# Chapter One:
# Assessment of Priority Concerns

This Chapter profiles and examines each of Yellow Medicine County's five priority water planning issues:

✓ ***Groundwater Protection***
✓ ***Erosion and Sediment Control***
✓ ***Reducing Priority Pollutants***
✓ ***Managing Flooding***
✓ ***Surface Water and Drainage Management***

## GROUNDWATER PROTECTION PRIORITY ISSUE

### Regional Hydrologic Assessment

Yellow Medicine County was recently included in a Regional Hydrogeologic Assessment (RHA), along with Swift, Chippewa, Lac qui Parle, and parts of Big Stone, Lincoln, Lyon, Redwood, and Renville Counties (reference number RHA-4). A Regional Hydrogeologic Assessment is a formal study of an area's geology and groundwater resources, emphasizing the investigation of shallow geologic, groundwater and pollution sensitivity conditions. RHA's should not be confused with County Geologic Atlases, which investigate the properties and distribution of rocks and unconsolidated earth materials beneath the land surface. A Regional Hydrogeologic Assessment normally covers an area in size of between four to nine counties, while a Geologic Atlas is specific to one county. Each Regional Hydrogeologic Assessment or County Geologic Atlas produces a series of information and products, including the following:

- ✓ County Well Index Database
- ✓ Geology Maps
- ✓ Water Chemistry and Groundwater Maps
- ✓ Pollution Sensitivity Maps
- ✓ Geographic Information System Files
- ✓ Interpretive Reports

The County's RHA was completed in two parts. Part A, Geology, was completed in 1999 on a scale of 1:200,000 by the Minnesota Geological Survey. The contents include information on the County's surficial geology (Plate 1) and quaternary stratigraphy (Plate 2). Part B, Hydrology, was completed in 2000 at a scale of 1:200,000 by the Minnesota Department of Natural Resources, Division of Waters. The contents include information on the County's surficial hydrogeology (Plate 3) and geologic sensitivity to pollution near

surface groundwater (Plate 4). Appendix B contains copies of Plates 1, 3 and 4 that were cropped to show Yellow Medicine County's results.

**Regional Hydrogeologic Assessment Plate 4:**
**Geologic Sensitivity to Pollution Near Surface Groundwater**
*As described at*
*http://www.dnr.state.mn.us/waters/groundwater_section/mapping/sensitivity.html*

The Minnesota Department of Natural Resources (DNR) defines a sensitive area as a geographic area characterized by natural features where there is significant risk of ground-water degradation from activities conducted at or near the land surface (MS § 103H.101). The DNR has developed criteria and guidelines to assess sensitive areas to encourage a consistent approach to assessing geologic sensitivity in Minnesota (Geologic Sensitivity Workgroup, 1991). Assessments are based on the geologic and hydrogeologic factors that affect the ability of geologic materials to restrict the downward migration of contaminants to the ground water of interest. This approach is called geologic sensitivity.

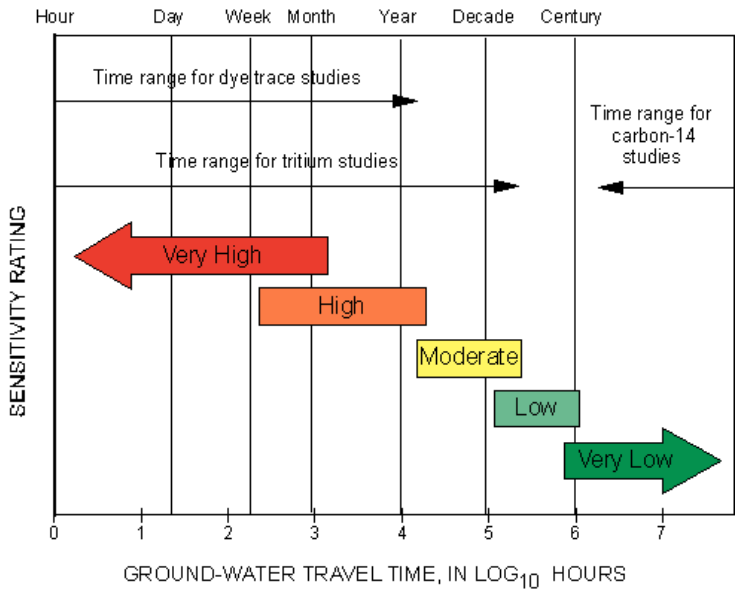
Groundwater sensitivity to pollution is best understood in relation to travel time, which is the approximate time that elapses from when a drop of water infiltrates the land surface until it enters an aquifer or reaches a specific target such as a spring. This is also often called residence time. Several techniques can be used to estimate the travel time of groundwater in an aquifer, including use of dye traces, radioactive and stable isotopes, and chlorofluorocarbons. Radiometric dating using radioactive isotopes of carbon (carbon-14) and hydrogen (tritium) are commonly used to estimate ground-water residence time (Alexander and Alexander, 1989). Estimated or measured travel times are inversely related to sensitivity: shorter travel times may indicate higher sensitivity and longer travel times may indicate lower sensitivity.

DNR Waters has defined five relative classes of geologic sensitivity (Very High, High, Medium, Low, and Very Low) that are based on overlapping time of travel ranges (see Figure 1). The pollution sensitivity of an aquifer is assumed to be inversely proportional to the time of travel. In addition, contaminants are assumed to travel at the same rate as water. 'Very High' sensitivity indicates that water moving downward from the surface may reach the ground-water system within hours to months. In these areas, there is little time to respond to and prevent aquifer contamination. Conversely, 'Low' sensitivity indicates there is time for a surface contamination source to be investigated, and possibly corrected, before serious groundwater pollution develops.

Relatively high sensitivity does not mean that water quality has been or will be degraded. If there are no contaminant sources, for example, pollution will not occur. Also, relatively low sensitivity does not guarantee that groundwater is or will remain uncontaminated. For instance, leakage from an abandoned well may bypass the natural protection of geologic materials, allowing contaminated water from one aquifer to directly enter another aquifer. The DNR Waters Criteria and Guidelines Report describes the process for preparing maps that show areas of relative sensitivity representing known or estimated subsurface

conditions. The maps are intended for use as screening tools and guides to indicate where additional information might be desirable to support land use or resource protection decisions. The Criteria and Guidelines Report discusses three types or "levels" of geologic sensitivity maps: Level 1 assessment - preliminary; Level 2 assessment - vadose zone materials; and Level 3 assessment - deeper aquifers. The three levels of pollution sensitivity assessment provide procedures to assess the geologic sensitivity of the water table as well as deeper aquifers. Selection of an assessment level depends on the groundwater of interest and the available information to conduct an assessment.

**Figure 1:**
**Groundwater Sensitivity**




**Time of Travel Criteria**

Geologic sensitivity ratings are based on the time required for water at or near the surface to travel vertically to the water table or other ground water of interest. Longer travel times imply a lower sensitivity to pollution. Dye trace, tritium, and carbon-14 studies can indicate the relative ages of ground water.

