conservation Districts and Counties.	Project Partners
MN Pollution Control Agency	Grant Holder
MN Department of Agriculture	

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## Main Body Report

### Section I – Work Plan Review

- ✓ Briefly outline any approved changes from the original work plan, staff, or participating organizations.  
Through this process, there were no formal changes, but offices did have issues with completing the tasks at hand in the appropriated amount of time.
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- ✓ Please list and give a brief report on each activity/task identified in your work plan (Attachment A of the 319 Grant Agreement, contract, or work order) or most recently approved work plan amendment. For each task, briefly summarize the activities completed and describe any problems, delays, or difficulties that have occurred in completing the project work. Explain how problems were resolved or list any activities that were not completed

## **Objective 1 Compile/Review Watershed Information at 12-digit Scale**

### **Project Partner Tasks:**

#### **Task A. Develop Site Specific Materials for Landowners/Stakeholders**

##### **Sub Task 1: Develop contact strategies to disseminate information**

##### **Sub Task 2: Distribute materials to landowners and interested parties**

### **Blue Earth County**

Landowners were contacted for interviews based on professional judgment, other landowner contacts, and the County Water Management Plan 2008-2013. Interview questions were developed to disseminate landowner information and asked at each interview. This provided reasonable and consistent answers gathered at the interviews that could be easily summarized.

### **Faribault County**

Landowners were not chosen based on a one-on-one interview process, as the staff thought it more helpful to target landowners and operators they were currently working with on conservation programs and practices. A folder of handouts was developed by the staff at the office containing information about practices, programs, and other information that was handed out to 4 interviewees and at some organizational meetings hosted by local clubs.

### **Freeborn County**

Landowners and operators were selected locally through multiple sources, three local experts including a long time SWCD employee, and SWCD Supervisor (Nominating District in watershed) and the County Feedlot Officer. A list of interview questions pertaining to subjects such as general questions related to overall water quality, concerns, causes of impairments to farm/operator specific questions that went into concerns on their land, their interest in conservation programs and BMPs to opinions regarding tiling, nutrients, and livestock. While staff was not able to get through all of the interview questions that were drafted and interviews were taking quite a bit of time, they were able to glean a lot of detailed information from their interviews. Staff developed handouts and kept them on hand, but only passed out pertinent handouts specific to what the interviewee was interested in.

### **Waseca County**

Landowners were contacted initially by phone to set up interviews. A set of pre-determined interview questions was developed by the staff to ask during the interview sessions. This provided reasonable and consistent answers gathered at the interviews that could be easily summarized.

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## **Objective 2 Landowner Consultation, Data Collection and Analysis**

### **Project Partner Tasks:**

#### **Task A. Landowner Contacts**

**Sub Task 1: Distribute educational materials to landowners for watershed goals and activities**

**Sub Task 2: County level (one-on-one) contacts with landowners to discuss critical area identification and implementation strategies**

**Sub Task 3: Identify planning and assessment opportunities and eligibility in conservation programs working with local landowners and operators**

**Sub Task 4: Build relationships through individual contacts and listening sessions with interested parties to assess the needs of the participants**

**Sub Task 5: Identify practices and economic needs to further implementation through conversations, personal meetings and focus groups**

**Sub Task 6: Communicate through meetings and individual contacts to involve other organizations working with farmers**

#### **Blue Earth County**

A one-on-one interview process was chosen with interviewees helping to identify conservation opportunities, level of interest and costs associated with practice implementation.

The main concerns that individuals referenced were more vegetation was needed which was related to long term conservation programs (64 out of 89). Conservation buffer strips along waterways was the most commonly suggested practice (38 out of 89). Individuals also indicated a need for more water retention projects to reduce flooding and erosion (26 out of 89). A small portion felt the need for physical conservation structures should or could be installed in the watershed (19 out of 89) and half of these individuals have previously installed this type of practices. Sixteen responses referred to the need for more drainage practices such as controlled drainage and two-stage ditches. Three responded that more tile drainage was needed to improve water quality. Twenty-six recommended either lakeshore or river projects. Nine responded to the need to address urban stormwater with retention and landscaping.

#### **Faribault County**

Chose not to use the one-on-one interview approach but instead used the format already established with ongoing conversations with landowners that are currently working with their office. Faribault chose to use the Redetermination of Benefits meetings with county landowners to be their open forum for discussion.

A resources used during the ROB meetings was the new County Drainage Engineer who was a liaison between landowners, contractors, outside engineering firms, ditch viewers, and the Drainage Authority.

It was noted that civic engagement is critical however, Faribault County lacks a large recreational resources such as the MN River. There are hopes that once landowners take ownership of the water that leaves there land these opportunities will open up.

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## **Freeborn County**

Utilized the one-on-one interview process in which they provided the landowners maps of their property which helped to illustrate the flow of water over their land. After explaining the TMDL process to the landowner a discussion was formed around a list of survey questions. Certain topics and issues were anticipated, based on previous staff knowledge, and several different handouts were brought to help explain the practices and programs these individuals were interested in. The interview process identified thirty-nine potential BMP projects through the course of twenty interviews. A majority of the identified projects included water and sediment control basins, grass waterways, side inlets and inlet filters, cover crops and filter strips. The list of practices has been shared with NRCS for both EQIP and CRP as well as shared with GBERBA.

## **Waseca County**

Utilized the one-on-one interview process prospective interviewees were contacted by phone to set up the interview. At times the individuals invited additional participants to the interviews. Organizations and clubs were contacted with a request to attend their meetings to get out the information and find additional contacts. Nearly all interviewed were in favor of riparian buffers. In addition, interest in establishing native plants along urbanized lakeshore. Some suggested that more water retention is needed to reduce flooding and sediment transport. Individuals with ties to lake associations tended to emphasize in-lake issues such as nuisance growth of aquatic plants and invasive species.

## **Objective 2 Landowner Consultation, Data Collection and Analysis**

### **Project Partner Tasks:**

#### **Task B. Compilation of Information for Priority Management Zone Identification**

**Sub Task 1: Describe watersheds from the local perspective including maps, figures and narrative**

**Sub Task 2: Description of how key landowners were identified or selected**

**Sub Task 3: Summary of landowner/operator contacts and lessons learned by individual contact discussions**

**Sub Task 4: Identification of Priority Management Zones or conservation opportunities based on the project partners professional judgment and review of critical area and Stressor ID work**

**Sub Task 5: Summary of conservation opportunities identified and the level of interest and costs associated with the implementation**

**Sub Task 6: Provide list of practices targeted to the Le Sueur River landowners, local governments and agencies to begin implementation goals**

## **Blue Earth County**

Priority management zones were identified using professional judgment, landowner contacts, the County Water Management Plan 2008-2013, and information on the Le Sueur River watershed available from the MPCA website.

The following priority management zones and conservation opportunities were identified: Lakes; Urban development; Highly erodible land (Knick zone, Near channel erosion – ravines and bluffs, Uplands – highly erodible cropland and gullies); Water retention and wetland restoration (drainage).

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PRACTICE	AVERAGE COSTS (Estimated Range/Program Payment)
<b>VEGETATION</b>	
<b>Filter Strip:</b> A strip or area of herbaceous vegetation situated between cropland, grazing land, or distributed land (including forest land) and environmentally sensitive areas.	\$450 - \$600 per Acre
<b>Grassed Waterway:</b> A shaped or graded channel that is established with suitable vegetation to carry surface water at a non-erosive velocity to a stable outlet.	\$2.50 - \$6.00 per Ln Ft
<b>Tree planting:</b> Establishing woody plants by planting seedlings or cuttings, direct seeding, or natural regeneration to provide erosion control, reduce pollution of air or water, provide or enhance wildlife habitat, to provide energy conservation, to uptake water or nutrients, and other purposes.	\$500 - \$1000 per Acre
<b>Reinvest In Minnesota (RIM):</b> The RIM Reserve program compensates landowners for granting conservation easements and establishing native vegetation habitat on economically marginal, flood-prone, environmentally sensitive or highly erodible lands. The program protects the state's water and soil resources by permanently restoring wetlands, adjacent native grassland wildlife habitat complexes and permanent riparian buffers.	\$5,400 - \$5,700 per Ac for Cropland \$3,200 - \$3,400 per Ac for Non Crop
<b>Conservation Reserve Program (CRP):</b> CRP is a voluntary program that helps agricultural producers safeguard environmentally sensitive land. CRP participants plant long-term, resource-conserving covers to improve the quality of water, control soil erosion, and enhance wildlife habitat. In return, the participants receive a rental payments and cost-share assistance. CRP contracts are 10 to 15 years in duration.	\$180 - \$275 per Acre
<b>Wildlife food plots:</b> Establishes a variety of plants to provide a reliable food source for wildlife. Wildlife food plots can also improve water quality by reducing soil erosion.	\$200 - \$400 per Acre
<b>STRUCTURES</b>	
<b>Grade Stabilization Structure:</b> A structure used to control the grade and head cutting in natural or artificial channels. Used to halt the advance of gullies and reduce soil erosion.	\$5,300 - \$29,500 Each
<b>Terrace:</b> An earth embankment, or a combination ridge and channel constructed across the field slope.	\$2.00 - \$4.50 Ft
<b>Water &amp; Sediment Control Basin:</b> An earth embankment or a combination ridge and channel generally constructed across the slope and minor watercourses to form a sediment trap and water detention basin.	\$6.00 - \$46.00 Ln Ft
<b>Diversion:</b> A channel constructed across the slope with a supporting ridge on the lower side	\$9.00 - \$88.00 per Ln Ft
<b>Lined Waterway or Outlet:</b> A waterway or outlet having an erosion-resistant lining of concrete, stone, or other permanent material.	\$1.50 - \$6.00 Sq Ft
<b>WATER RETENTION</b>	
<b>Sediment Basin:</b> A basin constructed with an engineered outlet, formed by an embankment or excavation or a combination of the two.	\$2.00 - \$5.00 Cu Yd
<b>Pond:</b> A water impoundment made by constructing a dam or an embankment	\$4.50 - \$7.00 Cu Yd

## **Faribault County**

Landowners and operators were chosen based on current project participation in conservation programs. Information was compiled on current conservation programs and funding opportunities and distributed to interested parties during landowner meetings.

Faribault feels that is not really the method or the agency that is asking us to work with landowners and collect information, because it is usually only for collecting for that specific day, or for that specific reach, or for that specific period. It is really about being able to gain the trust and understanding of our landowners and operators by providing them with a targeted, manageable, and prioritized process that will work to get the landowners involved and committed. Until we achieved this, are we simply just spinning our wheels?

It is also important to understand that maybe we need to collect the data, gather up the funding opportunities, and wait for them to come to the realization that their land is missing that element of conservation. For Faribault County, that is why we have chosen the drainage watershed scale to be the most effective in regard to the number of landowners, acres of land, current workload capacity, and continued shortage of technical and administrative funding.

We feel that through the PMZ process for the Le Sueur, we were able to add additional educational components and opportunities in regard to practices and data collected through current studies, alternative practices, etc. to our landowner informational meetings.

Faribault County will continue to collect and distribute data as we find to be effective, which is drainage system watershed by drainage system watershed.

## **Freeborn County**

Landowners and operators were selected locally through multiple sources, three local experts including a long time SWCD employee, and SWCD Supervisor (Nominating District in watershed) and the County Feedlot Officer. Each wrote a list of 10-35 names, duplicates were chosen first.

Priority management zones were identified using Dr. David Mulla's GIS layer that identified potential ravine and gully erosion issues.

During the interview process each individual was given the option to nominate another participant into the program.

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Practice:	Estimated Cost:	Cost Share Opportunity(s):
WASCOB (w/ support tile)	\$4000 each	75% cost share from EQIP, State Cost Share, GBERBA, or grant funding
Grassed Waterway (w/ support tile)	\$2250 each (assuming 500' long and 40' wide)	90% cost share through CRP plus annual rental rate (0.5 acre X \$220/acre X 10 years = \$1100). 75% cost share from EQIP, State Cost Share, GBERBA, or grant funding
Side Inlet	\$2000 each	75% cost share through EQIP, State Cost Share, GBERBA, or grant funding
Filterstrips & Side Inlet Filters	\$200/acre installation cost	90% cost share through CRP plus annual rental rate (1 acre X \$220/acre X 10 years = \$1100). Possible additional incentive from GBERBA or grant funding
RIM Buffer	\$400/acre installation cost	100% cost share through RIM. \$5600/acre payment to landowner in exchange for easement
Cover Crop	\$40/acre installation and termination cost	75% cost share through EQIP or grant funding
Drainage Water Management	Unknown	75% cost share through GBERBA
Manure Storage	Unknown/variable costs	75% cost share through EQIP or grant funding
Grade Stabilization	\$60,000 – 80,000 each for these specific projects	100% cost share through EQIP and GBERBA
Feedlot Roof Runoff (Gutters)	\$3000 each (\$15/foot X average 200ft/barn)	75% cost share through State cost share or EQIP

## Waseca County

Attempted to get a cross section of county residents that included farmers and other rural landowners, city and county employees, conservation club members, agricultural business staff, lake association members and others. Through this process several interviewees invited other participants to join in the program. Club organizations members were encouraged to participate.

The majority of the landowners interviewed described themselves in a variety of ways as being positive, active or doing a good job with soil and water conservation. Most thought they had installed watershed-impacting practices (waterways, sediment basins and terraces) at an adequate level and were not in immediate need of any additional program information.

The SWCD, however, sees more importance in the following concepts:

-Upland water storage basins for tile and surface runoff

Cost: \$4,000/acre including excavation and vegetation establishment

-Enhancing the function of existing drained reed canary wetlands to retain additional water

-Streambank stabilization and stream channel restoration and enhancement

Cost: vegetative bank revetment approximately \$100 - \$150 per foot.

-Floodplain enhancement

Cost: floodplain easements cost a high percentage of the value of the underlying property.

These concepts are somewhat non-traditional and we did not hear much about them from interviewees, who were by and large more familiar with the traditional waterway, terrace and sediment basin practices. Buffers have been widely promoted and the buffer concept has clearly been adopted by constituents, as we heard about it repeatedly during interviews.

What we did not hear might be as important as what we did hear, however, and it is apparent that we need to instill a new and innovative functional-watershed vision.

Our recommendation is to fund these initiatives at a minimum of a meaningful demonstration level. Two or three stream demonstrations across the county landscape would cost \$100,000 each; 100 acres of strategic wetland features would cost \$400,000; several floodplain easements could be purchased for \$2 million.

### **Objective 3 Project Administration**

#### **Project Partner Tasks:**

##### **Task A. Track Project Expenditures**

**Sub Task 1: Compile invoices from individual counties**

**Sub Task 2: Reimbursements to Counties**

Invoices were collected from all four counties involved in the PMZ interviews and reimbursements were delivered accordingly.

### **Objective 3 Project Administration**

#### **Project Partner Tasks:**

##### **Task B. Required Reporting**

**Sub Task 1: Collect County Information**

**Sub Task 2: Prepare semi-annual report information**

**Sub Task 3: Prepare final report information**

All County information was collected by GBERBA and all reporting was completed as directed by the deadlines.

## **Section II**

*For TMDL Development Projects describe the work products of the contract, such as a written TMDL or technical report, data files, maps, and any other attachments that were produced by the project.*

- ✓ **Measurements:** Please describe your evaluation plan and its results.
  - What tools did you use, what methods did you use to gather information?
  - If you did a survey, what was the sample size and what was the response rate, how did you analyze the results, evaluate the monitoring data, etc.?
  - If you have measurable environmental results, such as pounds of chemicals reduced, best management practices installed, pollutants prevented, waste eliminated, changes in water quality, resources conserved, etc., also include those here.

This information was presented above and is listed in depth in each Counties Summary which are attached.

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**Products:** Please list, and attach copies of any documents or products that have been produced during the reporting period, including monitoring data (if applicable, including the electronic summary of all data for the STORET data base), brochures, articles, special reports, tapes, CDs, etc. Provide relevant project photographs.

**Note about photos:** Photos may be scenes of the water resource in question and/or may illustrate installations, Best Management Practices (BMPs), or other measures that help show what the project accomplished. **Attached electronic files (e.g. JPGs) are preferred.** For questions about photos, please contact your regional MPCA Public Information Officer or Jennifer Groebner at 651-296-7706.

**Note for TMDL development projects and TMDL implementation projects:** All project monitoring data must be approved in the federal STORET data system and all best management practices implementation activities must be inputted into the state eLINK system before the final report will be approved and final project payment will be made.

- ✓ **Public outreach and education:** If part of your work plan, please evaluate the effectiveness of public participation and education plans for the project. Also, include the total numbers from project outreach and education activities, such as number of people reached, educational materials distributed, workshop participants, etc.
- ✓ **Long-term results:**
  - Do the results of this project build capacity that can increase the likelihood of long-term outcomes, such as:
    - § environmental problems identified or understood  
Where this landowner survey was performed by permanent watershed conservation staff, invaluable connections are made with local landowners. The chance to sit down on a one-on-one basis leads to a better understanding and trust by both parties. This trust leads to more watershed cooperation and projects on the land.
    - § land use changes in the watershed  
In the interview process wide support for perennial vegetation was expressed. Landowners expressing views in support of buffers to conservation staff are more likely to be open to opportunities when other programs are available.  
Blue Earth – Virtually everyone responding to the survey thought a 50 foot grass buffer or similar should be in place along streams and ditches.  
Waseca – Virtually all of those interviewed were in favor of riparian buffers.
    - § recommendations created  
Faribault – Simply put we must have a manageable plan. Those landowners that have always been passionate and conservation minded, will continue to do so, and will not expect anything in return. This is a very limited group. On the other hand, there will continue to be a much larger group that will only decide change is important when these considerations are forced on them in the form of regulation. Is this right? Which group do we focus on? The hope is that these and many other questions will be able to be answered through this effort by the PCA. In the mean time, Faribault County will continue to collect and distribute data as we find to be effective, which is drainage system watershed by drainage system watershed.  
Freeborn – If this were done again they would prefer to target on the HUC8 level as the Le Sueur was completed. At a HUC12 scale there would be a lot of producers that have some land inside and some land outside of the watershed. This occurs at the HUC8 level but would be much more prevalent at a HUC12 scale. From an agency perspective it is easier

to advertise a program or an opportunity on a larger scale. Also, believe there would be a lot of confusion on the part of the landowner at a HUC12 scale as well.

§ consensus for action created

After reviewing all survey information, the most well thought out process for the Le Sueur PMZ was the Freeborn model. A large number of landowners were surveyed and it was completed by an individual that had a stake in the information collected. Relationships were strengthened and projects will be forthcoming.

§ increased ability to solve similar problems in the future, etc.?

Freeborn – Learned something from each interview and found that each interview had value. It could have been some particular insight on a specific topic, and identified potential BMP, or learning about a person's personality. Some of the topics came up in several interviews but there was always something new as well. This process is something I hope to continue during future watershed work.

○ Did you form new partnerships or alliances as a result of the project? If so,

§ What longer-term impact will this have on the project?

MPCA will use this information when moving on toward the next PMZ process, one of which will be the Watonwan Watershed. Using this information will help to show what processes have worked and how we can get the best results and ultimately put more conservation on the land.

§ What future efforts are anticipated as a result of the partnership(s)?

Freeborn - The interview process identified 39 potential BMP projects through the course of 20 interviews.

One-on-one alliances can often be the most important ones made.

§ Describe any activities you are aware of by others that benefited from the results of your project and/or resulted in implementation of similar projects in other locations.

The Le Sueur Priority Management Zone Identification Project interviews and summary reports have been read by the Coordinators and staff of the Greater Blue Earth River Basin Alliance. This information will benefit greatly in the efforts being initiated in the Watonwan River TMDL project.

○ Is there a plan to continue the project beyond the end date of the grant agreement or contract? If so, explain.

This PMZ process has been completed but information will be moved on to the Assessment and then the Implementation Plan creation by MPCA.

○ Describe how you shared the results of your project. List any information or technology transfer and dissemination (newsletters, web sites, training, reports, disseminated project activities, accomplishments, and lessons to the general public). Where and to what audiences have you made presentations?

Each of the counties contributing to the process will be given the information from the other participating counties; also the GBERBA Coordinators have been given the information and along with the Watonwan Watershed Technician. All of this information will be used in the Watonwan PMZ process that has just started. Also this information will be discussed at several GBERBA Technical Committee meetings, bringing forth good discussion and the generation of new ideas and thoughts about the PMZ process and helping to streamline and produce an even better outcome for the next watershed. Also this will enable additional agency personnel (DNR and BWSR) to have input on the process.

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- What other audiences (media, businesses, other agencies, etc.) would be most interested in the results of this project?

The Natural Resources Conservation Service and Farm Service Agency offices in the respective counties will have more conservation projects as a result of the landowner interviews. Most of the potential BMPs that have a 'high probability of being installed' (Freeborn) qualify for the CRP or EQIP programs.

- Please describe any lessons learned during this project that would be valuable for future projects, even if the project didn't succeed as expected. What other recommendations or advice would you make for future activities related to this priority project area?

Freeborn – This PMZ project came at a difficult time for the SWCD in terms of being able to devote staff time to it. It had a more than ample timeframe but at the beginning of the timeframe we were working on projects that had a higher priority. When the timeframe was coming to an end this project became a high priority. This left other areas of our job understaffed such as surveying and design of BMPs. The irony of this project is that we were going out to drum up more business while we have an existing list of projects that are not being worked on. Some other districts hired contractors to do this work and this may have been an option for us as well. However, we saw value in having our own staff build relationships with local producers and tried to make the best impression we could.

- Please provide any feedback or suggestions that you would like to share with the MPCA to improve their grant programs.

Beings this process is a work in progress and is being done in several watersheds across the state; I believe the best information gathering techniques should be distributed to others working through this process.

In addition, it may be a good idea to take one or two people involved (from each watershed) and bring them together from across the state for a round table discussion. In this way you can learn the good and the bad about the process and make that available on the web or as a webinar to the next watershed participants in the PMZ process.

### Section III

- ✓ **Final Expenditures:** Projects should use the format they used in their work plan for the budget report on the final expenditures. This should list the tasks or activities outlined in their original (or amended) work plan.

**MPCA Final Report – Itemized Project Budget – June 30, 2013 is in Appendix A.**

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# MPCA Project Budget-Expenses

MPCA Project Budget and Expenditure Report

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Project Name: LeSueur River Watershed Priority Management Zone

June 30, 2013

Cost Category	Unit Cost	Unit Type	# of units	I. Match Cash	II. Contract Budget	III.A.	III.B.	III.C.
						Year 1 (2011) Jan 1 - Dec 31 Expended	Year 2 (2012) Jan 1 - Jun 30 Expended	Year 2 (2012) Jul 1 - Dec 31 Expended
<b>OBJECTIVE 1 - Compile/Review Watershed Information at 12-Digit Scale:</b>								
<b>A Develop Site Specific Materials for Landowners/Stakeholders</b>								
Tasks 1 - 2								
SWCD's								
Contact Strategies/Distribute materials	7.50	/contact	/ 306 hrs.		2,295.00	0.00	0.00	0.00
<b>OBJECTIVE 1 - TOTAL</b>					<b>2,295.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
<b>OBJECTIVE 2 - Landowner Consultation, Data Collection and Analysis</b>								
<b>A Landowner Contacts by SWCD's</b>								
Tasks 1-2 Distribute Materials/Contacts								
Estimate 7.5hr/contact X 306 Contacts	25.00	/hr.	/ 2,295 hrs.		57,375.00	0.00	0.00	0.00
Mileage - Est: 306 contact/30 miles avg round trip								
Estimate 7.5hr/contact X 306 Contacts	0.51	/mile	/ 9,180 miles		4,681.80	0.00	0.00	0.00
Tasks 3-4 Palnning/assessing practice participation								
Estimate 15.75hrs/34 HUC's	25.00	/hr.	/ 535 hrs.		13,375.00	0.00	0.00	0.00
Tasks 5-6 Group/organization communication								
Est: 6.75hrs/34 HUC's	25.00	/hr.	/ 230 hrs.		5,750.00	0.00	0.00	0.00
<b>B Compilation of Information for Priority Management Identification</b>								
Task 1 Describe watershed								
Task 1 Describe watershed	25.00	/hr.	/ 136 hrs.		3,400.00	0.00	0.00	0.00
Tasks 2-3 Describe & summarize landowner contact information								
Tasks 2-3 Describe & summarize landowner contact information	25.00	/hr.	/ 272 hrs.		6,800.00	0.00	0.00	0.00
Task 4 Identification of Priority Management Zone								
Task 4 Identification of Priority Management Zone	25.00	/hr.	/ 204 hrs.		5,100.00	0.00	0.00	0.00
Task 5-6 Summary of opportunities /List of target practices								
Task 5-6 Summary of opportunities /List of target practices	25.00	/hr.	/ 68 hrs.		1,700.00	0.00	0.00	0.00
Materials								
Materials	80.00	/HUC	/ 34 HUC		2,720.00	0.00	0.00	0.00
<b>OBJECTIVE 2 - TOTAL</b>					<b>\$ 100,901.80</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>
<b>OBJECTIVE 3 - Project Administration:</b>								
<b>A Track project Expenditures</b>								
Task 1-2 Compile invoicing/Reimbursements								
Task 1-2 Compile invoicing/Reimbursements	25.00	/hr.	/ 50 hrs.		1,250.00	0.00	0.00	200.00
<b>B Required reporting</b>								
Task 1-3 Semi annual/Final reporting								
Task 1-3 Semi annual/Final reporting	25.00	/hr.	/ 30 hrs.		750.00	250.00	0.00	50.00
<b>OBJECTIVE 3 - TOTAL</b>					<b>2,000.00</b>	<b>250.00</b>	<b>0.00</b>	<b>250.00</b>
<b>GRAND TOTAL</b>					<b>\$ 105,196.80</b>	<b>\$ 250.00</b>	<b>\$ -</b>	<b>\$ 250.00</b>

**Project Name: LeSueur River Watershed Priority M:**

Cost Category	III.D. Year 3 (2013) Jan 1 - Jun 30 Expended	IV. Cumulative Expend. (III.A. thr H.)	V. Budget Balance (IV - II)
<b>OBJECTIVE 1 - Compile/Review Watershed</b>			
A Develop Site Specific Materials for Landowners/Stakeholders Tasks 1 - 2 SWCD's Contact Strategies/Distribute materials	2,212.50	2,212.50	82.50
<b>OBJECTIVE 1 - TOTAL</b>	<b>2,212.50</b>	<b>2,212.50</b>	<b>82.50</b>
<b>OBJECTIVE 2 - Landowner Consultation, Identification of Landowner Concerns</b>			
A Landowner Contacts by SWCD's Tasks 1-2 Distribute Materials/Contacts Estimate 7.5hr/contact X 306 Contacts Mileage - Est: 306 contact/30 miles avg round trip	43,500.00	43,500.00	13,875.00
Tasks 3-4 Planning/assessing practice participation Estimate 15.75hrs/34 HUC's	3,415.30	3,415.30	1,266.50
Tasks 5-6 Group/organization communication Est: 6.75hrs/34 HUC's	13,373.75	13,373.75	1.25
B Compilation of Information for Priority Management Identification Task 1 Describe watershed	5,747.50	5,747.50	2.50
Tasks 2-3 Describe & summarize landowner contact information	2,828.00	2,828.00	572.00
Task 4 Identification of Priority Management Zone	5,393.32	5,393.32	1,406.68
Task 5-6 Summary of opportunities /List of target practices Materials	3,362.00	3,362.00	1,738.00
	1,459.00	1,459.00	241.00
	1,112.00	1,112.00	1,608.00
<b>OBJECTIVE 2 - TOTAL</b>	<b>\$ 80,190.87</b>	<b>\$ 80,190.87</b>	<b>\$ 20,710.93</b>
<b>OBJECTIVE 3 - Project Administration:</b>			
A Track project Expenditures Task 1-2 Compile invoicing/Reimbursements	1,050.00	1,250.00	0.00
B Required reporting Task 1-3 Semi annual/Final reporting	450.00	750.00	0.00
<b>OBJECTIVE 3 - TOTAL</b>	<b>1,500.00</b>	<b>2,000.00</b>	<b>0.00</b>
<b>GRAND TOTAL</b>	<b>\$ 83,903.37</b>	<b>\$ 84,403.37</b>	<b>\$ 20,793.43</b>

Appendix B  
Blue Earth County Perspective  
Description of Le Sueur River Watershed

# Description of Le Sueur River Watershed – Blue Earth County Perspective

Prepared by Blue Earth County and the Soil and Water Conservation District  
July 2013

The *Blue Earth County Comprehensive Water Management Plan 2008-2015* is the basis for much of this description of the Le Sueur River watershed. Local observations and new information about the watershed was incorporated into the County Water Management Plan. Work in the watershed by the National Center for Earth Surface Dynamics (NCED) has provided the most descriptive information of use to the county as we move forward to improve water quality in the Le Sueur River watershed.

This description of the Le Sueur watershed in Blue Earth County was prepared by county and SWCD staff using a number of existing sources:

*Blue Earth County Comprehensive Water Management Plan 2008-2015*  
<http://www.blueearthcountymn.gov/index.aspx?NID=361>

*An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011* <http://www.pca.state.mn.us/index.php/view-document.html?gid=16202>:

*Le Sueur River Watershed Monitoring and Assessment Report March 2012*  
<http://www.pca.state.mn.us/index.php/view-document.html?gid=17609>

## OVERVIEW

As stated on page 11 of *An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011*, <http://www.pca.state.mn.us/index.php/view-document.html?gid=16202>:

“The Le Sueur River is one of the heaviest contributors of sediment to the Minnesota River. Although some portion of that high suspended sediment load is very likely due to land use management in the watershed, the Le Sueur also appears to be naturally predisposed to relatively high sediment loads due to its fine-grained substrate and ongoing vertical incision in the lower 35 km of the river network, which has resulted in an anomalously steep gradient, or knick zone, in the lower reaches of the river. Knickpoints are expressed as slope discontinuities evident on all three major branches of the river, and they have propagated approximately 35-40 km upstream from the Minnesota River on each branch.”

In the summary of water chemistry trends in *Le Sueur River Watershed Monitoring and Assessment Report March 2012*, it states that “transparency was seen to be increasing in three of six stream reaches where there was enough data available to calculate trends.” The three stream reaches where transparency was increasing are in the knick zone, including “the LeSueur River in Wildwood Park, 2.75 mi N of St. Clair; the Maple River at CSAH 35, 5.2 mi S of Mankato; and the Maple River 0.9 MI SE of Good Thunder.”

The Le Sueur River watershed landscape within Blue Earth County varies considerably. Knickpoints and the knick zone downstream of knickpionts are defining features in the Le Sueur watershed and are located within Blue Earth County. Within the knick zone are the lower reaches of the LeSueur River, Cobb River and Maple River there are notable differences when compared with other areas in the watershed:

- Most highly erodible soils are in the knick zone
- Most ravines are in the knick zone

- Most bluffs are in the knick zone
- Most forested areas are in the knick zone
- Most scenic areas are in the knick zone
- More fishing areas are in the knick zone
- Most densely populated and only area with growing population is in the watershed within and draining to the knick zone
- Most urban type of development is within and in watershed containing the knick zone
- Most potential aggregate resources are in the knick zone
- Very high geologic sensitivity rating in the knick zone
- Most flowing wells in the knick zone

### **BLUE EARTH COUNTY WATER MANAGEMENT PLAN 2008-2015 - PRIORITY CONCERNS**

The Blue Earth County Water Management Plan 2008-2015 describes the county's priority water concerns. Priority concerns were identified by county residents in meetings and in a written survey. Soil erosion was the highest ranked priority concern in the county.

#### **Written Survey**

A written survey was mailed to all Township officials, City officials, City and County Planning Commission members, and citizen committees. A total of 224 survey forms were mailed. Of the 224 surveys mailed, 100 (45%) were returned. This included 110 surveys to municipal officials/citizens with 46 returned (42%), and 114 surveys to Township officials/citizens with 54 returned (47%). When describing where they live, 46% of those returning the survey were city residents, "farmers" 27%, "hobby farmers" 14%, and other rural residents 13%. The average number of years the respondents have lived in Blue Earth County was 37 years.

#### Survey Results Ranking Priority Concerns

Survey respondents were asked: *What do you think are the four most important water quality issues Blue Earth County should address in the next five years?"*

The four water quality issues most often selected as a priority concern were:

1. Soil Erosion – eroding stream banks – agricultural farm fields
2. Ground and Drinking Water – safety
3. Fertilizers and Pesticides Farms - Run off and over-application
4. Fertilizer and Pesticides in Cities – Run off and over-application

A complete list of the overall priority ranking and number of responses:

1. Soil Erosion (56)
2. Ground water and drinking water (54)
3. Fertilizer and pesticides from farms (53)
4. Fertilizer and pesticides in Cities (51)
5. Feedlots and livestock (43)
6. Urban development and run-off (37)
7. Septic systems (34)
8. City wastewater treatment (14)
9. Flooding or high water (13)

### **GENERAL DESCRIPTION OF THE LE SUEUR RIVER WATERSHED AND BLUE EARTH COUNTY**

Blue Earth County is located in south-central Minnesota approximately 75 miles southwest of the Twin Cities. The county is 764 square miles in area and had a population of 64,013 in 2010 according to the U.S. Census. Mankato is the county seat and largest city in the county with a population of 39,305 in 2010. Blue Earth County's most

notable features are its rivers, lakes, and productive agricultural land. The county contains the confluence of three major rivers: the Le Sueur River, the Watonwan River, and the Blue Earth River.

**Land Use and Land Cover**

Blue Earth County’s landscape is dominated by agricultural uses. Just over 80-percent of the County was cultivated in 1990 according the State’s Census of Land Use and Land Cover. Deciduous forests, mostly along the steep slopes adjacent to the rivers, represented just over eight percent of the County. Urban land uses represented just 1.4 percent of the total area of the County in 1990 and farmsteads and rural development represented 1.9 percent of the county.

**Population**

Blue Earth County has a 2010 population of 64,013. Between 2000 and 2010, the county population increased 14.4%, with 8,072 more people. The following table shows the population changes from 1990 to 2010.

1990	2000	2010	Change 1990-2000	% Change 1990-2000	Change 2000-2010	% Change 2000-2010
54,044	55,941	64,013	1,897	3.50%	8,072	14.40%

Source: US Census Bureau. 2010

The cities with the most growth in the county between 2000 and 2010 are in the Le Sueur River watershed. The City of Eagle Lake and the City of Madison Lake had the highest percentage of population growth in the county. Only two cities in the watershed, Amboy and Good Thunder, lost population. The following table displays the population changes in cities in the Le Sueur River watershed. Mankato is included only because the city is now growing into the Le Sueur River watershed.

MUNICIPALITY	2010	2000	% Change
City of Amboy	534	588	-10.1%
City of Eagle Lake	2422	1779	26.5%
City of Good Thunder	583	606	-3.9%
City of Madison Lake	1017	822	19.2%
City of Mankato*	39305	32357	17.7%
City of Mapleton	1756	1674	4.7%
City of Pemberton	247	223	9.7%
City of St. Clair	868	802	7.6%

Source: US Census Bureau. 2010 Census.

\*Small area of the city in the Le Sueur River watershed at this time.

Most population growth and new development in the county is in municipalities. The greatest population growth in unincorporated areas of the Le Sueur River watershed was in the townships nearest the City of Mankato. Older subdivisions in Mankato Township and Lime Township were annexed into the City of Mankato, so the population growth and new development in those townships is not accurately represented by population data alone. The following table displays the population changes in townships in the Le Sueur River watershed between 2000 and 2010.

TOWNSHIP	2010	2000	% Change
Danville Township	240	252	-5.0%
Decoria Township	1104	918	16.8%
Jamestown Township	693	622	10.2%
LeRay Township	746	860	-15.3%
Lime Township	1395	1304	6.5%
Lyra Township	327	348	-6.4%
McPherson Township	466	515	-10.5%
Mankato Township	1969	1869	5.1%
Mapleton Township	310	309	0.3%
Medo Township	364	390	-7.1%
Rapidan Township	1101	1069	2.9%
Sterling Township	296	272	8.1%

Source: US Census Bureau. 2010 Census

### Areas of Growth

Most new development and population growth in the county is occurring in municipalities in the LeSueur River watershed. The main centers of population growth in the Le Sueur River watershed are in the City of Eagle Lake and the City of Madison Lake. Most new development and growth of the municipal boundaries of the City of Mankato will be east and northeast of the city into the Le Sueur River watershed. The majority of the rural residential development in the County is along the river bluffs and wooded ravines nearest Mankato and lakes in the northeast corner of the county.

### Major Watersheds

There are five major watersheds within the county: the Blue Earth River Watershed, the Cannon River Watershed, the Le Sueur River Watershed, the Middle Minnesota River Watershed, and the Watonwan River Watershed. Table 8 shows the areas for each watershed. Map 4 displays the major watersheds in the county.

Although the Le Sueur River Watershed covers 48.1% of the county, the watershed that is in the county makes up only 34.1% of the total area for the watershed.

Area of Major Watersheds				
WATERSHED	TOTAL SQUARE MILES	SQUARE MILES IN BEC	PERCENTAGE OF WATERSHED IN BEC	LAND COVERAGE IN BEC FOR EACH WATERSHED
Middle Minnesota River	1385	178	12.8%	23.3%
Cannon River	1482	2	0.1%	0.2%
Blue Earth River	1205	124	10.2%	16.2%
Le Sueur River	1078	368	34.1%	48.1%
Watonwan River	850	93	10.9%	12.2%

As described in “An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011,” there are knickpoints in the Le Sueur watershed in the Le Sueur, Maple and Cobb Rivers located 22-25 miles upstream of the Minnesota River. This places the knick zone of these rivers all within Blue Earth County. The river miles of each river or stream in the Le Sueur River watershed are displayed in the following table.

RIVER OR STREAM	MILES IN BLUE EARTH COUNTY
Le Sueur River*	45
Cobb River*	53
Bull Run Creek	2
Little Cobb	23
Maple River*	51
Providence Creek	2
Rice Creek	12
Total	188

\*river with knick point in the knick zone

### Agriculture

Agriculture is important to the local economy and a major land use in the county and Le Sueur River watershed. There are 405,564 acres in farms in the county, according to the 2007 US Census of Agriculture. Corn for grain and hogs and pigs are the most commonly produced farm commodities in the county. The following table displays county farm data.

FARMS	2002	2007	PERCENT CHANGE
Number of farms	1125	1247	11%
Land in Farms	405,564 acres	415,326 acres	2%
Average Size of Farm	361 acres	333 acres	-8%
CROPS	ACRES	STATE RANK	U.S. RANK
Corn for Grain	201,872	6	52
Soybeans for beans	146,852	12	39
Forage - Land used for all hay and haylage, grass silage, and greenchop	3,995	76	2,460
Vegetables harvested for sale	2,223	30	329
Corn for Silage	1,408	61	821
LIVESTOCK	QUANTITY	STATE RANK	U.S. Rank
Hogs and pigs	537,657	2	15
Turkeys	141,186	26	143
Cattle and calves	13,739	58	1,748

Source: USDA. 2007 Census of Agriculture. Blue Earth County Profile.

### Wetlands

Like other counties in Southern Minnesota, the vast majority of the pre-settlement wetlands in



Blue Earth County were drained to allow for the production of crops and the development of roadways and communities. The DNR's "Minnesota Wetlands Conservation Plan" from 1997 estimated that only two percent of the county's pre-settlement wetlands remained in 1981. For regulatory purposes of the Wetland Conservation Act (WCA), the County falls within a group of counties for which less than 50-percent of the pre-settlement wetlands are intact.

A comprehensive inventory of existing wetlands is not available. The U.S. Fish and Wildlife Service and DNR are in the process of updating the National Wetland Inventory Maps.

The County has just begun the process of developing a comprehensive wetland protection and management plan which will classify existing wetlands for management and identify and prioritize sites for wetland restoration and enhancement.