The Regional Hydrogeologic Assessment is an excellent source of information, however, local decision-makers and County staff need to have a better understanding of how to use it. The County's long-term goal is to actually use the RHA in the decision-making process. For example, it could be used to help locate a proposed water-intensive industry in an area of the County with suitable groundwater concentrations. In response to this issue, the

County has created an Action Step in Chapter Two to learn how to interpret and use the RHA and other water-based information in the decision-making process (with State agency participation). For more information on Yellow Medicine County's Regional Hydrogeologic Assessment, contact the Minnesota Geological Survey or the Department of Natural Resources at the following location:

***Geology and Atlas Use***
Minnesota Geological Survey
2642 University Avenue
St. Paul, MN 55114-1057
(612) 627-4780 or http://www.geo.umn.edu/mgs
Groundwater and Pollution Sensitivity
DNR Waters
500 Lafayette Road
St. Paul, MN 55155-4032
MN Toll Free 1-888-646-6367
http://www.dnr.state.mn.us

**or visit the following website:**

http://www.dnr.state.mn.us/waters/programs/gw_section/mapping/platesum/umrbrha.html

**County Well Index**

The County Well Index (CWI) data base represents the most complete listing of wells known in the State of Minnesota. A GIS database (referred to as "WWPTCALC") was created in order to provide a tool to map well attribute information (such as stratigraphy, groundwater levels, water chemistry, and water use), which are collected by the Minnesota Geologic Survey and other agencies. Specifically, this coverage contains wells which have not been field-verified and for which a location was calculated, based on the Public Land Survey coordinates reported by the driller on the water well driller log submitted to the Minnesota Department of Health. The current WWPTCALC point cover was created from the CWI file obtained from MGS December 28.1998. At that time, approximately 167,000 records did not have field-verified locations; of these, 157,147 had viable locations (i.e., locations which represented valid combinations of township, range, and section values for Minnesota.)

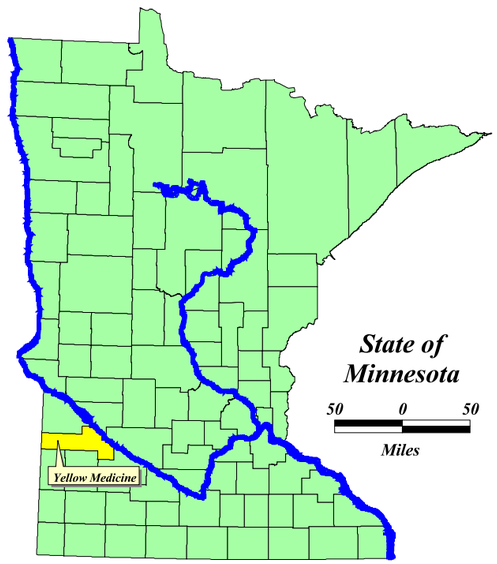
The associated Index file contains information on well use, well depth, ownership, address, and geology from County Well Index. The information in County Well Index was entered by the Minnesota Geological Survey from the Water Well Driller Log form, which was submitted by the well driller to the Minnesota Department of Health at the time the well was constructed. Submission of a Water Well Driller Log is a requirement of the Minnesota Water Well Construction Code, passed by the State Legislature in 1974. While the County Well Index does not represent all wells in the State, it is the single most complete listing of wells.

# Yellow Medicine County

## County Well Index & Potential Pollution Sources

N
W MCP E
S
Midwest Community Planning, LLC

Minnesota River
Granite Falls
MN River Watershed
Clarkfield
Hazel Run
Lac Qui Parle River Watershed
Canby
St. Leo
Yellow Medicine Watershed
Porter
Hanley Falls
MN River Watershed
Echo
Wood Lake
Redwood River Watershed
59
67
75
68
23
274




### Well Index Legend

- Septic Tank / Drian Field
- Barnyard
- Body of Water
- Tanks
- "Other Potential Pollution Source
- Well with Unidentifed Potential Pollution Source

Cities

Townships

Minnesota River

Major Watershed

Major Road

5 0 5 Miles

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The Well Index contain a number of key attributes, from well depth to potential contaminant sources nearby (with estimated distances). By using the 1998 GIS database, Map 2 was created. This map represents the County's wells that had a potential pollutant reported nearby. The margin of error, however, is quite substantial. This is due to "reporter error" from estimating distances and from failure to report a potential contaminant. As a result, Map 2 should only be used for a general discussion on addressing potential well contaminants.

Most of the potential contaminants found in Map 2 were from Septic Tanks / Drain Fields (132 red dots on the Map) and from being close to Barnyards (42 green dots). The other categories found in Yellow Medicine County were Bodies of Water (4 blue dots), tank locations (3 purple dots) and a miscellaneous "other category (4 orange dots). The other grey dots represent the remaining 185 wells that did not have a potential pollutant reported nearby (again, this does not mean that a well should be considered "safe" from the various potential pollutants).

## SOURCE WATER PROTECTION

***As described at: http://www.health.state.mn.us/divs/eh/water/swp/ and http://www.mrwa.com/WHPforMN.htm***

The purpose of Source Water Protection is to help prevent contaminants from entering public drinking water sources. There are three primary parts to Minnesota's Source Water Protection Program:

- **Wellhead Protection**
- **Source Water Assessments**
- **Protection of Surface Water Intakes**


**Wellhead Protection**

Wellhead protection is a means of safeguarding public water supply wells by preventing contaminants from entering the area that contributes water to the well or wellfield over a period of time. The wellhead protection area is determined by using geologic and hydrologic criteria, such as the physical characteristics of the aquifer and the effects which pumping has on the rate and direction of groundwater movement. A management plan is developed for the wellhead protection area that includes inventorying potential sources of groundwater contamination, monitoring for the presence of specific contaminants, and managing existing and proposed land and water uses that pose a threat to groundwater quality.

A public water supply well provides piped drinking water for human use to 15 or more service connections or to 25 or more persons for at least 60 days a year. A public water supply well is further defined as either a community or noncommunity water supply well. A community water supply well serves 15 or more service connections used by year-round

residents or at least 25 year-round residents. Examples include municipalities, subdivisions, and nursing homes. Noncommunity water supply wells are divided into the following two groups:

- A ***nontransient noncommunity*** supply well serves at least 25 of the same people over six months of the year (examples include schools, factories, and hospitals).

- A ***transient noncommunity*** supply well serves all other public water systems (examples include restaurants, gas stations, and churches).

The Minnesota Groundwater Protection Act of 1989 grants the commissioner of health authority to develop wellhead protection measures for wells serving public water supplies. Also, the 1986 Amendments to the federal Safe Drinking Water Act require states to implement wellhead protection programs for public water wells. The Minnesota Department of Health (MDH) is the lead agency for administering Minnesota's wellhead protection program. However, wellhead protection will be effective only through the cooperation of state and local governments, public water suppliers, contaminant source owners, and general public.

The long-term goal is to implement wellhead protection measures for all public water supply wells. However, the large number of public water supply wells (13,000), the diversity of geologic conditions in Minnesota, and current resource constraints require that wellhead protection be implemented in phases. MDH began implementing wellhead protection measures in 1998 for new municipal community wells. Other existing community wells and other types of public water supply wells will be phased in as time and resources are available.

Owners of community and nontransient noncommunity wells, when notified by MDH or a new well is added to a municipal water supply system, must develop a wellhead protection plan which includes:

1. A map of the wellhead protection area,
2. A vulnerability assessment of the well and the wellhead protection area,
3. An inventory of potential sources of contamination within the wellhead protection area,
4. A plan to manage and monitor existing or proposed potential source(s) of contamination, and
5. A water supply contingency strategy.

As of June, 1996, 26 community water supplies in Minnesota spent over $44 million to provide safe and adequate drinking water to their consumers following groundwater contamination of their wells. For communities where the population served is less than 1,000 people, the average cost per capita was $1,336. For larger communities (i.e., greater than 1,000), the average cost per capita was $336.

## Source Water Assessments

Source Water Assessments are reports that provide a concise description of the water source - such as a well, lake, or river - used by a public water system and discuss how susceptible that source may be to contamination. The 1996 amendments to the federal Safe Drinking Water Act require states to produce source water assessments for all their public water systems and to make the results of those assessments available to the public. MDH has recently completed assessments for the over 7,000 public water systems in the state. The types of facilities for which assessments have been completed range from small businesses on their own well to large city water systems using several different water sources. Assessments are now available to the public on MDH's source water assessment web page (see the website listed below). You can search for an assessment either by name of the facility or by county. Table 1 recreates the search results for Yellow Medicine County.

***http://www.health.state.mn.us/divs/eh/water/swp/swa/index.htm***

**Table 1:**
**Yellow Medicine County's Public Water Suppliers**
*(visit http://156.98.150.16/swa/pdwmain.cfm)*

| Public Water Supplier | ID | City | County |
|---|---|---|---|
| Bergen Lutheran Church | 5870016 | Granite Falls | Yellow Medicine |
| Canby | 1870001 | Canby | Yellow Medicine |
| Canby Golf Club | 5870031 | Canby | Yellow Medicine |
| Clarkfield | 1870002 | Clarkfield | Yellow Medicine |
| Echo | 1870003 | Echo | Yellow Medicine |
| Goodfellows | 5870052 | Montevideo | Yellow Medicine |
| Granite Falls | 1870004 | Granite Falls | Yellow Medicine |
| Granite Falls Golf Club | 5870049 | Granite Falls | Yellow Medicine |
| Hanley Falls | 1870005 | Hanley Falls | Yellow Medicine |
| Hazel Run | 1870011 | Hazel Run | Yellow Medicine |
| J.B. Yates | 5870050 | Granite Falls | Yellow Medicine |
| Porter | 1870006 | Porter | Yellow Medicine |
| Saint Leo | 1870007 | St. Leo | Yellow Medicine |
| St. Lucas Lutheran Church | 5870029 | Cottonwood | Yellow Medicine |
| Upper Sioux Agency State Park | 5870046 | Granite Falls | Yellow Medicine |
| Wood Lake | 1870008 | Wood Lake | Yellow Medicine |

| | |
|---|---|
| **Number of PWS selected** | **16** |

A brief overview of each source water assessment is provided for the public water suppliers found in Table 1. ***Please note that not all of the tables are complete!*** The Minnesota Department of Health will be completing the tables as information is obtained on each well. The following definitions apply to the tables presented:

**Unique Well Number** – a unique reference number assigned to each well.

**Well ID# –** some public water suppliers have more than one well location. As a result, each well has an identification number.

**Depth** – refers to the depth of the well.

**Well Use –** describes if the well is used as the public water's primary source of water.

**Aquifer** – describes the geologic formation of the aquifer (if known).

**Aquifer Sensitivity** – Aquifer sensitivity refers to the degree of geological protection afforded the aquifer(s) used by the public water supply.

**Well Sensitivity** - Well sensitivity refers to the integrity of the well due to its construction and maintenance. It is based on the results of the well construction assessment. It can be one of the following:

(1). The well is susceptible to contamination because it does not meet current construction standards or no information about well construction is available, regardless of aquifer sensitivity.

(2). The well is not susceptible because it meets well construction standards and does not present a pathway for contamination to readily enter the water supply.

**SWPA - Source Water Protection Area**

Indicates whether a Source Water Protection Area has been designated for the well (the table will report either a 'yes' or 'no').

***Public Water Supplier: Bergen Lutheran Church***

| Unique Well No | Well ID | Depth | Well Use | Aquifer | Aquifer Sensitivity | *Well Sensitivity | SWPA |
|---|---|---|---|---|---|---|---|
| 00262209 | Well #1 | 36.0 | Primary | | High | See (1) | No |

Aquifer sensitivity is considered high because either insufficient geologic information is available or existing information indicates the presence of vulnerable geologic conditions.

| Source Description | Count |
|---|---|
| Building (Means a structure that does not contain any actual or potential contaminant sources.) | 1 |
| Electric transmission line | 1 |
| Grave | 1 |
| Septic tank | 1 |

None of the contaminants regulated under the federal Safe Drinking Water Act for this type public water system have been detected in the source water during required monitoring. A list of regulated contaminants can be found at http://www.epa.gov/safewater.

***Public Water Supplier: Canby***

| Unique Well No | Well ID | Depth | Well Use | Aquifer | Aquifer Sensitivity | *Well Sensitivity | SWPA |
|---|---|---|---|---|---|---|---|
| 00241450 | Well #7 | 170.0 | Primary | Glacial Deposits | High | See (2) | No |
| 00115503 | Well #8 | 154.0 | Primary | Glacial Deposits | Low | See (2) | No |

**Aquifer Sensitivity** –

***High*** - The glacial aquifer is considered to exhibit a high sensitivity to contamination because of the local geological setting.

***Low*** - The glacial aquifer is covered by one or more layers of fine-grained material that probably protect it from potential sources of contamination.

**Source Water Susceptibility** - Source water susceptibility refers to the likelihood that a contaminant will reach the source of drinking water. It reflects the results of assessing well sensitivity, aquifer sensitivity, and water quality data.

***Well 7 (high)*** is considered to exhibit a high susceptibility to contamination because of the local geological setting.

***Well 8 (high)*** is considered to be susceptible because of the tritium content of the well water in glacial deposits.

One or more contaminants regulated under the federal Safe Drinking Water Act for this public water supply system have been detected in the source water. However, the water supplied to users meets state and federal drinking water standards for potability.