### **Ecoregions**

Ecoregions are areas with similar climate, land form, soil, vegetation, and hydrology. Seven ecoregions are found in Minnesota. The county is located in two ecoregions: North Central Hardwood Forests (NCHF) and Western Corn Belt Plains (WCBP). Most of Le Sueur River watershed in Blue Earth County is in the WCBP ecoregion. A small area of the northern boundary of the Le Sueur watershed is in the NCHF ecoregion. The boundaries of the NCHF ecoregion were changed in recent years to include more of the LeSueur River watershed thus changing water quality standards for Eagle Lake and Madison Lake.

## **EXPECTED CHANGES TO SURFACE WATER and RELATED NATURAL RESOURCES**

Expected changes to physical environment that impact water resources planning and management are described in the County *Water Management Plan 2018-2015*. The three expected changes identified in the plan are all applicable to the Le Sueur River watershed:

1. On-going stream bank and bluff erosion, channel migration, and gully and ravine erosion.
2. Land conversion for urban development.
3. Ag land management related to economic and market changes.

All of these expected changes have potentially negative impacts for surface water, ground water and natural resources. The amount of change and the extent these changes can be prevented or mitigated is limited by many socio-economic, environmental and political factors.

### **Expected Change: On-going stream bank and bluff erosion, channel migration, gully and ravine erosion.**

When the last Water Plan was written in 1997, significant changes to the surface water resources were not expected. It was known that stream bank erosion and stream channel changes were occurring, but it was not easy to track those changes over time or realize the magnitude and extent of the problem. With advances in GIS technology and digital aerial photography, dramatic changes to stream channels can now be documented on many of the rivers in the county. Blue Earth County purchased LiDAR in 2005 which allowed for numerous and extensive studies of near channel erosion locally and by state agencies and national organizations, such as the National Center for Earth Surface Dynamics (NCED).

### **Expected Change: Land Conversion for Urban Development**

Construction of major road interchanges, wastewater services, and other infrastructure are already taking place in the Le Sueur River watershed. Urban type of land uses, such as roads, dwellings, commercial and industrial buildings, and parking lots, are potentially the greatest threat to natural resources in Blue Earth County, as farm land, wooded areas, wetlands and other environmentally sensitive areas will be permanently converted to or

impacted by development. The most immediate and significant land use change is anticipated in the northeast corner of the county in the Le Sueur River watershed around the City of Mankato, City of Eagle Lake, City of Madison Lake and the area lakes. Residential development pressure around the scenic areas in Blue Earth County, including the lakes, rivers, wooded ravines and wetlands in the northern third of the county in the Le Sueur River watershed also has been and continues to be an issue in the county.

Potential impacts as a result of these land conversions include:

- Loss of crop land
- Loss of wetlands and wildlife habitat
- Degraded wetlands and wildlife habitat with impaired water quality and fragmented habitat
- Loss of undeveloped shoreland, fisheries and wildlife habitat
- Loss of wooded areas and prairie
- Increase in impervious surfaces and runoff

Protection strategies, including a 1) detailed inventory of existing natural resources in highest priority areas, 2) planning and policy to protect existing resources and prevent negative impacts inherent with urban type of development, and 3) land acquisition or easements will be critical to avoid permanent loss of natural resources in the highest priority areas.

#### *Mankato*

Most of the existing City of Mankato corporate limits are located in the Middle Minnesota and Blue Earth River watersheds. The City of Mankato has expanded and will continue to expand northeast and east into the Le Sueur River watershed toward the City of Eagle Lake and Eagle Lake. Ravine erosion in Wilson Creek in the Le Sueur River watershed has already been identified as a problem in the city limits of Mankato. The land between Mankato and Eagle Lake contains hydric soils, poorly suited for development without extensive drainage, and infiltration practices will likely be impractical.

#### *Eagle Lake*

The City of Eagle Lake has had the highest percentage of population growth in the county. Development is occurring in all directions of the city with the most residential development occurring south and west. Roadway improvements are planned between Eagle Lake and Mankato, all within the Le Sueur River watershed. Flooding in older areas of the city is a problem related to the existing stormwater system.

#### *Madison Lake.*

Madison Lake and surrounding lake areas are attractive for development. There is a significant amount of rural, non-farm, residential development around Madison Lake. The City of Madison Lake is now a regional partner with the City of Mankato wastewater treatment system. Development around the unincorporated areas of Madison Lake will also be partners in the City of Mankato regional wastewater treatment facility, as the Lake Washington sewer district was expanded to manage this area.

#### **Expected Change: Ag Land Management Related Economic and Market Change**

Currently increasing corn prices are a concern as farmers growing more corn can mean changes on the landscape and changes in land management that could increase water quality problems. Potential impacts as a result of these land management changes could include:

- Land converted from other uses to crop land
- Encroachment on wetlands, floodplains, steep slopes, ditches and other sensitive areas
- Un-renewed conservation easements
- Crop patterns and rotations increasing pests, use of pesticides and herbicides
- Crop patterns and rotations changing and increasing fertilizer needs
- Increased private and public drainage
- Loss of wetlands and wildlife habitat

- Degraded wetlands and wildlife habitat with impaired water quality

## GEOMORPHOLOGY

Topography and soils in the Le Sueur River watershed located in Blue Earth County is different from the land upstream in Waseca, Freeborn and Faribault counties. These differences in the watershed are due to its geomorphic history. The geomorphic history of the Le Sueur River watershed is described in “*An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011.*” The following excerpts of the report describe the evolution of the Le Sueur River:

### *Geomorphic History:*

The Le Sueur River watershed is comprised of a relatively low-relief upper watershed, with high-relief ravines and bluffs along the lower river corridor. The high relief in the lower 35 km of the Le Sueur, Big Cobb, and Maple River valleys is the result of knickpoint migration through the basin (Gran et al., 2009). These knickpoints originated from a sharp drop in base level on the mainstem Minnesota River during the catastrophic draining of glacial Lake Agassiz... Pre-existing tributaries like the Blue Earth and Le Sueur rivers were low-gradient streams of glacial meltwater origin that were stranded above the master stream when the initial incision occurred. Knickpoint migration continues today, driven by hydrology and sediment transport. Through most of the knick zone the river is incising through fine-grained till substrate. Bedrock waterfalls occur where the channel incises through limestone on several tributaries in the lowermost river valley... Knickpoints are expressed as slope discontinuities evident on all three major branches of the river, and they have propagated approximately 35-40 km upstream from the Minnesota River on each branch (Gran et al., 2009).

The river is currently incising through the most recent glacial deposits as well as underlying early- to mid-Pleistocene glacial sediment and in places has reached the underlying Cambrian Jordan sandstone. Bedrock crops out along the lower Maple, Le Sueur and Cobb rivers within 15 km of the mouth.

Because most of the Le Sueur River watershed was covered by glacial Lake Minnesota prior to valley incision, we assume the flat upland surface extended across the top of the river valley prior to valley excavation.

### *Land Use/Land Cover History:*

The dominant land cover before the influence of humans was prairie and wet prairie (Marschner, 1930, Minnesota Department of Natural Resources, 2007). Hardwood forests were limited to river corridors and the northeastern portion of the watershed (Marschner, 1930). The two main changes that resulted from Euro-American settlement beginning in the mid-1800s were the conversion of original prairie to agricultural fields and the alteration to the hydrology through artificial drainage. Hydrology changes included draining of the wetlands, creating a large public and private ditch network, and the installation of tile drainage systems. In addition, the conversion from perennial grasses to annual crops also constitutes a major change in hydrology, as evapotranspiration rates have changed dramatically, particularly in the spring and early summer. Approximately 84% of the basin is now cropland (Kudelka, 2010), primarily row crops such as corn and soybeans, and according to the Water Resources Center (2000) of Minnesota State University in Mankato, Minnesota, almost all of the farm fields have artificial drainage...

### *Climate Change:*

Superimposed on this direct manipulation of the drainage system are indirect changes imposed by climate change in the last ~50 years. Trends show a statewide increase in mean annual precipitation, the number of days with precipitation, and the number of intense rainfall events per year (Novotny and Stefan, 2007). To compound the complexity of the system, these changes to land use, hydrology, and climate, affect a geomorphically young, evolving channel network in the Le Sueur River watershed.

## SOIL EROSION

Reducing runoff and soil erosion is a priority concern identified in the *County Water Management Plan 2008-2015*. As described in the water plan, soil erosion and sedimentation and runoff containing nutrients and pesticides are known sources of pollutants to surface water. These pollutants are transported through gully, sheet and rill erosion, tile intakes, tile lines, ditches and directly to surface water. Highly erodible soils are found along every river, stream and intermittent stream in the Le Sueur River in Blue Earth County. A small percentage (3.2 percent, 1,902 acres) of the cropland in the LeSueur River watershed is classified as highly erodible. Reducing soil erosion on agricultural land requires a combination of understanding soil properties, field conditions and land management practices intended to protect the soil from wind and water. Establishing and promoting proven best management practices including buffer strips, filter strips, grassed waterways, terraces, crop residue, tillage practices, nutrient management, water retention, and other USDA approved best management practices are priority actions in the *Water Management Plan 2008-2015*.

Soil erosion is a wide-spread and well-known problem associated with agricultural land use and intensive use of soils. Soil loss through erosion can also reduce soil productivity and increase agricultural production costs to individual farmers. Soil eroded from agricultural land can be transported to surface waters through direct runoff to a river, stream, ditch, lake or wetland or through in-field tile intakes to sub-surface drainage tile systems. Soil erosion also occurs along stream banks, wooded hillsides, ravines, construction sites and anywhere soil is not protected from water and wind. Regardless of the source, all eroded soil can degrade surface water.

Understanding the sources of sediment has evolved in recent years, and it is now known that runoff containing sediment from uplands in Blue Earth County is considerably less than one-half the total sediment in streams and lakes reported in the 1980 USDA *Resources Conservation Act Summary - Natural Resources Inventory of Blue Earth County* which stated that “the deterioration of surface water is directly related to sediment and ag-waste pollutants being carried by runoff, and approximately one-half of the total sediment deposited in the streams and lakes is from cropland.” The Executive Summary in *An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011* states that “Although agricultural uplands account for only one quarter of the suspended sediment currently exported from the Le Sueur watershed, upland sediment represents the source which has experienced the largest percentage increase in erosion rates and is the dominant source above the incised reach.”

There are different types, sources and degrees of severity of soil erosion. The USDA characterizes erosion with the following definitions:

*Sheet and Rill*- Detachment and transport of soil particles caused by rainfall splash and runoff degrade soil quality.

*Ephemeral Gully*- Small channels caused by surface water runoff degrade soil quality and tend to increase in size. On crop land they can be obscured by heavy tillage

*Classic Gully*- Deep, permanent channels caused by the convergence of surface runoff degrade soil quality. They enlarge progressively by head-cutting and lateral widening.

In Blue Earth County, very large, classic gullies are commonly called ravines. Ravines are found along most rivers and streams with the largest ravines along the Minnesota River and the lower reaches of the Watonwan, Blue Earth, Le Sueur, Maple and Cobb rivers. Ravines outlet to rivers, streams, lakes and river terraces. Historically ravines were sometimes used for grazing when pasturing livestock was a common practice. In the City of Mankato, many roadways were constructed in ravines, like Stadium Road, Glenwood Avenue, and Thompson Ravine Road, for example. Most ravines today are forested, because they are too steep for row crop agricultural or urban type of development. In the LeSueur River watershed, ravines are classified as sources of sediment separate from upland sources.

**High Priority Erosion Areas – Erodible Land Classification**

Erosion prone soils are found throughout the Le Sueur River watershed, but most of the HEL in the LeSueur River watershed is along rivers and in ravines in the lower reaches of the LeSueur, Maple and Cobb Rivers. These areas are the greatest sources of sediment in the LeSueur River watershed. Erodible land classifications in the county are shown on Map 12.

Areas with highly erodible soils are generally not used for farming due to practical difficulties associated with steepness. To better define and target management practices for reducing sediment from uplands, cropland was displayed in a separate map. Map 13 shows the erodible land classification of cropland in the county. Future analysis in the LeSueur River watershed will identify areas where erodible soils connect to rivers, streams, lakes and wetlands so management practices can be targeted to those areas.

**Erodible Land Classification in the Le Sueur River Watershed**

Of the HEL in the entire county, about 3,800 acres is cropland, representing just over nineteen percent of the HEL in the county. About half of the cropland with HEL is in the Le Sueur River watershed. Cropland includes established CRP and other established conservation practices that are not considered permanent. Map 12 displays the Erodible Land Classification for all of the soils in the County and Map 13 displays the Erodible Land Classification for the cropland in the County.

When looking at erodible soils and cropland in the Le Sueur River watershed only 1 percent (1,902 acres) of cropland is classified as highly erodible land and 3.8 percent (7,096 acres) is classified as potentially highly erodible land. The following table is summary of erodible land classifications in the three main watersheds in the Le Sueur River basin within Blue Earth County.

Erodible Class	Cobb River Watershed		Le Sueur Watershed Main Stem		Maple River Watershed	
	Acres of cropland	Percent of Cropland	Acres of cropland	Percent of Cropland	Acres of cropland	Percent of Cropland
Highly erodible land	467	0.7%	785	1.4%	650	1.1%
Potentially highly erodible land	1,942	2.9%	3,279	5.7%	1,875	3.1%
Subtotal	2,409		4,064		2,525	
Not highly erodible land	63,612	96.4%	53,161	92.9%	57,891	95.8%
Total	66,021	100.0%	57,225	100.0%	60,417	100.0%

Source: Blue Earth County Environmental Services

The cropland that is classified as highly erodible land and the potentially highly erodible cropland (8,998 acres) in the Le Sueur River watershed can be targeted for best management practices. The areas of cropland with the most highly erodible soils in the Le Sueur River watershed are described as follows:

*Maple River watershed* – mostly upstream of Good Thunder.

*Cobb River watershed* – mostly upstream of Beauford

*Le Sueur River watershed* – mostly small tributary streams joining the main stem east of State Highway 22 and land north of the Le Sueur River

**Soil Texture**

Map 14 displays the general soil texture. Map 14 displays general soil texture.

### *Coarse Soils*

Coarse texture soils in the Le Sueur River watershed are located mainly in the lower reaches of the Le Sueur, Maple and Cobb River. Another area with coarse soil deposits is along the north “shore” of the drained Jackson Lake east of the City of Amboy.

### *Muck – Mucky peat or mucky silt loam*

Muck soils are found in historic wetlands and shallow lakes, mostly in the east part of the LeSueur River watershed in the county, in the Cobb River, Little Cobb River and main LeSueur River watersheds. The lake bed of drained Jackson Lake east of the City of Amboy is the largest consolidated area of muck soils.

### *Fine Soils*

Fine soils in the Le Sueur River Watershed are found mainly in the southern half of the county, with the largest consolidated areas being in the Maple and Cobb River watersheds near Good Thunder and Mapleton. This area is part of the Glacial Lake Minnesota.

### **Wind Erosion**

Wind erosion can be a source of sediment and soil-related pollutants. Map 15 displays the Wind Erodibility Index of soils in the county. Wind erosion can be significant during the months of the year when the soil is unprotected by vegetation, crop, crop residue or snow cover and exposed to wind and rain, and drifts of eroded soil can collect in and along ditches and fence lines across the landscape.

The USDA does not consider wind erosion a wide-spread problem in Blue Earth County. The soils with the greatest wind erosion potential in the Le Sueur River watershed are coarse-textured and muck soils. With the exception of the drained Jackson Lake bed near Amboy, muck soils in the watershed have the highest wind erodibility index in the watershed, losing 101-200 tons per acre per year. Fine textured soils have a wind erodibility index of 51-100 tons per acre per year. Fine textured soils in the LeSueur River watershed are mainly in the uplands in the upper reaches of the LeSueur River watershed on the glacial lake plain of Glacial Lake Minnesota in the southeast quarter of the county.

### **Hydric Soils**

Most of the soils in the Le Sueur River watershed are defined as hydric soils. Map 16 displays the Hydric Soil Classification in the county. A Hydric Soil is defined by the USDA NRCS as “a soil that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part.” The concept of hydric soils includes soils developed under sufficiently wet conditions to support the growth and regeneration of hydrophytic vegetation. Soils that are sufficiently wet because of artificial measures are also included in the concept of hydric soils. Also, soils in which the hydrology has been artificially modified are hydric if the soil, in an unaltered state, was hydric. Some series, designated as hydric, have phases that are not hydric depending on water table, flooding, and ponding characteristics. (USDA NRCS) Many non-hydric soil units have inclusions of hydric soils in drainage ways and depressed areas. These inclusions were sometimes too small to be shown in the Soil Survey.

Because there is so much hydric soil in the LeSueur River watershed this information alone is not helpful for identifying and prioritizing potential wetland restoration sites in a landscape and economy dependent on agricultural land use.

## **BLUFFS AND RAVINES**

In the study of water quality problems in the Minnesota River basin, landowners have pointed to bluffs and ravines since the first Minnesota River Assessment Project in the 1990s. This led to studies of bluff and ravine erosion in recent years. As stated in the Executive Summary of *An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011*,

“.. under current conditions, the largest sediment sources remain near-channel sources (erosion of bluffs and channel widening and incision) within the incised portion of “knick zone” of the Le Sueur watershed... Because of the geologic history and setting, the near-channel areas are vulnerable to accelerated erosion, and hydrologic changes in the upper watershed have had large impacts on sediment loading. Any further increases in intense rainfall events over the next century in the upper Midwest are likely to further accelerate sediment supply through hydrologic amplification of naturally-sensitive channel reaches.”

“... the other main sources of sediment, ravines and uplands, contribute approximately 9% and 27% of the annual sediment load on average in the modern time period (2000-2010) . These values will fluctuate from year to year given annual hydrologic conditions and represent average annual contributions as percentages of sediment at the mouth of the Le Sueur River.”

## **RAVINES**

In Blue Earth County very large gullies are commonly called ravines. Ravines in the Le Sueur River watershed are generally wooded, because they are too steep for row crop agricultural or urban type of development. Less-steep ravines were sometimes used for grazing historically when pasturing livestock was a common practice. Ravines are classified as separate sources of sediment in the Le Sueur River and other watersheds.

Ravines can cut directly all the way down to the main stem river or end on a higher terrace. This affects whether or not ravines are likely supplying sediment directly to the river, or depositing it in a fan on a terrace. According to *An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011*, “ravines that are in the process of reconnecting to the main stem river through incision across a terrace have the highest potential of producing abundant sediment in the near future.” In some areas, ravines depositing sediment on terraces are filling wetlands occupying lost channels of the river which may reduce wetland storage capacity over time.

### **Ravine Management**

*An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011*, states that “The contribution of ravines to the total sediment loading is smaller than bluffs due to their much smaller spatial extent. Nonetheless, some ravines can deliver sediment to the river channel at very large rates, and these sediment hot-spots can represent good initial management opportunities for sediment reduction.” The report also states that research on ravines in the Le Sueur River watershed found “no common ravine morphometries associated with ravines that showed significant decadal-scale change. The main conclusion from this approach is that there is no evidence of systematic ravine lengthening over the past seven decades within the margin of error associated with georeferencing and delineating ravine tips from air photos.”

Much like bluffs, local observations of ravines show there are different processes causing ravine erosion. Seeps, tile inputs and upland changes all influence ravine stability. It appears that ravine erosion has become more problematic in the past 10-15 years. Blue Earth County and SWCD are using GIS and 2005 and 2012 LiDAR to identify ravines with the greatest erosion during the seven years between LiDAR data.

Erosion control structures are the most common practice used for ravine and classic gully stabilization. A 1984 master’s thesis by Mark J. Davidson analyzed the effectiveness of erosion control structures installed in Blue Earth County using USDA cost share funds. Between 1950 and 1981, 143 erosion control structures were installed using cost share funds, with 51 in the Le Sueur River watershed. As described in Davidson’s thesis, “Erosion control structures are commonly referred to as gradient stabilizers stabilization structures and drop structures. These structures are generally used in arresting extreme gullying or ravine erosion of agricultural fields. Such a structure consists of a field level inlet pipe collecting agricultural runoff and carrying it downward to an outlet pipe which is located at a gradient level where erosion potential is greatly reduced.” Many more erosion control structures have been constructed in the Le Sueur River watershed, but USDA information about cost share projects is now private, so an analysis of this practice currently is not possible.

## BLUFFS

Bluffs have been the focus of much research in the Le Sueur River watershed in recent years. *An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011* states "it is likely that bluff erosion actually accounts for approximately 50-60% of the total sediment budget." The National Center for Earth Surface Dynamics' (NCED) work to identify bluffs shows there are hundreds of bluffs in the Le Sueur River watershed and the *An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011* states that bluffs "line 32% of the river in Blue Earth County and can be as much as 60 meters high."

*An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011* describes three types of bluffs in the Le Sueur River watershed:

**"Normally-consolidated till bluffs** are the most common in the watershed. These bluffs have are composed of stacked tills with permeabilities consistent with the present day over-riding load. As described later in this report these bluffs primarily erode by undercutting due to the flow of the river. In some places seeps occur, but these tend to be localized at a contact with sand lenses or other stratigraphic change. We can identify that these seeps are not driving erosion because there is no evidence to show that erosion is higher where these seeps occur.

**Over-consolidated till bluffs** occur less frequently in the watershed. These bluffs are again composed of stacked tills. After these tills were deposited a large load was placed on them likely due to a glacier re-advancing over them, forcing the moisture out. These bluffs have low permeabilities, are very steep, and have characteristic vertical joints. Bluff erosion appears to be highly episodic at these sites and is lower than on normally-consolidated till bluffs. While undercutting likely contributes to erosion at these sites, freeze-thaw processes may be the driving cause of erosion. Failure is common along vertical joints, which are likely conduits for water. As the water freezes and expands the joints become weaker, until the weight of the block ultimately overcomes any resisting forces and fails.

**Terrace bluffs** are normally-consolidated bluffs capped by alluvium. Terrace bluffs were banks at one point during the river evolution, but became stranded as the river incised. These bluffs often have a riverine gravel unit at the base of floodplain alluvium. This gravel unit is often a source of seeps. In this case seepage may be contributing to erosion, yet overwhelmingly field evidence suggests that these bluffs are also eroding primarily by undercutting. The absence of any obvious break in slope at these sites indicates that the lower till units are keeping pace with erosion in the overlying alluvium. While seepage erosion does occur at some of these sites, the long-term average rate of seepage erosion cannot be any greater than the long-term average rate of undercutting.

Each bluff has unique characteristics that cause it to erode in different ways.

### ***Bluff erosion Processes:***

There are three primary causes for bluff erosion typically observed in the Minnesota River basin: sapping, undercutting, and freeze-thaw (Day et al., in review). Each of these processes leave different characteristic patterns of erosion, making it possible to determine which processes dominate erosion and which processes occur to a lesser degree. References in this section to the toe of the slope refer to the sediment deposited at the base of the bluff as opposed to the in-situ sediment which is referred to simply as the base of the bluff.

### **Undercutting**

Typically undercutting is a result of shear stress imparted on the base of the bluff by the flow of the river. When the shear stress of the flow overwhelms the shear strength of the bluff, sediment is removed. Eventually enough sediment is removed that the weight of the overlying, now unsupported sediment is



greater than the resisting forces. When this occurs the upper portion of the bluff will fail and deposit a toe at the base of the bluff. The bluff will not be undercut again until the toe is removed by the same fluid shear stress which causes undercutting to occur. This process is taking place in all rivers where flows are great enough to cause erosion.

In places where this process is dominant, the bluff faces are likely steep with an easily eroded toe sometimes present at the base. These bluffs maintain a steep face because over long time scales erosion is essentially equal at all portions of the bluff face. The constant removal of the toe reduces the ability of these bluffs to stabilize.

### **Sapping**

Sapping is the result of groundwater flow through the bluff, which seeps out along the face. As water infiltrates into the ground during a storm event, that water flows to areas of lower potential which may commonly be the river, or in agricultural areas, a tile drain or ditch. Sediment is eroded from the bluff face below the seep when the discharge of the seep is greater than the critical shear stress required to move sediment (Fox et al., 2007). Over-saturation from seeps may also weaken sediment in that location making the area more susceptible to mass failure (Lindow et al., 2009). Often seeps like these can be seen on the face of a bluff as an area of wet sediment, and sometimes water may be flowing in these areas. This form of erosion is often localized in non-homogeneous sediment such as tills, and may increase erosion in specific locations. In layered sediment a confining layer may reduce the risk of sapping below that layer and may cause erosion in only the upper, more permeable units (Fox et al., 2007). This is most common on terraces where alluvium capping the bluff is more permeable than the underlying till. If this occurs the upper unit can be seen to erode more rapidly than the underlying units. In homogeneous sediment, sapping occurs at the base of the bluff at the river water level elevation.

When the water level is relatively constant this sapping does not dramatically increase erosion because the confining pressure of the river water helps to stabilize the slope (Jia et al., 2009).

When the water elevation in the river drops quickly that confining pressure is removed and the resulting sapping can increase erosion along the base of the bluff. Similar to when traditional undercutting occurs the overlying unsupported portion of the bluff will fail and form a toe at the base of the bluff. With no other forces acting on the bluff that sediment will remain at the toe and the bluff will ultimately form a gentle slope at the angle of repose of the sediment. As the bluff slope lowers, vegetation will develop to further stabilize the bluff and will ultimately reduce sapping as the vegetation takes up the water.

### **Freeze-thaw**

Freeze-thaw events can also cause erosion. Even small amount of moisture in the sediment forming a bluff can freeze and expand 9% by volume (Liu, et al., 2008). As this happens that area of the bluff is weakened. Often water collects along conduits such as microfractures, joints or even along roots. This can focus the erosion to these areas and will likely result in localized erosion. In homogeneous sediment, freeze-thaw processes may be equally likely anywhere. When freeze-thaw processes result in erosion along the base of the bluff, the resulting undercutting can cause failure above. These failures will form a toe at the base of the bluff which will remain if there is no other force to remove the sediment. In many cases freeze-thaw events do not directly cause failure, and instead weaken sediment such that failure occurs as a result of spring storms (Thomas et al., 2009). “

The report states that undercutting is the dominant force of erosion in the Le Sueur watershed:

“While each of these processes are eroding bluffs in the Minnesota River basin, the absence of significant toe deposition and the presence of steep-faced bluffs suggest that undercutting is the dominant force of erosion. While sapping and freeze-thaw are both causing erosion these processes would likely lower the bluff slope if undercutting was not occurring. Undercutting will primarily occur when flows are high in the river, during spring or other flooding events throughout the year. This is not to suggest that undercutting cannot occur during normal flows, but the rate is lower.”

## **Bluff Management**

Bluff erosion mediation is recommended in *An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011*.

“Bluffs are clearly a significant source of sediment along the Le Sueur River and any attempts to lower turbidity must include some form of bluff erosion mediation. The two main approaches are to focus on the problem at hand (bluff erosion) or to focus on the cause (increased flows). Addressing bluff erosion at the bluff scale requires an understanding of which bluffs are most likely to erode in the future, which is challenging given the episodic nature of bluff erosion (i.e. the high producers today may not erode much for the next few decades).”

## **Structures**

Managing bluffs with structures is costly. Structural practices to stabilize bluff erosion have generally been used on eroding bluffs that threaten dwelling or infrastructure. Bluff stabilization projects are also used to preserve farmland or as part of a channel restoration. The Blue Earth SWCD and DNR worked on a “toe wood stabilization” and channel restoration demonstration project on the Le Sueur River in 2011. J-hooks and rip-rap type of projects have been common in the LeSueur River watershed, with large numbers of projects constructed in 2011 after record flooding in September 2010 significantly eroded many bluffs in the watershed and throughout the county.

It is stated in *An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011* that “It is not known if riprap or other structures will work well to stabilize these features long-term, especially in the knick zone which is actively incising.” Local observations suggest structural practices are working in some areas. Local j-hook projects on the Le Sueur River in Decoria Township have been in place for nearly twenty years and are working to protect bluffs from erosion, according to reports from the Township Board of Supervisors who constructed the projects to protect township roads threatened by bluff erosion.

## **Vegetation**

Consistent with local observations, the *An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011* states

“We know from the aerial photographs that vegetation does not stabilize bluffs over the long term, but over the short term, vegetation can exert a stabilizing influence. For all bluffs that were vegetated in 2005 there was some period of time since 1938 where they were un-vegetated. Further evidence that vegetation does not play a significant role in the rate of longer-term bluff erosion are the similar retreat rates measured for the vegetated and non-vegetated bluffs. This result is contradictory to beliefs about bank erosion, but because bluffs are high features vegetation can be undercut and cannot stabilize the slope long-term...”

## **Land Use**

*An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011* recommends that “Any work on bluffs should be accompanied by regulations to protect vulnerable sites (greater set-backs, stricter zoning, no direct drainpipes, etc.).” The county’s Hazard Mitigation Plan update identifies ravine and bluff erosion near channels as a hazard in Blue Earth County. Increasing structure setbacks is one of the recommended mitigation strategies in the plan. Structural setbacks are regulated by the county or city shoreland ordinance. The land area regulated by the shoreland ordinance is 300 feet from the “ordinary high water level” of a river or stream, and a 30 foot setback is required. These setbacks are the minimum according to state rules. More technical information will be needed to consider where and how much the structural setbacks should be increased.

The DNR regulates any activity at or below the ordinary high water level of a river, stream, lake or public water wetland, so the design of discharges and outfalls are regulated by the DNR.

## **Water Retention**

An *Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011* suggests that “the best way to reduce bluff erosion throughout the entire watershed may be to hold water in the uplands longer, reducing the flow in the river and thus reducing the shear stress imparted on the bluff by the flow.”

“Effective management will require a combination of actions to reduce erosion at its source and more effectively control the physical drivers of erosion, requiring management of peak flows. If only sediment sources are addressed, management actions will risk addressing the symptom but not a dominant causal factor. As high flows in the river are the underlying, systemic driver of near-channel erosion, increased water retention in uplands will reduce sediment loads over the long-term and can help mitigate on-going and future changes in precipitation.”

At the same time there has been research about bluff erosion and changing hydrology from increased drainage in the Le Sueur River watershed, there has also been much discussion and research on changing rainfall patterns and how this may be contributing to bluff erosion. Weather trends are changing in recent decades with more extreme rainfall events and “flash floods” occurring than in the past. Regardless of the cause of bluff erosion, whether it’s a natural process responding to increased drainage or a response to climate change, the solution is the same: more water retention is needed.

Farmers interviewed for the Le Sueur River project indicated they generally do not support wetland restoration or protection. Nevertheless, there have been large scale wetland restorations for wildlife habitat in the Le Sueur River watershed in recent years. Work on a wetland management for Blue Earth County has started to identify and prioritize wetlands for protection and sites for restoration and enhancement. The locally determined, science based wetland plan will likely include water storage potential because of its public value for water retention and habitat.

## **LAKES**

There are 22 public water lakes in the Le Sueur River watershed within Blue Earth County. Lakes in Blue Earth County are a high priority for county residents and are valued for active and passive recreation. Citizens formed lake associations for Madison Lake and Lura Lake. The following is a list of lakes in the Le Sueur River watershed in Blue Earth County:

Albert, Alice, Born, Cottonwood, Eagle, Hobza, Indian, Knights, Lost Marsh, Lura, Madison, Mud, Perch, Pick Marsh, Rice, Severson, Stockman, and 5 unnamed lakes

Lakes in the Le Sueur River watershed are addressed as a priority concern in the “Urban Development, Stormwater Runoff and Pesticides” section of the *County Water Management Plan – 2008-2015*. The following are excerpts from the local water plan. <http://www.blueearthcountymn.gov/DocumentCenter/View/225>

### **Priority Concerns Assessment**

Conversion of land from agricultural and open space to urban use is likely the greatest threat to natural resources in the County. New development in the Northeast corner of the county is the main areas of concern, as these areas of the county are growing. The Northeast area includes the City of Mankato, City of Madison Lake, City of Eagle Lake, Jamestown Township, Le Ray Township, Lime Township, and Mankato Township. New development is a mainly a concern for three reasons: 1) sediment in construction runoff, 2) pollutants in runoff after construction, and 3) changes in hydrology as a result of stormwater infrastructure and increased impervious surfaces.

### **Shoreland Areas**

Erosion and sedimentation, chemical pollutants, and temperature are all concerns related to urban development in shoreland areas. Wetlands are also impacted by urban land uses and runoff. Removing shore vegetation harms

fish and other wildlife habitat and increases the erosive effects of lake waves along the shore of lakes and wetlands. The long-term effects of development are more difficult to correct as water leaves lakes relatively slowly and pollutants settle and are trapped in the lake. Shoreland management around lakes and wetlands is increasingly important as development pressure increases.

### **Northeast Corner**

The City of Madison Lake and the City of Eagle Lake are growing relatively rapidly in an area of the county with the highest density of lakes and wetlands sensitive to runoff, erosion and sedimentation. With new roadways and extension of utilities, increased development pressure is expected in this area within the planning period. Extension of wastewater utilities to Madison Lake is complete, and the formation of a sewer district involving Madison, Duck and Ballantyne Lakes joining the Lake Washington sewer district is complete. This extension of wastewater utilities will likely increase development pressure around these lakes and the City of Madison Lake in the Le Sueur River watershed.

### **City and County Parks**

Camping is provided at two county parks on lakes in the county, both in the Le Sueur River watershed, Bray Park on Madison Lake and Daly Park on Lura Lake. There are also city parks on Madison Lake.

### **Summary of Lake Conditions in the Le Sueur River Watershed**

Lake water quality standards in Minnesota are based on ecoregions. Because of the number and types of lakes in Minnesota, the MPCA uses the ecoregion concept to assess the water quality of lakes in areas with similar climate, land form, soil, natural vegetation, and hydrology. There are seven ecoregions are found in Minnesota, and Blue Earth County is located in two of the State's ecoregions: the North Central Hardwood Forests (NCHF) and the Western Corn Belt Plains (WCBP). Most of Blue Earth County is in the WCBP ecoregion. A relatively small area in northeast Blue Earth County is in the NCHF ecoregion.

The MPCA changed the boundaries of the WCBP and NCHF so the ecoregions -and water quality standards- affecting two lakes in the Le Sueur River watershed that were previously in the WCBP: Madison Lake and Eagle Lake North.

### **State Agency Reports on Lakes in the Le Sueur River Watershed in Blue Earth County**

Only the three largest lakes, Madison Lake, Lura Lake and Eagle Lake North, have been included in water quality reports prepared by state agencies. These lakes are now impaired waters, and, according to the *MPCA June 2010 Assessment Report of Selected Lakes Within the Le Sueur River Watershed Minnesota River Basin*, "the watersheds for each of these lakes will need to be addressed through a TMDL study to determine the source and extent of pollution problems." There are no TMDL studies completed at this time.

The three reports used to prepare this description of lakes in the Le Sueur River watershed included:

#### ***MPCA June 2010 Assessment Report of Selected Lakes Within the Le Sueur River Watershed Minnesota River Basin***

MPCA lake monitoring activities were not yet in sync with the watershed approach in 2008; the year MPCA intensively monitored streams in the Le Sueur watershed to assess their condition. MPCA monitoring of large lakes within the Le Sueur watershed were concluded in 2009. This report describes all available lake data collected within the past ten years by partner agencies, grantees, and citizen volunteers found in STORET for the Le Sueur watershed.

Three lakes in Blue Earth County were included in the report, Eagle Lake north, Madison and Lura Lake. The report states that "the majority of these lakes possessing assessment level data have been determined to be non-supporting of recreational use," and total phosphorus must be reduced to improve water quality.

"Reducing levels of TP will be required in order to reduce the occurrence of algal blooms for lakes within the Le Sueur River watershed. Alternatively, should in-lake TP concentrations increase, the potential for

nuisance algal blooms will also increase. It is important to limit as much external (watershed) phosphorus loading to the lakes as possible to improve or maintain the current concentrations. Additionally, the watersheds for each of these lakes will need to be addressed through a TMDL study to determine the source and extent of pollution problems.”

***DNR and MPCA 2010 Sentinel Lake Assessment Report Madison Lake (07-0044) Blue Earth County, Minnesota***

This report includes monitoring data and an analysis of land use in the watershed. It accurately describes the local views of Madison Lake. The report states:

“Madison is an important local resource, and is one of the largest and deepest lakes in Blue Earth County. It provides varied recreational opportunities including fishing, swimming, boating, sailing and skiing. It is a highly developed lake and, as such, makes a substantial contribution to the local economy.”

***MPCA 2006 Lake Assessment of Six Lakes in Blue Earth County: Ballantyne (07-0054), Duck (07-0053), Eagle Lake (07-0060), George (07-0047), Loon (07-0096) and Madison Lake (07-0044)***

Madison Lake and Eagle Lake are in the Le Sueur River watershed. Lura Lake was not included in this report. This MPCA report states that “these lakes are a unique natural resource that have an immense value to this area of the state.” This is consistent with local attitudes about the value of Madison Lake and Eagle Lake. This report also includes recommendations for the MPCA to work with local governments and lake residents to improve the lakes:

“It is essential that lake protection efforts for these lakes be conveyed to the local government (zoning and land use authorities) as well as local property users. The concern for protecting and improving these lakes should be elevated. These lakes are a unique natural resource that have an immense value to this area of the state.”

## **DESCRIPTION OF MADISON LAKE, EAGLE LAKE AND LURA LAKE**

### **MADISON LAKE**

The City of Madison Lake's North Shore Park is on the shore of Madison Lake. A public access, fishing dock, and picnic areas are at this park. County-owned Bray Park is located on the north shore of the southeast bay of the lake. Bray Park provides overnight camping spaces, picnicking areas, a swimming beach, fishing dock, trails and a public access. Bray Park attracts visitors for camping and fishing from southern Minnesota and Iowa.

The SLICE report on Madison Lake land use analysis shows a decline of agricultural land use and an increase in developed land use during the time of their analysis between 1969 and 2001. Since 2001 developed land has increased in the watershed, so in 2013 the percentage of developed land in the watershed has likely more than doubled since 1991, and cultivated land continues to be less than half of the watershed. It is expected that the rate of land use conversion to developed land use in this watershed will increase. The City of Madison Lake and the unincorporated areas of the Madison Lake are partners in a regional, municipal wastewater treatment system with the City of Mankato. Eliminating the existing subsurface sewage treatment systems (SSTS) around the lake is not expected to improve water quality because the SSTS are relatively new and there are virtually no direct sewage discharges to the lake. Land use around Madison Lake is regulated by the City of Madison Lake, Blue Earth County and the Lake Washington sewer district.

Invasive species, like curly leaf pondweed and Eurasian watermilfoil, as well as shoreland erosion are problems identified by lake residents and the lake associations.

***MPCA June 2010 Assessment Report of Selected Lakes Within the Le Sueur River Watershed Minnesota River Basin***

Madison Lake is a large, deep intermittently stratifying lake located approximately six miles east of Mankato, Minnesota. The Madison Lake watershed drains into an unnamed tributary that eventually flows into the Le Sueur

River near Eagle Lake, MN through an outlet south of Mud Lake. Madison Lake’s watershed is moderate relative to its surface water area with an area of 11,161 acres and a watershed to lake ratio of 8:1. Land use is dominated by cropland with the percentage being closer to what is found in the WCBP and exceeding the expected range for the NCHF.

Madison Lake is part of the SLICE program with further monitoring scheduled to continue. Madison Lake was sampled for chemistry from May through October of 2008 and 2009. TP concentrations were low during the spring and steadily increased over the summer peaking in September. The pattern of increasing TP in Madison Lake is consistent with other lakes in Minnesota. Profile data from 2008 for both sites indicates that a weak thermocline forms at a depth of eight-nine meters (~29.5 feet) in July and August but remains well mixed during the rest of the season. This indicates that Madison Lake is subject to continuous mixing during the spring and fall but a thermocline will develop during periods of low winds and water movement. As a result, nutrients are likely being stirred up from the sediment and released into the lake water during much of the year. DO remained above five mg/L through most of the year with hypoxic conditions developing at approximately four-six meters (~19.7) in July and August and anoxic conditions below six meters (19.7 feet) in July. Severe nuisance blooms of blue-green algae are a common occurrence in most summers with individual chl-a measurements greater than 40 µg/L common in recent years.