### *Public Water Supplier: Canby Golf Club*

| Unique Well No | Well ID | Depth | Well Use | Aquifer | Aquifer Sensitivity | *Well Sensitivity | SWPA |
|---|---|---|---|---|---|---|---|
| 00266327 | Well #1 | | Primary | | High | See (1) | No |

Aquifer sensitivity is considered high because either insufficient geologic information is available or existing information indicates the presence of vulnerable geologic conditions. Source water susceptibility is considered high because insufficient information is available to determine the degree of geological protection that is afforded the source of drinking water. An inventory of potential contamination sources within 200 feet of the well(s) has not been completed. The source water may be susceptible to sources of nitrate, nitrogen and disease organisms such as septic systems, sewer pipes, and sewage holding tanks, among other sources such as fuel tanks, improperly sealed wells, over application of fertilizer, and runoff from surrounding properties.

### *Public Water Supplier: Clarkfield*

| Unique Well No | Well ID | Depth | Well Use | Aquifer | Aquifer Sensitivity | *Well Sensitivity | SWPA |
|---|---|---|---|---|---|---|---|
| 00102076 | Well #5 | 139.0 | Primary | Glacial Deposits | Low | See (2) | No |
| 00148797 | Well #6 | 130.0 | Primary | Glacial Deposits | Low | See (2) | No |

The glacial aquifer is covered by one or more layers of fine-grained material that probably protect it from potential sources of contamination. None of the contaminants regulated under the federal Safe Drinking Water Act for this public water supply system have been detected in the source water.

### *Public Water Supplier: Echo*

There is not much information in the Echo source water assessment. It does report that the source water susceptibility is considered high because insufficient information is available to determine the degree of geological protection that is afforded the source of drinking water. However, none of the contaminants regulated under the federal Safe Drinking Water Act for this public water supply system have been detected in the source water.

### *Public Water Supplier: Goodfellows*

| Unique Well No | Well ID | Depth | Well Use | Aquifer | Aquifer Sensitivity | *Well Sensitivity | SWPA |
|---|---|---|---|---|---|---|---|
| 00611223 | Well #2 | 510.0 | Primary | Bedrock | Low | See (2) | No |

The bedrock aquifer is covered by one or more layers of fine-grained material that probably protect it from potential sources of contamination. None of the contaminants regulated under the federal Safe Drinking Water Act for this type public water system have been detected in the source water during required monitoring.

### *Public Water Supplier: Granite Falls*

| Unique Well No | Well ID | Depth | Well Use | Aquifer | Aquifer Sensitivity | *Well Sensitivity | SWPA |
|---|---|---|---|---|---|---|---|
| 00403980 | Well #1 | 166.0 | Primary | Glacial Deposits | Low | See (2) | No |
| 00668467 | Well #2 | 168.0 | Primary | Glacial Deposits | Low | See (2) | No |

The source of drinking water is covered by one or more layers of fine-grained material that probably protect it from potential sources of contamination. In addition, none of the contaminants regulated under the federal Safe Drinking Water Act for this type public water system have been detected in the source water during required monitoring.

### *Public Water Supplier: Granite Falls Golf Club*

| Well No | Well ID | Depth | Well Use | Aquifer | Aquifer Sensitivity | *Well Sensitivity | SWPA |
|---|---|---|---|---|---|---|---|
| 00651869 | Well #2 | 499.0 | Primary | Bedrock | Medium | See (2) | No |

The lateral extent of fine-grained materials between the land surface and the source of drinking water does not appear to be persistent throughout the source water protection area. An inventory of potential contamination sources within 200 feet of the well(s) has not been completed. The source water may be susceptible to sources of nitrate, nitrogen and disease organisms such as septic systems, sewer pipes, and sewage holding tanks. Other sources such as fuel tanks, improperly sealed wells, over application of fertilizer, and runoff from surrounding properties may be of concern to water quality. None of the contaminants regulated under the federal Safe Drinking Water Act for this type public water system, however, have been detected in the source water during required monitoring.

### *Public Water Supplier: Hanley Falls*

| Unique Well No | Well ID | Depth | Well Use | Aquifer | Aquifer Sensitivity | *Well Sensitivity | SWPA |
|---|---|---|---|---|---|---|---|
| 00209067 | Well #2 | 286.0 | Primary | Bedrock | Low | See (2) | No |
| 00545003 | Well #1 | 260.0 | Primary | Bedrock | Low | See (2) | No |

The source of drinking water is covered by one or more layers of fine-grained material that probably protect it from potential sources of contamination. Past results indicate that at least one entry point from this community public water system will exceed the Arsenic Maximum Contaminant Level (MCL) of 10 ug/L. Arsenic is a naturally occurring contaminant that is found in west-central and northwestern Minnesota.

### *Public Water Supplier: Hazel Run*

There is not much information in the Hazel Run source water assessment. It does report that the source water susceptibility is considered high because insufficient information is available to determine the degree of geological protection that is afforded the source of drinking water. However, none of the contaminants regulated under the federal Safe Drinking Water Act for this public water supply system have been detected in the source water.

### *Public Water Supplier: J.B. Yates*

| Unique Well No | Well ID | Depth | Well Use | Aquifer | Aquifer Sensitivity | *Well Sensitivity | SWPA |
|---|---|---|---|---|---|---|---|
| 00183776 | Well #1 | 472.0 | Primary | Bedrock | Low | See (2) | No |

The source of drinking water is covered by one or more layers of fine-grained material that probably protect it from potential sources of contamination. In addition, none of the contaminants regulated under the federal Safe Drinking Water Act for this type public water system have been detected in the source water during required monitoring.

***Public Water Suppliers: Porter and St. Leo***
***(In the Lincoln-Pipestone Rural Water System)***

| Unique Well No | Well ID | Depth | Well Use | Aquifer | Aquifer Sensitivity | *Well Sensitivity | SWPA |
|---|---|---|---|---|---|---|---|
| 00149160 | Well #V1 | 62.0 | Primary | Glacial Deposits | Low | See (2) | Yes |
| 00149161 | Well #V2 | 58.0 | Primary | Glacial Deposits | Low | See (2) | Yes |
| 00149163 | Well #V3 | 67.0 | Primary | Glacial Deposits | Low | See (2) | Yes |
| 00149162 | Well #V4 | 60.0 | Primary | Glacial Deposits | Low | See (2) | Yes |
| 00149182 | Well #V5 | 69.0 | Primary | Glacial Deposits | Low | See (2) | Yes |
| 00505550 | Well #H1 | 43.0 | Primary | Glacial Deposits | High | See (2) | Yes |
| 00505508 | Well #H2 | 37.0 | Primary | Glacial Deposits | High | See (2) | Yes |
| 00505507 | Well #H3 | 55.0 | Primary | Glacial Deposits | High | See (2) | Yes |
| 00505510 | Well #H4 | 39.0 | Primary | Glacial Deposits | High | See (2) | Yes |
| 00505511 | Well #H5 | 32.0 | Primary | Glacial Deposits | High | See (2) | Yes |
| 00440325 | Well #B1 | 176.0 | Primary | Glacial Deposits | Low | See (2) | No |
| 00527475 | Well #B2 | 223.0 | Primary | Glacial Deposits | Low | See (2) | No |
| 00527476 | Well #B3 | 203.0 | Primary | Glacial Deposits | Low | See (2) | No |
| 00550052 | Well #B4 | 453.0 | Primary | Glacial Deposits | Low | See (2) | No |
| 00607161 | Well #H6 | 70.0 | Primary | Glacial Deposits | High | See (2) | No |
| 00637715 | Well #B5 | 294.0 | Primary | Glacial Deposits | Low | See (2) | No |
| 00637716 | Well #B6 | 323.0 | Primary | Glacial Deposits | Low | See (2) | No |
| 00634546 | Well #B7 | 448.0 | Primary | Glacial Deposits | Low | See (2) | No |
| 00613137 | Well #H7 | 82.0 | Primary | Glacial Deposits | High | See (2) | Yes |
| 00613136 | Well #H8 | 72.0 | Primary | Glacial Deposits | High | See (2) | Yes |

The water supply for Lincoln-Pipestone Rural Water System is obtained from 20 primary wells (see the text box on the next page). The water supply system is implementing the wellhead protection plan that has been approved by the Minnesota Department of Health under Minnesota Rules 4720. One or more contaminants regulated under the federal Safe

Drinking Water Act for this public water supply system have been detected in the source water. However, the water supplied to users meets state and federal drinking water standards for potability.

### *Public Water Supplier: St. Lucas Lutheran Church*

| Well No | Well ID | Depth | Well Use | Aquifer | Aquifer Sensitivity | *Well Sensitivity | SWPA |
|---|---|---|---|---|---|---|---|
| 00262211 | Well #1 | 90.0 | Primary | | | See (1) | No |

Source water susceptibility is considered high because insufficient information is available to determine the degree of geological protection that is afforded the source of drinking water. The following statement summarizes the types of potential contamination sources present in the inner wellhead management zone and the potential drinking water contaminants related to them:

| Source Description | Count |
|---|---|
| Building (Means a structure that does not contain any actual or potential contaminant sources.) | 1 |
| Electric transmission line | 1 |
| Grave | 1 |
| LP Tank | 1 |

None of the contaminants regulated under the federal Safe Drinking Water Act for this type public water system have been detected in the source water during required monitoring.

### *Public Water Supplier: Upper Sioux Agency State Park*

| Unique Well No | Well ID | Depth | Well Use | Aquifer | Aquifer Sensitivity | *Well Sensitivity | SWPA |
|---|---|---|---|---|---|---|---|
| 00258021 | Well #1 Main Well | 285.0 | Primary | Bedrock | Low | See (1) | No |
| 00258023 | Well #2 Shop | 265.0 | Primary | Bedrock | Low | See (1) | No |
| 00564689 | Well #3 Horse Riders Campground | 73.0 | Seasonal | Bedrock | Low | See (2) | No |
| 00572654 | Well #4 Yellow Medicine Campground | 81.0 | Seasonal | Glacial Deposits | Low | See (2) | No |

The aquifers are covered by one or more layers of fine-grained material that probably protect it from potential sources of contamination. The following statement summarizes the

types of potential contamination sources present in the inner wellhead management zone and the potential drinking water contaminants related to them:

| Source Description | Count |
|---|---|
| Building (Means a structure that does not contain any actual or potential contaminant sources.) | 3 |
| Drainfield - above or below grade | 1 |
| Electric transmission line | 2 |
| Pit | 1 |
| Privy | 1 |
| Petroleum storage tank, above ground, less than 1100 gallons | 1 |
| Septic tank | 2 |

None of the contaminants regulated under the federal Safe Drinking Water Act for this type public water system have been detected in the source water during required monitoring.

***Public Water Supplier: Wood Lake***

| Unique Well No | Well ID | Depth | Well Use | Aquifer | Aquifer Sensitivity | *Well Sensitivity | SWPA |
|---|---|---|---|---|---|---|---|
| 00240111 | Well #2 | 215.0 | Primary | Glacial Deposits | Low | See (2) | No |

The source of drinking water is covered by one or more layers of fine-grained material that probably protect it from potential sources of contamination. None of the contaminants regulated under the federal Safe Drinking Water Act for this public water supply system have been detected in the source water.

**Protection of Surface Water Intakes**

The third main component to Minnesota's Source Water Protection Plan is to develop protection plans for surface water intakes. Although not required, many of Minnesota's 24 community water supply systems that use surface water have expressed interest in developing protection plans. The Minnesota Department of Health is convening a work group to help determine how these plans should be prepared and who should approve them. There is great potential to incorporate protection plans with watershed management plans or river basin plans.

**Abandoned Wells** (visit http://www.health.state.mn.us/divs/eh/wells/abandwel.html)

A well that is not in use - or sometimes referred to an "abandoned" well - can be a potential threat to health, safety, and the environment. Wells that are no longer used may be buried or forgotten. Often they have not been sealed properly. Sealing is the process of clearing an unused well of debris and filling the well with a special material called grout. The sealing must be done by a licensed contractor.

Unused wells that have not been properly sealed can be a source of groundwater contamination, potentially affecting nearby drinking water wells. They may threaten the quality of the water in city water wells, your neighbor's well, or even your own well. Groundwater is the main source of drinking water for three out of every four Minnesotans. Protecting groundwater is everybody's business.

As a well ages, the casing may rust, joints may leak, the pump may become stuck in the well, or the well may fill with debris. If the well is covered with loose boards or concrete, the cover may eventually decay or break open. Surface water runoff, debris, and other contaminants can then enter the well. A well may be taken out of service for a variety of reasons. It may no longer provide enough water. It may not have been repaired when it needed to be. It may have become contaminated. A well may be "lost" or abandoned when property changes hands, or when use of the land changes from agricultural to industrial or residential. Old, unused wells are easily forgotten.

Groundwater is found in underground geologic formations called aquifers. Ordinarily the layers of rock and soil that lie between an aquifer and the surface, or between aquifers, act as a natural barrier against the spread of contamination. However, an unused, unsealed well can provide an open channel between the surface and an aquifer - or between a shallow aquifer and a deeper aquifer. An unused well can act as a drain - allowing surface water runoff, contaminated water, or improperly disposed waste to reach an uncontaminated aquifer.

If unsealed large-diameter wells are not covered or otherwise protected, the open well hole can be a safety hazard, especially for children and animals. By law, a well must be in use, be under a maintenance permit, or be sealed by a licensed contractor. A well must be sealed if:

1. the well is not in use,
2. the well is contaminated,
3. the well has been improperly sealed in the past,
4. the well threatens the quality of the groundwater, or
5. the well otherwise poses a threat to health or safety.

If you have an unused well - and wish to keep the well for future use - you must apply for a special "maintenance permit" from the Minnesota Department of Health (MDH). The permit requires an annual fee, and is only issued if the well meets minimum sanitary requirements.

Yellow Medicine County established a well sealing program during the early 1990s as a result of its first water plan. Through this program, the County's has sealed 541 wells and cost share of $105,763 has been distributed.