Based on the chemical monitoring results and poor water clarity, Madison Lake was classified as a eutrophic lake. Additionally, based on the TP and chl-*a* standards for the support of aquatic recreation, Madison Lake was determined to be non-supporting of aquatic recreational use and was listed as an impaired water under the 2010 303(d) Impaired Waters List.

The DNR and MPCA 2010 *Sentinel Lake Assessment Report Madison Lake (07-0044), Blue Earth County, Minnesota*, accurately describes the local views of Madison Lake. The report states:

“Madison is an important local resource, and is one of the largest and deepest lakes in Blue Earth County. It provides varied recreational opportunities including fishing, swimming, boating, sailing and skiing. It is a highly developed lake and, as such, makes a substantial contribution to the local economy.”

This report analyzed land use in the Madison Lake watershed, “Since land use within the watershed affects water quality significantly, it has proven helpful to summarize land use in simple categories and look at changes in land use over time.” Land use records suggest a slight decline in the percent of land in agricultural uses and an increase in developed land use in recent years. The latest land use summary (NLCD 2001) shows the Madison watershed is predominately agricultural. Based on a comparison of three databases that represent land use for 1969, 1991, and 2001, developed use has increased while cultivated use has decreased. This comparison also suggests that the percent of water and wetlands has increased over time as well. There are ten feedlots noted in the watershed and most are located on or near watercourses that can potentially drain to the lake. Depending on land application practices and permit compliance, these feedlots are a potential source of excess nutrients to the lake. The following table summarizes historical land use trends in the Madison Lake watershed.

Land use	% Land Use NLCD 2001	% Land Use GAP 1991	% Land Use LU 1969	WCBP typical land use percentage	NCHF typical land use percentage
Developed	9	5	4	0 – 16	2 - 9
Cultivated (Ag)	48	62	61	42 – 75	22 - 50
Pasture & Open	10	15	12	0 – 7	11 - 25
Forest	2	0.5	0.5	0 – 15	6 - 25
Water/ Wetland	31	21	22	3 - 26	14 - 30
Feedlots (#)	10				

Source: *DNR and MPCA 2010 Sentinel Lake Assessment Report Madison Lake (07-0044) Blue Earth County, Minnesota*

**The MPCA Intensive Monitoring Report on the Le Sueur River Watershed summary of the Madison Lake 11 HUC states:**

**Water chemistry assessments on assessed AUIDs in the Madison Lake 11 HUC**

Not enough water chemistry data was available to assess any AUID in this watershed unit.

#### **Outlet stream water chemistry for the Madison Lake 11 HUC**

Outlet water chemistry was not collected because of the small size of the watershed unit. There is also no local data available. One time water chemistry values for total phosphorus, total suspended solids, nitrate-nitrite nitrogen and un-ionized ammonia were all within acceptable levels. Measurements for water temperature and conductivity were also found to be within ecoregion expectations. DO data for the two visits indicate a potential DO flux issue (2.8 and 12.2 mg/l). One of the two pH readings was above the standard of 9 (9.3) and the other reading was within the standard. The biological station on this AUID is roughly two miles downstream of nutrient impaired Madison Lake.

#### **Madison Lake watershed unit summary**

The outlet of Mud Lake and Madison Lake was the only reach sampled for fish IBI in the watershed unit. The stream reach wasn't sampled for macroinvertebrates due to low flow conditions during the sampling time frame. The final assessment for aquatic life has been deferred due to channelization on the AUID. Habitat assessment indicated a rating of fair. Invertebrate sampling did not occur due to low flow conditions at time of sampling. Not enough data was collected from any stream reach in the watershed to assess for aquatic recreation. This small watershed is primarily cropland draining to Madison Lake, which is impaired for excess nutrients and mercury, and other smaller shallow lakes and wetlands that have not been assessed.

#### **Fish Consumption**

The *MPCA Intensive Monitoring Report on the Le Sueur River Watershed* reports that "Madison Lake is impaired for fish consumption because of mercury in walleye" and "qualifies for inclusion in the Minnesota Statewide Mercury TMDL <http://www.pca.state.mn.us/water/tmdl/tmdl-mercuryplan.html> ..." Implementation of the mercury TMDL is focused primarily on reducing mercury emissions to the atmosphere.

## **EAGLE LAKE NORTH**

Eagle Lake County Park is located on the northeast shore of the lake. It is a narrow roadside park located between the CSAH 26 and the lake that can be used for fishing and picnicking. The park also provides public boat access to the lake.

Land development around Eagle Lake North has been influenced by its proximity to the Mankato Municipal Airport. Special airport zoning has restricted development of occupied structures within the runway flight paths. There have been changes to the Airport zoning in recent years to allow more development in this area, but development is now somewhat limited by an Urban Fringe Overlay District in the County Zoning Ordinance. Land use around Eagle Lake is regulated by several zoning ordinances, including Lime Township, Blue Earth County and the City of Mankato airport zoning.

#### ***MPCA June 2010 Assessment Report of Selected Lakes Within the Le Sueur River Watershed Minnesota River Basin***

Eagle Lake North is the northern basin of Eagle Lake located approximately two miles east of Mankato. Eagle Lake North is a shallow lake that is 189 hectares (467 acres) and represents 65 percent of the whole of Eagle Lake. Unlike a majority of the other lakes within the Le Sueur River watershed that are in the WCBP ecoregion, Eagle Lake is located within the NCHF ecoregion. Eagle Lake's watershed is moderate relative to its surface area with a watershed to lake-ratio of 20:1. Land use within the Eagle Lake watershed is relatively typical of the NCHF ecoregion with the exception of a high percentage of open rangeland. In addition, the percentage of forested land is below normal.

Eagle Lake North was sampled for chemistry from May through September of 2006 and 2008. The average TP for Eagle Lake from both 2006 and 2008 data was well above the assessment criteria for lakes within the NCHF or WCBP ecoregion. TP in Eagle Lake climbed throughout the season and spiked in August of 2008 at 198 µg/L before declining in September. The average chl-*a* for Eagle Lake North over the two-year period was also well above the assessment criteria for the NCHF. As a result of the high levels of TP and chl-*a* as well as high total suspended inorganic solids the water clarity of Eagle Lake was well below the range of expected ecoregional values with an average of just 0.3 meters (one foot).

The lake was well-mixed throughout both monitoring seasons. This is typical for large, shallow lakes. Based on the trophic status data, Eagle Lake was classified as hypereutrophic. Additionally, based on the TP and chl-*a* assessment standards, Eagle Lake North was determined to be non supporting of aquatic recreational use and was listed as impaired under the 2010 303(d) Impaired Waters List.

## **LURA LAKE**

County-owned, Daly Park, is located on the northeastern shore of Lura Lake, approximately four miles southwest of Mapleton. The park provides overnight camping spaces, picnicking areas, and a half mile trail. Public access to the lake is provided at the park. Swimming and fishing are popular activities at the park. Lura Lake and Daly Park attract visitors for camping and fishing from southern Minnesota and Iowa.

As described in the County Water Plan, Lura Lake had its fish population reclaimed using rotenone in 1994. The removal of rough fish from the lake prompted an increase in the growth of desirable aquatic vegetation. Water quality tests after the lake was reclaimed showed dramatic improvements in water clarity and reductions in algae and phosphorus. Water clarity, for example, improved from 1.3 feet in 1994 to 6.2 feet in 1995. Shoreland erosion was a serious problem on the lake that was addressed with a major effort to stabilize much of the shore over a period of years. Observed water clarity reportedly improved following the stabilization projects. Water clarity has declined since the first years of the fish reclamation.

### ***MPCA June 2010 Assessment Report of Selected Lakes Within the Le Sueur River Watershed Minnesota River Basin,***

Lura Lake is a large, shallow polymictic lake located approximately three miles southwest of Mapleton, Minnesota. Lura Lake's watershed is small relative to its surface water area with an area of 2,657 acres and a watershed to lake ratio of 2:1. Land use is dominated by the lake and surrounding wetlands with the percentage being well above the range of values expected for the WCBP. Additionally, land use devoted to cropland is lower than the typical watershed in the WCBP.

According to the *MPCA June 2010 Assessment Report of Selected Lakes Within the Le Sueur River Watershed Minnesota River Basin*, Lura Lake was sampled for chemistry in 2004 and 2009. Results show TP and chl-*a* were well above the assessment criteria for lakes within the WCBP ecoregion. Despite the high levels of TP and chl-*a*, the water clarity for Lura Lake is above the assessment standard with an average of just 1.1 meters (3.6 feet). TP concentrations climbed through the spring until finally peaking in July and then steadily decreasing into September. The chl-*a* values and Secchi transparency for Lura Lake closely mirror the rise and fall of available nutrients. The pattern of TP levels peaking during mid-summer in Lura Lake is consistent with other shallow lakes in Minnesota.

Profile data was collected sporadically throughout Lura Lake for DO and temperature measurements. DO briefly dropped just below five mg/L in early July of 2009 but remained above five mg/L throughout the remainder of the year. The surface water temperature spiked at 25.6 in August and a thermocline did not develop. This indicates that Lura Lake is continuously mixing throughout the season. As a result, nutrients are continuously being stirred up from the sediment and released into the lake water. It is likely that a majority of the nutrient loading for Lura Lake occurs internally due to constant mixing and a relatively small watershed.



Based on the chemical monitoring results and water clarity, Lura Lake was classified as a eutrophic lake. Additionally, based on the TP and chl-*a* standards for the support of aquatic recreation, Lura Lake was determined to be non-supporting of aquatic recreational use and was listed as an impaired water under the 2008 303(d) Impaired Waters List.

Information about Lura Lake water quality monitoring and the TMDL is not available. According to the MPCA website, TMDL Project: Lura Lake — Excess Nutrients:

“Lura Lake is located in the [Le Sueur watershed](#) in the Minnesota River basin. For additional information, see the [Redwood-Cottonwood Rivers Control Area \(RCRCA\)](#) website or the MPCA's [Impaired Waters Viewer](#),” and “the TMDL study is currently underway and is being developed by the Minnesota State University Mankato -Water Resources Center.”

## DRAINAGE

Improving water quality with implementation of mutually-beneficial actions addressing both environmental concerns and drainage of land is a goal of the county Water Management Plan 2008-2015. Establishing vegetated ditch buffers and increasing water retention in County drainage systems are high priority actions of the Water Management Plan.

Drainage systems play an important role in both the urban and rural areas of the county. Drainage systems for urban land uses have different components and regulations than agricultural drainage systems. This section describes only agricultural drainage systems, mainly county ditches.

Ditches were constructed in rural areas to drain land and to collect water quickly and efficiently to provide better soil conditions and increase land available for the production of crops. Saturated soils in the root zone can drown crops and fields are inaccessible for farm machinery. With good drainage the growing season is effectively extended as cropland can be planted earlier in the spring and harvested later. Cropland drainage also extends the season for fall manure application.

Meandering, small and intermittent streams were deepened and straightened to facilitate better drainage. Wetland complexes and low lying areas were drained with the construction of open ditches. The result is a relatively straight, lineal system of open channels and subsurface tile that connects and follows naturally low lying areas and drainage ways. There are many soils in the Le Sueur River watershed with a shallow seasonal water table.

### **Ditch Ownership – County Ditches**

County ditches are often assumed to be owned by County governments. County ditches are actually privately owned, publicly managed ditches. The property owners within each ditch's watershed are collective owners of the ditch and are responsible for all costs of ditch management.

The State Drainage Law, Minnesota Statute, Chapter 103E, known as the Drainage Code, directs how privately-owned County ditches are managed. The Drainage Code was initiated in the late 1800s along with Federal grants to ensure that the nation's “swamps” would be drained. The purpose of the law was to establish a process to oversee drainage management among the ditch owners. The original process is very similar to the process used today. As prescribed in the Drainage Code, the Blue Earth County Board of Commissioners acts as the Ditch Authority and is responsible for drainage management and oversight. The County employs a ditch manager to coordinate the Ditch Authority's responsibilities.

### Private ditches

It is important to note that there are also privately owned ditches in the county. The number and location of private ditches is unknown. Due to the abundance of rivers, streams and intermittent streams in the County, many land owners are able to drain directly to these natural drainage systems instead of joining a County ditch system. According to estimates of the County Ditch Manager, slightly less than half of the total land area in the County drains to a County Ditch.

### Sediment and pollutants

Drainage ditches can be a source of sediment from eroding ditch banks and can also quickly transport sediment and pollutants from agricultural and urban runoff to surface waters. Buffer strips along drainage ditches help reduce erosion and sedimentation by slowing overland flow, trapping sediment and other pollutants, and holding soil in place along the ditch banks. Reducing erosion and sedimentation also reduce maintenance costs for ditch owners.

### Hydrologic Impacts

Drainage systems alter the natural hydrologic cycle in order to lower the seasonal high water table. Ideally, rainfall naturally infiltrates to recharge shallow and deep aquifers and surface run-off is minimal. In agricultural areas with poorly drained soils or soils with a high seasonal high water table, subsurface drainage collects groundwater at a fairly shallow depth and discharges to a ditch, river, stream, lake or wetland. The overall volume and rate of water discharged to surface water during rain events and snow melt is increased as water that would have infiltrated to ground water is diverted to surface water relatively quickly.

The increase of rate and volume can cause erosion of surface water channels within the system and downstream as the channel widens or deepens to carry the increased volume. Surface water channels include any sites with flowing water such as rivers, streams, intermittent streams, the ditch channel itself, ravines and outfalls. Downstream channel impacts are dependent on variables such as the amount of change in rate and volume and the condition of the existing channel.

Drainage practices minimizing or reducing increases in rate and volume of water can protect surface water channels. Partially restoring natural hydrologic function by providing areas for water retention and infiltration effectively decreases the rate and volume of discharge to surface waters and increases ground water recharge.

### County Ditch Drainage Systems Inventory

An extensive drainage network covers most agricultural land in the County. This network consists of 704\* miles of County ditches. County ditches include both open ditches and subsurface tile ditches. Open ditches are channels that function much like streams. There are 163 miles of open ditch in Blue Earth County.

Publicly-managed Ditches in Blue Earth County	
Type of ditch	Ditch Miles*
Open	163
Tile	541
Total	704

Source: Blue Earth County Taxpayer Services, Ditch Authority, 2007

\*estimated, includes only ditches within the county

About half of the open ditches in the county are in the Le Sueur River watershed which comprises 48% of the county. The following table summarizes the miles of open ditches in watersheds in the county.

<b>Miles of Open Ditch in Blue Earth County</b>	
<b>WATERSHED</b>	<b>MILES</b>
Blue Earth River	17.72
Cannon River	1.76
<b>Le Sueur River</b>	<b>84.79</b>
Middle Minnesota	39.44
Watonwan River	14.98
<b>Total</b>	<b>158.69</b>

Source: Blue Earth County Water Plan 1997-2007

### **Ditch Buffers**

Ditch channel buffers generally benefit both the drainage function of the ditch system and water quality by reducing erosion and sedimentation. The root system and ground cover provided by vegetation in the ditch buffer stabilizes the banks of the ditch reducing the need for ditch maintenance costs. Ditch buffers can trap sediment from water and wind erosion. Ditch buffers can also reduce pesticide and herbicide “drifting” during application and surface water runoff from adjacent crop land. Ditch buffers provide a physical separation between ditch channel and farm equipment applying fertilizers, pesticides, or manure.

### **Dutch Buffer Drainage Code Requirements – when buffers are required**

All new ditches require a ditch buffer, but new ditches are rarely constructed in the county. Existing drainage systems are essentially “grandfathered in”, meaning they are allowed to continue without a one-rod buffer until the ditch is *improved*. Ditch buffers are required on all *improvements*. Establishing ditch buffers is not required for all *repairs*. Some repairs, such as re-sloping, require viewers and a buffer must be established.

Amendments to the Drainage Code in 2007 allows Drainage Authorities more flexibility to establish and maintain a one rod buffer strip and side inlet controls where needed (incrementally) using repair procedures and determination of damages, and no longer requires re-determination of benefits for repairs. This Drainage Code amendment has not been used in the county.

The Drainage Code defines four types of drainage projects: new systems, repairs, improvements and lateral extensions.

*Repairs:* Repairs include minor work such as spraying for weeds and brush, removal of isolated silt deposits, bridge or culvert cleaning, removal of vegetation, debris or other obstructions. Repairs may also involve more extensive cleaning of the ditch bottom of silt deposits to the grade line and bottom width as originally constructed or subsequently improved, and could include fixing isolated side slope damage due to sloughing, fixing damage to culverts and structures, and removing large trees from the channel. These repairs are not intended to significantly increase hydraulic efficiency or capacity of the ditch, or to extend and improve drainage benefits.

*Improvements:* An improvement project involves the enlarging, extending, straightening, or deepening of an established, previously constructed system. Generally an improvement project provides for the upgrading and enhancement of the existing system’s hydraulic capacity and drainage ability. An existing drainage system may only be extended up to one mile downstream to a more adequate outlet. A determination of benefits is required when there is an improvement.

*New Systems:* Generally new systems involve converting private drainage systems to public drainage systems. The number of new drainage systems constructed is few, as wetlands are now protected.

*Lateral Extensions:* Lateral extensions are most often existing privately-owned tile drained area that is officially brought into the ditch. Buffers are required for new open ditch laterals. Lateral extension is rare.

### **Side Inlet and Tile Inlet Buffers**

In some ditches, the spoil banks prevent overland surface water flow from the adjacent field to the ditch channel. Side inlets are constructed to allow drainage from the adjacent, low lying areas to the ditch channel. Buffers around side inlets can provide the same services as ditch buffer strips by reducing erosion and sedimentation. Side inlet buffers can be established as part of the ditch buffer but are not required.

Tile inlets in the ditch system can also be the source of pollutants and sediment. Water quality and ditch function can be protected and improved with tile inlet buffers. This is particularly true when established in areas where soil erosion potential is relatively high with slope, slope length and soil type conditions all contributing factors.

### **Water Retention**

Many of the County tile ditches and open ditches are overloaded with water during storm events and snow melt due to the addition of private tile drainage and the construction of laterals. Overloading older, ditch and tile infrastructure increases maintenance costs as sections of the tile system can collapse. To solve the combined problem of overloading and aging drainage infrastructure, ditch owners sometimes propose increasing flow capacity by replacing a tile ditch with an open ditch, widening and deepening an existing open ditch channel, or increasing the size of the tile mains. Reducing peak flows to the ditch can help avoid this expense, reduce downstream impacts and improve water quality. In many cases, establishing water retention areas and restoring wetlands can be a cost effective alternative to or reduce costs of a ditch improvement project.

Establishing water retention areas can have both positive and negative economic impacts the ditch system. For example, if water retention is added to an overloaded ditch system, the need to improve the ditch and the project costs might be avoided. In another example, if a ditch improvement project is necessary, the land needed for retention is purchased by the entire ditch system adding to the total ditch project costs. The land in the retention area is no longer benefiting from the project and therefore not generating revenue for the project. Ditch system owners often argue that the public benefit must be considered and public money should be used to establish retention and other conservation practices that do not benefit ditch owners.

### **Municipal Impacts**

Municipalities are part of several County Ditch watersheds in Blue Earth County. Storm water drainage discharges have increased the rate and volume of water to a few County ditches causing erosion problems at the outfall and downstream. The City of Mapleton's and the City of Amboy's wastewater treatment stabilization ponds and storm water systems discharge to a County Ditch. In Mankato, Eagle Lake and Madison Lake, urban growth and conversions of cropland to urban land uses have impacted County ditches.

Issues related to urban drainage connections with County Ditches are concerns primarily in areas where conversion of agricultural land to urban type of land uses is occurring. County ditch concerns at the urban and rural interface most often involve legal or management issues of the ditch and immediately surrounding land uses.

Responsibility for managing ditches extending into the City of Mankato was transferred to the city in 2013. In the Le Sueur River watershed, County Ditch 12 discharges to Wilson Creek and a ravine in the city where erosion has become a problem.

### **Water Retention and Wetlands**

Blue Earth County's wetland policies and programs are described in the *Comprehensive Water Management Plan 2008-2013*. Work has begun on a comprehensive wetland management plan for the county that will consider both the functions and public values of wetlands.

## **FLOODING**

Flooding is a concern to many residents in the Le Sueur River watershed. Blue Earth County participates in the National Flood Insurance Program and is required to administer a Floodplain Ordinance to help protect areas that are susceptible to flooding. The Federal Emergency Management Agency (FEMA) has identified the flood hazard areas of the County with Flood Insurance Rate Maps. FEMA divides the floodplain into two sections: the floodway and the flood fringe. The floodway is the channel of the river and the adjacent land areas that must remain open in order to discharge a base flood. The flood fringe is the portion of the floodplain outside of floodway, where structural development can occur if properly protected. The regulatory floodplain is synonymous with the 100-year flood, which is the flood that has a 1 percent chance of occurring in any given year. There is not a great deal of residential development in the flood prone areas of the County.

While the majority of the County is an elevated plain, flooding problems have occurred in the Le Sueur River watershed. The floods on record for the Le Sueur River occurred in 1951, 1965, and 1969. Most of the severe flooding has occurred in the spring due to snow melt runoff and spring rains. However, heavy rainfall for several days in September 2010 caused record floods in the Le Sueur River watershed. Prior to 2010, there had not been severe floods in the Le Sueur River watershed since 1969; while there have been severe floods on the Minnesota River in Mankato.

The direct costs of flood losses typically include: (1) the direct loss to the individual homeowner, business and agriculture interests, damage to motor vehicles, crop loss; (2) the damage to community infrastructure (storm sewers, roads, bridges, etc.); and (3) the costs associated with the flood fight and clean up.

Indirect costs of flooding include (1) lost profits to businesses closed during floods; (2) wage losses and unemployment benefits; (3) federally subsidized flood insurance payments; (4) income tax deductions for flood losses not covered by insurance; (5) low interest disaster relief loans; and (6) the cost of federal, state and local agencies and units of government in implementing disaster relief programs.

Land use practices have a significant impact on flooding. Because over ninety percent of the wetlands in the County have been drained, the storage of flood waters has been greatly reduced. Restoring wetlands to help store flood waters is one way to help reduce the effects of flooding. Ensuring that future development does not encroach on the floodplain is also important to prevent flood damages.

### *FEMA Map Limitations*

Detailed Flood Studies were conducted for most areas of the county when FEMA's Floodplain Maps were compiled prior to 1990. Just over two thirds of the land the county which is defined as being in a Special Flood Hazard Area Inundated by the 100-Year Flood is classified as being in " Zone A" which does not have detailed flood information or elevations for the 100-year Flood. This includes most rivers and streams in the Le Sueur River watershed. There have been significant river channel changes since the FEMA Floodplain maps were last revised. There are river channels in the county that have changed so much that the river channel itself is now located outside of the Floodplain that was delineated in 1990.

### *FEMA Map Modernization*

FEMA is in the process of modernizing Flood maps in Blue Earth County using the County's LiDAR high resolution elevation data and high resolution orthophoto collected in 2005. There have been no new flood studies.

### *Flooding*

Other types of flooding and flood inundation are not identified on official maps but cause significant damage to infrastructure and dwellings. Flooding and landslides also damages ravines and erodes shoreland and bluffs.

Flash floods are a concern in the Le Sueur watershed where street flooding is a problem in the City of Amboy, Good Thunder and Mapleton due to inadequate infrastructure. Damage and closures of roadways has become increasingly common in the Le Sueur River watershed. Flooding in September 2010 closed many roadways county-wide. Late spring flooding in May and June 2013 closed Highway 30 near Mapleton in the Le Sueur River watershed, and crops remained unplanted in much of the Le Sueur River watershed in southern Blue Earth County.

## **WILDLIFE AND RECREATION**

It is the goal of the county to "Maximize opportunities to protect, enhance and restore wetlands and other natural areas to improve water quality, fisheries, wildlife habitat, recreation and land conservation."

### **Wildlife**

Rivers in the county provide the best fishing in the Le Sueur River watershed. Many of the lakes in the county are also very popular for fishing, boating and other recreation. Wooded and buffered rivers and wetlands provide most wildlife habitat in the watershed. Most of the State Wildlife Management Areas (WMAs) in the county are in the Le Sueur River watershed. Habitat loss and fragmentation from conversion of woodland and wetlands to urban and agricultural land use is the biggest threat to wildlife habitat in the county.

### **Wildlife Habitat - Forest**

The extensive network of rivers in the county provides forested, riparian habitat corridors of varying widths. The forested areas in the county are found mainly along steep slopes, waterways and ox-bows where farming is not practical due to steepness, wetness or other accessibility issues. These forested, mainly riparian, corridors are long and relatively narrow as they follow the rivers. Widening the forest habitat in some areas would benefit some wildlife species.

The type, location and density of forest land cover in the county have fluctuated based on many factors, including agricultural practices and disease. The historic Big Woods extended into the county in the far northeast corner. The Big Woods were cleared for agriculture and homes by homesteading pioneers. Dutch Elm disease destroyed most elm trees on both the urban and rural landscape in the 1960s and 1970s. In the 1970s and 1980s pasture land was converted to crop land, but some pastures were either planted with trees or trees were allowed to grow. Both urban development and agricultural land use continue to encroach on wooded areas.

### **Wildlife Habitat – Prairie and Wetlands**

Prairie, wetland and upland habitats are far less common in the county as a result of agricultural use and urban development. Continued drainage of wetlands for urban development divides the remaining, larger wetlands into smaller and smaller pieces. The resultant smaller wetlands are fragments sometimes referred to as habitat patches. Wildlife species habitat conditions are critical to the development of healthy populations. Habitat needs vary and may be very different at critical points in the life cycle of many species. Connection of wetland habitat

patches with diverse conditions within and between wetlands to form wetland complexes is the most desirable for wildlife habitat. Wetlands adjacent to lakes are critical habitat for quality fisheries.

### **Wildlife and Recreation**

Most county parks and many city parks are located next to rivers, streams, lakes and wetlands. Scenic vistas, water access, wildlife viewing, exercise and other outdoor experiences are provided by these publicly owned parks collectively. As the population continues to shift from rural to urban, providing opportunities for these experiences will be increasingly important. Budget constraints at the State and local government level limit opportunities to acquire land, develop parks, expand parks and establish wildlife conservation and fishing areas in the county.

The county continues to develop and improve parks for conservation and wildlife habitat. The Indian Lake Conservation Area, for example, is a wetland restoration and replacement site developed into a park and is connected to a heavily used local and regional trail system. The county has also started using native vegetation and rain gardens in parks to improve wildlife habitat. Constructing canoe accesses with new bridges and trails with many roadways has become a standard practice in the county.

### **Parks**

Most of the county parks are located in shoreland areas. The County Parks Department has included rain gardens in conjunction with improvements to public canoe and boat accesses on the Le Sueur River as a means to control and treat stormwater runoff from the paved parking area. The county has also restored wetlands in county parks. The following is a list of existing parkland in the Le Sueur River watershed and the river or lake associated with each.

- Bray Park – Madison Lake
- Lone Pine Rest Area – Madison Lake
- Daly Park – Lura Lake
- Red Jacket Trail Park – Le Sueur River
- Schimek Park Conservation Area – Maple River
- Wildwood Park Conservation Area – Le Sueur River
- Eagle Lake Wayside Area – Eagle Lake
- Hungry Hollow Stop – Le Sueur River
- St. Clair City Park – Le Sueur River
- North Shore Park – Madison Lake

### **Boating, Canoeing and Kayaking**

The Le Sueur River is a popular canoe route. The Maple and Cobb Rivers are less popular than the Le Sueur River but are well used.

Madison Lake, Eagle Lake and Lura Lake are most popular for motorized boats.

## **FEEDLOTS AND MANURE MANAGEMENT**

It is the county's water management plan goal to prevent and reduce pollution of surface and ground water with implementation of livestock and nutrient management programs, policies and best practices.

Livestock feedlot manure can be a source of bacteria, TSS, phosphorus, nitrogen and other pollutants. Most livestock in Blue Earth County is produced in confinement barns with below-barn, concrete manure storage pits. Runoff containing manure used as fertilizer for agricultural crop production is likely the greatest source of pollution from livestock feedlots. Preventing and reducing runoff and protecting groundwater are the highest priorities.

Continuing the County Feedlot Program and working with feedlot operators to improve nutrient management planning and application methods in environmentally sensitive areas will be the most important actions related to livestock production and feedlots during the planning period.

Today land applied manure is the greatest source of surface water pollution from livestock feedlots in Blue Earth County. Many feedlot operators are doing a good job with manure management and continuing to improve as manure management plans are required for feedlots with 300 or more animal units.

### **Background**

There have been many changes in livestock production methods in the past 40 years. Modern livestock production involves fewer but much larger, totally confined feedlots. Total confinement barns have replaced open lots, partial confinement barns, shelters and pastures. Another difference is the type of animals produced. In the County, the number of cattle, dairy, turkeys and chickens have declined dramatically, while the number of swine has increased. Blue Earth County is one of the top hog producing Counties in the State.

Awareness of water pollution from feedlots has increased in the past 25 years. In the early 1990s a series of State enforcement actions against several feedlot operators in Blue Earth County brought a great deal of attention to feedlots with direct manure run off to surface waters. The County began aggressively working with feedlot owners to correct feedlot pollution problems. The County also initiated and joined the State in enforcement actions. As a result, most feedlots with direct manure run off were eliminated as many of the operators chose to close these sites and either construct confined facilities to replace the problem sites or discontinue producing livestock.

Poorly constructed earthen manure storage pits, basins and other inadequate manure storage facilities were also closed. Blue Earth County was one of the first Counties in the State with a feedlot ordinance. Today Blue Earth County is one of the few Counties with a feedlot program requiring annual County permits and annual permit fees. Feedlots are regulated primarily by Minnesota Rules Chapter 7020.

The SWCD and NRCS have been important partners in feedlot management providing technical support to feedlot operators and the County. For eligible projects, grants to feedlot operators are available through the SWCD and NRCS. Dozens of feedlots with runoff problems utilized the services and cost share programs through the SWCD and NRCS during the 1990s for fixes such as waste storage, gutters, and surface water diversions.

Manure has great benefits as crop fertilizer and can be very valuable depending on current commercial fertilizer prices and availability. Manure is also a waste associated with livestock production. From the feedlot operator's view manure must be managed with consideration of practical needs and economic factors associated with applying the manure. Ideally manure is fully utilized as crop fertilizer and applied at rates related to crop needs and nutrients available using methods to prevent manure or nutrient runoff to surface water according to the feedlot operator's manure and nutrient management plans. Considerations of distance to the field, nutrient density of manure, soil nutrient needs, type of equipment, time, acres, etc. can all influence the operators decisions related to manure application rates.

### **Seasonal high water table and saturated soils**

The landscape in Blue Earth County is dominated by soil types with a high seasonal high water table. A high seasonal high water table can be a problem for manure storage and manure application. According to the USDA Soil Survey most soils in Blue Earth County are poorly suited for land application of manure due to wetness. Most below barn, concrete manure storage structures need perimeter tile in order to protect the concrete walls of the pit from cracking and groundwater/pit infiltration. Inspections of these tile systems over time may be necessary for ground water protection.

The water table is lowered in much of the County by privately owned, subsurface tile drainage systems. Even with tile drainage, wetness can limit land application of manure during critical times for manure application before planting in spring and before snowfall in the fall.



### **Type of animal feedlots**

Many types of livestock are produced in Blue Earth County. Swine, cattle, cows, turkeys and chickens are the most common, but swine production dominates the livestock industry in Blue Earth County.

### **Pastures**

Pastures are exempt from MPCA feedlot rules. Properly maintained pastures reduce surface runoff and soil erosion and are considered to have less environmental impact than open lots. Pastures are not exempt from State water quality rules. Livestock on pastures are not restricted from accessing lakes, rivers or other waters. Pastures associated with a feedlot are regulated differently than pasture-only operations. Pastures connected to feedlots must register with the MPCA or County, and if located on a lake, a pasture connected to a feedlot must be fenced from the water.

There are few pastures remaining in the Le Sueur River watershed.

### **Shoreland**

Due to close proximity to surface water, feedlots with open lots in Shoreland are considered to have a greater potential for runoff. As of 1998, new feedlots are prohibited from located within Shoreland Areas Map 25 displays the feedlots located within 300 feet of a DNR protected river or stream and within 1,000 feet of a DNR protected lake.

### **Manure Storage**

Under-barn concrete manure storage pits are the most common manure storage system in Blue Earth County. There are also earthen manure storage basins, manure stockpiles and few open lots.

### **Manure management plans**

All feedlots with 300 or more animal units are required to have manure management plans according to State rules.

### **Manure Application**

Manure application set backs are difficult to enforce, but the County, as part of the State program requirements, has begun spot-checking fields for compliance with setback and other manure application rules. The most common manure application violations among both private and commercial applicators relate to encroachment into required manure application set backs from intermittent streams, drainage tile intakes and road ditches.

State and County regulations include setbacks from environmentally sensitive features. These setbacks vary depending on whether manure is incorporated and if on frozen ground. Blue Earth County manure application set backs from some surface water features are more restrictive than the State.

#### **Manure Application Set Back Differences Between County Livestock Ordinance and MPCA**

##### *Set-backs shown are with incorporation*

Intermittent streams: County- 50' MPCA- 25'

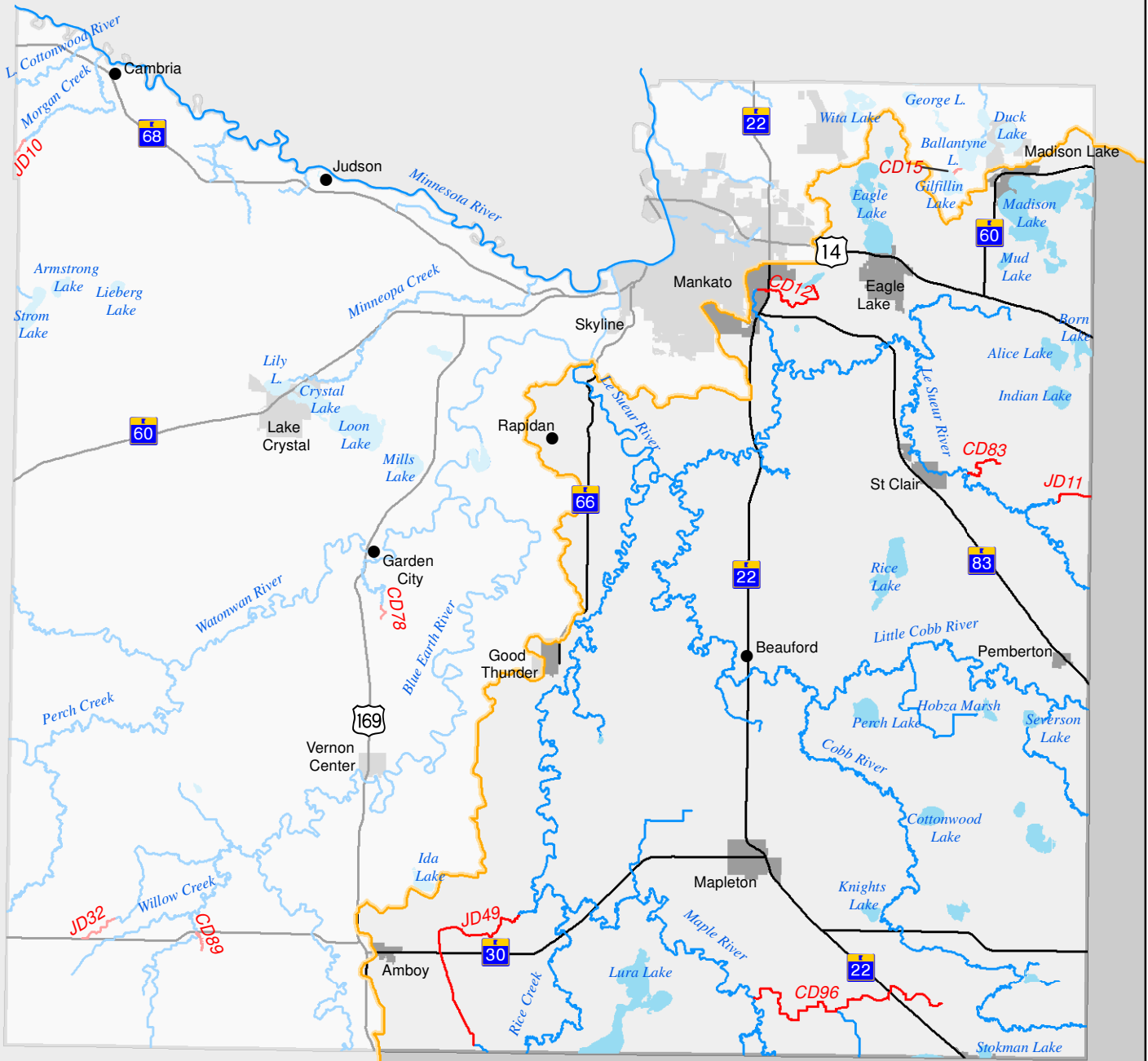
Tile intakes: County- 25' MPCA- 0'







Drainage Ditches: County- 25' MPCA- 25'

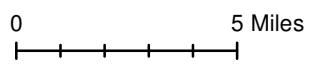
Lakes: County- 100' MPCA- 25'

Wetlands County- 50' MPCA- 25'

# Map 8. Protected Streams, Lakes, and Wetlands



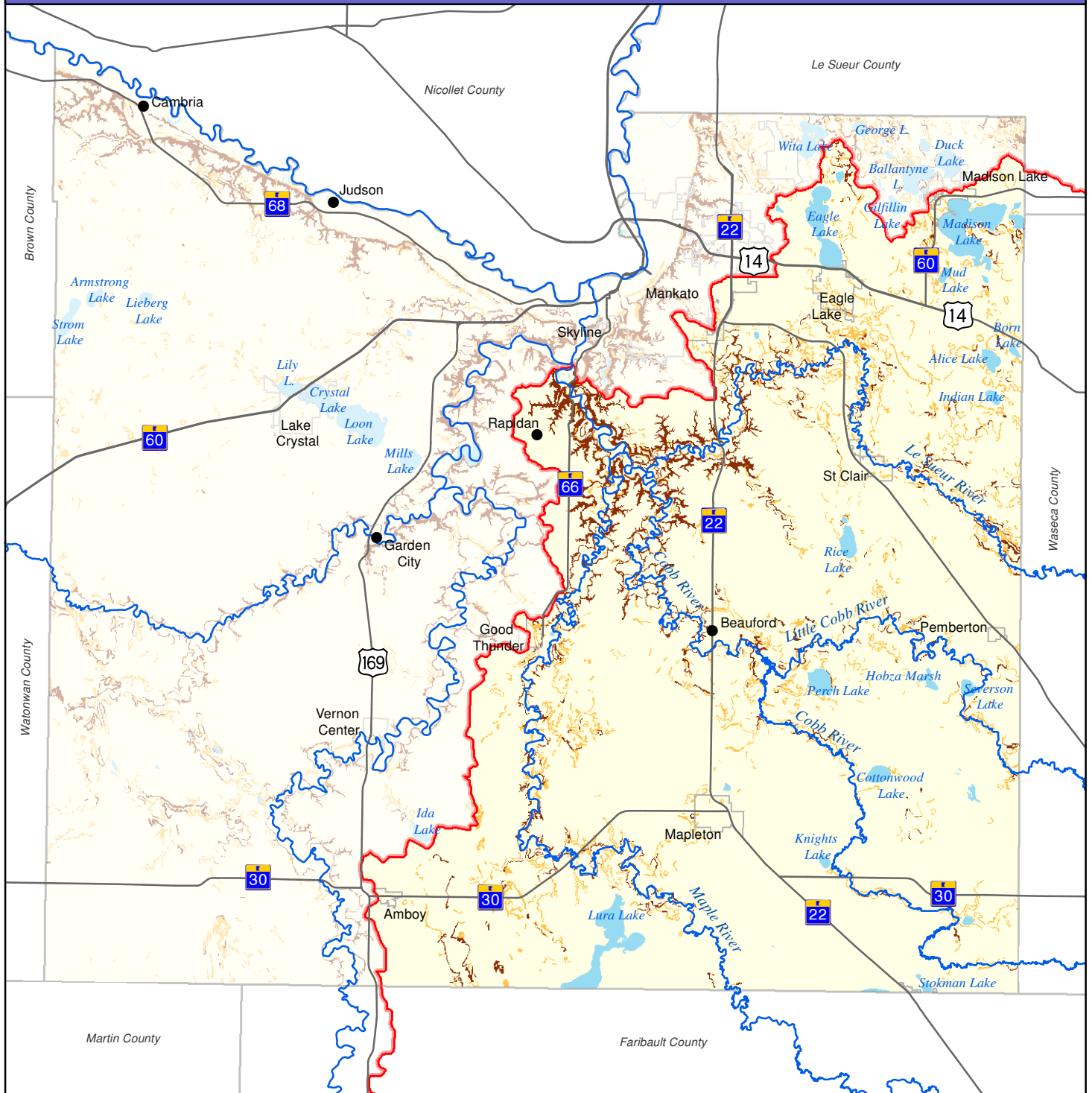
-  Le Sueur River Watershed
-  Protected Lake or Wetland
-  County Ditch Classified as Protected Water
-  Protected Stream or River
-  State or U.S. Highway
-  City




Prepared By: Blue Earth County  
 Environmental Services  
 2013





Note: Protected streams, lakes, and wetlands listed in the Shoreland Section of the County Code are shown.

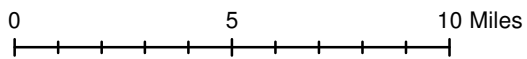
# Erodible Land Classification of Soils in the Le Sueur River Watershed in Blue Earth County



 Le Sueur River Watershed

**Erodible Land Classification**

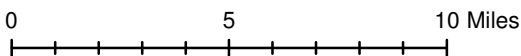
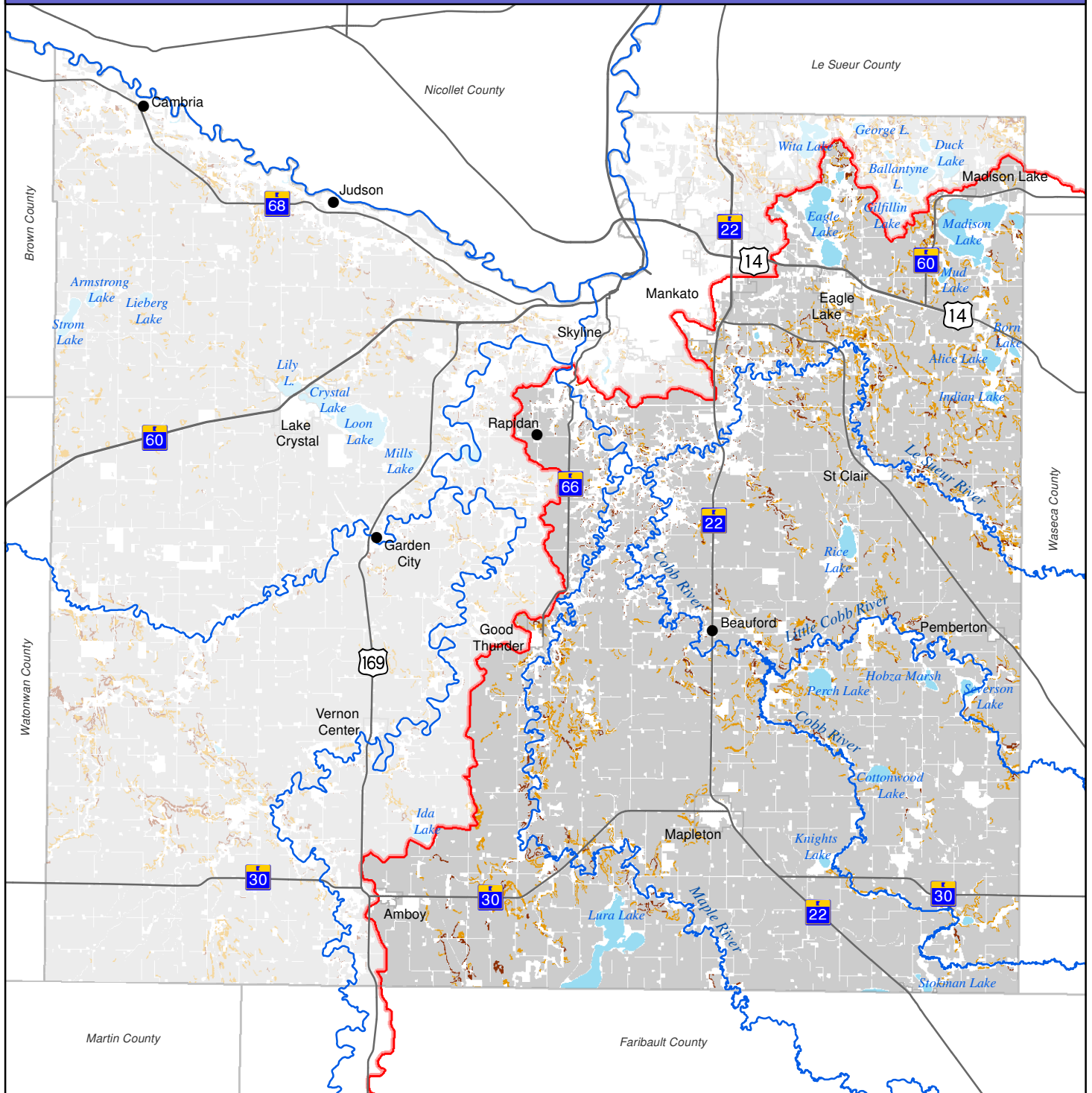
-  Highly erodible land
-  Potentially highly erodible land
-  Not highly erodible land
-  No Value or Water




Prepared By: Blue Earth County  
Environmental Services  
July 2013




Source: NRCS SSURGO Soils

# Map 13. Erodible Land Classification of Cropland in the Le Sueur River Watershed in Blue Earth County



 Le Sueur River Watershed

**Erodible Land Classification of Cropland**

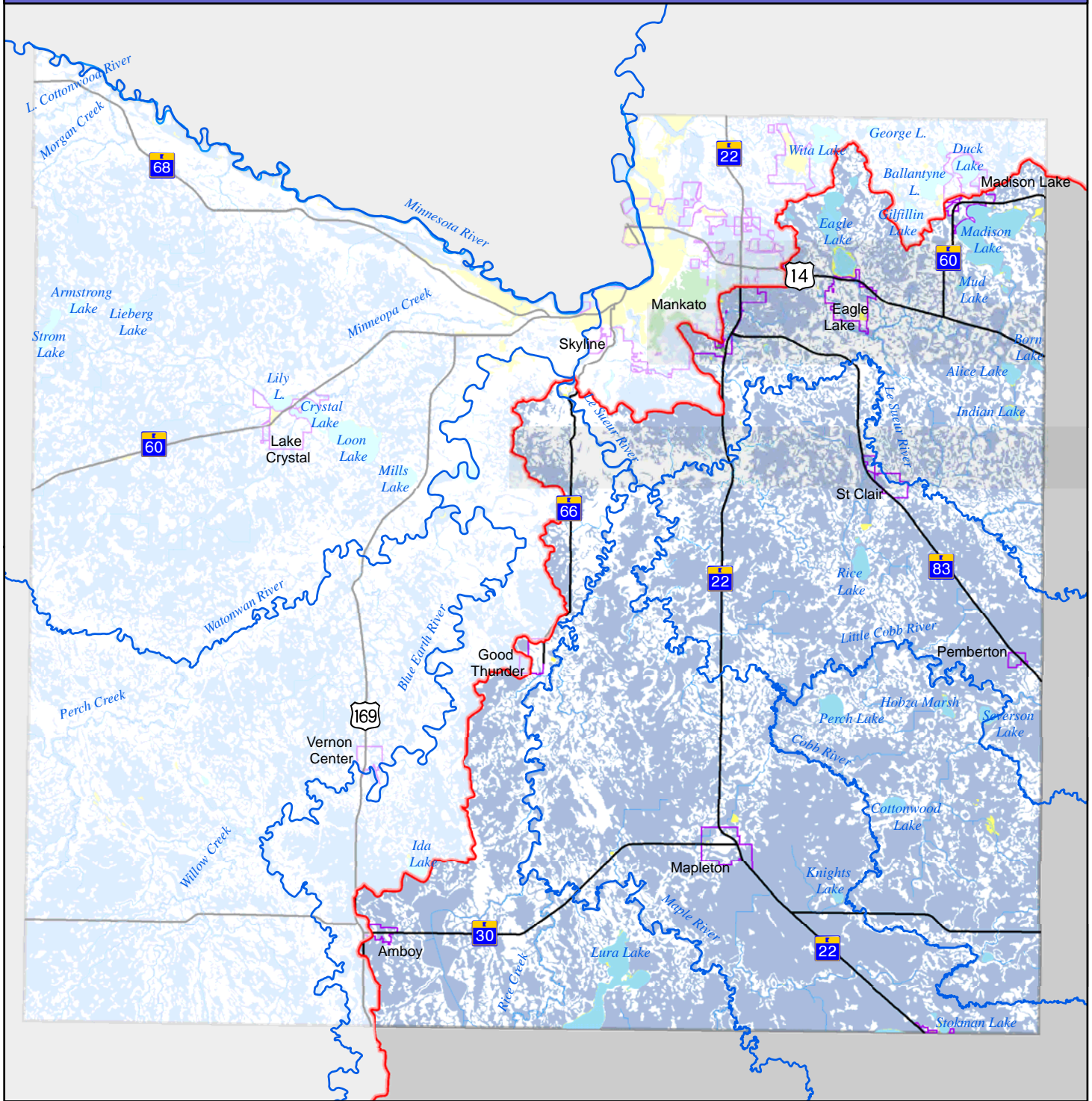
-  Highly erodible land
-  Potentially highly erodible land
-  Not highly erodible land




Prepared By: Blue Earth County  
Environmental Services  
July 2013





Source: NRCS SSURGO Soils

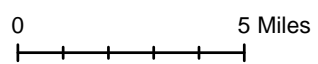
# Map 16. Hydric Soils Classification



 Le Sueur River Watershed

**Hydric Soils Classification**

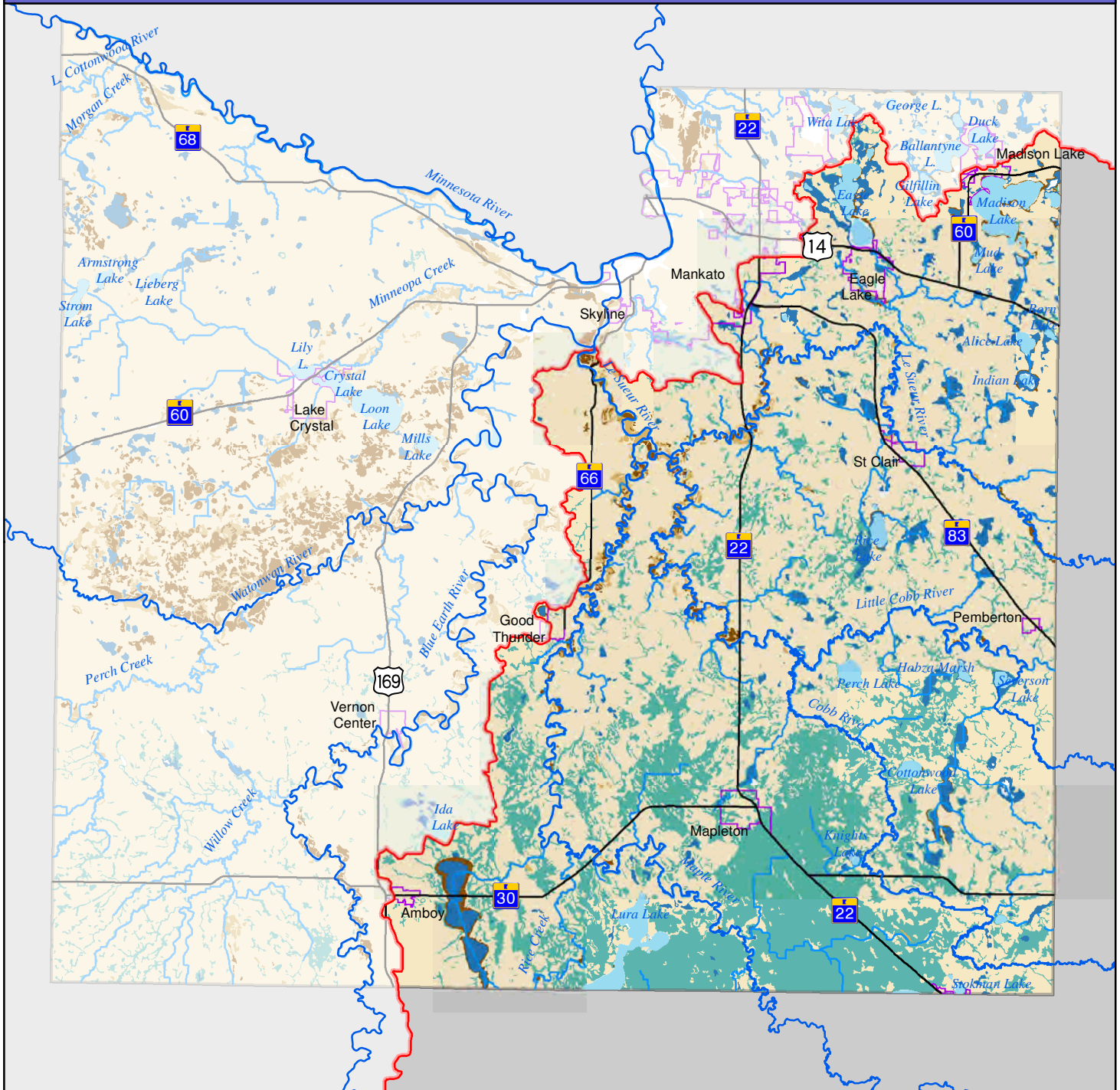
-  All hydric
-  Partially hydric
-  Not hydric
-  Unknown




Prepared By: Blue Earth County  
Environmental Services  
2013






Source: NRCS SSURGO Soils

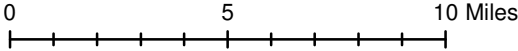
# Map 14. General Soil Texture



 Le Sueur River Watershed

**General Soil Texture**

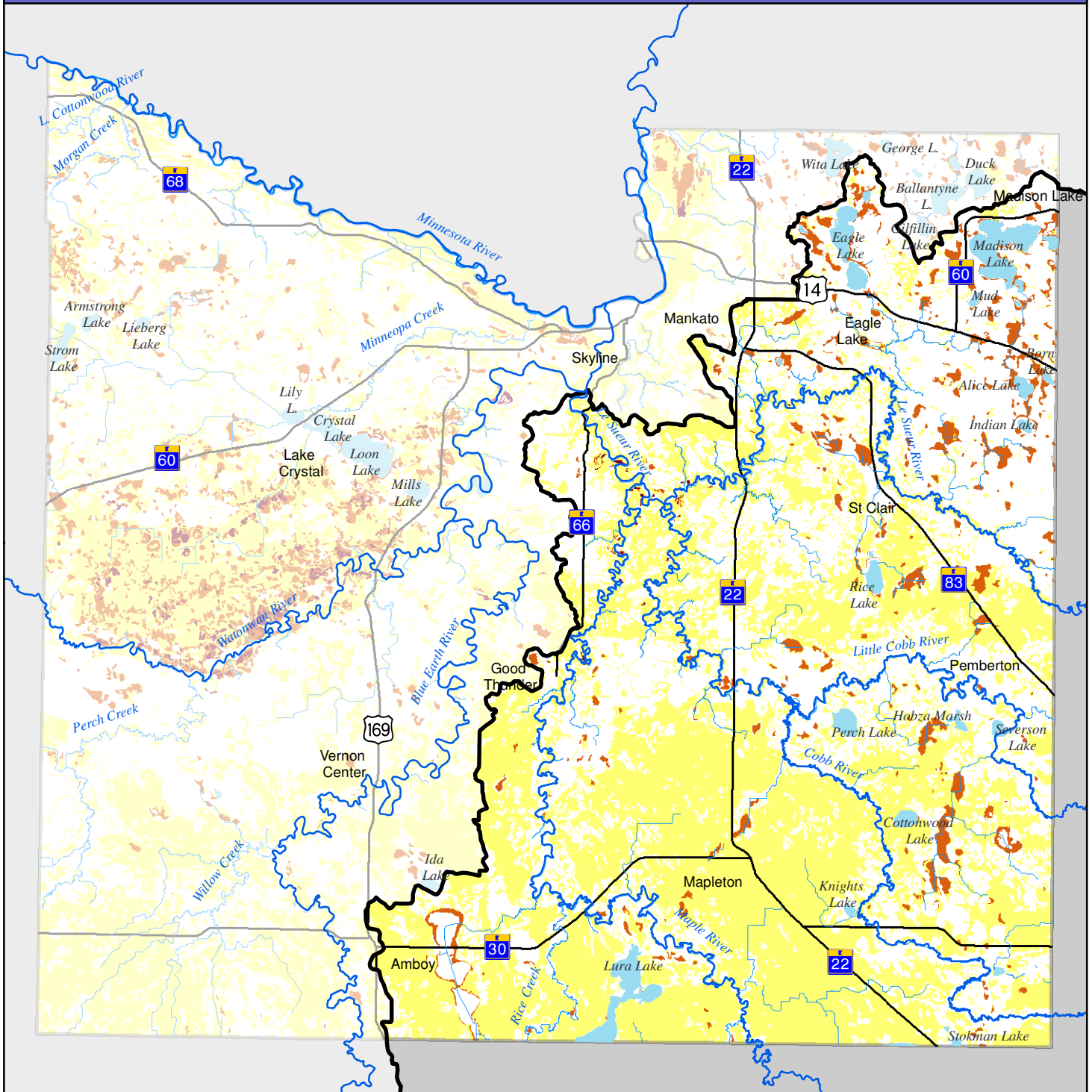
-  Coarse
-  Moderately Coarse
-  Medium or Moderately Fine
-  Fine
-  Muck- mucky peat or mucky silt loam




Prepared By: Blue Earth County  
Environmental Services  
July 2013





Source: NRCS SSURGO Soils

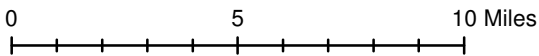
# Map 15. Wind Erodibility Index



 Le Sueur River Watershed

**Wind Erodibility Index**  
Tons lost per acre per year

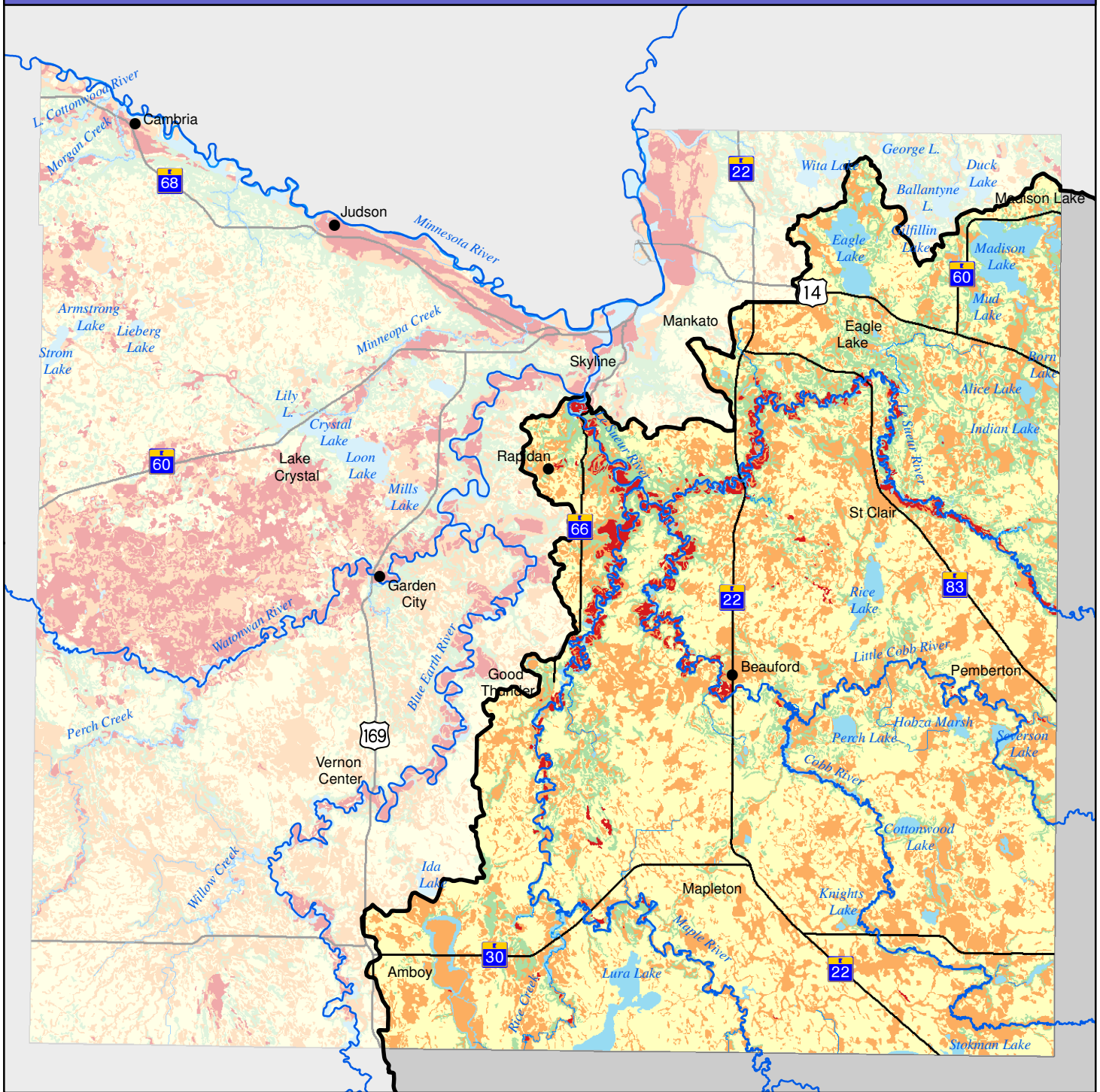
-  0-50
-  51-100
-  101-200
-  Over 200



Prepared By: Blue Earth County  
Environmental Services  
2013

Source: NRCS SSURGO Soils

# Map 23. Level 1 Geologic Sensitivity Rating



Le Sueur River Watershed

State or U.S. Highway

City

### Level 1 Geologic Sensitivity

Low

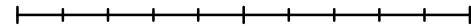
Moderate

High

Very High

No Value

0 5 10 Miles



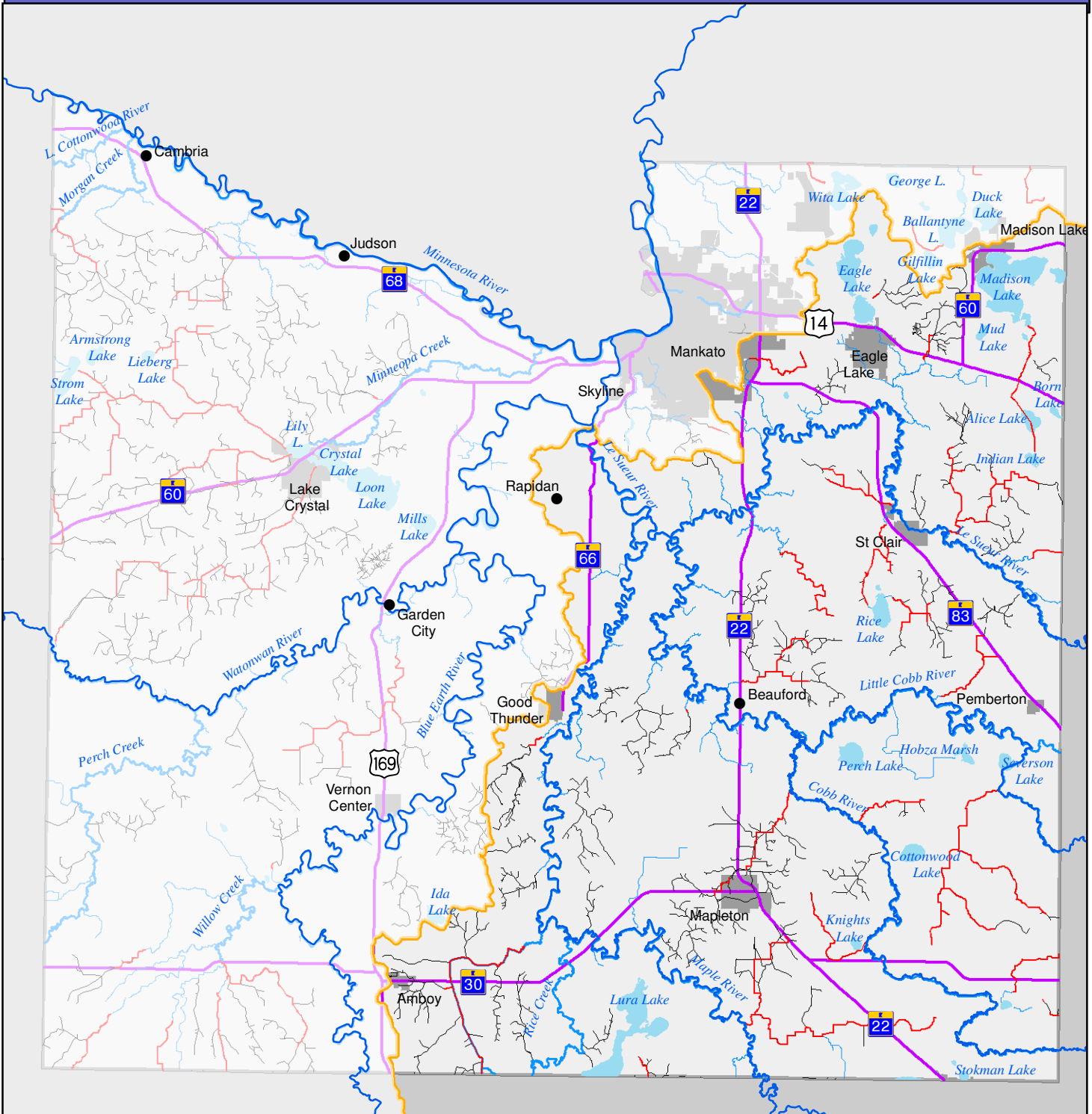
Prepared By: Blue Earth County  
Environmental Services  
2013









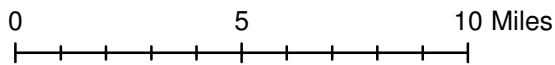
Source: Level 1 geologic sensitivity ratings from MN DNR for each soil type (USDA NRCS SSURGO Soils). "A Level 1 assessment examines geologic conditions to a depth of about 5 feet below the land surface. The assessment is based on the assumption that the material to a depth of about 5 feet below the land surface is representative of the entire vadose zone, the unsaturated material above the water table. Many factors or conditions that affect geologic sensitivity and that lie at depths greater than 5 feet cannot be identified by this assessment level. A Level 1 assessment addresses potential groundwater contaminants that originate at the land surface. It does not assess the pollution potential of contaminants that originate below the surface, such as underground storage tanks or improperly constructed wells." MNDNR



# Map 26. County Ditch and Tile Systems

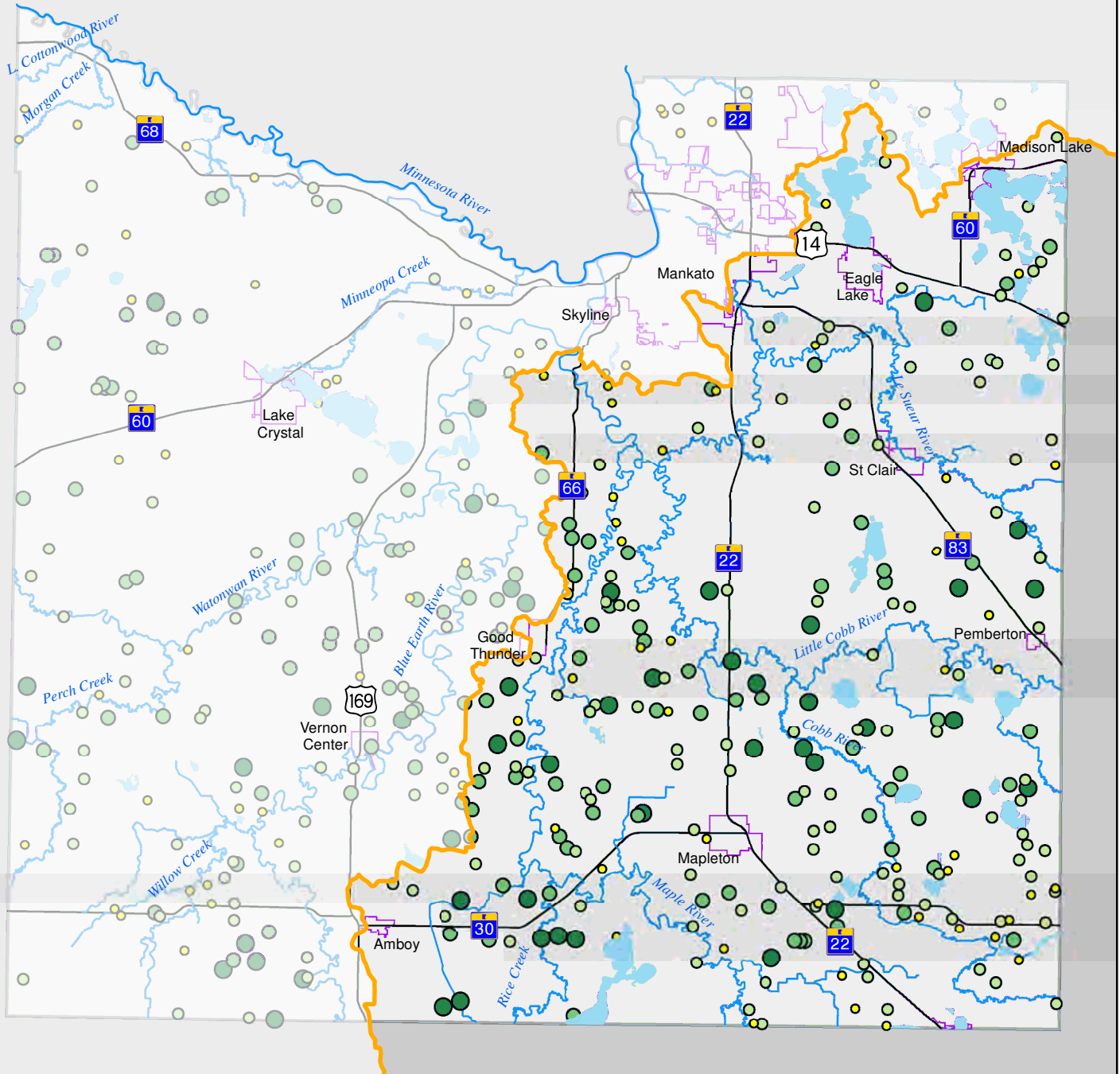










-  Le Sueur River Watershed
  -  State or U.S. Highway
  -  Stream or River
  -  Lake
- County Ditch Type**
-  Open Ditch
  -  Tile Ditch

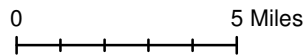


Prepared By: Blue Earth County  
Environmental Services  
2013

# Permitted Feedlots within Blue Earth County



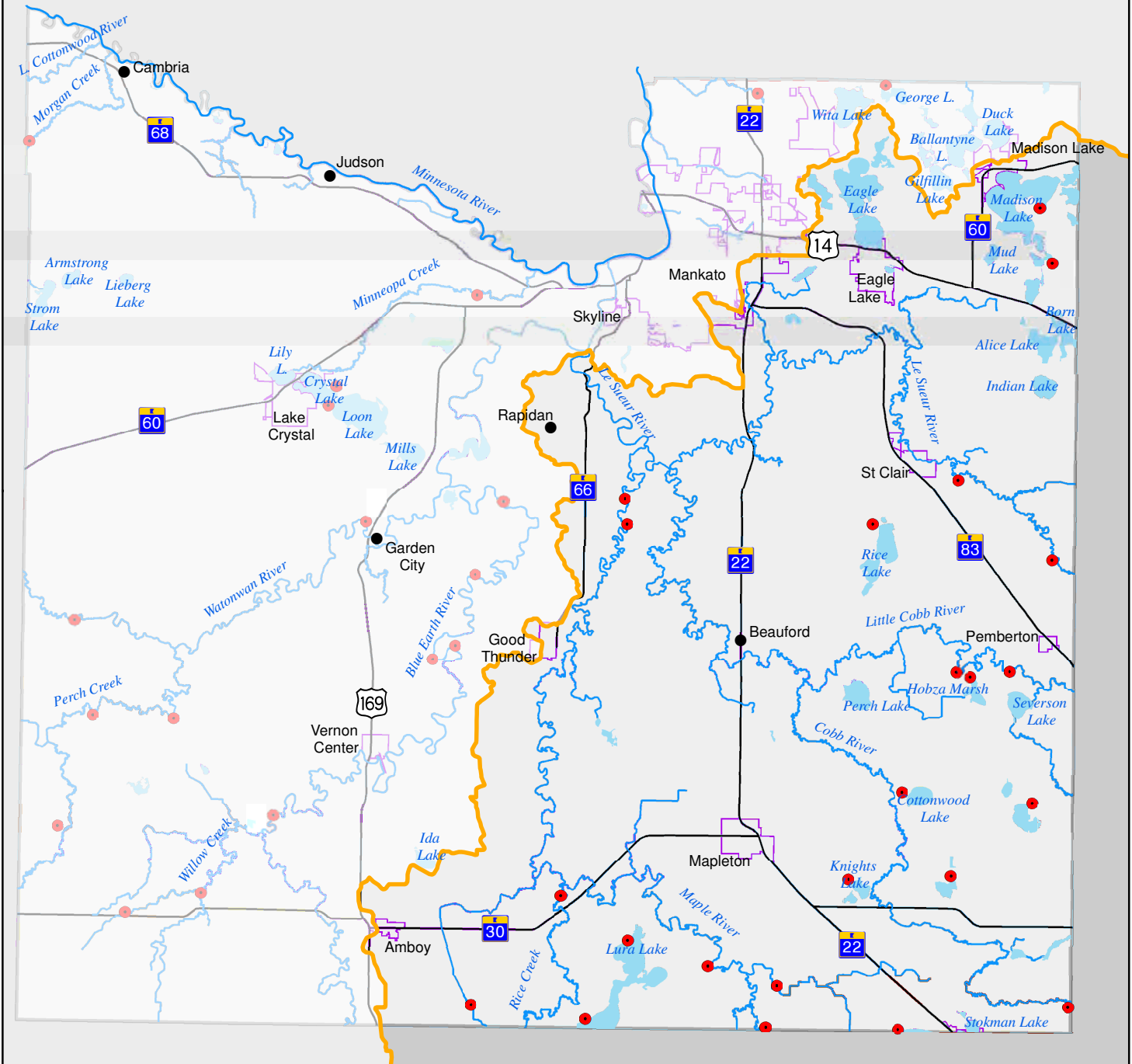
-  Le Sueur River Watershed
-  Protected Lake or Wetland
- Permitted Feedlot**
-  10 - 49 Animal Units
-  50 - 299 Animal Units
-  300 - 999 Animal Units
-  1000 - 2000 Animal Units
-  Protected Stream or River
-  City









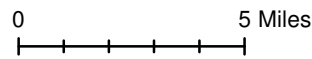
Prepared By: Blue Earth County  
Environmental Services  
March 2011

Source: Blue Earth County  
Feedlot Inventory  
2013

# Feedlots within Designated Shoreland Areas



-  Le Sueur River Watershed
-  Feedlot Located in a Shoreland Area
-  DNR Protected Basin
-  Protected Stream or River
-  State or U.S. Highway
-  City



Prepared By: Blue Earth County  
Environmental Services  
2013

Source: Blue Earth County  
Feedlot Inventory  
2013

*Note: Shoreland means land located within the following distances from public waters: 1,000 feet from the ordinary high water level of a lake, pond, or flowage; and 300 feet from a river or stream, or the landward extent of a floodplain designated by ordinance on a river or stream, whichever is greater.*

Appendix B - continued  
Priority Management Zones, Opportunities and Practices Targeted to  
Le Sueur River Watershed in Blue Earth County

# Priority Management Zones, Opportunities and Practices Targeted to Le Sueur River Watershed in Blue Earth County

Prepared by the Blue Earth County Environmental Services Department  
and the Soil and Water Conservation District  
July 2013

## IDENTIFICATION OF PRIORITY MANAGEMENT ZONES

Priority management zones were identified using professional judgment, landowner contacts, the County Water Management Plan 2008-2013, and information on the Le Sueur River watershed available from the MPCA:  
<http://www.pca.state.mn.us/index.php/water/water-types-and-programs/watersheds/le-sueur-river.html>

*An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011*

*Le Sueur River Watershed Monitoring and Assessment Report March 2012*

*Assessment Report of Selected Lakes Within the Le Sueur River Watershed Minnesota River Basin June 2010*

*DNR and MPCA 2010 Sentinel Lake Assessment Report Madison Lake (07-0044) Blue Earth County, Minnesota*

*MPCA 2006 Lake Assessment of Six Lakes in Blue Earth County: Ballantyne (07-0054), Duck (07-0053), Eagle Lake (07-0060), George (07-0047), Loon (07-0096) and Madison Lake (07-0044)*

## PRIORITY MANAGEMENT ZONES

The following priority management zones and conservation opportunities were identified:

- Lakes
- Urban development
- Highly erodible land
  - Knick zone
  - Near channel erosion- ravines and bluffs
  - Uplands – highly erodible cropland and gullies
- Water retention and wetland restoration
- Drainage

## PRIORITY MANAGEMENT ZONE/OPPORTUNITIES: LAKES

Lakes in Blue Earth County are a high priority for county residents and are valued for active and passive recreation. The following is a list of lakes in the Le Sueur River watershed in Blue Earth County:

Albert, Alice, Born, Cottonwood, Eagle, Hobza, Indian, Knights, Lost Marsh, Lura, Madison, Mud, Perch, Pick Marsh, Rice, Severson, Stockman, and 5 unnamed lakes

The watersheds of all lakes in the Le Sueur River watershed are priority management zones for all types of practices to reduce sedimentation and nutrients and improve water clarity and fisheries. The watersheds of the largest three lakes with the highest recreational value in the county are listed as impaired and are priority areas for management and conservation opportunities. These lakes are Madison Lake, Eagle Lake and Lura Lake

Two of these lakes, Madison and Lura, have lake associations. Shoreland restoration on Madison and Lura lakes because the shoreland is more developed compared with other lakes in the county.

The MPCA 2006 *Lake Assessment of Six Lakes in Blue Earth County: Ballantyne (07-0054), Duck (07-0053), Eagle Lake (07-0060), George (07-0047), Loon (07-0096) and Madison Lake (07-0044)* states that Madison Lake and Eagle Lake in the Le Sueur River watershed “are a unique natural resource that have an immense value to this area of the state.” This is consistent with local attitudes about the value of Madison Lake and Eagle Lake. This report also includes recommendations for the MPCA to work with local governments and lake residents to improve the lakes:

“It is essential that lake protection efforts for these lakes be conveyed to the local government (zoning and land use authorities) as well as local property users. The concern for protecting and improving these lakes should be elevated. These lakes are a unique natural resource that have an immense value to this area of the state.”