**For further information about source water protection, please contact:**

Wellhead Protection Program - (651) 215-0800
**Minnesota Department of Health**
Source Water Protection Unit
Drinking Water Protection Section
PO Box 64975 - St. Paul, Minnesota 55164-0975

**The Lincoln Pipestone Rural Water System**
(As described at http://www.lprw.com/)

The Lincoln Pipestone Rural Water System (LPRW) was established in 1979 pursuant to Minnesota Statute 116A through a joint powers agreement pursuant to Minnesota Statute 471.59 and under the jurisdiction of the Fifth Judicial District. The MISSION of LPRW is

> *"To enhance the quality of life for the people in the southwest Minnesota area by acquiring and providing reliable, high quality, affordable water in an environmentally responsible manner through a publicly-owned system."*

LPRW provides service in Lac qui Parle, Lincoln, Lyon, Murray, Nobles, Pipestone, Redwood, Rock and Yellow Medicine Counties. LPRW's customer base, as of December, 2002, consists of: a) 2,820 rural customers using less than one million gallons per year per customer; b) 146 rural customers using more than one million gallons per year per customer; c) 20 incorporated cities; d) 4 unincorporated community water systems; and e) supplemental water supplied to Red Rock Rural Water and Marshall Municipal Utilities.

***Water Production and Use:*** Water is produced from well fields near Burr, Verdi and Holland with a small reserve source at Edgerton. In 2002 an average of 3,736,000 gallons per day were produced across the system. This water served 2,992 customers and an estimated population of 16,200. At the Burr well field and treatment plant, average daily production was 1,265,000 gallons provided to 797 customers and an estimated population of 4,500. New water resources are being developed, and a major expansion is underway in the Burr Service Area. At the Verdi well field average daily production was 1,118,000 gallons provided to 1,134 customers and an estimated population of 7,670. The Verdi well field is the original LPRW water source, and water quality remains high enough so that treatment is not required. At the Holland well field and treatment plant, average daily production was 1,354,000 gallons provided to 1,061 customers and an estimated population of 4,050. The Holland treatment plant and well field has been upgraded recently, but distribution improvements are still needed to meet current demand. Longer-term improvements such as the Lewis and Clark Rural Water System are needed to meet the needs for expanded service

in this service area. Protection and improvement of our water supplies is an on-going process, and a top LPRW priority. LPRW is working with water systems in southwest Minnesota and neighboring states to develop the water resources we need now and in the future. For more information on Lincoln-Pipestone Rural Water, contact the following:

Lake Benton, Minnesota 56149-0188
East Highway 14, Box 188
Phone: (507) 368-4248
Fax: (507) 368-4573
http://www.lprw.com/

## Groundwater Protection
## Profile and Assessment Summary

The ***Regional Hydrologic Assessment*** provides a vast amount of geologic and water-related information that should be used to help guide day-to-day land use planning. The problem, however, is interpreting the right information so that is can be used. According to Plate 4, the groundwater pollution sensitivity levels near Canby are very high and also are major concerns near the Cities of Hanley Falls, Granite Falls and Wood Lake. The County's Water Plan Committee recognizes the potential of using the regional assessment and, as a result, created an action step geared towards learning how to use the resource.

The ***County Well Index*** revealed that it has potential in being a valuable asset once the database becomes more complete. Map 2 reveals that many individual wells are located next to potential contamination sources. The type of database could be expanded to eventually include information on site visits designed to inspect the safety of each well. The index could also be used as a means to customize future programs aimed at addressing private well protection.

The larger category of ***Source Water Protection*** is one of the Minnesota Department of Health's main responsibilities. According to the efforts described on their website, ***Wellhead Protection Plans*** will eventually be designed for all ***Public Water Suppliers***. In the interim, the information presented in this section (along with the corresponding website) may help in prioritizing wellhead protection on a local level. The Water Plan Committee recognizes the importance of Wellhead Protection and has committed to a number of action steps found in Chapter Two. These efforts include participating on source water protection planning teams, prioritizing Wellhead Protection Areas for cost-share and other land use incentive programs, and providing a variety of education on both wellhead protection areas and private well protection areas.

The other major part of the County's groundwater protection issue continues to be stressing the importance of properly sealing ***Abandoned Wells***. This includes both an education component along with providing cost-share money to seal up to 20 wells annually.

## EROSION AND SEDIMENT CONTROL PRIORITY ISSUE

### Yellow Medicine County's Soils

The Soil Survey Geographic (SSURGO) database for Yellow Medicine County was developed by soil scientists as part of the National Cooperative Soil Survey. SSURGO depicts information about the kinds and distribution of soils on the landscape. This data set consists of georeferenced digital map data and computerized attribute data. The map data are in a soil survey area extent format and include a detailed, field verified inventory of soils and miscellaneous areas that normally occur in a repeatable pattern on the landscape and that can be cartographically shown at the scale mapped. This layer displays the location of features too small to delineate at the mapping scale, but they are large enough and contrasting enough to significantly influence use and management. The soil map units are linked to attributes in the National Soil Information System relational database, which gives the proportionate extent of the component soils and their properties.

Soils in Yellow Medicine County are generally clay and sand with rock a major characteristic in the northeast portion along the Minnesota River and above Granite Falls. The following is a brief description of the ten general soil associations occurring within the County:

**Barnes-Buse-Flom -** The Barnes soils are well drained. They are mainly undulating but are steeper near the Buse Soils. The Buse soils are well drained, calcareous, and mainly rolling to very steep. They are closely intermingled with Barnes soils, except in steeper areas. The Flom soils are nearly level and poorly drained. They are in shallow drainage ways on wet flat areas.

**Forman-Flom-Aastad -** The Forman soils are on the convex parts of the Coteau slope and are adjacent to the steep side slopes along drainage ways. They are well drained and are mainly undulating, but are steeper near the Buse soils. The Flom soils are in the shallow drainage ways. They are nearly level and poorly drained. The Aastad soils formed in plane and slightly convex parts of the Coteau slope. They are nearly level and moderately well drained.

**Ves-Canisteo -** The Ves soils are well drained and are on convex knolls that rise 4 to 10 feet above the floor of the till plain. The Canisteo soils are poorly drained and calcareous. They are in float areas and on rims of depressions.

**Ves-Canisteo-Spicer -** The Ves soils are well drained and are on convex knolls. The Canisteo soils are poorly drained and calcareous. They formed in a 20 to 40 inch thick mantle of silty lake-deposited sediment that overlies the loam glacial till. The Spicer soils are poorly drained and calcareous. They formed in a mantle of silty, lake-deposited sediment about 40 to 80 inches thick.

**Doland-Spicer -** The Doland soils are on the smooth side slopes and are well drained. The surface soil is black and very dark gray silt loam about 11 inches thick. The Spicer soils are in the drainage ways and poorly drained and calcareous. The surface soil is black and very dark gray silty clay loam and silt loam about 22 inches thick.