#### **PRIORITY MANAGEMENT OPPORTUNITY/ZONE: LAND CONVERSION TO URBAN DEVELOPMENT**

New development is a concern for three reasons: 1) changes in hydrology as a result of stormwater infrastructure and increased impervious surfaces, 2) sediment in construction runoff, and 3) pollutants in runoff post-construction.

The northeast corner of the Le Sueur River watershed in Blue Earth County is a priority management area because it is most affected by land conversion from agriculture, woodland and wetland land uses to urban development. The City of Eagle Lake, the City of Madison Lake and the City of Mankato are expanding in the Le Sueur River watershed are in this priority management zone.

#### **Channel Protection**

New development stormwater discharges from the City of Eagle Lake and the City of Mankato will discharge to ravines in the lower reaches of the Le Sueur River, Eagle Lake and public waters wetlands in the area. County Ditch 12, also known as Wilson Creek, discharges to a ravine where erosion problems have been identified in the Le Sueur River watershed.

Stormwater sizing for channel protection is not required by Minnesota NPDES permit or other Minnesota Rules but would be the best practice for reducing erosion in this area. Stormwater management methods and sizing for downstream channel protection is described in the Minnesota Stormwater Manual.

[http://stormwater.pca.state.mn.us/index.php/Channel\\_protection\\_criteria\\_\(Vcp\)](http://stormwater.pca.state.mn.us/index.php/Channel_protection_criteria_(Vcp))

#### **Low impact development**

Stormwater management design, infrastructure needs and local policy can address some of the effects of development. Model ordinances and other information related to low impact development and alternative subdivision design is available from the DNR, MPCA Stormwater Manual, the Nonpoint Education for Municipal Officials (NEMO) program, the Center for Watershed Protection, MPCA Stormwater Manual, and other sources.

Key water quality points included in NEMO model ordinances:

- Provide standards for measuring velocity and volume of runoff.
- Making maximum use of infiltration, including standards and technologies, given the variety of soil types, topography and extent of existing development.
- Ensure annual runoff rates and volumes from post development site conditions mimic the annual runoff sites and volumes from predevelopment site conditions.
- Regulating the amount and types of impervious surfaces.
- Protect functional value of wetlands and natural water courses.
- Provide plant and animal habitat.
- Promote watershed-based stormwater management.
- Promote infiltration and ground water recharge.
- Provide a vegetated corridor (buffer) to protect water resources from development.

- Provide no increase in temperature.
- Protect life and property from dangers of flooding.
- Protect public and private property from damage resulting from runoff or erosion.

#### **Other cities**

The watersheds surrounding all the municipalities in the watershed are priority management zones as flash flooding is a problem reported in most cities in the watershed, including

- Amboy – Maple River watershed
- Good Thunder – Maple River watershed
- St. Clair – Le Sueur River watershed
- Mapleton – Cobb River watershed
- Eagle Lake – Le Sueur River watershed

Stormwater retrofits are needed in some of these municipalities as well as stormwater management plans that identify opportunities for water retention and wetland restoration in the watershed where the city is located to prevent flooding and store stormwater discharges from the city prior to discharge to the surface water. Most of these municipalities discharge to ravines or outfalls where erosion can occur. These small municipalities need technical assistance to develop stormwater plans as most do not have these types of plans. There may be opportunities to work with these communities to address stormwater in their watershed, particularly following the September 2010 flood when all were affected.

#### **PRIORITY MANAGEMENT ZONE: KNICK POINTS and KNICK ZONE**

Knickpoints and the knick zone downstream of knickpoints are defining features in the Le Sueur watershed located within Blue Earth County. Within the knick zone are the lower reaches of the LeSueur River, Cobb River and Maple River. There are notable differences when compared with other areas in the watershed:

- Most highly erodible soils are in the knick zone
- Most ravines are in the knick zone
- Most bluffs are in the knick zone
- Most oxbows are in the knick zone
- Most forested areas are in the knick zone
- Most scenic areas are in the knick zone
- More fishing areas are in the knick zone
- Most densely populated and only area with growing population is in the watershed within and draining to the knick zone
- Most urban type of development is within the watershed containing the knick zone
- Most potential aggregate resources are in the knick zone
- Very high geologic sensitivity rating in the knick zone

All of these features are priority management zones and many present opportunities for combining local interests in wildlife, groundwater protection and natural resources with water quality practices.

#### **PRIORITY MANAGEMENT ZONE: HIGHLY ERODIBLE LAND**

Soil erosion was the highest ranking priority concern identified by county residents during development of the current county water plan. Le Sueur River impairments include turbidity, and sediment has been the focus of many studies in the Le Sueur River watershed.

The executive summary in *An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011* states that “Although agricultural uplands account for only one quarter of the suspended sediment currently

exported from the Le Sueur watershed, upland sediment represents the source which has experienced the largest percentage increase in erosion rates and is the dominant source above the incised reach.”

Highly erodible land is found throughout the Le Sueur River watershed in the county. The most highly erodible land is in the knick zone near the channel and in ravines. Highly erodible and potentially highly erodible cropland is also found in all areas of the Le Sueur River watershed in the county. The cropland that is classified as highly erodible land and the potentially highly erodible cropland (8,998 acres) in the Le Sueur River watershed can be targeted for best management practices. The areas of cropland with the most highly erodible soils in the Le Sueur River watershed are described as follows:

*Maple River watershed* – mostly upstream of Good Thunder

*Cobb River watershed* – mostly upstream of Beauford

*Le Sueur River watershed* – mostly small tributary streams joining the main stem east of State Highway 22 and land north of the Le Sueur River

#### **PRIORITY MANAGEMENT ZONE/OPPORTUNITY: HIGHLY ERODIBLE LAND – STREAM BANKS AND BLUFFS**

Addressing stream bank and bluff erosion is a priority, because erosion from these sources is a major contributor of sediment to the Cobb, Maple, Le Sueur and Minnesota rivers. *An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011* states “it is likely that bluff erosion actually accounts for approximately 50-60% of the total sediment budget,” and bluffs “line 32% of the river in Blue Earth County and can be as much as 60 meters high [196.85 feet].”

Highly erodible stream banks and bluffs are also a priority because channel widening and incision, channel migration and knick zone progression threaten dwellings and infrastructure and cropland. Bluff stabilization projects require engineering and permits, and the projects are costly. There are relatively few bluff stabilization projects in the Le Sueur River in the county. Instead, most projects addressing bluff erosion involve diverting the river channel away from the toe of the bluff. This is done with construction of j-hooks in the channel and, more recently, toe wood with woody debris. Stabilization projects with rip-rap are most often part of a stream bank projects. Rip rap is also used to protect the toe of banks of bluffs.

#### **Land use policy**

*An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011* recommends that “In key locations, vulnerable areas along the main stem channels should have stronger protections, in terms of setbacks, mechanical armoring, limiting direct discharge from tile lines or pipes, or ensuring adequate buffers.” There is interest in increasing setbacks for structures in the Le Sueur River and other watersheds in the county. This mitigation strategy was identified in the county’s update of the Hazard Mitigation Plan in 2013. However, technical information is needed to determine how much the setbacks should be increased and where.

#### **PRIORITY MANAGEMENT ZONE: HIGHLY ERODIBLE LAND/ RAVINES**

Ravines and gullies are priority management zones and are common features in all sub-watersheds of the Le Sueur River watershed. The largest ravines are located in the knick zone of the Le Sueur, Maple and Cobb rivers;

Ravines and large gullies in the Le Sueur River watershed are found throughout the watershed not only along rivers but also along lakes and on terraces above the rivers. Ravines connected to surface water contribute sediment directly to surface water. Ravines connected to upland terraces instead of river systems often deposit sediment in wetlands reducing wetland storage capacity and degrading wetland habitat.

*An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011* states that ravines “contribute approximately 9%... of the annual sediment load on average in the modern time period (2000-2010).” Erosion



from ravines is variable. As stated in the report, “some ravines can deliver sediment to the river channel at very large rates, and these sediment hot-spots can represent good initial management opportunities for sediment reduction.” The report also states that research on ravines in the Le Sueur River watershed found “no common ravine morphometries associated with ravines,” and “there is no evidence of systematic ravine lengthening over the past seven decades...”

Much like bluffs, local observations of ravines shows there are different processes causing ravine erosion. Seeps, tile inputs and upland changes all influence ravine stability. It appears that ravine erosion has become more problematic in the past 10-15 years, but not all ravines have erosion problems, and it seems there are no patterns for predicting which ravines will develop erosion problems. Local observations of ravines shows that erosion often worsens in ravines where there has been some type of change in land use affecting runoff or groundwater or change in hydrology from surface water or tile inputs. Blue Earth County and the SWCD are currently working on a ravine study using GIS and 2005 and 2012 LiDAR to identify ravines with the greatest erosion during the seven years between LiDAR data.

#### **PRIORITY MANAGEMENT ZONE/OPPORTUNITY: WETLANDS**

*An Integrated Sediment Budget for the Le Sueur River Basin Final Report June 2011* states that reducing erosion will require managing peak flows.

“Effective management will require a combination of actions to reduce erosion at its source and more effectively control the physical drivers of erosion, requiring management of peak flows. If only sediment sources are addressed, management actions will risk addressing the symptom but not a dominant causal factor. As high flows in the river are the underlying, systemic driver of near-channel erosion, increased water retention in uplands will reduce sediment loads over the long-term and can help mitigate on-going and future changes in precipitation.”

Restoring wetlands is a priority in the county water management plan. It is the County’s goal to “maximize opportunities to protect, enhance and restore wetlands and other natural areas to improve water quality, fisheries, wildlife habitat, recreation and land conservation.” Identifying, assessing and prioritizing wetland areas for protection and enhancement and restoring wetlands are priorities of the *Water Management Plan 2008-2015*.

Opportunities to restore wetlands exist throughout the county in the Le Sueur River watershed, because more than 90% of the pre-settlement wetlands were drained. The county is working with local partners to prepare a comprehensive wetland protection and management plan that will identify and prioritize strategic locations for wetland restoration.

#### **PRIORITY MANAGEMENT ZONE/OPPORTUNITY: DRAINAGE SYSTEMS**

Improving water quality with implementation of mutually-beneficial actions addressing both environmental concerns and drainage of land is a goal of the county Water Management Plan 2008-2015. Establishing vegetated ditch buffers and increasing water retention in County drainage systems are high priority actions of the Water Management Plan.

Wetland restoration in ditch systems is preferred to engineered solutions, but wetland restoration and retention projects that necessitate conversion of cropland are not widely supported by landowners.

Interest in ditch design for conservation is developing in the county after County Ditch 57 was improved with a surge basin and a two stage ditch in the Cobb River watershed near Mapleton. Interest in controlled drainage is also increasing in the county, as landowners have become more aware of downstream impacts from drainage to ditches, rivers and streams. With hydric soils dominating the county, most land used for crop production has been drained. The cost of retrofitting existing tile drainage systems to controlled drainage systems is costly and cannot be done on every field.

## **CONSERVATION OPPORTUNITIES and PRACTICES TARGETED TO LE SUEUR RIVER WATERSHED**

### **Summary of conservation opportunities identified and the level of interest and costs associated with their implementation**

While conducting the landowner interviews questions were asked about practices that could be done on their land as well as what conservation practices they thought should be implemented in the LeSueur River watershed in order to help improve water quality. The following is a summary of the types of conservation practices suggested by the 89 individuals who participated in the interview process.

**CONSERVATION PROGRAMS:** 64 respondents indicated that more vegetation related conservation practices and programs, such as CRP, WRP, and RIM, are needed. Conservation buffer strips along waterways was the most commonly suggested practice for the Le Sueur River watershed (38 of 89).

**WATER RETENTION:** 26 respondents indicated that more wetlands and ponds are needed in the watershed for water retention to reduce flooding and erosion.

**CONSERVATION STRUCTURES:** 19 respondents indicated that conservation structures such as waterways, terraces, grade stabilization structures and water & sediment control basins should or could be installed in the watershed. More than half (10 of 19) of the respondents either have installed waterways or suggest more waterways are needed in the watershed.

**DITCHES/DRAINAGE:** 16 respondents recommended drainage practices such as controlled drainage and two stage ditches. Three participants recommended more tile drainage to improve water quality.

**RIVER PROJECTS and CLEAN OUT:** 15 respondents recommended river projects such as removing woody debris from the river channel, stabilizing the channel with rip-rap and channelizing rivers.

**LAKES PROJECTS:** 11 respondents would like to see more lake shore restoration projects. This response was only suggested by those who live on a lake in the Le Sueur River watershed.

**URBAN PRACTICES:** 9 respondents recommended addressing urban stormwater with retention and landscaping such as rain gardens.

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### **List of Practices Targeted to the Le Sueur River Watershed**

The County and SWCD will need additional resources to implement the *County Water Management Plan 2008-2015* goals and objectives and conservation practices in the Le Suer River watershed. The need for additional staff to develop projects in targeted areas was clearly described in the county water plan.

Best management practices can be promoted and encouraged to control soil erosion and sedimentation or chemical or nutrient runoff or infiltration that impairs water quality in priority management zones. The objectives for best management practices are to: (1) control nutrient run off, (2) stabilize critical erosive areas, (3) divert runoff to protect and improve water quality; (4) reduce wind erosion, (5) control gully, rill or sheet erosion, (6) protect shoreland from erosion, (7) control storm water runoff, and (8) protect or improve surface and ground water quality.

The list of practices targeted to the Le Sueur River watershed was made using professional judgment, landowner suggestions from interviews, the civic engagement process, and the County Water Management Plan 2008-2015. The following table displays the list of practices, range of costs of practices. This list is targeted to landowners, local governments and agencies in the Le Sueur River watershed.

PRACTICE	AVERAGE COSTS (Estimated Range/Program Payment)
<b>VEGETATION</b>	
<b>Filter Strip:</b> A strip or area of herbaceous vegetation situated between cropland, grazing land, or distributed land (including forest land) and environmentally sensitive areas.	\$450 - \$600 per Acre
<b>Grassed Waterway:</b> A shaped or graded channel that is established with suitable vegetation to carry surface water at a non-erosive velocity to a stable outlet.	\$2.50 - \$6.00 per Ln Ft
<b>Tree planting:</b> Establishing woody plants by planting seedlings or cuttings, direct seeding, or natural regeneration to provide erosion control, reduce pollution of air or water, provide or enhance wildlife habitat, to provide energy conservation, to uptake water or nutrients, and other purposes.	\$500 - \$1000 per Acre
<b>Reinvest In Minnesota (RIM):</b> The RIM Reserve program compensates landowners for granting conservation easements and establishing native vegetation habitat on economically marginal, flood-prone, environmentally sensitive or highly erodible lands. The program protects the state's water and soil resources by permanently restoring wetlands, adjacent native grassland wildlife habitat complexes and permanent riparian buffers.	\$5,400 - \$5,700 per Ac for Cropland \$3,200 - \$3,400 per Ac for Non Crop
<b>Conservation Reserve Program (CRP):</b> CRP is a voluntary program that helps agricultural producers safeguard environmentally sensitive land. CRP participants plant long-term, resource-conserving covers to improve the quality of water, control soil erosion, and enhance wildlife habitat. In return, the participants receive a rental payments and cost-share assistance. CRP contracts are 10 to 15 years in duration.	\$180 - \$275 per Acre
<b>Wildlife food plots:</b> Establishes a variety of plants to provide a reliable food source for wildlife. Wildlife food plots can also improve water quality by reducing soil erosion.	\$200 - \$400 per Acre
<b>STRUCTURES</b>	
<b>Grade Stabilization Structure:</b> A structure used to control the grade and head cutting in natural or artificial channels. Used to halt the advance of gullies and reduce soil erosion.	\$5,300 - \$29,500 Each
<b>Terrace:</b> An earth embankment, or a combination ridge and channel constructed across the field slope.	\$2.00 - \$4.50 Ft
<b>Water &amp; Sediment Control Basin:</b> An earth embankment or a combination ridge and channel generally constructed across the slope and minor watercourses to form a sediment trap and water detention basin.	\$6.00 - \$46.00 Ln Ft
<b>Diversion:</b> A channel constructed across the slope with a supporting ridge on the lower side	\$9.00 - \$88.00 per Ln Ft
<b>Lined Waterway or Outlet:</b> A waterway or outlet having an erosion-resistant lining of concrete, stone, or other permanent material.	\$1.50 - \$6.00 Sq Ft
<b>WATER RETENTION</b>	
<b>Sediment Basin:</b> A basin constructed with an engineered outlet, formed by an embankment or excavation or a combination of the two.	\$2.00 - \$5.00 Cu Yd
<b>Pond:</b> A water impoundment made by constructing a dam or an embankment	\$4.50 - \$7.00 Cu Yd

or by excavating a pit or dugout.	
<b>Wetland Restoration:</b> The return of a wetland and its functions to a close approximation of its original condition as it existed prior to disturbance on a former or degraded wetland site.	\$300 - \$600 per Acre
<b>RIVER, STREAM and LAKE</b>	
<b>Streambank and Shoreland Protection:</b> Treatment(s) used to stabilize and protect banks of streams or constructed channels, and shorelines of lakes, reservoirs, or estuaries.	Stream Barb - \$75.00 Cu Yd Bioengineered - \$25.00 Ln Ft Rip Rap Bank - \$18 - \$35 Ln Ft
<b>Stream Habitat Improvement and Management:</b> Maintain, improve or restore physical, chemical and biological functions of a stream, and its associated riparian zone, necessary for meeting the life history requirements of desired aquatic species.	\$9,000 - \$16,000 per Acre
<b>Clearing and snagging:</b> Removal of vegetation along the bank (clearing) and/or selective removal of snags, drifts, or other obstructions (snagging) from natural or improved channels and streams.	\$900 - \$2,000 per Acre
<b>DRAINAGE SYSTEMS</b>	
<b>Structure For Water Control:</b> A structure in a water management system that conveys water, controls the direction or rate of flow, maintains a desired water surface elevation or measures water.	\$1,000 - \$2,000 Each
<b>Denitrifying Bioreactor:</b> A structure containing a carbon source installed to intercept subsurface drain (tile) flow or ground water, and reduce the concentration of nitrate-nitrogen.	\$35.00 - \$55.00 Cu Yd
<b>Drainage Water Management:</b> The process of managing water discharges from surface and/or subsurface agricultural drainage systems.	\$500 - \$2,000 Each
<b>Two-stage ditches:</b> Vegetated benches are added to each side of a ditch, mimicking the floodplains that occur naturally along streams. The benches make the sides of a ditch less steep and more stable, and the vegetation helps absorb water during periods of high flow and can filter nutrients from run-off.	\$8.00 - \$12.00 Ln Ft
<b>OTHER</b>	
<b>Livestock Waste Management:</b> The application of eligible conservation practice components to improve water quality associated with livestock wastewater and runoff.	Varies widely depending upon practices need and animal units
<b>Nutrient Management:</b> Nutrient management is managing the amount, source, placement, form, and timing of the application of plant nutrients and soil amendments.	\$16.00 - \$18.00 per Acre
<b>Residue and Tillage Management:</b> Managing the amount, orientation, and distribution of crop and other plant residue on the soil surface year-round, while limiting the soil disturbing activities used to grow crops.	\$30.00 - \$40.00 per Acre
<b>SSTS:</b> Individual subsurface sewage treatment systems.	\$10,000 - \$20,000

## **LAKES**

More information will be needed to target practices in the Madison Lake watershed. According to the *LeSueur River Watershed Monitoring and Assessment Report • March 2012*, “the watersheds for each of these lakes [Madison, Eagle and Lura] will need to be addressed through a TMDL study to determine the source and extent of pollution problems.”

It is important to limit as much external (watershed) phosphorus loading to the lakes as possible to improve or maintain the current concentrations.

### **Education and Policy Opportunities:**

Shallow lakes are sensitive to land use changes. Local residents and local policy makers need technical information about each lake to guide future land use decisions. The County is just starting the process of updating the Comprehensive Land Use Plan. Technical support and information is needed from the DNR and MPCA for policy makers to make sound land use decisions that can permanently affect lake and stream water quality in the Le Sueur River watershed and county-wide.

The following are local entities responsible for land use decisions for lakes in the Le Sueur River watershed:

- Madison Lake City Council and Planning Commission,
- Eagle Lake City Council and Planning Commission,
- Blue Earth County Board and Planning Commission,
- Lime Township and Planning Commission (Eagle Lake North),
- Mankato Township and Planning Commission,
- Jamestown Township,
- Le Ray Township,
- Madison Lake Association,
- Lura Lake Association
- Lake Washington Sewer District (includes Madison Lake unincorporated areas)

### **Lake Riparian Areas:**

Shore impact zones should be protected with permanent vegetation for all land uses. The County and SWCD are partners on project underway to establish permanent vegetation in the shore impact zone in agricultural areas. This should be expanded to the shore impact zones of lakes, but support will be needed from lake associations and policy makers at the city and county level.

Shoreland restoration and stabilization projects should be established where needed. Areas of the lakes needing restoration and stabilization have not been specifically identified.

Technical assistance will be needed to work with landowners to restore their shore and construct stabilization projects. There is a sense at the county level that lake shore residents needs for technical assistance have been neglected because there is not enough local staff with expertise and time to work with lake shore residents and lake associations.

### **Stormwater:**

The cumulative effects of increased runoff from individual shoreland development projects and small subdivisions on water quality are not accounted for in the MPCA NPDES permit requirements for non-MS4 communities.

### **Wetlands and Water Retention**

Treatment wetlands are needed to treat and reduce runoff and reduce phosphorus from all land uses in the watershed. More information is needed about watershed and subwatershed inputs to the lakes and strategic sites for wetland restoration.

There is interest in stormwater retrofit systems in municipalities within impaired lake watersheds and for existing developments in unincorporated areas. More technical information is needed to identify the best locations and types of stormwater retrofits.

Financial resources and partnerships are needed to protect and restore wetlands and construct and maintain BMPs.

#### **MPCA Recommendations for Lakes:**

The MPCA made similar recommendations about lakes of concern in the Northeast corner of Blue Earth County in their report, *MPCA 2006 Lake Assessment of Six Lakes in Blue Earth County: Ballantyne (07-0054), Duck (07-0053), Eagle Lake (07-0060), George (07-0047), Loon (07-0096) and Madison Lake (07-0044), which included two lakes in the Le Sueur River watershed:*

“A continued effort to protect these lakes from further degradation is strongly recommended. Some important considerations for improving and protecting the water quality of the lake include

- A more comprehensive review of land use practices in the watershed
- Implementation of BMP’s in the shoreland area and ultimately through the watersheds
- Proper maintenance of buffer areas between lawns and the lakeshore
- Minimizing use of fertilizers
- Ensure septic systems are maintained and up to code
- Reduce other Phosphorous loading into the lakes (e.g., stormwater from near-shore development activities in the watershed)
- Raise public awareness on the condition of these lake
- Property owners and community to take ownership in the quality of these lakes

These considerations will be important in improving the water quality of these Blue Earth County lakes as well as maintaining them over the long term. .The improvement and protection of the lakes is essential not only for the future of the lakes, but the community as well. This is well stated by Krysel, et al (2003) “The evidence shows that management of the quality of lakes is important to maintaining the natural and economic assets of this region.”

**Water Plan Management Goal:** *Protect and improve water quality by promoting and establishing stormwater management practices that reduce pesticides, fertilizers and other pollutants in runoff and reduce the rate and volume of stormwater runoff to reduce erosion.*

The following objectives and actions contained in the water plan cannot be implemented without additional support from the DNR and MPCA and additional staff at the local level.

#### **Objective 1: Encourage municipalities and Townships to review and revise stormwater, zoning and subdivision ordinances to protect water resources.**

**Action 1:** Work with City staff, engineers and consultants to provide each City with general information about urban stormwater runoff impacts.

**Action 2:** Work with the City staff, engineers, consultants, NEMO, DNR and others as appropriate to provide each City with model ordinances to address development and stormwater impacts.

**Action 3:** Assess the need and seek funding for consultant services to review and rewrite local ordinances, if needed.

**Action 4:** Work with Mankato Township and Lime Township to provide each with general information about urban stormwater runoff impacts and model ordinances to address stormwater impacts.

#### **Objective 2: Reduce erosion at existing urban stormwater outlet structures.**

**Action 1:** Work with City staff, engineers, SWCD and the County Ditch Manager to inventory and evaluate stormwater outlets to determine where erosion problems exist.

**Action 2:** Identify short-term and long-range solutions to stormwater runoff problems and construct structures, retention areas and other conservation practices where needed.

**Action 3:** Work with City staff and SWCD to seek funding for Action 2 if needed.

**Objective 3: Reduce erosion from construction sites.**

**Action 1:** Provide general information about MPCA NPDES permit rules to municipalities (not Mankato) and Mankato Township staff.

**Action 2:** Provide general information about MPCA NPDES permit rules along with construction permits issued by the County.

**Action 3:** Work with staff of municipalities, MPCA stormwater staff and others to assess compliance and educational needs related to State NPDES permit requirements.

**Action 4:** The City of Mankato will continue implementation of its Stormwater Pollution Prevention Plan, partnering with the County and local municipalities for education and other activities when appropriate.

**Objective 5: Protect sensitive lake shoreland areas from development.**

**Action 1:** Assess the shoreland and riparian areas of all lakes, especially those with greatest likelihood of development such as Madison, Duck, Ballantyne, George, Eagle, Lura, Crystal, Loon, and Mills Lakes, to provide a baseline and general information for the County Planning Commission and the affected municipalities.

**Action 2:** Address shoreline protection in the County's Comprehensive Land Use Plan and amend County land use regulations to protect shoreland areas from development impacts.

**Objective 6: City and County park systems will continue to develop and redevelop shoreland areas providing public access, reducing runoff, and protecting stream banks and shoreland.**

**Action 1:** The County Parks Department will continue to utilize and promote best management practices, such as rain gardens and use of native vegetation, in all County parks, as appropriate.

**Action 2:** The County will continue to work with lake associations, local conservation organizations, the DNR and other State agencies to stabilize shoreland areas in County Parks where needed and as funding is available.

Appendix B continued  
Blue Earth County  
Summary of landowner selection and discussions



BLUE EARTH TASK B, SUBTASK 2&3  
SUMMARY OF LANDOWNER SELECTION AND DISCUSSIONS

### LANDOWNER SELECTION

Based on advice received from Blue Earth Soil and Water and Blue Earth Environmental Health staff, outreach to 101 Blue Earth County residents was initiated. These consisted of a cross-section of residents that included farmers and other rural landowners, city and county employees, conservation club members, canoe club members, ag business staff and others.

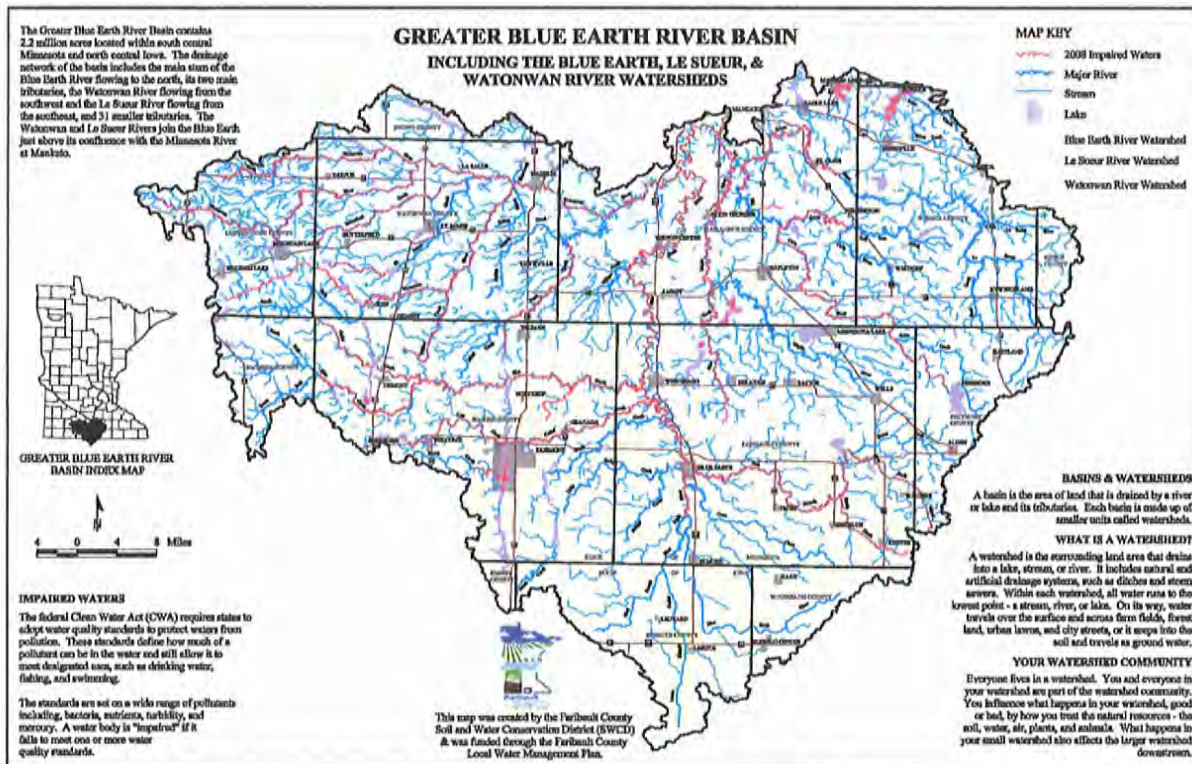
An effort was made to include at least some responses from each of these “walks of life” sectors but no attempt was made to control sample sizes within the individual sectors.

Prospective interviewees were almost always contacted by phone and subsequently interviewed. The primary exception to this procedure would be when the individual contacted initially invited neighbors or relatives to participate in the survey.

Organizations were approached with a request to attend one of their meetings. One or two organization representatives suggested that they would like to email other members and invite them to participate. The response rate seemed to be low with the email approach.

The sample was drawn somewhat systematically as opposed to randomly, in an effort to get some responses from across the watershed. The map below shows the Le Sueur River watershed segment of the Blue Earth river watershed, highlighted in blue and essentially occupying the east half of Blue Earth County and including Eagle, Lura and Madison Lakes; and the Cobb River, Maple River and Rice Creek.

The land-use affiliation of the respondents would appear to be a logical way of stratifying this survey design, anticipating that the responses of , for example, farmers might be different than the responses of conservation club members based on their opinions regarding land use.



## DISCUSSIONS

Many farmers expressed concern about the capacity of local streams to convey water. Several suggested that the rivers are a mess, the fallen trees should be cleaned out. Some thought that the channels should be straightened to improve drainage. One person suggested that the streams should be lined with concrete from Minnesota to Louisiana. Many commented that years ago - usually two generations back, the personal communication limit, when the grandparents were farming - livestock grazing and firewood removal kept the river channels free of debris and obstructions. Many stated that all we need to do now is remove the obstructions to restore the former order. One respondent suggested that, in the pre-settlement landscape, prairie fires kept the rivers free of woody debris and able to convey water.

Few farmers expressed support for wetland preservation or restoration. Several suggested that restoration of wetlands was not a good idea. One individual with a larger restoration in permanent easement said that he now regretted taking the richest land on his farm out of production at what now seems like a low price. He added that he now

wishes that he improved the outlet. Several people commented that society should keep farm land in production in order to feed a growing human population.

Several farmers expressed some frustration with current wetland identification procedures, regulations regarding tiling wet areas, the cost of wetland bank acres and the difficulty of procedures relating to 1026 forms.

Many conservation club members expressed concern about drainage acceleration resulting from pattern tiling. Many suggested that more wetlands, holding ponds, water-infiltrating prairies and other similar features should be established to reduce flooding, habitat loss and structural damage to the river channels.

Many lake association members emphasized in-lake issues, including increased nuisance growth of aquatic plants and proliferation of invasive aquatic plants and animals.

No one talked at all, at least not in a systemic way, about the increasing importance of floodplain function and floodplain management. However, several people did highlight a specific floodplain issue of the Cobb River getting out of its banks and crossing to the Maple River, eroding topsoil as it goes. Examples like that might be demonstration opportunities.

## AREAS OF AGREEMENT

Most respondents thought that land use has an impact on surface waters.

Across all interviews, there appeared to be a general awareness of drainage acceleration. This was expressed in a variety of ways (eg “back in September, 2010, we could not believe how fast the water got to the Cobb River”).

There seemed to be broad support from all walk-of-life sectors for buffer strips. Virtually everyone responding to the survey thought that a 50-foot grass buffer, or something similar, should be in place along all ditches and streams. Lakeshore residents showed some consistent interest in establishment of native plants along the urbanized lakeshore.

There were numerous observations that farming practices have changed substantially during the last half of the 20th century: less pasture, hay and wetland, more row crop, less cultivation, more chemical use, much more tile, larger farms, less personal connection to the land, more absentee landowners, accelerated upstream drainage. Several people pointed out that some changes have been positive for water quality: for example, consolidation of livestock operations that now are much more regulated in terms of manure management was perceived to be a positive compared to the old common method of keeping the animals in the ravine running to the river.

THERE APPEARED TO BE ALMOST A CONSENSUS THAT THE MID-STREAM DRAINAGE SYSTEM HAS NOT KEPT PACE WITH UPSTREAM DRAINAGE IMPROVEMENTS. This thought was expressed in different ways between the farmer and non-farmer walks-of-life groups, farmers largely of the opinion that the rivers are a mess of fallen trees, log jams and flow obstructions; and conservation group members frequently of the opinion that midwestern streams are being blown out and structurally damaged as a result of forcing agricultural drainage water into them.

Appendix C  
Faribault County  
Summary of perspective of Le Sueur Watershed

**LeSueur River PMZ Final Report  
Faribault County  
June 25, 2013**

Over the past 3 years, Faribault County has taken time to think through and develop a methodology that we felt would be the best way to work with our landowners in identifying priority areas where conservation efforts are needed. In Faribault County, drainage systems are as important as our highway system. The ongoing challenge is to better understand how these systems were designed, how they currently operate, and how we move into the future striking a balance between landowner drainage needs and natural resource needs utilizing different tools than have been used in the past.

In order to achieve these goals, the county is committed to utilizing the drainage watershed approach. Planning will occur in conjunction with an established Redetermination of Benefits (ROB) schedule. This method will be systematic and comprehensive, providing solutions on a small watershed scale. The county feels that this is the only effective way. A vast majority of landowners are only concerned about water quality and quantity when it impacts the land in which they own, reside, or farm. It is very hard to get them to understand or care how their current land use activities affect their neighbors' property, let alone how they might be impacting the Le Sueur River, Minnesota River, or Lake Pepin.

The Le Sueur River is not in Faribault County. The rivers we do have are not considered aesthetic or recreational. Our Iowa neighbors to the south call their drainage systems "drains". This is how the watercourses in our county are thought of, making water quality far from the minds of our landowners. Water quantity on the other hand can become a hot topic in a wet year like 2013, but the majority of landowners just want the water off their field and everything to drain faster, with little regard to downstream impacts. Usually those who do voice a concern are those at the outlet being affected. Other times landowners do understand storage is needed, but almost always on someone else's land. So how do we change their minds? Only by continued education and prioritization, one small watershed at a time.

Faribault County's targeting efforts began in the East Branch Blue Earth River watershed, which unfortunately is outside of the Le Sueur Watershed. The work that was requested by the PMZ effort was about a year too early. We have hosted 2 landowner informational meetings for the larger CD 3 watershed, which encompasses approximately 43,500 acres in the Le Sueur, but Redetermination of Benefits, watershed inventory, planning, and more in-depth landowner meeting won't begin until late 2013 and 2014.

### **Objective 1, Watershed Information Compilation**

#### **Task A - Develop Site specific materials**

In order to respond to the landowner involvement in this project, we developed a "Landowner Toolbox" of current conservation programs and funding opportunities (included). Staff developed several program fact sheets and brochures, and worked with partner agencies for additional information. This is also available on the SWCD website. The folders were intended to be distributed during one-on-one interviews. Instead most

were handed out during landowner meetings to interested parties. For the landowners who looked over this information, they will gain a greater understanding of available projects and programs, making future meetings and discussions more productive.

## **Objective 2, Landowner Consultation, Data Collection and Analysis**

### **Task A - Landowner Contacts**

#### **Subtask 1,2,3,4**

Although Faribault County did not necessarily achieve the goal of 67 one-on-one interviews outlined in the PMZ process, we believe that our approach by drainage system will provide more opportunities to work directly with the landowners as they will have a common goal and maybe even have the added “peer pressure” to implement practices that they have recognized as imperative for consistent drainage management.

We also felt that it is important for current SWCD staff to be conducting the interviews as many landowners become confused when they have multiple outside personnel working on collecting and distributing “conservation” information. The SWCD wants to be the agency distributing correct information to landowners, and in-turn the ones they can trust and go to for assistance and information. Also a forgotten element is landowners themselves should gain something from the interview process, and this can only occur by working with the same staff and office they know and trust. They need to know who we are, what we do, and who they can contact.

At the time of the PMZ, we were not able to provide this as we have been targeting and focusing in the Blue Earth, so perhaps for us, it would have been putting the cart before the horse. We don’t believe cold calling landowners with only the PMZ purpose would be benefitting anyone. The interviews would occur more naturally through ongoing conversation while staff is working within that targeted watershed. The county will be providing this within the Le Sueur over the upcoming years. As local staff, it is our responsibility to gain the understanding and trust of our landowners so that they are comfortable coming to us with problems and more importantly questions. This does not happen overnight. We feel that by just doing an “interview” and not providing any follow-up, that we may not be doing any service to the landowner.

It also needs to be stated that the interviews are truly only a representation of one snapshot in time. We feel that landowner responses will be based on current conditions. For example if the same questions were asked last year during the drought, and today after a weekend of 6+ inches of rain countywide, answers would potentially be different.

As we work with landowners, we are continually “interviewing” them as to what traditional practices they are willing to implement and discussing with them what non-traditional or innovative practices they would be interested in seeing implemented. We have been fortunate in the GBERBA area to have had great implementation resources, however, the challenge continues to be working around the fact that currently it is

much more financially important to continue and expand cropping systems. Hopefully in this current weather pattern, we may again be able to sell additional conservation practices. Not because of an inventory, or a PMZ project, but simply because it makes sense.

### **Subtask 5&6 – Group/organization communication**

As part of the county’s ditch assessments, we are conducting landowner informational meetings in conjunction with ROB. These meetings are conducted in a manner that allows for presentation and discussion of traditional and non-traditional opportunities for drainage. The SWCD is fortunate to have a Drainage Engineer on staff that is able to serve as an important liaison between landowners, contractors, outside engineering firms, ditch viewers, and the Drainage Authority. The Engineer will be out front working with landowners.

Civic Engagement is also critical. However, there are methods that have been successful in other parts of the LeSueur watershed because a connection to the river as a recreational resource can be demonstrated. We do not have that with the Maple River, so at this time we do not spend a lot of time and resources on such activities. Our hopes is that once our landowners take ownership of the water that leaves their land, we will open up these opportunities.

### **Task B - Compilation of Information for PMZ Identification**

#### **Sub Task 1 - Describe Watershed**

The LeSueur comprises of nearly 35% of Faribault County.

#### **Sub Task 2&3 - Summary of landowner selection and discussions**

At the beginning of the PMZ project a landowner map with 12 digit HUC’s was developed to identify potential interviews within the Le Sueur. However, for reasons previously stated, it was determined that the process would work better to interview landowners that the SWCD has some sort of relationship with. For example, working with a producer while conducting a feedlot or septic inspection (we are already there, and not taking additional time from the landowner). Another scenario involved working with landowners while out in the field looking at drainage systems. For these, the landowners were a higher priority since something had been identified on their land. In the future we will target landowners through meetings and one-on-one after an inventory of the system.

#### **Sub Task 4 - Conservation Opportunities**

In our opinion, it is really not the method, or the agency that is asking us to work with the landowners and collect the information, because it is usually only collecting for that specific day, or for that specific reach, or for that specific period. It is really about being able to gain the trust and understanding of our landowners and operators by providing them with a targeted, manageable, and prioritized process that will work to get the landowners involved and committed. Until we have achieved this, are we simply just spinning our wheels?



It is also important to understand that maybe we need to collect the data, gather up the funding opportunities, and wait for them to come to the realization that their land is missing that element of conservation. For Faribault County, that is why we have chosen the drainage watershed scale to be the most effective in regard to the number of landowners, acres of land, current workload capacity, and continued shortage of technical and administrative funding.

We are committed in moving forward with our plan which means that we will continue to be flip flopping between the Blue Earth and LeSueur watersheds. The county has a drainage inspector and drainage engineer to help us achieve our goals.

We feel that through the PMZ process for the Le Sueur, we were able to add additional educational components and opportunities in regard to practices and data collected through current studies, alternative practices, etc. to our landowner informational meetings.

In addition, it has been identified several times throughout our landowner meetings that we must find a way to allow for funding of non-traditional (NRCS, BWSR) practices. For example, working with ditch systems and be able to provide a funding mechanism for the implementation of water retention areas, implementing common sense and cost effective alternatives, etc.

### **Sub Task 5, 6**

To summarize up our interviews, it simply restates why we must have a manageable plan. We have 4 very different situations and very different conclusions expressed by the interviews. Those landowners that have always been passionate and conservation minded, will continue to do so, and will not expect anything in return. This is a very limited group.

On the other hand, there will continue to be a much larger group that will only decide change is important when these considerations are forced on them in the form of regulation. Is this right? Which group do we focus on?

I hope that these and many other questions will be able to be answered through this effort by the PCA. In the mean time, Faribault County will continue to collect and distribute data as we find to be effective, which is drainage system watershed by drainage system watershed.

### **Objective 3 – Project Administration**

#### **Task A – Track Project Expenditures**

GBERBA responsibility

#### **Task B – Reporting**

GBERBA responsibility

Appendix D  
Freeborn County summary  
of perspective of Le Sueur River Watershed

## Le Sueur River Watershed

### Description:

The Le Sueur River Watershed covers 710,832 acres in south central Minnesota. Of those acres, approximately 68,932 acres reside in the county of Freeborn and serves as the headwaters of the Le Sueur River. Additionally the headwaters of the Maple River and the Cobb River, two sub watersheds of the Le Sueur, make their beginnings in Freeborn County. The Le Sueur River and other sub watersheds, drain from Freeborn County in a northwesterly direction into the Blue Earth River which eventually outlets into the Minnesota River near Mankato, Minnesota. The population for this portion of the watershed is approximately 1,300 people with a density of 12 inhabitants per square mile. Freeborn and Hartland are the cities located within this portion of the watershed. Freeborn, with a population of 298 people has a total acreage of 114 acres. The other city within this portion of the watershed is Hartland with a population of 314 and covers 175 acres.



Figure 1: Le Sueur River Watershed; outlined in red is the portion of the watershed within Freeborn County

The geomorphology of the Le Sueur River Watershed within Freeborn County consists mostly of rolling to undulating areas that exhibit variable relief over broad reaches. Figure 2 is a Digital Elevation Model (DEM) of the Le Sueur River Watershed within Freeborn County. Areas that are shaded darker are lower

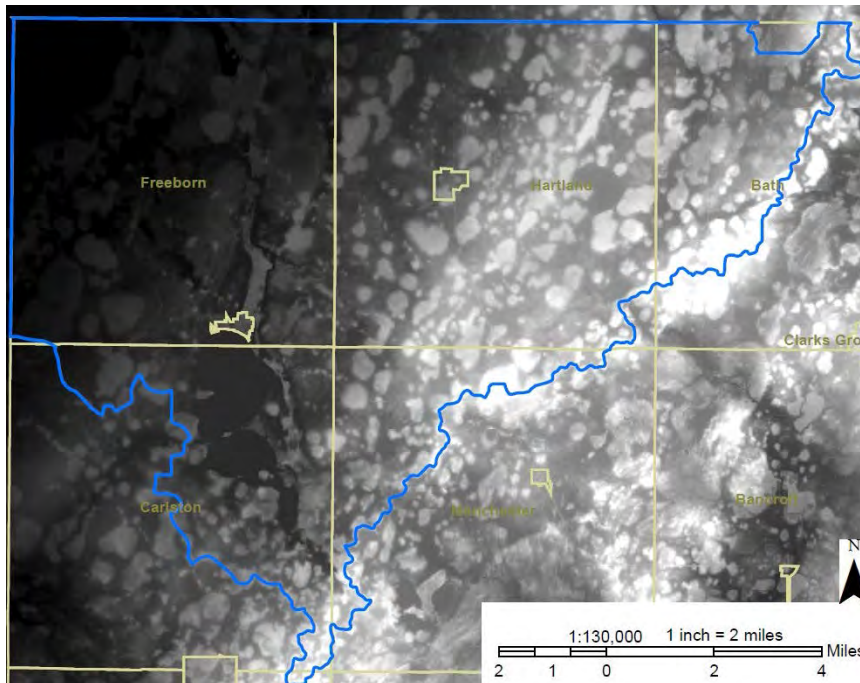


Figure 2: Digital Elevation Model (DEM) of the Le Sueur Watershed within Freeborn County

elevations, while areas of lighter shading are higher elevations. This landscape was created by glaciers that receded from the region 15,000 years ago; leaving behind nutrient rich sediment in glacial moraines. These glacial moraines are the reason for the variability of the landscape, such as the southeastern edge of the Le Sueur River Watershed that consists of sharply dropping hills or ridges to gently rolling terrain in the northwest portion of Freeborn County.

Before European settlement, the landscape was dominated by prairie/wet prairie as seen in Figure 3. The soil here formed upon deposited glacial sediments. The composition of soils within this area is: silt loam, clay loam, loam, and muck. Pre-settlement vegetation created thick organic rich topsoil. With the combination of topography, past vegetation and soil types, this area is highly desirable for agriculture. Of the soils located in this area, 80% of the soils are considered prime soils for farmland. However, of those soils, 62% are only considered suitable as prime farmland if drained. That is because a large majority of the soils fall into the drainage classes of 'very poorly drained' to 'somewhat poorly drained'. Approximately 84% of the land use in this portion of the watershed is agriculture; corn and soybeans making up the majority of crops planted. In order to farm soils that have been labeled as 'prime farmland if drained', many fields are tiled and outlet into a series of ditches. Within the Le Sueur Watershed in Freeborn County there is approximately 102 miles of public ditches (tiled and open). This leaves very little of the area uninfluenced by humans.

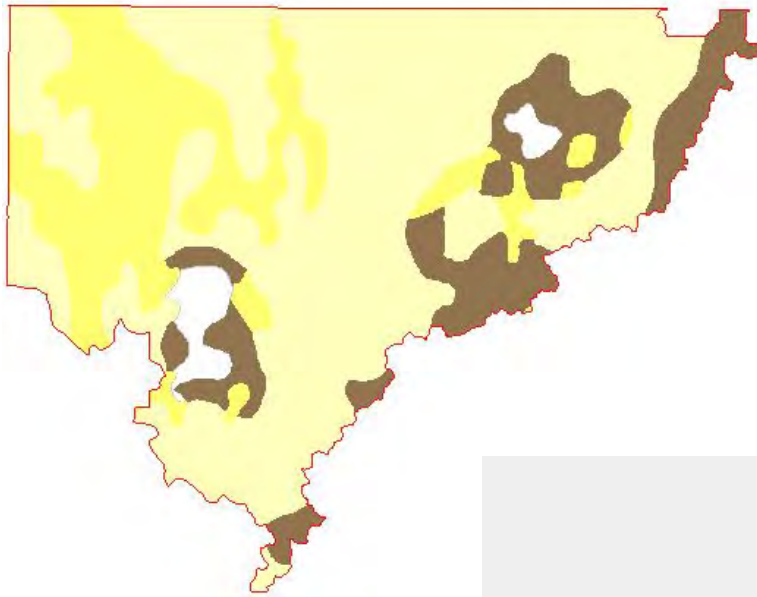


Figure 3: Pre-Settlement Vegetation in Freeborn County's portion of the Le Sueur River Watershed

## **Objective 2 – Task B – Subtask 2**

Landowners and land operators were selected locally through multiple sources. Three local experts were asked to identify landowners and land operators based on two simple criteria: 1 – they would be willing to talk to a representative of the SWCD about soil and water issues, 2 – it would be possible that they would voluntarily install a Best Management Practice. The experts were as follows: a long time SWCD employee that knew many of the landowners and had worked with many of the people in the past; a SWCD supervisor whose nominating district included the Le Sueur River Watershed and who also knew many of the landowners and operators; and the county feedlot officer who was familiar with the livestock operators and had an inkling of who had issues and who is looking for solutions. Each of these people produced a list of 10-35 landowners and producers. Some of the names were duplicates and these rose to the top of the list.

We also looked at a remote sensing and LiDAR derived shapefile from GBERBA that identified potential ravines. This spatial data was cross referenced with the county's online public land ownership data to acquire ownership information.

One of the last ways we found potential land owners was during the course of the interviews. Interviewees had a chance to nominate people for the privilege of being interviewed by one of their favorite SWCD employees. Most of the names the interviewees mentioned were already on our list and reinforced our confidence that we were talking to the right people.

After potential landowners were identified, an introductory letter was sent to each individual in groups of 10 or 12 at a time. The smaller mailings allowed staff to feasibly call the landowners and set up appointments in a timely manner. We wanted the letter to be fresh in their minds when we called and not to have been thrown away a month ago. During the call we would politely ask if they would share with us what land they also rented so that these parcels could be included in customized maps. A couple of letters did not reach the recipients at the time of the phone call due to outdated address files or other reasons. Staff would consider an individual uninterested in meeting after two voicemail messages, and/or one phone or in-person conversation without setting up an appointment. We interviewed 10 out of 12 people who were sent letters in group I, seven out of ten in group II, and three out of 10 in the final mailing group. Only one letter recipient called us before we called them.

There is likely a bias towards the positive side of conservation. The selection process and the individual's opportunity to decline being interviewed both likely skewed our sample towards people that are cooperative and interested in conservation.

## **Objective 2 – Task B – Subtask 3**

I began each interview with a few ground rules. I explained:

*“I am here to get your opinions and information from you and it is not my intent to argue or point fingers. Please tell me how you feel and I will keep an open mind and not be offended. I realize that you have other things to do so if and when you get sick of talking to me please give me a 5 minute warning. I will then wrap things up within those 5 minutes. Your responses will be summarized and you will remain anonymous. The only exception is if you are interested in a specific practice and would like to pursue opportunities for assistance.”*

I began with a short spiel using the Water Resource Center “Aquatic Use-Impaired Waters” map of the Le Sueur River major watershed and the “Land Use” map of the Le Sueur River major watershed. I explained that we were working with the surrounding counties of Waseca, Faribault, and Blue Earth on this project. We wanted to gather information on issues related to water quality, evaluate how our programs are doing, and assess opportunities for projects in the future. I tried to make the hydrologic connection from their property to the Minnesota River. For example I would say, “The water on your farm flows into the Little Cobb River, then flows into the Cobb River, and then flows into the Le Sueur River, which joins the Blue Earth River right before it enters the Minnesota River.” People were usually able to locate their property on the map. Including the smaller streams and a few road landmarks on the map really helped people identify where their property was located within the Le Sueur River watershed. Once they had identified their property, they had varying levels of understanding how water flowed at that location. People were also interested in what the smaller tributaries were named and where they started. This was a great educational opportunity that was simple and well received.

At this point I mentioned how the MPCA has been doing a number of studies to determine what condition our water resources are in on a watershed scale. Unfortunately the highlighted water bodies are considered impaired because they have too much of something or too little of another. This could be anything from too much sediment in the water, excessive levels of phosphorus that leads to eutrophication (green water), high levels of mercury in fish, E. coli, or not enough dissolved oxygen just to name a few. I followed this up with the land use map that showed agriculture as being the predominant land use with 84% of the area; Urban land use at 7%, and water/wetlands at 6%. All the cities are rather small and none of them are classified as MS4 cities.

I would then go on to mention that we want the sediment and nutrients to stay on the field where they are a valuable resource instead of running off into surface waters where they become a liability. My belief was that most landowners and producers would agree. I then transitioned into the survey with a list of questions. The list of questions I compiled was more of a cue for me to guide the conversation. I did not want the conversation to be rigid around the questions but instead to let the conversation flow (no water pun intended) from topic to topic and refer back to the questions when there was a lull or to follow up on a prior comment. The conversations were really across the board in term of the order of topics and the interviewee’s engagement in the conversation. After the first interview I quickly realized that it was not feasible to get answers to all of my questions in what I felt was a reasonable amount of time (around an hour). I tried to order the questions by general topic and then underlined ones that I

felt were more important. I had two pages of questions and occasionally other topics would come up which was just fine.

After the first four questions I would begin going through the customized maps of the owner/operator property that contained the most opportunities for potential BMPs. I would introduce the maps with the premise that I wanted to show off the new mapping technology that we have access to. On the maps I circled areas of existing BMPs to give the owner/operator credit for BMPs they had already installed and also areas for potential new site specific BMPs. I would describe the potential BMP sites as areas that were likely to have soil erosion or water quality issues. I would then further explain the characteristics of the landscape that would lead me to believe there was a resource concern for me to circle. If the landowner had not already responded, I would ask if there was an erosion issue in that location or if they would be interested in installing a BMP there. Every attempt was made to make this non-confrontational and if the landowner said there was not an issue it was left at that.

The first type of customized map I introduced was a contour map. Most people were used to contour maps but not at a two foot contour scale. The next customized map presented would be either a digital elevation map (DEM) or a digital elevation map with hillshade (DEMHS). I favored the DEMHS because it provided good contrast where there were gullies. The county-scale DEM did not show the elevation changes on a farm-scale map as well as the DEMHS. In some interviews I included a map that revealed flow accumulation or stream power to show where we would expect to see water running across a field after a large rain event. These maps presented the opportunity for some discussion on how each of these products can help make our work easier and more accurate. Meetings that were held in the office had the advantage of having interactive maps if they were so interested. In addition, topographic position index calculations were completed through ArcMap for some areas within the watershed in-house. This was a useful tool in identifying potential gullies. However it was similar in usefulness to the DEMHS and took longer to load on the computer. It was also more difficult to explain to landowners and consequently it was not used during the interviews.

I feel the maps were crucial to being able to take an honest look at their land and pinpointing opportunities. They brought out great discussion and were able to expedite our conversation. We were able to point out a specific area on the map and saved a lot of time. I am optimistic that even though a landowner did not indicate interest in installing a BMP at the time of the meeting, there is a map sitting on his desk at home with a gully circled in red that he will look at critically the next time he is in the field and he might change his mind in a year.

Certain topics and issues were anticipated. I brought several handouts with me to provide to the landowners when they indicated interest. I did not want to give them a huge packet of info if they were not interested in it. This was helpful, I believe, to keep their interest after I left and provided concrete information that they could refer to.

Handouts included:

- Le Sueur River Watershed Fact Sheet (MPCA)
- Cost Share Summary (SWCD)
- CCRP Fact Sheet (FSA)
- 300' Riparian Area Land Use (MPCA/WRC)
- EQIP Fact Sheet (NRCS)
- Expiring CRP Fact Sheet (UM-Extension)

- DWM Pamphlet (BWSR)
- Tiling & AD-1026 Fact Sheets (NRCS)
- Soil Health Fact Sheet (NRCS)
- RIM Fact Sheet (BWSR)
- RIM Buffer Fact Sheet (BWSR)
- Wetland Banking Fact Sheet (BWSR)

*\*\*Please see the individual interview reports for individual responses and findings. Items that the interviewer found interesting, informative, or descriptive of the interviewee's opinions are in bold type.*

## **Rational and Summary of Questions**

### **Big Picture Questions**

*1. On a watershed scale what do you believe are the main causes of the problems discussed?*

*Landowners do not intend to lose nutrients or soil.*

I wanted to get a big picture view where they could take a step back and look at the Le Sueur River or the Minnesota River. One common theme is the thought that people in urbanized areas were contributing higher rates of pollutants per acre than compared to agricultural lands. This did not surprise me since it is easy to point a finger at someone else. Other common themes though to contribute to the loss of nutrients or soil were filterstrips, large rain events, and in-stream erosion.

*2. On the land that you are in control of, what do you believe are the worst contributors to the problems discussed?*

This is one that I wanted to word carefully. The intent was to start thinking about what positive impacts they could have if they implemented a BMP. This was meant to bring the conversation to a very local scale, specifically land that they are in control of or have an influence on. Common answers included large rain events and site specific circumstances. This also spurred conversation about things that they have done to reduce erosion, including tiling.

*3. What changes have you noticed in your farming career? Weather, markets, equipment, farming practices, farm size, ect.*

This question tried to capture the changes that have occurred in agriculture. The years of farming experience ranged from 8 to 50+ years. Many changes were noted including: technology, equipment size, yields, hybrids, and chemicals, precision, less livestock, going from plowing to chisel plowing, markets, and many others. There were a few older farmers that had a hard time answering this question. I found that interesting because I think the changes have been tremendous.

*4. How does the Farm Bill influence your farm operation?*

This question stemmed from a visit from Rep. Walz last summer on the Farm Bill. A representative from the Corn Growers Association was trying to take equal stage as the congressman and stated that local farmers need a new farm bill so they can make decisions for what they are going to plant next year. That really made me wonder what kind of influence the farm bill really has on local producers. If there is one thing that is true with local producers about the farm bill it is that they all have an opinion. Most stated that it does not affect them much and some wanted parts or all of it to go away.

### **Farm/Operator Specific Questions**



*5. Please describe your farm operation. Acres owned, rented, tillage decisions, fertilizer decisions, pesticide decisions, rotations, rollers, ect.*

The wording of this question could have been better stated since I received quite a few “what do you mean?” responses. Most were a corn/bean rotation with a little corn on corn. Most described their tillage as conservation tillage which means chisel plow or disk ripper in the fall and lighter tillage in the spring. No one had tried organic farming but several said it was not feasible.

*5A. What do you like about farming?*

This is a question that was added part way through the process after it was recommended from someone else who performed interviews. I did not ask this as often because of its “feel good” connotation. Responses included independence and being able to produce something.

*6. On land that you own, what % of the cost or total dollar amount would you be willing to spend to install BMP's?*

This question did not come up frequently. Generally people are used to about 75% cost share. Recognizing the need for the BMP seemed to be a larger limiting factor than installation costs.

*7. Do you currently use no-till, strip till, ridge till, or mulch tillage? If so what type and what % of the land you operate? If not why not and what incentive rate would you be willing to convert to one of these tillage types?*

This was across the board. No ridge till was mentioned throughout the interviews. One thing that stood out to me was some people only tried no-till or strip till one year before deciding they did not like it. Resource professionals indicate it takes several years to get the full benefit of reduced tillage. Being able to increase infiltration and the soils field capacity through decreasing tillage and increasing soil organic matter is probably one of the cheapest ways to decrease surface runoff. The reduced tillage practices need to work economically to be widely accepted. For producers that incorporate manure it may not be economically feasible for them to own a conventional and no-till/strip till equipment.

*8. Do you think in terms of yield per acre or profit per acre?*

Responses did not indicate a clear winner. Another question that could be interesting would be: What does it cost you to produce a bushel of corn or beans? I would be curious to know how many producers would be able to answer that. This was a question to see what a producer's measure of success is. Specifically, with reduced tillage you may decrease yield but increase profit.

*9. Do you scout for weeds and pests prior to spraying pesticides? How do you determine if you will spray?*

A lot of the interviewees implement a combination of pre-emergent spray and scouting.

*10. Do you use GPS?*

This question includes all the computerized technology of GPS, autosteer, yield monitors, variable planting and fertilizer application. Most had yield monitors and autosteer. I see an opportunity for us to review yield maps with producers to help them increase soil health. Right now they take their yield maps to the fertilizer applicator and the tiling contractor to improve their yields but I have

never seen them bring one into the office to improve the soil health. Producers are becoming more technologically advanced and agencies need to keep up.

*11. How long do you plan to farm and who will farm after you retire?*

I thought this was a good question but I found the second part a bit uncomfortable to insert into a conversation so it was not asked very often. Only one interviewee quit farming prior to retirement. Most will farm until they retire on paper and then continue to help with farming operations and influence the decisions.

*12. What is the lowest payment you would accept to: plant cover crops, install grassed waterways, no-till, do a CNMP, install a filterstrip?*

This was a good question and was brought into the conversation during the farm scale map discussion. Cover crops are kind of the new and exciting thing in agriculture now. There is a void of knowledge and equipment regarding crops that are not corn and beans. They need technical assistance to help determine what species to plant, when, and how. They also want to know how their investment in a cover crop is going to be paid back. Currently reduction in compaction, nutrient savings, wind erosion, and water erosion are hard for a producer to quantify and put a dollar figure on. Filterstrips seemed to be the poster child for “the right thing to do”. Producers must see a need for grassed waterways and water and sediment control basins. That need must override the inconvenience of placing an obstruction in the middle of their field. There is an expectation that CRP payments should equal cash rent payments.

There are big hurdles to overcome when dealing no-till and strip till. One is purchasing a no-till planter. Fertilizer application is also an issue along with the cost of purchasing band fertilizer application equipment for strip till. The best way to get people to convert to these is to have someone (a local farmer) demonstrate that it will work on the heaviest clay soil we have around here and be as profitable as or more profitable than conventional tillage. I do not know yet if this is feasible or not.

**Nutrient Management Specific Questions**

*13. Do you currently do soil tests to apply fertilizers and soil amendments?*

Most do some sort of soil test on a multi-year basis. Some use crop removal.

*14. Do you apply manure? If so do you test the manure for nutrients?*

Most of the larger operations are required to test the manure. The nutrient credit is variable from 50-100%.

*15. Do you use any setbacks for spraying pesticides or applying fertilizer/manure?*

On paper the answer is yes. However, very seldom do you see increased weed competition next to surface tile intakes or streams due to that area not being sprayed.

*16. Do you use trial plots to evaluate different methods?*

There is a fair amount of on-the-farm trials going on. No data is more trustworthy and more applicable to your operation than data you collect yourself on your operation. A lot of producers have

yield monitors and can easily determine differences in yields. Some share information with a small group.

### **Renter/Landlord Specific Questions**

#### *17. Would your landlord be willing to install BMPs on their property?*

With less producers and more rented land it is important to know who the decision maker is on a piece of property. The relationships between tenant and landowner appear to be insecure and respectful. Most seemed to have long term relationships but tenants are fearful of losing land. Renters and landowners both have influence on whether or not a BMP gets installed or kept in place. The biggest issue is not whether or not it gets installed but rather who pays for it and how much cropland will it take out of production.

#### *18. On the land that you rent how would you describe your influence on the landowner to implement BMPs?*

See question #17

#### *19. What % or amount do you believe your landlord/tenant would be willing to contribute to BMPs?*

Some costs are split on a percentage basis, some are incurred by one with a trade from the other (for example the renter pays for a water and sediment basin but gets a reduced rent for the next X years to make up for it), and some are incurred by one or the other because they expect to receive the benefits.

#### *20. On the land that you rent would you be willing to incur costs to implement BMPs? If so what % or amount?*

See question #19. There has to be a recognized need and benefit to take action. Some people do not go through the hassle of a cost share program to install lower cost BMPs.

#### *20A. Do you treat owned and rented land differently?*

The resounding answer was “no”. Rumors and speculation say that renters abuse the land to make a couple quick bucks. If the renter has security that he will be able to rent long term I believe they will be willing to manage the land for the long term.

### **Wetlands/Tile Specific Questions**

#### *21. Have you added drainage tile? When? Do you plan to add drainage tile?*

Just about everyone had added or fixed tile recently. Just about everyone wanted to add more tile. The main theme with tile is that it will improve your yields, reduce erosion, and it is good on a watershed scale because it causes the soil to act like a sponge and meters the water out longer. Many producers are old enough to have first-hand experience when the government provided cost share for tile and tile was widely considered a good thing. This concept did not fully resound with me until I heard Kurt Deter speak at the Farm Forum in Waseca in the spring of 2013. Kurt described it as being “un-American” a few decades ago not to tile low spots and bring wetlands into crop production. This brought many nods of approval from the producers sitting in the audience. A

couple of producers in the interview viewed themselves as providing food for the world. When you have a noble cause like this it makes a little water pollution seem trivial.

*22. Would you be interested in conservation drainage? (bioreactor, two stage ditches, seasonal drainage, sediment traps in drainage ditches)*

This was a new idea to a lot of people but some were familiar with the concept. I think they were interesting ideas but with the exception of replacing surface inlets no-one really indicated they wanted one on a specific place in their farming operation. Bioreactors and saturated buffers do not increase crop yields and most producers do not think they are losing very many nutrients through tile water. Even with a major drought last year removing water from the landscape takes a lot more precedence than saving water for the dry part of the year.

*23. Do you have wetlands or farmable wetlands on your property? How do they affect your land?*

No-one raised this as an issue which was a surprise to me.

*24. Would you allow temporary water storage on your property? Less than 48 hours, no expected crop mortality.*

This was another touchy subject that I did not ask very many times. A few thought it was a good idea but did not volunteer to have it on their land. They did agree that anyone who would do it should be compensated somehow.

### **Livestock Specific Questions**

*25. Do you raise livestock? If so do you use rotational grazing?*

Most do not raise livestock currently. Interviewees included one confinement hog, one feedlot beef, one dairy with rotational grazing, and one beef with rotational grazing.

*26. What do you do with your mortalities?*

Animal composting has been popular with EQIP lately. No opportunities for this practice were identified.

### **Wrap-up/Summary Questions**

*27. What are the main factors that influence your decisions (return on investment, "the right thing to do", routine, peer/social pressure, regulations)?*

Return on investment (ROI) seemed to be the main response with "it's the right thing to do" being second. I think conservationist speak "it's the right thing to do" language whereas farmers listen to ROI.

*28. Would you be willing to install BMPs on your property or change the way you operate for financial gains?*

No-till, strip-till, and cover crops all fall in this category. Grassed waterways and sediment basins somewhat fall into this category because gullies are considered damage both to repair and in terms of crop loss.

29. *Would you be willing to install BMPs on your property or change the way you operate for environmental gains?*

Filterstrips fall into this category but one of the underlying reasons for a filterstrip is to protect their drainage ditch. This causes a long term savings in maintenance costs.

30. *What type of conservation assistance would you like? \$, engineering, data, demonstrations, coordination, checkout.*

People who responded to this question found the cost share assistance most valuable. There was a need for more demonstrations, especially of new practices. Producers are fairly self-sufficient and confident that they know how to fix the simple problems without engineering assistance.

31. *What has your experience been with the SWCD, NRCS, and other governmental units? What C/S is available?*

Most of the feedback was good. A couple of instances were recalled from a specific employee many years ago. This is a good reminder that we all represent our specific agency and sometimes the government as a whole and these perceptions can last a long time. One long-time farmer however was not aware of the EQIP program. Others were not aware of the drainage water management or the RIM Buffer program. This shows two things: 1) we need to spend effort on advertising these opportunities and 2) these opportunities need to be available for an extended period of time. Having a sign-up period for a few months or a year is not long enough for people to hear about it.

32. *What other conservation or farming related information would you like to share with me?*

This was kind of a catch-all question in case I missed something. Most people were pretty talked out by this time.

33. *Where do you get your Ag info from? Who do you trust? Who/what influences conservation?*

Responses included independent agronomists, agronomists that work for co-ops, internet, groups such as the MN corn and soybean growers, magazines such as Successful Farming and The Land, chemical representatives, seed dealer representatives, and word of mouth.

The take home message for me was that no-one mentioned the SWCD or NRCS. I think we are viewed as sources of cost share and paperwork after the decision has been made. We are not perceived as sources of information to base farm scale decisions on.

34. *Who else in this neighborhood do I need to talk to?*

This question was not asked much and yielded a few responses. Most of the responses were already on our list.

**\*\*Please Also See:**

- Introductory Letter
- Landowner Questionnaire
- Maps
- 20 Interview Summaries
- PMZ Map of Property represented by the interviews
- Water Resource Center "Aquatic Use-Impaired Waters" Map

- Water Resource Center "Land Use" Map
- Example of handouts

#### **Objective 2- Task B-Subpart 4**

The interview process identified 39 potential BMP projects through the course of 20 interviews. This was an impressive average of two potential projects per interview. Six of the potential projects are physically located outside of the Le Sueur watershed. These landowners own and/or operate land within multiple watersheds.

Three out of the four HUC 12 watersheds that are predominantly within the county had sufficient interest and opportunities to be Priority Management Zones. The top priority of these three would probably be the watershed that contains the TMDL listed impaired stream. The fourth watershed had much less interest in installing BMPs even though it has a TMDL listed stream reach. There are small portions of four other HUC 12 watersheds but we were not able to get adequate landowner feedback in these watersheds due to their small size.

I would prefer to target the Le Sueur watershed (HUC8) instead of smaller watersheds. At a HUC12 scale there would be a lot of producers that have some land inside and some land outside of the watershed. This occurs at the HUC8 level but would be much more prevalent at a HUC12 scale. From an agency perspective it is easier to advertise a program or an opportunity on a larger scale. I believe there would be a lot of confusion on the part of the landowner at a HUC12 scale as well. It may be a good compromise to target a smaller watershed but at the same time make a larger area eligible for funding. It is undesirable to work with a landowner who lives in one watershed and have to turn down an equally good project a mile away because that property is located in the wrong watershed. Also, successful projects are some of the best advertising we can do and the more successful projects we have in an area the better.

*\*\*Please also see the:*

- PMZ Identified Potential Projects Map

## **Objective 2-Task B-Subpart 5**

Of the potential 39 projects 10-20% of the projects would be either ineligible for cost share or the landowners will not seek cost share. Three are currently being worked on for cost share. Of the practices listed I feel the drainage water management (DWM), RIM Buffer, and wetland restoration as being the least likely of coming to fruition. The remaining projects of water and sediment control basin (WASCOB), grassed waterway, side inlet, side inlet filter, cover crop, and filterstrip have a high probability of being installed. Luckily, these practices comprise the majority (25) of the identified potential projects. However it would be overly optimistic to expect all of these identified practices to be installed.

### **Estimated costs are as follows:**

*(Costs do not include staff time, technical and planning costs, or landowner time in regards to administration time)*

Practice:	Estimated Cost:	Cost Share Opportunity(s):
WASCOB (w/ support tile)	\$4000 each	75% cost share from EQIP, State Cost Share, GBERBA, or grant funding
Grassed Waterway (w/ support tile)	\$2250 each (assuming 500' long and 40' wide)	90% cost share through CRP plus annual rental rate (0.5 acre X \$220/acre X 10 years = \$1100). 75% cost share from EQIP, State Cost Share, GBERBA, or grant funding
Side Inlet	\$2000 each	75% cost share through EQIP, State Cost Share, GBERBA, or grant funding
Filterstrips & Side Inlet Filters	\$200/acre installation cost	90% cost share through CRP plus annual rental rate (1 acre X \$220/acre X 10 years = \$1100). Possible additional incentive from GBERBA or grant funding
RIM Buffer	\$400/acre installation cost	100% cost share through RIM. \$5600/acre payment to landowner in exchange for easement
Cover Crop	\$40/acre installation and termination cost	75% cost share through EQIP or grant funding
Drainage Water Management	Unknown	75% cost share through GBERBA
Manure Storage	Unknown/variable costs	75% cost share through EQIP or grant funding
Grade Stabilization	\$60,000 – 80,000 each for these specific projects	100% cost share through EQIP and GBERBA
Feedlot Roof Runoff (Gutters)	\$3000 each (\$15/foot X average 200ft/barn)	75% cost share through State cost share or EQIP

## **Objective 2-Task B- Subpart 6**

The list of practices that can be targeted towards the Le Sueur River has been shared with NRCS for both EQIP and CRP. The list has also been shared with GBERBA. The SWCD will work with interested agencies to determine eligibility, feasibility, design, and cost share opportunities. Data has also been shared with Freeborn County Environmental Services Department and the Freeborn County Drainage Ditch Inspector.

### **Summarizing Thoughts and Ramblings of the Interviewer**

I feel that this interview process has helped me professionally. I feel I have a better understanding of the opinions of the local producers. This was a great education opportunity for many of the interviewees. I was impressed when I tallied the potential projects and came up with an average of about two projects per interviewee. The opportunity to have several frank farm scale conversations with producers is something that everyone in a local resource management position should do. It has given me the confidence to ask questions of the producer and bring up problem areas on a piece of land that a producer otherwise would not inquire about.

The brief project guidance for this project was a blessing and a curse. It took a while to figure out exactly what was expected of us. Once we realized the main two objectives simply were to find projects and to gather information and ideas it went much easier. I think it was good to be able to decide locally what materials we were to provide and what questions to ask. It would have detracted greatly from the project if I went to someone's house and said "The MPCA wants me to ask you these questions". We chose to use open ended questions to try to keep the conversations going. While very difficult to quantify, it provided some great insight.

One thing that was difficult is not arguing or disagreeing with certain statements. It was challenging to acknowledge that you understand what they were saying but to do so in a way that did not give the impression that you agreed with it. Sometimes the interviewee would ask the interviewer for their opinion. Again, I did not want to argue but since I had asked them to give me their real opinion I felt it was only fair that when asked I would give my true opinion. When this occurred it was done in a way that was the least confrontational as possible.

There are additional questions that may provide additional insight but are difficult to ask or to respond to. What is a landowner's responsibility to the land? What is a renter's responsibility to the land? What is our responsibility to downstream landowners? How attached are you to a parcel? How often does the decision maker physically inspect the property? (not just a drive by on Sunday but walk or drive the whole property). What are some of their recreational values you have that are associated with the land and water? At what point does the increased wind and water erosion from rolling a field outweigh the benefits of a flat field? If 90% of the farmers are doing the right thing and the other 10% will not change what do we do as a society at that point?

One of the main hurdles that we have locally is having staff with the experience and technical skills to take a structural project from start to finish. Recently we have lost SWCD and NRCS staff through



retirement and other job offers. This has decreased the staff from six to as few as three at times. New staff needs training to gain experience. This has resulted in slower than desired turnaround times for projects. A common theme that we have noted with grant funded positions is that only entry level people are interested in them because the jobs are not stable. Once they get a year or two of experience they find a more stable position. During this time lead staff needs to devote their time to training the new person. Once the staff leaves, the relationships they have with the local producers vanishes. Therefore there is a great need for permanent funding of positions to keep trained staff that can maintain long-term relationships with producers.

This PMZ project came at a difficult time for the SWCD in terms of being able to devote staff time to it. It had a more than ample timeframe but at the beginning of the timeframe we were working on projects that had a higher priority. When the timeframe was coming to an end this project became a high priority. This left other areas of our job understaffed such as surveying and design of BMPs. The irony of this project is that we were going out to drum up more business while we have an existing list of projects that are not being worked on. Some other districts hired contractors to do this work and this may have been an option for us as well. However we saw value in having our own staff build relationships with local producers and tried to make the best impression we could.

I learned something from each interview and found that each interview had value. It could have been some particular insight on a specific topic, an identified potential BMP, or learning about a person's personality. Some of the topics came up in several interviews but there was always something new as well. This process is something I hope to continue during future watershed work.

Appendix D continued  
Freeborn County supporting documents



**Freeborn County Soil & Water  
Conservation District**  
*1400 West Main Street  
Albert Lea, MN 56007-1816  
Phone: 507-373-5607 Ext. 3  
FAX: 507-373-7654  
[www.freebornswcd.org](http://www.freebornswcd.org)*

January 31, 2013

John  
Street  
Town

Dear John and Jane,

As a landowner in Freeborn County, I'm sure you recognize the value of our lakes, wildlife, soil, and other natural resources. The Freeborn County Soil and Water Conservation District (SWCD) has been helping protect these resources for over 70 years by providing landowners and managers with information, technical assistance, and cost share assistance.

While we have made great progress, some of our streams and lakes are not as clean as we would like. Water runoff containing soil, nutrients, and other substances is still a major concern. Soil erosion and compaction is still evident in some fields.

There are many actions a landowner can take to help water quality and to help their land. Some, like filterstrips, have been around for many years while others, like a denitrifying bioreactor, are relatively new. Each landowner has a unique set of natural resource challenges and opportunities on their property.

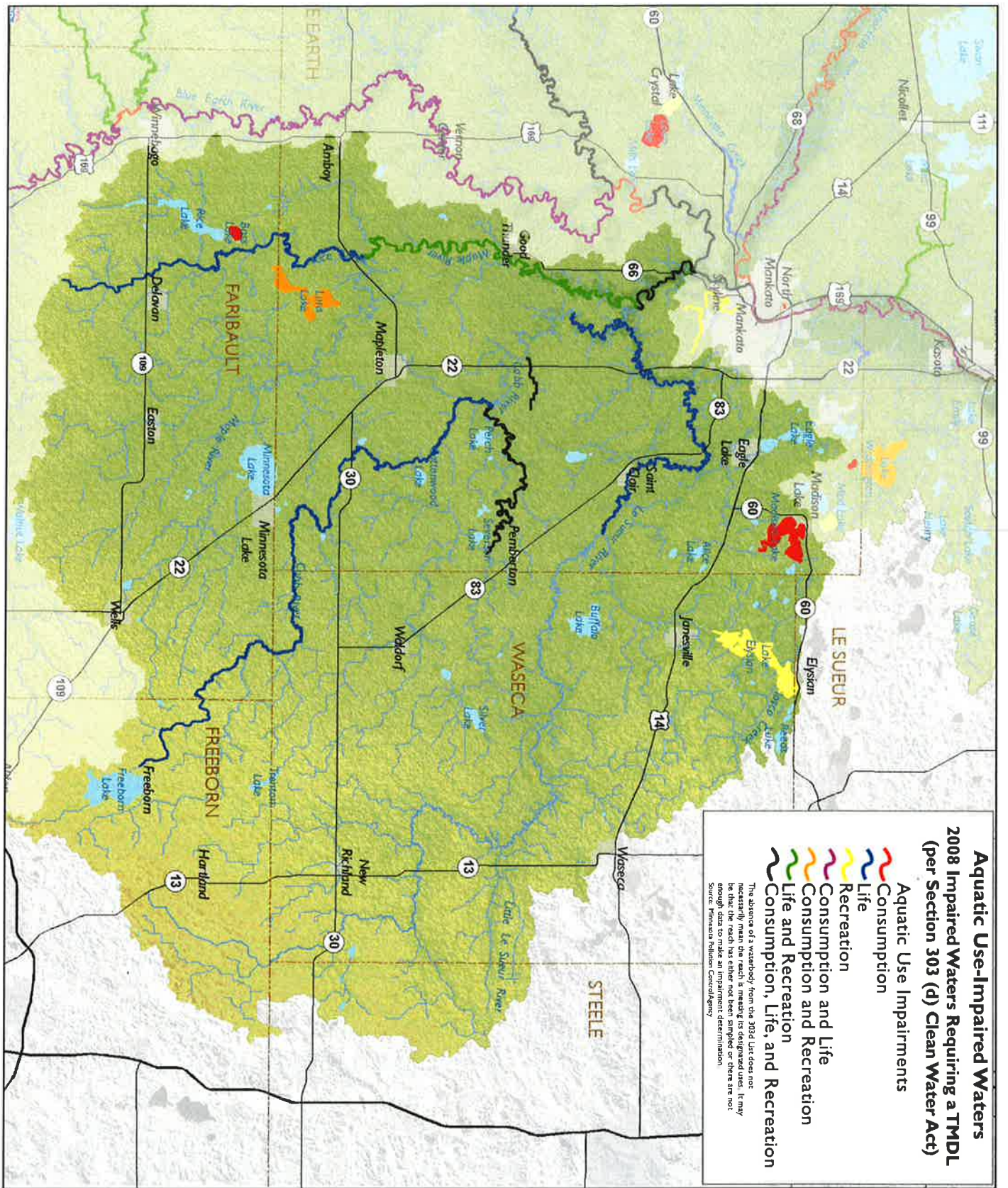
We are contacting you because we believe there is an opportunity to decrease erosion and increase water quality on your land, and we want to meet with you to discuss funding and technical assistance that is available. We also want to talk with you about current farming practices and the effectiveness of our programs.

I would like to meet with you in person to discuss your property and farming operation. My goal during these meetings is to get a better understanding of your property and the factors that influence your decisions. I would also like to be able to identify conservation opportunities that fit your operation. I will be following up with you by phone to arrange a time and place to meet, at your convenience.

Sincerely,

Mark Schaetzke  
District Manager/Technician

# LE SUEUR RIVER MAJOR WATERSHED

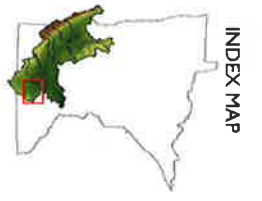


**Aquatic Use-Impaired Waters**  
**2008 Impaired Waters Requiring a TMDL**  
**(per Section 303 (d) Clean Water Act)**

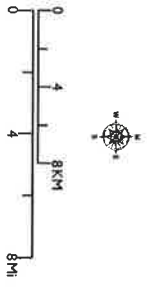
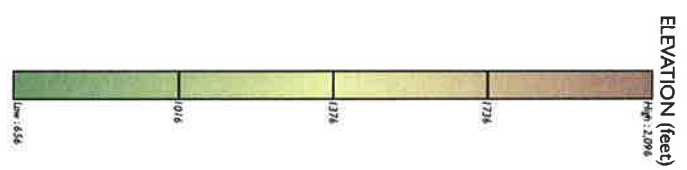
**Aquatic Use Impairments**

- █ Consumption
- █ Life
- █ Recreation
- █ Consumption and Life
- █ Consumption and Recreation
- █ Life and Recreation

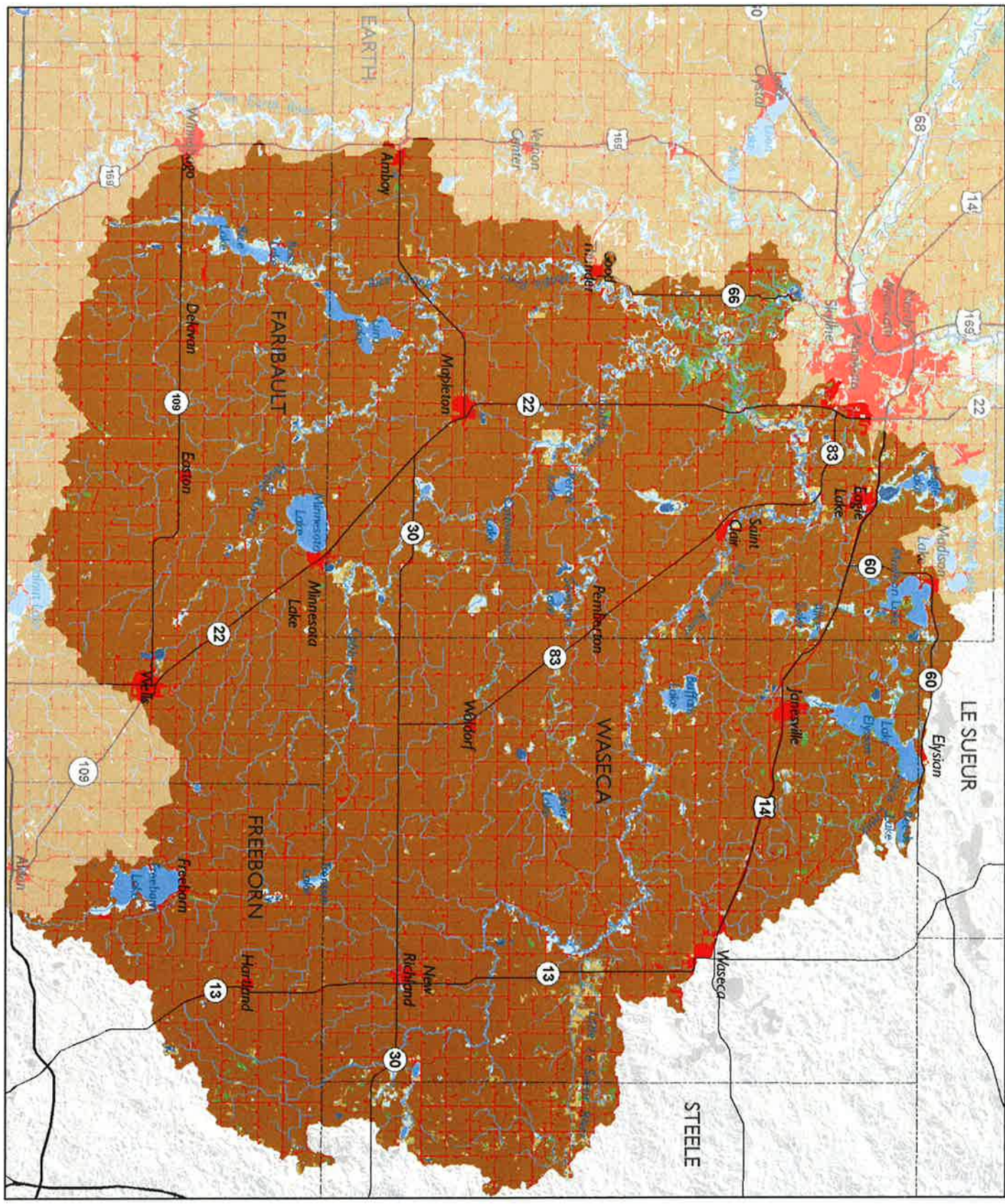
The distance of a watershed from the 303d List does not necessarily mean the reach's ranking as degraded uses. It may indicate that the reach is not degraded enough to make an impairment determination. Source: Minnesota Pollution Control Agency



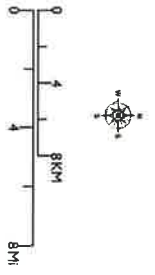
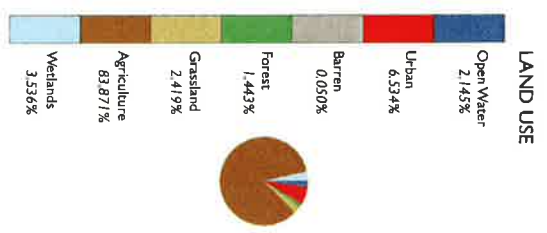
- LEGEND**
- Major Roads and Highways
  - County Boundaries
  - State Boundaries
  - Major Waterways
  - Lakes and Reservoirs
  - Municipal Boundaries



# LESUEUR RIVER MAJOR WATERSHED



- LEGEND**
- Major Roads and Highways
  - Minor Roads
  - - - County Boundaries
  - - - State Boundaries
  - ~ Major Waterways



### **Interview ground rules**

I am here to get your opinions and info, not to argue with you. Please tell me how you really feel and I will try to keep an open mind and not be offended. 5 minute warning.

Responses will be summarized – confidential.

SWCD will keep a list of people interested in specific practices and distribute to potential funding opportunities only.

### **Landowner Questions**

#### ***Big Picture***

1 On a watershed scale what do you believe are the main causes of the problems discussed? Landowners do not intend to lose nutrients or soil.

2 On the land that you are in control of what do you believe are the worst contributors to the problems discussed?

3 What changes have you noticed in your farming career? Weather, markets, equipment, farming practices, farm size, ect.

4 How does the Farm Bill influence your farm operation?

#### ***Farm/operator specific***

5 Please describe your farm operation. Acres owned, rented, tillage decisions, fertilizer decisions, pesticide decisions, rotations, rollers, ect.

What do you like about farming?

6 On land that you own what % of the cost or total \$ amount would you be willing to spend to install BMP's?

7 Do you currently use no-till, strip till, ridge till, or mulch tillage? If so what type and what % of the land you operate? If not why not and what incentive rate would you be willing to convert to one of these tillage types?

8 Do you think in terms of yield per acre or profit per acre?

9 Do you scout for weeds and pests prior to spraying pesticides? How do you determine if you will spray?

10 Do you use GPS?

11 How long do you plan to farm and who will farm after you retire?

12 What is the lowest payment you would accept to: plant cover crops, install grassed waterways, no-till, do a CNMP, install a filterstrip.

#### ***Nutrient management***

13 Do you currently do soil tests to apply fertilizers and soil amendments?

14 Do you apply manure? If so do you test the manure for nutrients?

15 Do you use any setbacks for spraying pesticides or applying fertilizer/manure?

16 Do you use trial plots to evaluate different methods?

**Renter/landlord**

17 Would your landlord be willing to install BMPs on their property?

18 On the land that you rent how would you describe your influence on the landowner to implement BMPs?

19 What % or amount do you believe your landlord/tenant would be willing to contribute to BMPs?

20 On the land that you rent would you be willing to incur costs to implement BMPs? If so what % or amount?

20A Do you treat owned and rented land differently?

**Wetlands/tile**

21 Have you added drainage tile? When? Do you plan to add drainage tile?

22 Would you be interested in conservation drainage? (bioreactor, two stage ditches, seasonal drainage, sediment traps in drainage ditches)

23 Do you have wetlands or farmable wetlands on your property? How do they affect your land?

24 Would you allow temporary water storage on your property? Less than 48 hours, no expected crop mortality.

**Livestock**

25 Do you raise livestock? If so do you use rotational grazing?

26 What do you do with your mortalities?

**Wrap up/summary**

27 What are the main factors that influence your decisions (return on investment, "the right thing to do", routine, peer/social pressure, regulations)?

28 Would you be willing to install BMPs on your property or change the way you operate for financial gains?

29 Would you be willing to install BMPs on your property or change the way you operate for environmental gains?

30 What type of conservation assistance would you like? \$, engineering, data, demonstrations, coordination, checkout.

31 What has your experience been with the SWCD, NRCS, and other governmental units? What C/S is available?

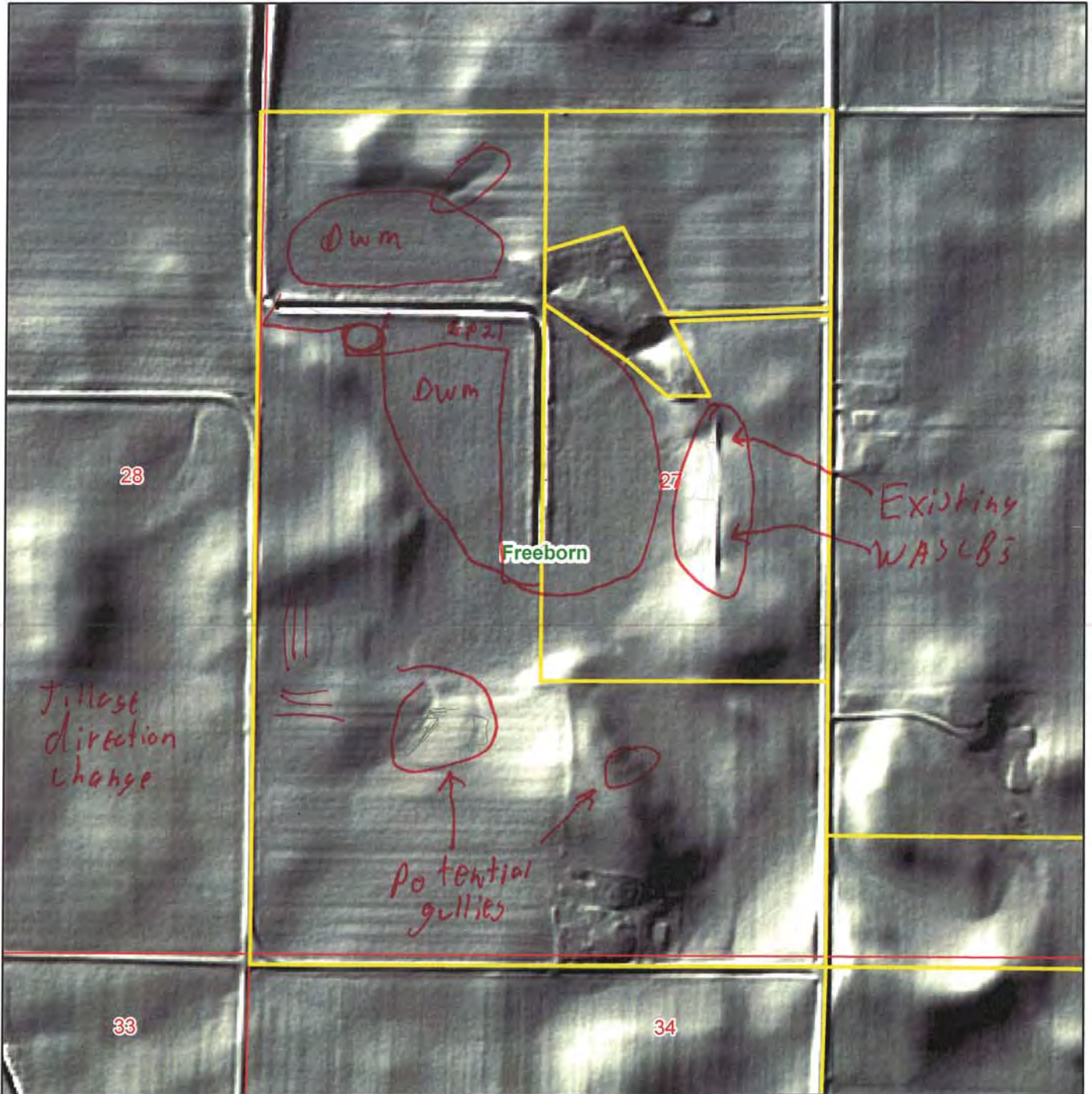
32 What other conservation or farming related information would you like to share with me?

33 Where do you get your Ag info from? Who do you trust? Who/what influences conservation?

34 Who else in this neighborhood do I need to talk to?

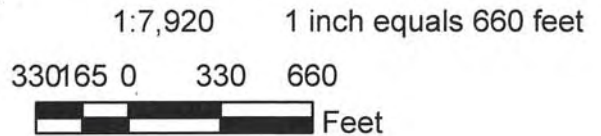
*Goal #1 is to find projects*

*Goal #2 talk to folks to get opinions and ideas.*



**Freeborn Township Section  
Freeborn County**

- Civil Townships - Freeborn
- Sections - Freeborn



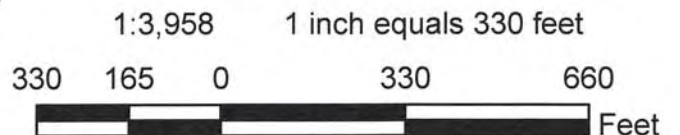
Maps are for graphical purposes only. They do not represent a legal survey. While every effort has been made to ensure that these data are accurate and reliable within the limits of the current state of the art, NRCS cannot assume liability for any damages caused by any errors or omissions in the data, nor as a result of the failure of the data to function on a particular system. NRCS makes no warranty, expressed or implied, nor does the fact of distribution constitute such a warranty.



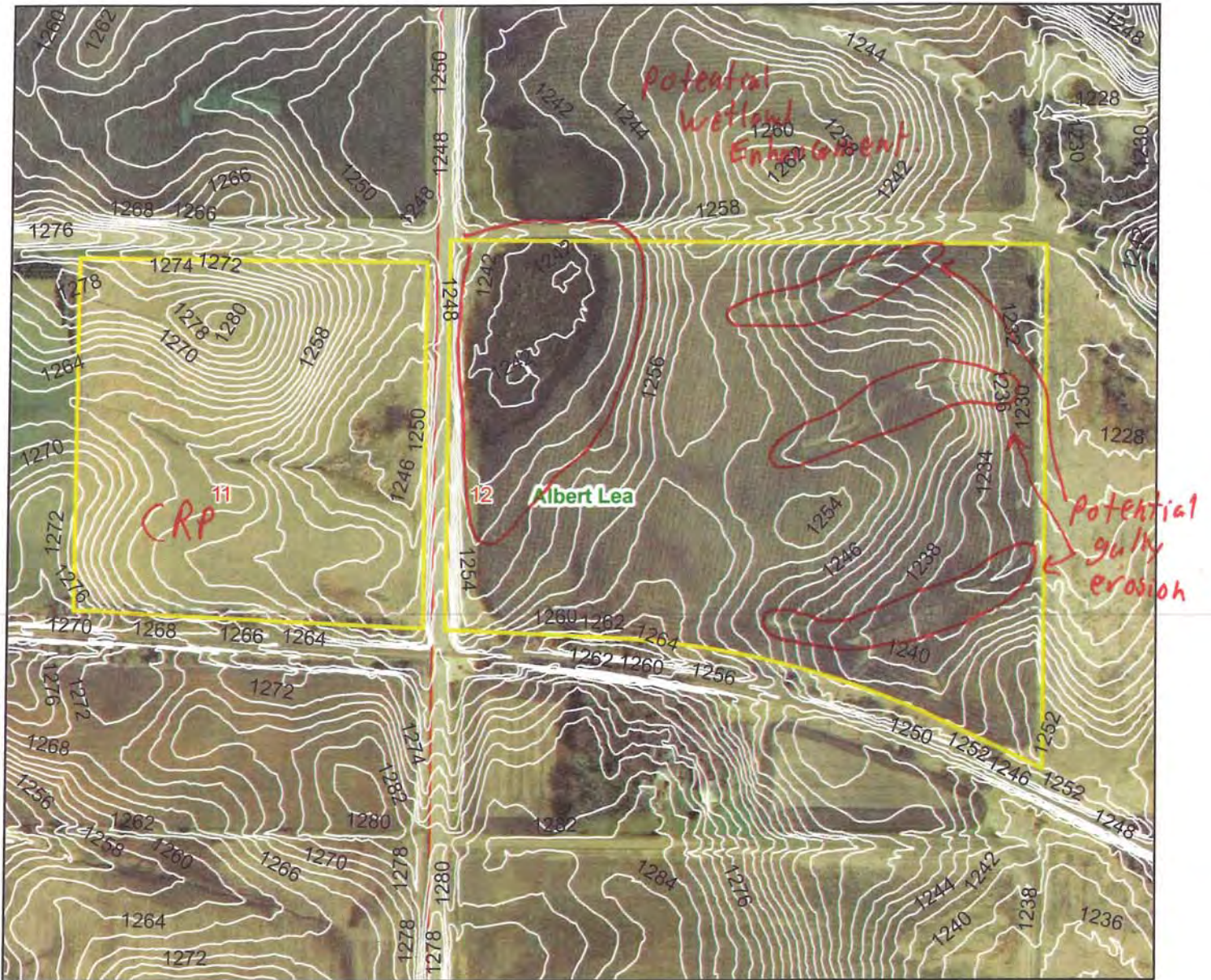


## Freeborn Township Section 16 Freeborn County

- Civil Townships - Freeborn
- Sections - Freeborn
- Flow Accumulation

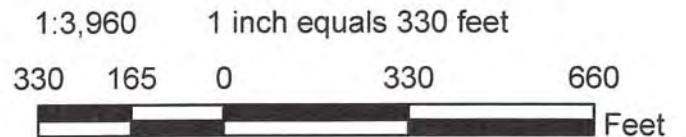


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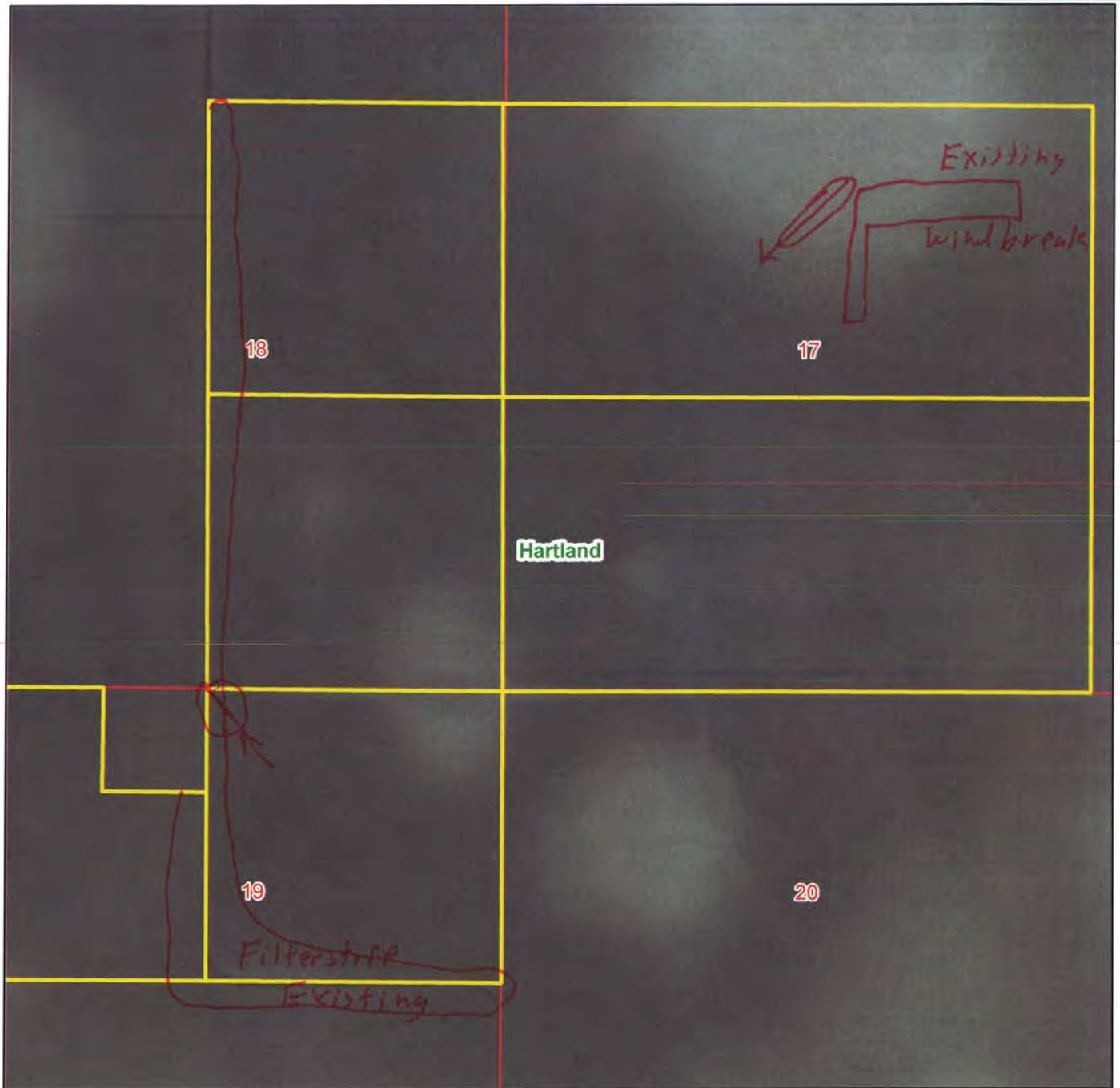


## Albert Lea Township Sections 11 and 12 Freeborn County

-  Contours
-  Civil Townships - Freeborn
-  Sections - Freeborn



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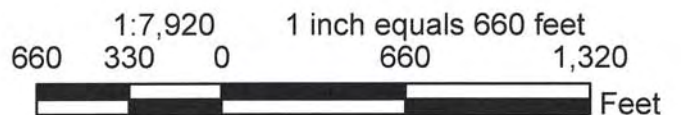
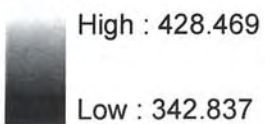


- Civil Townships - Freeborn
- Sections - Freeborn

## Hartland Township Sections 17, 18, and 19 Freeborn County

### Digital Elevation

#### Value



Maps are for graphical purposes only. They do not represent a legal survey. While every effort has been made to ensure that these data are accurate and reliable within the limits of the current state of the art, NRCS cannot assume liability for any damages caused by any errors or omissions in the data, nor as a result of the failure of the data to function on a particular system. NRCS makes no warranty, expressed or implied, nor does the fact of distribution constitute such a warranty.



# FACT SHEET

United States Department of Agriculture  
FARM SERVICE AGENCY

February 2013

## Conservation Reserve Program Continuous Sign-Up

### Overview

USDA Farm Service Agency's (FSA) Conservation Reserve Program (CRP) is a voluntary program that helps agricultural producers use environmentally sensitive land for conservation benefits. CRP participants plant long-term, resource-conserving covers to improve the quality of water and air, control soil erosion and enhance wildlife habitat. In return, FSA provides participants with rental payments and cost-share assistance.

FSA administers CRP while other USDA agencies and partners provide technical support. More detailed information on CRP is available in the FSA fact sheet "Conservation Reserve Program" located at [www.fsa.usda.gov/Internet/FSA\\_File/crp\\_prog\\_0726.pdf](http://www.fsa.usda.gov/Internet/FSA_File/crp_prog_0726.pdf)

### CRP Continuous Sign-Up

Environmentally sensitive land devoted to certain conservation practices may be enrolled in CRP at any time under continuous sign-up. Offers are automatically accepted provided the land and producer meet certain eligibility requirements. Offers for continuous sign-up are not subject to competitive

bidding. Continuous sign-up contracts are 10 to 15 years in duration.

To offer land for continuous sign-up, producers should contact their local FSA office.

### Contract Effective Date

For continuous sign-up, the effective date of the CRP contract is the first day of the month following the month of approval. In certain circumstances, producers may defer the effective date for up to six months.

If the acreage is currently under CRP contract and is within one year of the scheduled expiration date, the effective date is Oct. 1 following the expiration date.

### Eligible Producers

To be eligible for CRP continuous sign-up enrollment, a producer must have owned or operated the land for at least 12 months prior to submitting the offer, unless:

- The new owner acquired the land due to the previous owner's death;
- The ownership change occurred due to foreclosure where the owner exercised a timely right of redemption in accordance

with state law or;

- The circumstances of the acquisition present adequate assurance to FSA that the new owner did not acquire the land for the purpose of placing it in CRP.

### Eligible Land

To be eligible for placement in CRP, land must be cropland that is planted or considered planted to an agricultural commodity four of the previous six crop years from 2002 to 2007, and is physically and legally capable of being planted (no planting restrictions due to an easement or other legally binding instrument) in a normal manner to an agricultural commodity.

### Eligible Practices

The land must be eligible and suitable for any of the following conservation practices:

- Riparian buffers;
- Wildlife habitat buffers;
- Wetland buffers;
- Filter strips;
- Wetland restoration;
- Grass waterways;
- Shelterbelts;
- Living snow fences;
- Contour grass strips;
- Constructed wetlands;

- Restoration of aquaculture wetlands;
- Wildlife habitat restoration within approved State Areas for Wildlife Enhancement (SAFE) projects;
- Salt tolerant vegetation or;
- Shallow water areas for wildlife.

Land within an Environmental Protection Agency (EPA)-designated public wellhead area also may be eligible for enrollment on a continuous basis.

### CRP Continuous Sign-Up Payments

FSA provides CRP continuous sign-up participants with annual rental payments, including certain incentives and cost-share assistance:

- **Rental Payments**

In return for establishing long-term, resource-conserving covers, FSA provides annual rental payments to participants. FSA bases rental rates on the relative productivity of the soils within each county and the average dryland cash rent or cash rent equivalent as guidelines.

The per-acre annual rental rate may not exceed the calculated rate determined in advance of enrollment. While continuous sign-up acceptance is not determined by a competitive

offer process, producers may elect to receive an amount less than the maximum payment rate.

- **Cost-Share Assistance**

1. An upfront signing incentive payment (SIP) up to \$150 per acre;
2. Cost share assistance equal to 50 percent of the eligible installation costs for eligible participants.
3. A practice incentive payment (PIP) equal to 40 percent of the eligible installation costs for eligible participants who enroll certain practices. The one-time PIP will be issued after the practice is installed, eligible costs are verified and other payment eligibility criteria are met.

### For More Information

For more information on CRP continuous sign-up, contact a local FSA office or visit FSA's website at [www.fsa.usda.gov/crp](http://www.fsa.usda.gov/crp).



**General CRP signup announced! May 20<sup>th</sup> thru June 14<sup>th</sup>.**  
**See FSA or NRCS for more details.**

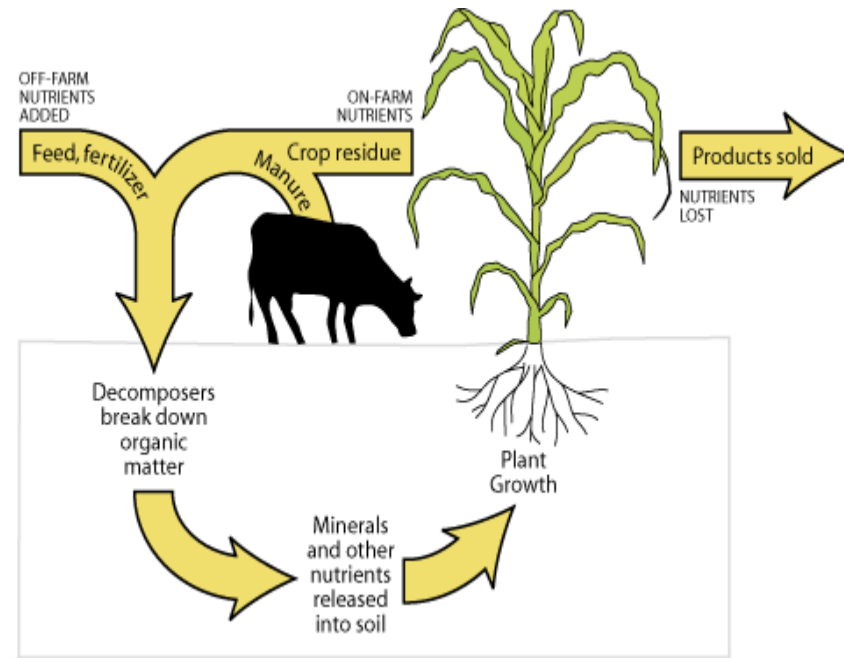
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*USDA is an equal opportunity provider and employer.*

## Nutrient Management Plan

A nutrient management plan (NMP) details how nutrients will be managed for crop production, while minimizing loss of crop nutrients to water resources and/or the atmosphere. These plans are prepared in collaboration with the producer and are designed to help the producer with systematic implementation and maintenance activities associated with the plan. NMPs must be developed by a Technical Service Provider (TSP) certified in NRCS TechReg for CAP 140 Nutrient Management Plan. NMP cost-share is available for plans to be used on fields for which controlled subsurface drainage, a denitrifying bioreactor and/or replacement of open tile inlets is planned.



## Available Cost-Share

- 75% state cost-share is available for the following practices: CAP 130 Drainage Water Management Plan; Structure for Water Control (Practice 587); Denitrifying Bioreactor (747); CAP 104 Nutrient Management Plan, and; Subsurface Drain (606) alternative tile inlet.
- An incentive payment is available for Drainage Water Management Operation (554) where controlled subsurface drainage structures have been installed, at \$7.58 per acre per year for the first three (3) years of implementation/operation, up to a maximum of 300 acres per cooperator. A CAP 130 Drainage Water Management Plan is required.
- An incentive payment is also available for Nutrient Management (590) implementation on fields where controlled subsurface drainage and/or denitrifying bioreactor is implemented, and/or where existing open tile inlet(s) are replaced by dense pattern tile. A CAP 104 Nutrient Management Plan is required. The incentive payment for the first three (3) years of implementation is \$5.44 per acre per year for CAP 104 acres without manure and \$10.78 per acre per year for CAP 104 acres with manure, up to a maximum of 300 acres per cooperator.

## Additional Resources

- Minnesota Board of Water and Soil Resources <http://www.bwsr.state.mn.us/>
- Questions and Answers about Drainage Water Management for the Midwest [http://www.mn.nrcs.usda.gov/technical/eng/Drainage\\_water.html](http://www.mn.nrcs.usda.gov/technical/eng/Drainage_water.html)
- NRCS Conservation Activity Plan—Drainage Water Management Plan 130 (CAP 130)
- NRCS Conservation Practice Standard—Structure For Water Control, Code 587
- NRCS Conservation Practice Standard—Drainage Water Management, Code 554
- NRCS Interim Conservation Practice Standard—Denitrifying Bioreactor, Code 747
- NRCS Conservation Practice Standard—Subsurface Tile , Code 606
- NRCS Conservation Activity Plan—Drainage Water Management Plan 104 (CAP 104)



Inside This Brochure	
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Get a Drainage Water Management Plan	2
Controlled Subsurface Drainage	2
Denitrifying Bioreactor	3
Replacement of Open Tile Inlets	3
Nutrient Management	4
Available Cost-Share	4
Additional Resources	4

FY 2013

## BWSR Conservation Drainage Program Drainage Water Management Grants



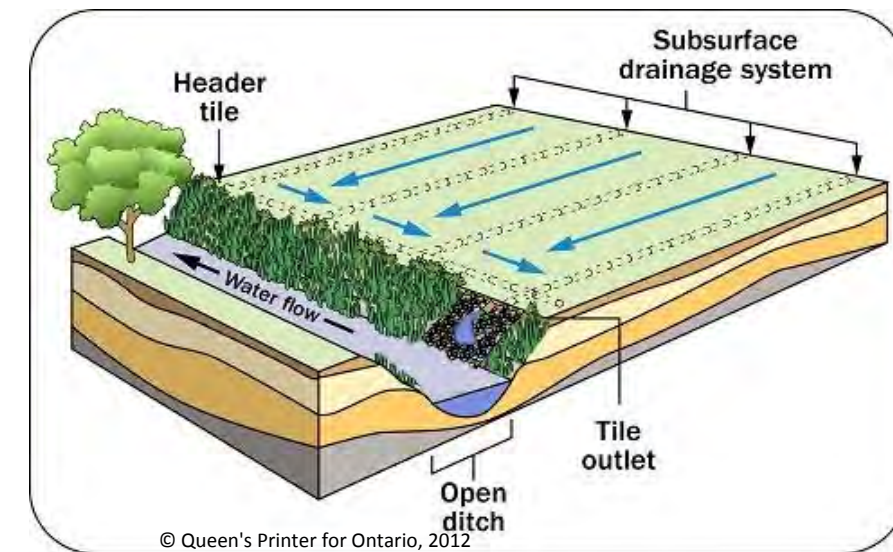
### Introduction

Subsurface tile drainage is a water management practice increasingly utilized in agricultural fields in Minnesota to improve field access for planting and harvesting and to increase crop productivity. At the field scale, tile drainage typically reduces surface runoff by increasing subsurface runoff, and increases total annual runoff volume by reducing water availability for evaporation, primarily during the spring and fall when crops are not growing. Conventional tile drainage can increase the loss of soluble crop nutrients from fields, such as nitrate nitrogen and soluble phosphorus, as well as increase the transport of herbicides, pesticides and pathogens. Increased runoff volume can in turn increase downstream flooding and sediment transport.

Conservation practices and strategies have been developed to reduce water quantity and quality impacts of subsurface tile drainage, as well as surface drainage. BWSR drainage water management grants involve a suite of practices, including:

- NRCS Conservation Activity Plan (CAP) 130 Drainage Water Management Plan;
- Structure for Water Control (Practice 587);
- Drainage Water Management Operation (554);
- Denitrifying Bioreactor (747);
- Conservation Activity Plan (CAP) 104 Nutrient Management Plan;
- Nutrient Management (590),
- Subsurface Drain (606) alternative tile inlet.

This brochure describes these conservation drainage practices.



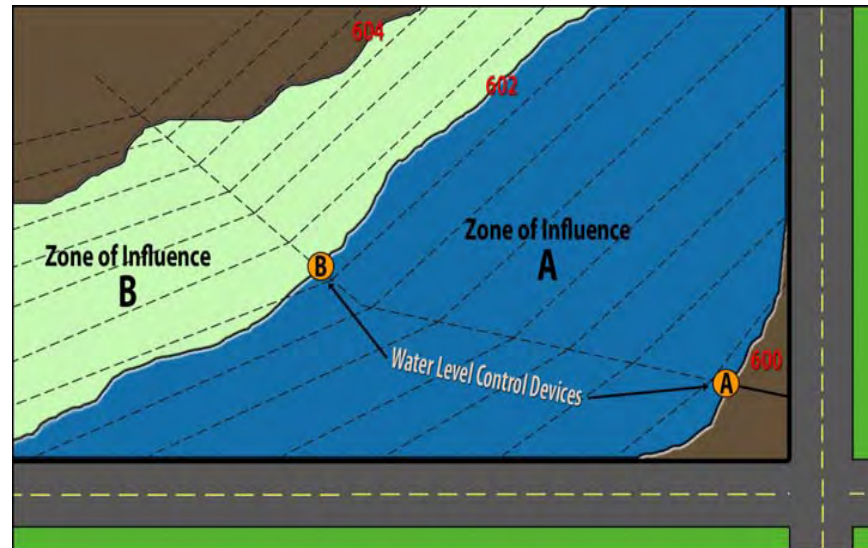
### What's New

The 2012 Legislature provided additional Clean Water Funds for FY 2013 to the Board of Water and Soil Resources in Chapter 264, Section 7 (d) for the Conservation Drainage Program, with the intent to be used for drainage water management in coordination with Natural Resources Conservation Service practice standards. The appropriation language also allows the use of Conservation Drainage Program funding for water quality improvement

practices on new tile drainage systems. Previous appropriations only allowed retrofitting of existing drainage systems. The BWSR Conservation Drainage Program and NRCS Environmental Quality Incentive Program funds will not be used for new tile, with the exception of dense pattern tile replacing existing open tile inlets.

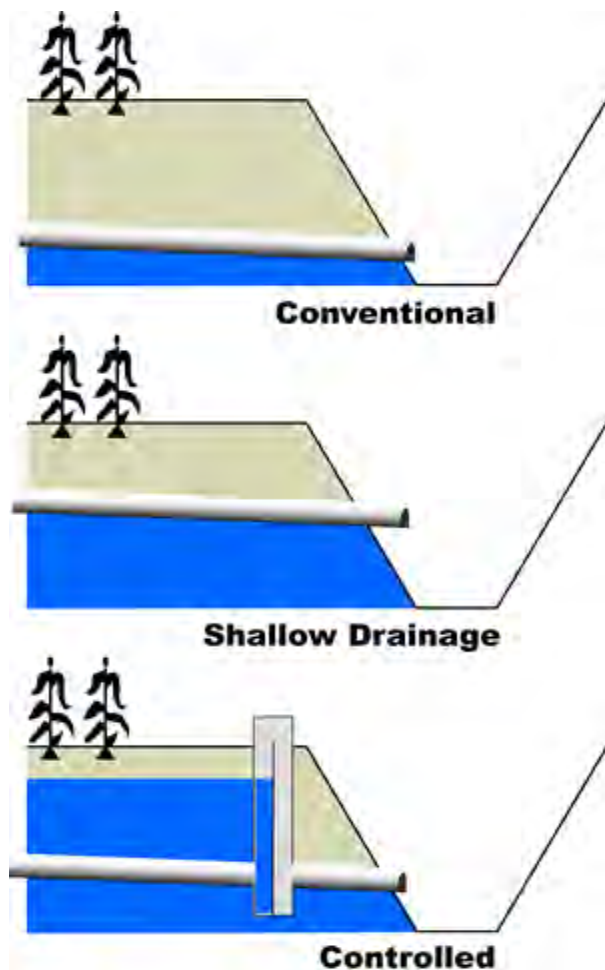
## Get a Drainage Water Management Plan

A Drainage Water Management Plan (DWMP) is a plan of action to help landowners protect and improve water quality, potentially enhance crop production and retain soil productivity. A properly prepared DWMP ensures that factors of landscape, soils, slope and current drainage systems are taken into consideration and incorporated into the function of your DWM System. Conservation drainage practices that can be included in a DWMP are listed in the Introduction section of this brochure and explained below. DWMPs must be developed by a Technical Service Provider (TSP) certified in NRCS TechReg for Conservation Activity Plan (CAP) 130 Drainage Water Management Plan.



## DWMP Components

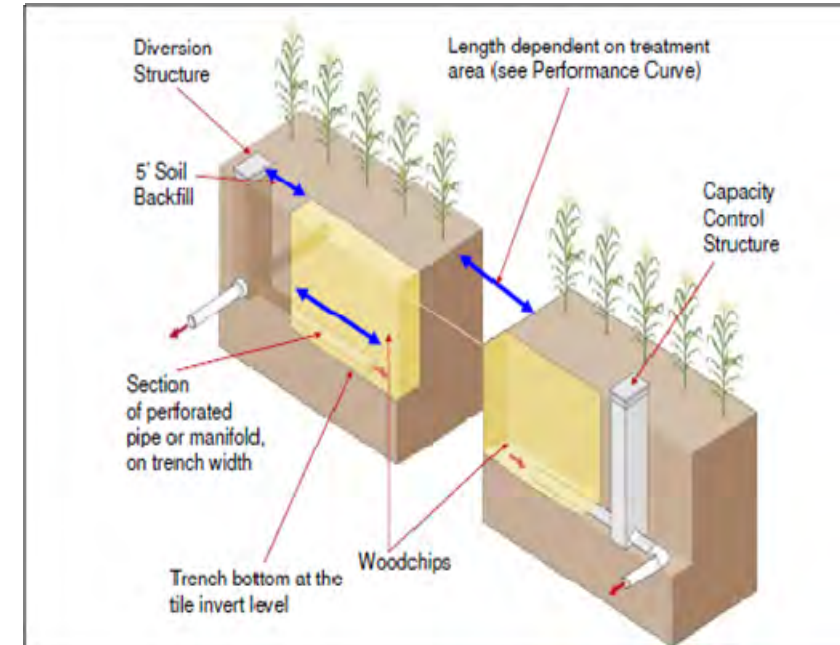
### Controlled Subsurface Drainage



Controlled subsurface drainage (CSD), sometimes referred to as Drainage Water Management, is a practice used to control or manipulate the ground water elevation in a subsurface tile-drained field. CSD is similar to traditional tile drainage except that tile outflow is managed by structure(s) for water control that effectively control the elevation of the water table in a field during the year by adding or removing stoplogs within a structure, or managing on/off elevations in a lift station, to raise or lower the water table. CSD may be implemented as part of a new tile system, or as part of a system retrofit to the extent practical. CSD tile systems are most effective when tile laterals are laid out on the topographic contour, as shown above.

Varying the water table depth during the year allows management of the timing and, to some extent, the amount of water discharged. CSD is based on the premise that the same drainage intensity is not required at all times during the year. With CSD, both water quality improvements and production benefits are possible. The DWMP provides the location and size for each planned structure for water control based on topography and system layout. Once the locations of the structures are determined, the area of the field impacted by each water level control structure (zone of influence) can be determined. To effectively use and benefit from a DWM system, it is crucial that the plan includes a detailed operation and maintenance plan.

## Denitrifying Bioreactor



As an edge-of-field practice, denitrifying bioreactors have been developed to help remove nitrates that leach into tile drains. Each bioreactor consists of a lined trench filled with woodchips and covered with soil through which the tile water flows before entering a surface water. Microorganisms from the soil colonize the woodchips. Some of them break down the woodchips into smaller organic particles. Other microorganisms “eat” the carbon produced by the woodchips, and “breathe” the nitrate from the water. Just as humans breathe in oxygen and breathe out carbon dioxide, these microorganisms breathe in nitrate and breathe out nitrogen gas, which exits the bioreactor into the atmosphere. Through this process, nitrate is removed from the tile water before it can enter surface waters.

## Replacement of Open Surface Tile Inlets

Isolated surface depressions in agricultural fields are commonly drained with subsurface tile having surface inlets. Open inlets that are flush with the surface of the ground can provide a direct conduit for sediment and nutrients to enter tile systems, which outlet into ditches, streams, and rivers. Alternative tile inlets increase sediment trapping efficiency through increased settling time and/or filtering. They can also reduce the velocity of flow into the tile inlet. Examples of alternative inlets include perforated risers and dense pattern tile.

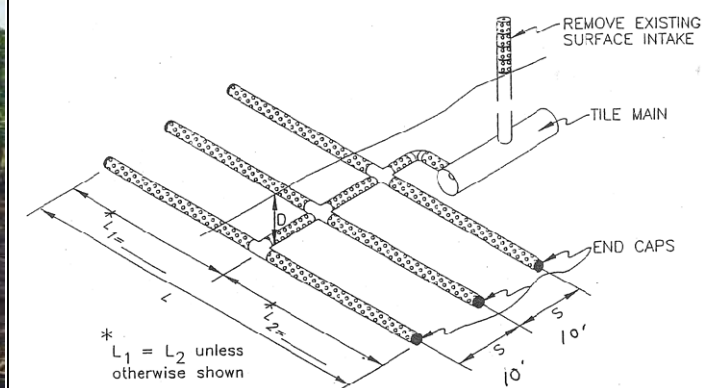
### Replace This



### With One of These



Perforated Riser



Dense Pattern Tile



# RIM Reserve Clean Water Fund-Lessard Sams Outdoor Heritage Fund-Riparian Buffers SWCD Program Guidance



## Introduction:

The intent of this guidance document is to outline the enrollment criteria and conditions that will govern the landowner application sign-up for this RIM Reserve conservation easement program on eligible riparian buffer lands. This guidance should be considered additive to existing RIM policy and procedure.

This program is funded by the state of Minnesota through the Clean Water Fund (CWF) and the Lessard Sams Outdoor Heritage Fund (LSOHC). \$6.0 million is available for each year of the biennium (FY 2012 and 2013) from the CWF. \$2.249 million is available in 2012 from LSOHC.

## Statute requirements / conditions:

1. Easements will be acquired via the RIM Reserve program (MS 103F.501).
2. Permanent easements only.
3. Buffer widths must be a minimum of 50 feet and no more than 100 feet maximum average for clean water. Buffer extensions to a maximum average of 200' may be granted for wildlife habitat enhancement purposes (Prairie Section only). Measurements start at top of bank for streams and ditches or water's edge for lakes. Width can be less than 50 feet if there is a natural impediment beyond the landowner's control, for example a road or property line.
4. Clean water buffers are also eligible when adjacent to and used to solve bluff land erosion problems.
5. Buffers must be adjacent to public waters defined as: streams, ditches and lakes, excluding wetlands; as shown on the DNR Protected Waters Inventory (PWI) maps.
6. Eligible land must have been owned by the landowner for 1 year prior to application.
7. Eligible landowners – any individual or entity that is not prohibited from owning ag land under MS 500.24 Corporate Farm m Law. Farm corporations need to be certified by the MN Dept. of Agriculture, contact 651-297-2200.

## Sign-up criteria:

1. Local project areas requested by SWCD and selected by the Board of Water and Soil Resources (BWSR).
2. The application period is currently ongoing.
3. Scoring criteria established for wildlife component, minimum wildlife score of 50 required.
4. Local screening committee will rank applications for funding at the conclusion of the signup period.
5. Priority should be placed upon land in existing or new CRP contracts that had crop history prior to enrollment in CRP.
6. Existing vegetation area between eligible cropland and riparian source must be included in the easement acreage. This existing non-crop area shall not exceed 50% of the entire offered acreage. Non-crop acres over 50% must be donated.



7. Whenever possible, land on both sides of the stream or ditch must be enrolled.
8. It is the intent of these buffers to focus on upland riparian sites. Floodplain areas that exceed these narrow buffer widths are not eligible and are to be enrolled under other programs that target floodplains.
9. Minimum 3 acre total easement size per application, unless part of a larger project initiative.

#### Additional information

Annually the BWSR establishes payment rates for easement programs.

Cropland is defined by RIM as cropped with an annually planted crop 2 of the last 5 years. CRP is considered cropland for this sign-up.

For land in existing CRP contracts, no changes in vegetative cover will be required. Cost share dollars will be available for new native grass seeding or to bring cover up to specs. Landowners will continue to receive CRP payments for the life of the CRP contract.

For more information please contact:

Freeborn SWCD  
1400 W. Main St  
Albert Lea, MN 56007  
(507) 373-5607 ext 3



# Farming in the 21st Century

## a practical approach to improve **Soil Health**

### What is Soil Health? Why Should I Care?

Soil health is *the capacity of a soil to function*. How well is your soil functioning to infiltrate water and cycle nutrients to water and feed growing plants?

Soil is a living factory of macroscopic and microscopic workers who need food to eat and places to live to do their work.

There are more individual organisms in a teaspoon of soil than there are people on earth; thus, the soil is controlled by these organisms.

Tillage, fertilizer, livestock, pesticides, and other management tools can be used to improve soil health, or they can significantly damage soil health if not applied correctly.

Managing for soil health (improved soil function) is mostly a matter of maintaining suitable habitat for the myriad of creatures that comprise the soil food web.

Managing for soil health can be accomplished by disturbing the soil as little as possible, growing as many different species of plants as practical, keeping living plants in the soil as often as possible, and keeping the soil covered all the time.

### Manage More by Disturbing Soil Less

Tilling the soil is the equivalent of an earthquake, hurricane, tornado, and forest fire occurring simultaneously to the world of soil organisms. Simply stated, tillage is bad for the soil.

Physical soil disturbance, such as tillage with a plow, disk, or chisel plow, that results in bare or compacted soil is destructive and disruptive to soil microbes and creates a

hostile, instead of hospitable, place for them to live and work.

The soil may also be disturbed chemically or biologically through the misuse of inputs, such as fertilizers and pesticides. This disrupts the symbiotic relationship between fungi, microorganisms and crop roots.

By reducing nutrient inputs, we can take advantage of the nutrient cycles in the soil to supply crop nutrients and allow plants to make essential associations with soil organisms.

### Diversify with Crop Diversity

Sugars made by plants are released from their roots into the soil and traded to soil microbes for nutrients to support plant growth.

The key to improving soil health is assuring that the food and energy chains and webs includes as many different plants or animals as practical.

Biodiversity is ultimately the key to success of any agricultural system. Lack of biodiversity severely limits the potential of any cropping system and disease and pest problems are increased.

A diverse and fully functioning soil food web provides for nutrient, energy, and water cycling that allows a soil to express its full potential.

Above ground diversity = Below ground diversity  
(plants) (soil food web)





## Grow Living Roots Throughout the Year

There are many sources of food in the soil that feed the soil food web, but there is no better food than the sugars exuded by living roots.

Soil organisms feed on sugar from living plant roots first. Next, they feed on dead plant roots, followed by above-ground crop residues, such as straw, chaff, husks, stalks, flowers, and leaves. Lastly, they feed on the humic organic matter in the soil.

Healthy soil is dependent upon how well the soil food web is fed. Providing plenty of easily accessible food to soil microbes helps them cycle nutrients that plants need to grow.

## Keep the Soil Covered as Much as Possible

Soil should always be covered by growing plants and/or their residues, and soil should rarely be visible from above. This is true regardless of land use (cropland, hayland, pasture, or range).

Soil cover protects soil aggregates from 'taking a beating' from the force of falling raindrops. Even a healthy soil with water-stable aggregates (held together by biological glues) that can withstand wetting by the rain may not be able to withstand a 'pounding' from raindrops.

A mulch of crop residues on the soil surface suppresses weeds early in the growing season giving the intended crop an advantage. They also keep the soil cool and moist which provides favorable habitat for many organisms that begin residue decomposition by shredding residues into smaller pieces.

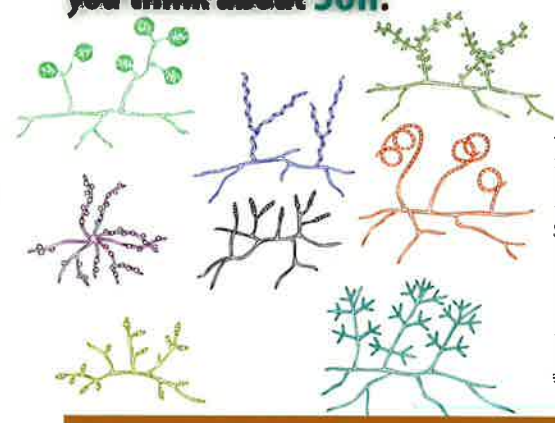
## Soil Health for Your Farm, Ranch... for You!

Soil health is improved by disturbing the soil less, growing the greatest diversity of crops (in rotation and as diverse mixtures of cover crops), maintaining living roots in the soil as much as possible (with crops and cover crops), and keeping the soil covered with residue at all times.

Drills, planters, seed, fertilizer, pesticides, livestock, fences, water, farm implements, etc. are all tools that can be used to manage the soil habitat for the benefit of living members of the soil food web.

Many soils have a water infiltration problem that causes a water runoff problem. If soil health is improved, the structure of the soil results in greater water infiltration, less runoff, less or no erosion, and reduced incidence of flooding and sedimentation.

**Managing for Soil Health must begin by changing the way you think about Soil.**



Illustrations courtesy of Dr. James Nardi, University of Illinois at Urbana-Champaign.



*diversify with crop diversity*

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September 2010

Developed by the Soil Quality National Technology Development Team with contributions from North Dakota NRCS



**Freeborn Soil & Water  
Conservation District**  
1400 West Main Street  
Albert Lea, MN 56007  
Phone: 507-373-5607 Ext. 3  
FAX: 507-373-7654

updated 2-19-2013

## Current Cost Share Opportunities

### State cost share

Administrator: Soil and Water Conservation Districts (SWCDs)

Practices: Farmstead shelterbelt, field windbreak, grassed waterway, sediment basin, contour stripcropping, streambank stabilization, feedlot runoff control, critical area stabilization, filterstrips, terraces.

Who is eligible: Landowners and renters with resource concerns.

Cost Share: up to 75% with some not to exceed limits.

### Conservation Reserve Program (CRP)

Administrator: Farm Service Agency (FSA)

Practices: Grassed Waterways, Field windbreaks, farmstead windbreaks, living snowfences, filterstrips, wooded buffers, wetland restoration, pheasant habitat, duck nesting habitat.

Who is eligible: Cropland owners that meet FSA requirements, have owned the land for at least one year, and cropped acres meet practice requirements.

General CRP – competitive signup periods – the next signup starts May 20, 2013.

Continuous CRP – Landowners can sign up at any time if land is eligible for the practice.

Cost Share – up to 50% for General CRP, up to 90% for Continuous CRP with some not to exceed limits. Also eligible to receive annual rent of \$144 to \$260 per acre in Freeborn County.

### Environmental Quality Incentives Program (EQIP)

Administrator: Natural Resources Conservation Service (NRCS)

Practices: over 70 practices available for cash grain, livestock, and organic operations.

See NRCS website below for practices and info

<http://www.mn.nrcs.usda.gov/programs/eqip/2012/supplements.html>

Who is eligible: Landowners who are or will be entered in the FSA system.

Cost share: Payment rates currently are set at 75% of the state level. Limited resource, beginning, and socially disadvantaged farmers can get 90% of the state level.

### Wildlife Habitat Incentives Program (WHIP)

Similar to EQIP except that applicant must own 5 or more acres.

### Reinvest In Minnesota (RIM)

Administrator: SWCDs

Practices: Easements on filterstrips and wetland restorations.

Who is eligible: landowners with land next to surface water or restorable wetlands.

Cost Share – Easement payment and up to 100% of restoration costs.

### Conservation Drainage

Administrator: SWCD

Practices: drainage water management plan, controlled drainage, denitrifying bioreactor, alternative tile inlet, nutrient management plan.

Who is eligible: landowners

Cost share: up to 75%.

### Weed Management Area (WMA)

Administrator: SWCD

Practices: removal of noxious or invasive species such as buckthorn, wild parsnip, purple loosestrife, and garlic mustard.

Who is eligible: Landowners

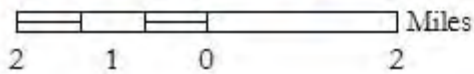
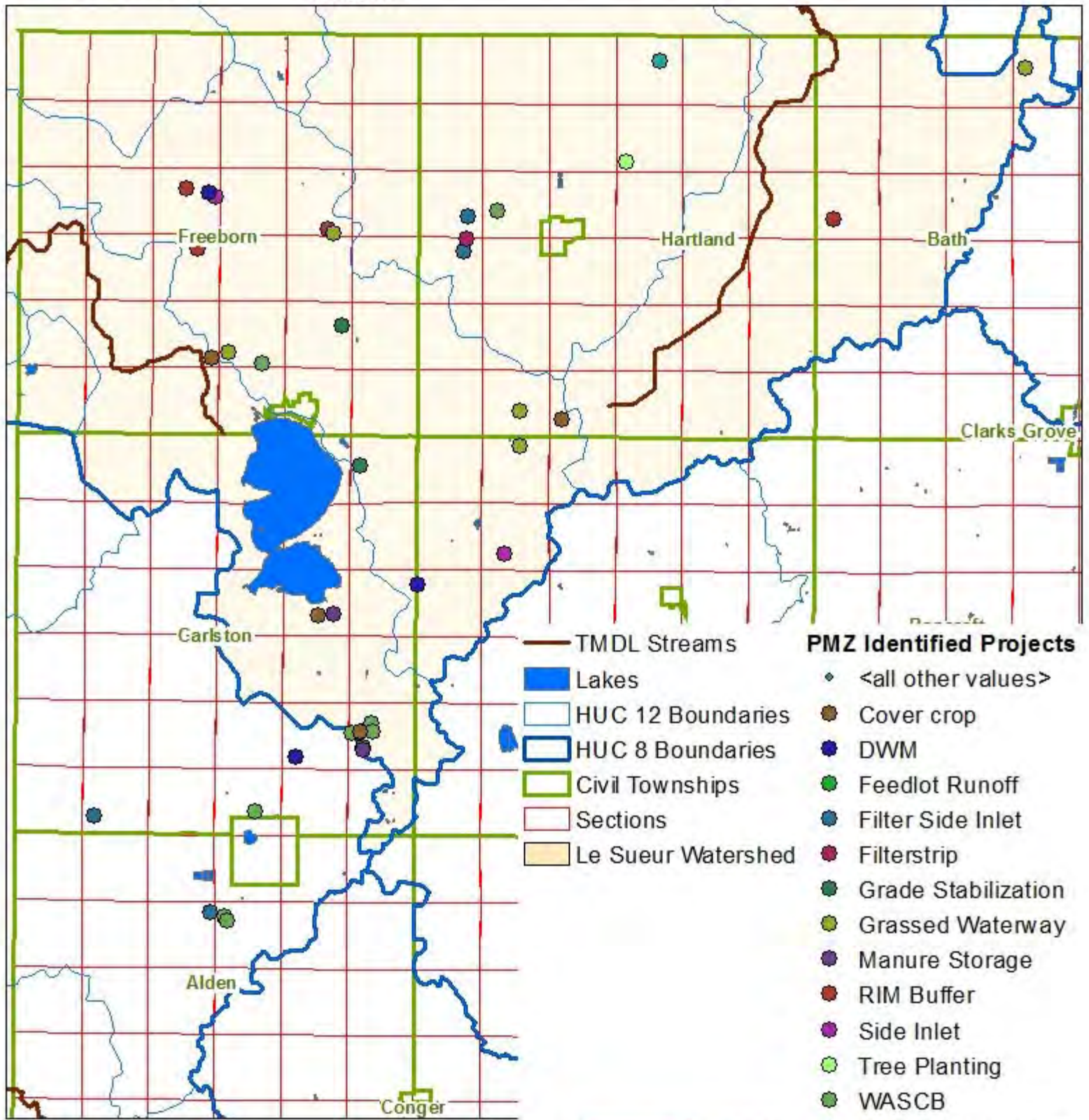
Cost share: up to 75%

### MN DNR and USFWS

Wildlife habitat improvement projects (native grass and wildflowers, wetland restoration, invasive and noxious species removal, tree planting).

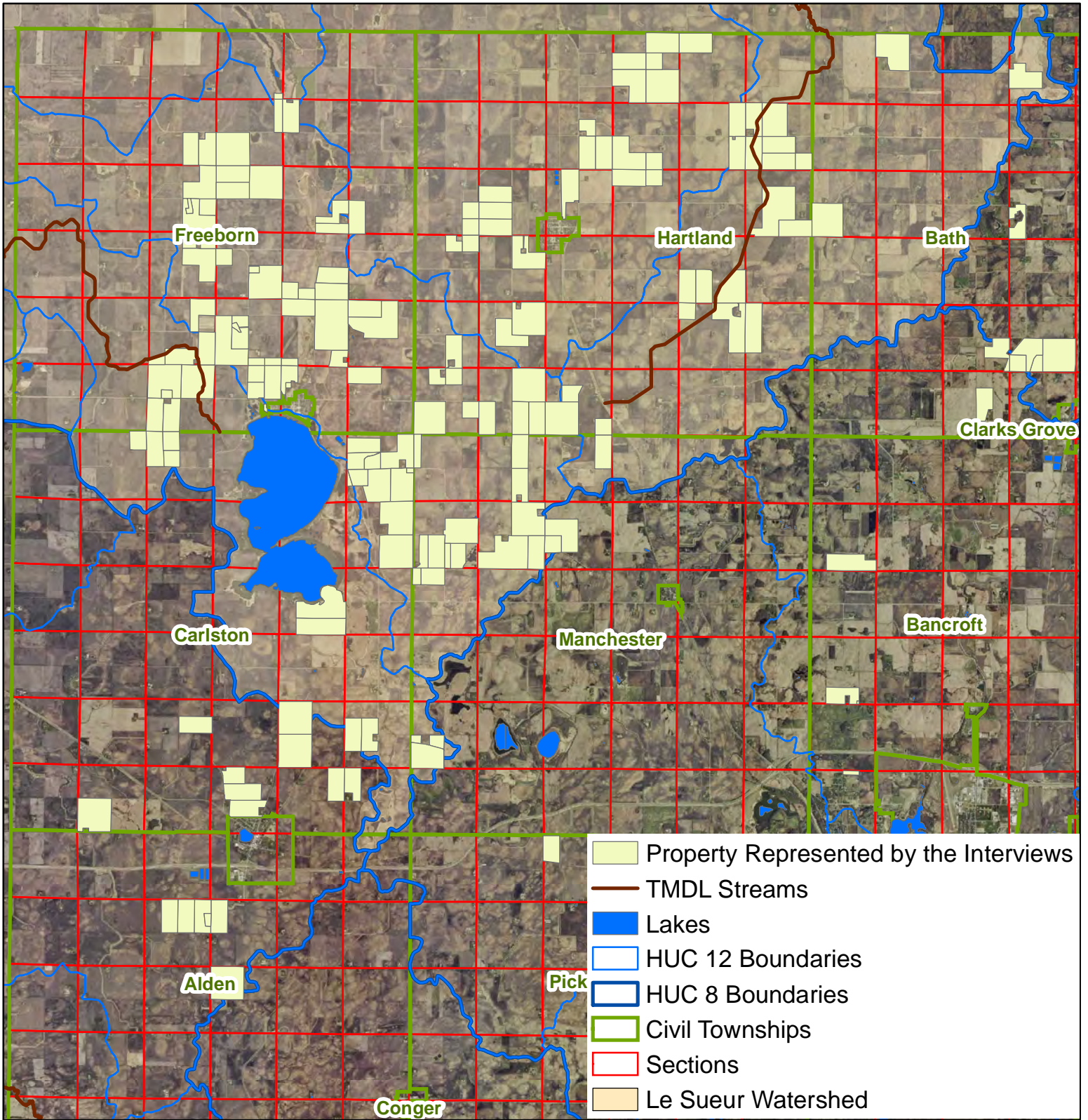
Other: Specific projects that do not fall into the categories above, but will provide soil and water benefits could pursue grant funding. The SWCD would assist in this process.

# PMZ Identified Potential BMP Projects

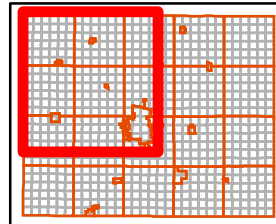
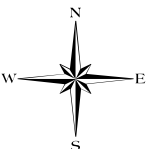


Freeborn County

# Property Represented by the PMZ Interviews



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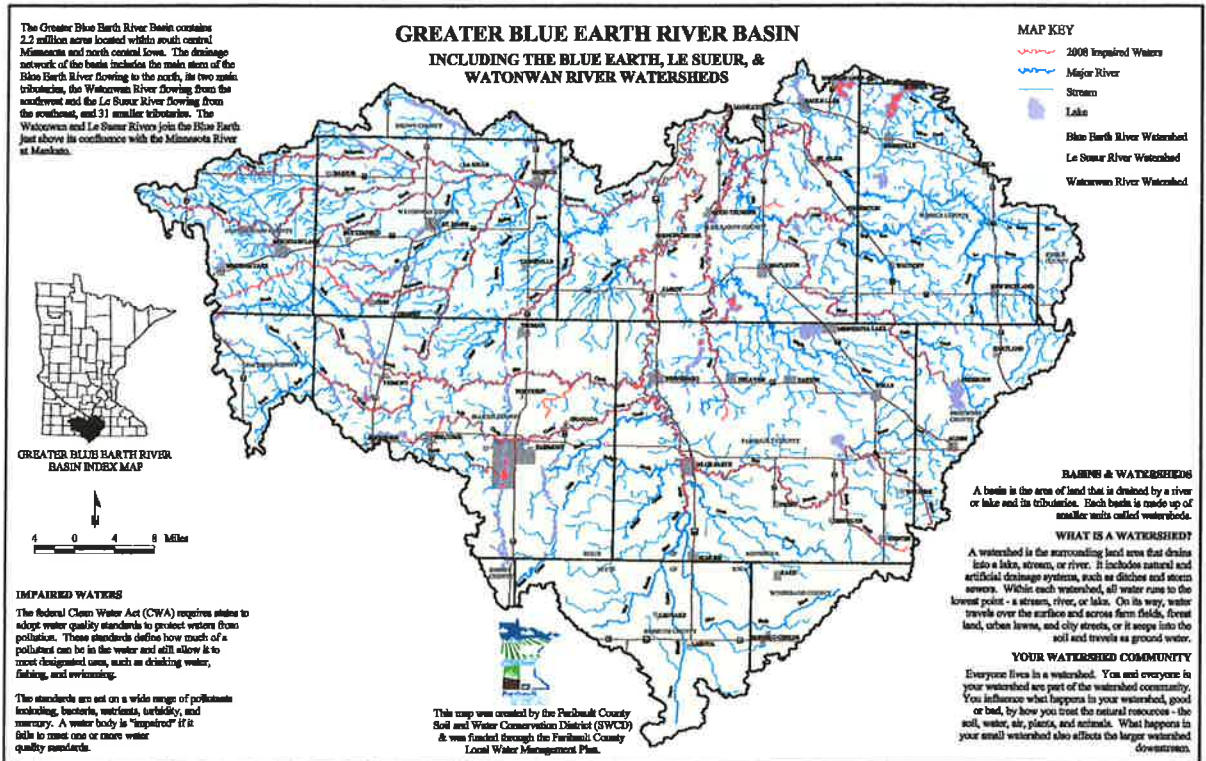


2011 imagery

Maps are for graphical purposes only. They do not represent a legal survey.

Appendix E  
Waseca County summary of perspective of  
Le Sueur Watershed





## DISCUSSIONS

Most respondents thought that land use has an impact on surface waters.

Many of the people participating in the survey identified tiling and accelerated drainage as a concern for the Le Sueur River watershed. Most thought that water quality had declined, citing increased flooding of streams, increased erosion and increased turbidity.

Several suggested that water quality had improved over the years, with some of those specifically mentioning improved sewage treatment and improved management of livestock manure.

Virtually all of those interviewed were in favor of riparian buffers; a large majority thought that establishment of buffer strips should be a top pick to benefit the watershed. Lakeshore residents showed some consistent interest in establishment of native plants along the urbanized lakeshore.

Some suggested that more wetlands, holding ponds and other similar features should be established to reduce flooding, sediment transport and erosion of river banks.

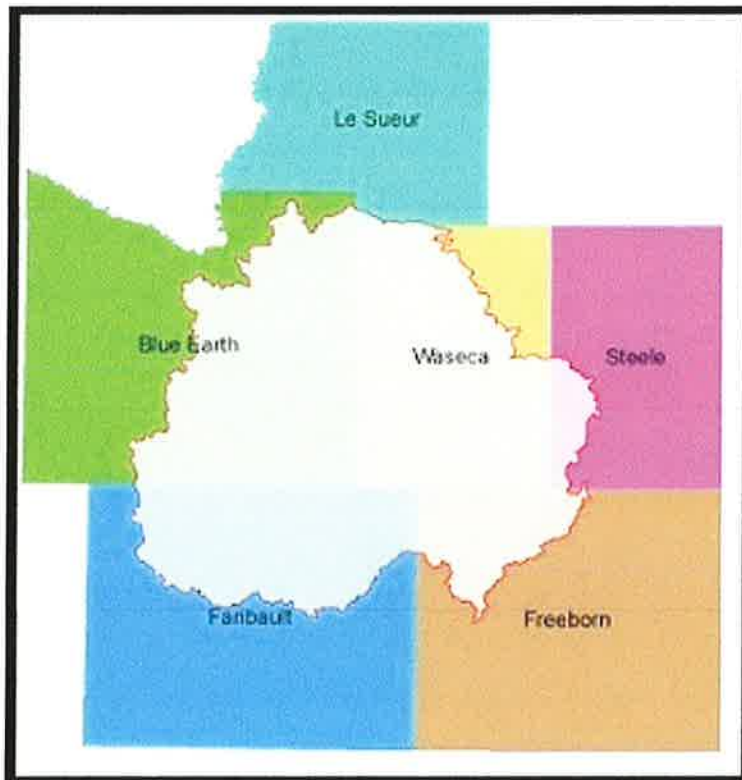
Lake association members tended to emphasize in-lake issues, including increased nuisance growth of aquatic plants and proliferation of invasive aquatic plants and animals.

One or two people talked about the increasing importance of floodplain function and floodplain management.

## WASECA TASK B, SUBTASK 1 - DESCRIBE WATERSHEDS

The Le Sueur River is a tributary of the Blue Earth River, 111 miles long, in southern Minnesota. Via the Blue Earth and Minnesota Rivers, it is part of the watershed of the Mississippi River, draining an area of 1,089 square miles. It is the largest tributary of the Blue Earth River, draining 31% of its watershed.

The Le Sueur River rises in Hartland Township in northwestern Freeborn County and flows initially northwardly, through the southwestern extremity of Steele County into Waseca County, then westwardly in a winding course into Blue Earth County. It flows into the Blue Earth River southwest of Mankato, approximately three miles upstream of the Blue Earth's mouth at the Minnesota River. Its largest tributaries are the Cobb and Maple Rivers, which it collects from the south approximately six and eight miles (10 km/ 13 km) upstream of its mouth, respectively.

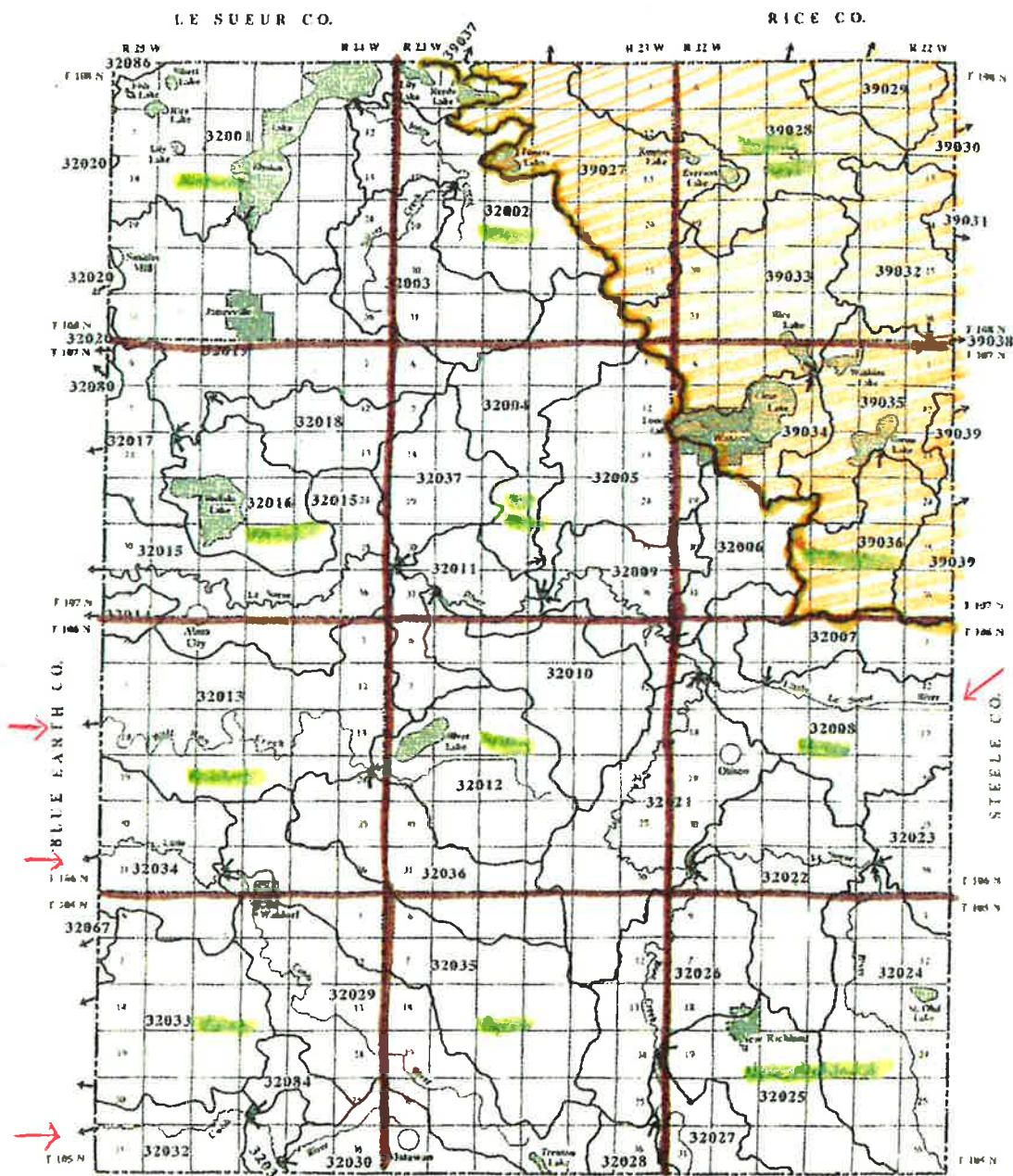


The Le Sueur River flows in most of its course on till plains and on the plain of a former glacial lake, through deeply incised ravines in its lower course. Extensions of the Big Woods, a tract of hardwoods that has since been largely converted to agricultural use,

historically followed the river's riparian corridor southward. According to the Minnesota Pollution Control Agency, approximately 84% of the larger watershed of the Blue Earth River is used for agricultural cultivation, primarily that of corn and soybeans.

The Le Sueur River watershed occupies much of Waseca County, only the northeastern corner of that county draining to the Cannon River. Tributaries in Waseca County include the Little Le Sueur River, Cobb River, Little Cobb River and Bull Run Creek.

## MINOR WATERSHED INDEX MAP



WASECA TASK B, SUBTASK 2&3  
SUMMARY OF LANDOWNER SELECTION AND DISCUSSIONS

### LANDOWNER SELECTION

Based on guidance received from Waseca Soil and Water District Manager Marla Watje, outreach to 107 Waseca County residents was initiated. These consisted of a cross-section of residents that included farmers and other rural landowners, city and county employees, conservation club members, ag business staff, lake association members and others.

An effort was made to include at least some responses from each of these “walks of life” sectors but no attempt was made to control sample sizes within the individual sectors.

Prospective interviewees were almost always contacted by phone and subsequently interviewed. The primary exception to this procedure would be when the individual contacted initially invited neighbors or relatives to participate in the survey.

Organizations were approached with a request to attend a meeting. These included the New Richland Sportsmen’s Club, the Reeds Lake Association, the Waldorf Garden Club, the City of Janesville, the City of New Richland and the Lake Elysian Watershed Association. LEWA representatives suggested that, as an alternative to a meeting, they would like to email other members and invite them to participate. The response rate seemed to be low with the email approach.

The sample was drawn somewhat systematically as opposed to randomly, in an effort to get some responses from across the county. The map below shows the Le Sueur River watershed segment of the Blue Earth river watershed, highlighted in blue and essentially occupying all but the northeast corner of Waseca County and including Elysian and Reeds Lakes; and the Cobb River, .

The land-use affiliation of the respondents would appear to be a logical way of stratifying this survey design, anticipating that the responses of , for example, farmers might be different than the responses of conservation club members based on their opinions regarding land use.

## TASK B, SUBTASK 4 - IDENTIFY PMZs AND CONSERVATION OPPORTUNITIES

Waseca County Soil and Water has made some remarkable on-the-ground progress in forming partnerships among diverse constituencies, including lake associations, conservation clubs and farmers and using the combined resources of government and residents to put water-quality solutions on the ground.

The Reeds Lake watershed is a good example of a success story. As a result of the partnership-forging efforts of District Manager Marla Watje, significant farm runoff has been largely infiltrated by establishment of functional riparian buffers and eroding ravines have been restored and stabilized. Rain gardens have been installed at key locations in the urban segment of the watershed.

The Reeds Lake initiative is having a positive impact on the water quality of Reeds Lake. Perhaps more importantly, however, it creates an atmosphere of cooperation and stewardship and pulls people from different walks of life together in partnership; it serves as a demonstration of success: if we can succeed at Reeds Lake, we can succeed in a larger watershed setting; and it educates people in the most effective way there is, by demonstration and participation.

The positive momentum created by Waseca SWCD at Reeds Lake should be continued, in the form of additional infiltration area, rain garden and ravine stabilization project funds.

A similar argument can be made for St Olaf Lake, where the SWCD has designed and installed innovative infiltration features in cooperation with the City of New Richland, the New Richland Sportsmen's Club, Waseca County and private landowners. The project at St Olaf Park is right at the public access, making it very high-profile and a very effective and popular demonstration of storm water management.

The lakes of Waseca County are popular recreational assets that are visited and valued by a broad cross-section of Waseca County residents. Any restoration projects are going to have immediate public support because of the visible, tangible value of the lakes.

A third area of emphasis is in-stream restoration. The SWCD has installed a number of in-stream restoration features over the years, most recently including the construction of revetments, cross-vanes, j-hooks and bank-side boulders along reaches of the Le Sueur River and its tributaries.

These initiatives have substantial education value for landowners and should be continued, at least at a demonstration level. Specifically, the Mark Byron project should be monitored, enhanced where feasible and continued downstream to the Le Sueur River if funding opportunities arise.

PMZ number 4 is protection and enhancement of floodplain function. Waseca SWCD led the state in obtaining landowner sign-ups for BWSR's 2011 floodplain easement program. Some of these floodplain easement opportunities were nothing short of fabulous in terms of restoration of watershed function. Some included the likelihood of being able to put channelized streams back into their natural, sinuous channel. We should make every effort to obtain funding for the unfunded segment of this group. And we should actively look for more.

## Waseca County Survey Questions/Responses -112

- 1) What changes have you observed in your lifetime in area lakes, rivers, land use and water quality?
- 2) What are the causes?
- 3) Are you Interested in conservation? (include any comments about organization membership, project involvement etc here)
- 4) What would be the best conservation project ideas on your land? "Your land" can include land owned, rented, managed, used for hunting, residence, lakeshore or other interest.
- 5) Would you be interested in doing a conservation project on a 75:25 cost-share basis?
- 6) Do you think that land use affects (target water body: LeSueur River, Lake Elysian etc)?
- 7) What type of conservation projects would benefit the LeSueur River?
- 8) Would you be interested in that type of project on your property? If you have questions about possible projects and would like to be contacted for further information by Waseca SWCD please provide name and phone number or other contact info.