**Burr-Du Page-McIntosh Variant** - The Burr soils are on the flat and slightly concave parts of the lake plain. They are poorly drained calcareous, and have a high content of gypsum. The Du Page soils generally are next to the streams that cross the lake plain but at a slightly higher elevation. They are moderately well drained and calcareous. The McIntosh Variant soils are on plane and slightly convex areas that are 1 foot to 3 feet above areas of Burr soils. They are calcareous and somewhat poorly drained.

**Calco-Du Page -** The Calco soils are typically on the lower levels of the flood plain. These poorly drained, calcareous soils formed in silty material deposited by floodwaters. The Du Page soils are on the slightly higher levels of the flood plain. They are deep and moderately well drained.

**Arvilla-Egeland -** The Arvilla soils are somewhat excessively drained. They are dominantly nearly level, but a few areas are gently sloping. The Egeland soils are well drained. These soils are in nearly level swales and on gently sloping side slopes.

**Terril-Storden-Swan Lake** - The Terril soils are on foot slopes, in slump areas on the back parts of side slopes, and in drainage ways that dissect the side slopes. These soils are moderately well drained and noncalcareous. The Storden soils are on steep and very steep convex side slopes that support prairie vegetation. These soils are well drained and calcareous. The Swan lake soils are on steep and very steep convex side slopes that are covered by forest vegetation. These soils are well drained and calcareous.

**Copaston-Rock Outcrop** - The Copaston soils are well drained and are undulating to steep. The Rock, outcrop part of the unit is Precambrian igneous rock. It is mostly gneiss.

**Yellow Medicine Soil and Water Conservation District**

The Yellow Medicine County Soil Conservation District was duly organized as a government subdivision of this State, and a public body corporate and politic on the 17th day of April 1950. On February 5, 1963, the district name was officially changed to the Yellow Medicine Soil and Water Conservation District (SWCD). The mission of the Yellow Medicine SWCD is to provide technical, financial, and educational support for the purpose of conserving and/or protecting soil, water and other county resources.

## Wind Erosion

Wind erosion is the process of separation and sedimentation of soil material by wind action. It occurs in all parts of the County and is a cause of serious soil deterioration. The basic causes of wind erosion are wherever the soil is overly loose and dry, the surface is smooth, dry and without debris, and the wind is strong without resistance.

In the County, wind erosion has caused high amounts of topsoil loss due to high winds. These losses range from 0 to 12 tons per acre. Potential for severe wind erosion occurs on approximately 25% of the cropland, 110,000 acres. The remaining cropland has a slight to moderate erosion problem. Damage has occurred due to the intensified heat of strong southerly winds. Many streams and roadside ditches have become increasing subject to sedimentation due to soil movement in the wind. Productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer.

## Water Erosion

Water erosion is the disturbance of soil from its original position by water movement. Water erosion in the County can be classified as sheet erosion, rill erosion, and gully erosion and stream bank erosion. Sheet erosion is the removal of thin layers of soil by water over the entire surface. Rill erosion or rills are small channels caused by running water, and can be removed by normal cultivation operations. Gully erosion is caused the same as rill erosion only on a larger scale, too large to be removed by ordinary tillage. Stream bank erosion occurs along the banks of streams during and in between rainstorms, but primarily during peak flood stages.

Water erosion in the County ranges from 0 to 20 tons per acre. 50% of the cropland, 205,000 acres, has soils subject to excessive erosion. Many areas in the County are considered critical water erosion areas because of steep slopes and slow water permeability. Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layers are lost and part of the subsoil is incorporated into the plow layer. Second, soil erosion on farmland results in sediment entering streams.

## Tillage Transect Survey – Yellow Medicine County

The cropland roadside transect survey method is designed to gather information on tillage and crop residue management systems by rating the percentage of cropland meeting residue targets. Conservation tillage is an indicator of environmentally friendly systems being used on cropland and is a component of the Natural Resource Conservation Service (NRCS) Performance Reporting Management System (PRMS). One of the NRCS strategic goals is to have 50% of the cropland managed to enhance soil quality. The following data display's Yellow Medicine County's transect survey results from 2000 to 2002.

***Residue Trend Analysis***
***Percent of Corn and Soybean Fields meeting residue targets***

| 2000 | 2001 | 2002 |
|---|---|---|
| 26% | 48% | 40% |

The above information documents the last three years of published information available for Yellow Medicine County. It reflects the percent of corn and soybean fields in the county that meet residue targets for conservation tillage. Data documents that the three-year average reflects 38% of the fields meeting residue targets.

**Wind and Water Erosion Definitions**

The Yellow Medicine SWCD was heavily involved throughout the water planning process. As a result, two erosions maps were created showing wind and water erosion-prone soils. These maps were created using USGS's Soil Viewer Extension. Although the maps should not be used for site planning, they provide a general view of the extent that wind and water erosion plays in Yellow Medicine County.

For administration of the State Cost-Share Program by the Yellow Medicine Soil and Water Conservation District the following definitions apply:

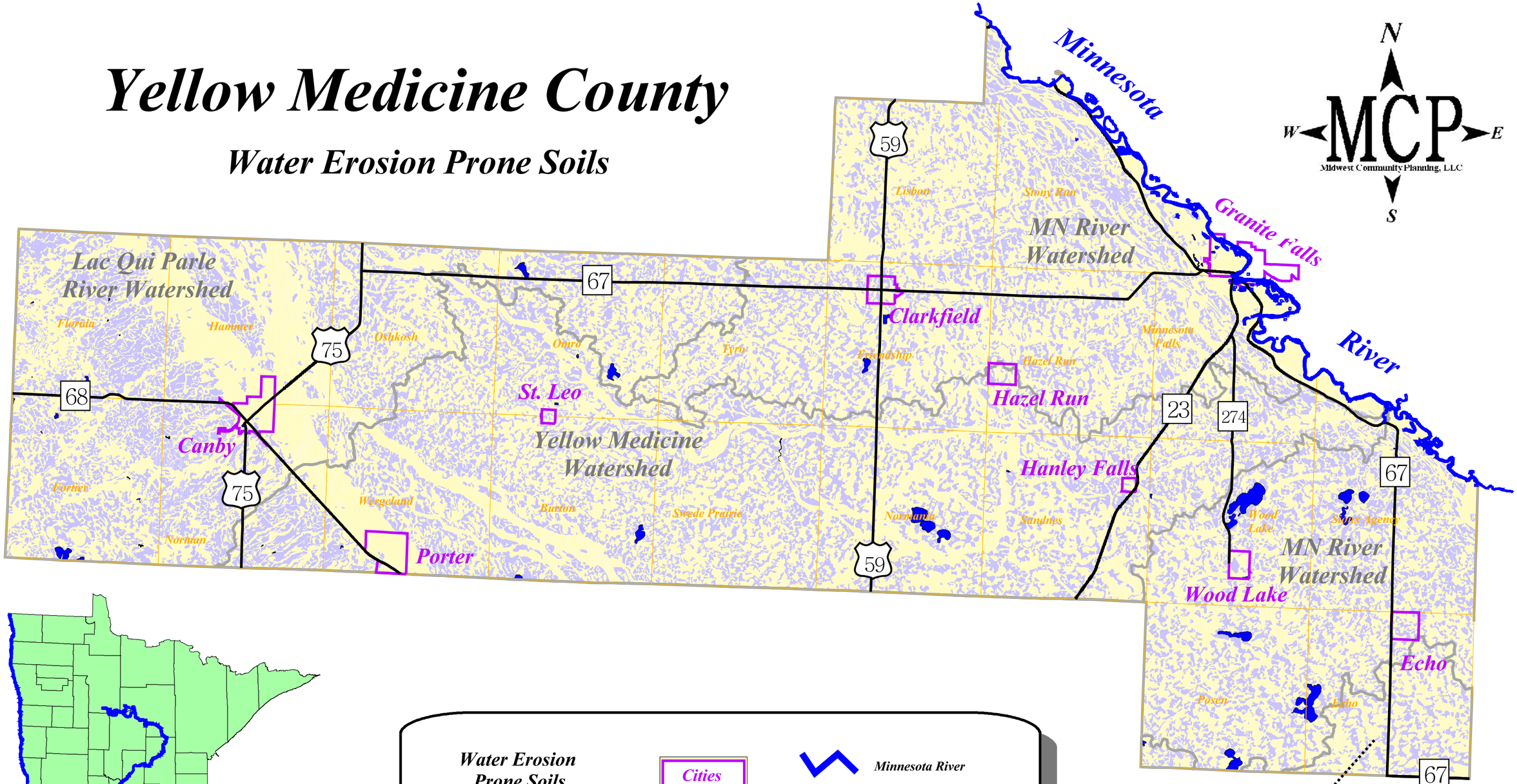
> **High Priority Erosion Problems** – "High priority erosion problems" means areas where erosion from wind or water is occurring equal to, or in excess of, 2 x T tons per acre per year or is occurring on any area that exhibits active gully erosion or is identified as high priority in the comprehensive local water plan or the conservation district's comprehensive plan.
>
> **High Priority Water Quality Problems** – "High priority water quality problems" means areas where sediment, nutrients, chemicals, or other pollutants discharge to Department of Natural Resources designated protected waters or to any high priority waters as identified in a comprehensive local water plan or the conservation district's comprehensive plan, or discharge to a sinkhole or groundwater. The pollutant delivery rate to the water source is in amounts that will impair the quality or usefulness of the water resource.

**Yellow Medicine County Riparian Land use**

It is estimated that Yellow Medicine County has 58,084 acres in the riparian zone (For this discussion the riparian zone is defined as the 100-year floodplain or a 100-foot wide riparian zone along linear water features and/or lakes within the County). Of these total acres - it is estimated that 39,068 acres are cultivated. From current Yellow Medicine County enrollment data in CRP, CREP, RIM, WRP, etc. – we estimate that 9100 acres are located in a riparian area. Thus approximately 23 percent of the 100 year floodplain / 100 foot riparian zone is currently protected in Yellow Medicine County.

# Yellow Medicine County

## Water Erosion Prone Soils







**Water Erosion Prone Soils**

**Not Water Erosion Prone**

**Cities**

**Townships**

**Minnesota River**

**Major Watershed**

**Major Road**

5 0 5 Miles

*Disclaimer: This map was created by using USGS's Soil Viewer Extension and information provided by Yellow Medicine County.*

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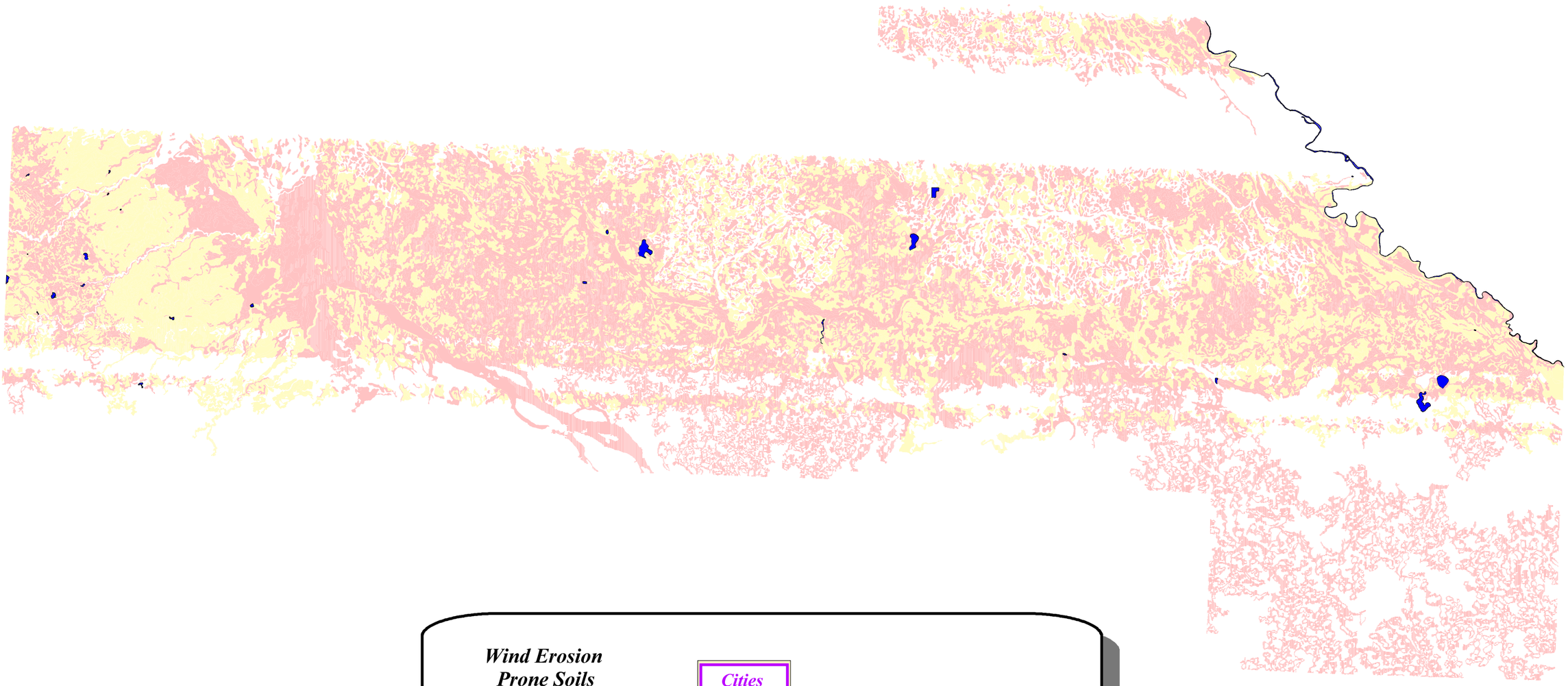
Wind Erosion
Prone Soils
Not Wind Erosion Prone
Cities
Townships
5
0
5 Miles

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## EROSION AND SEDIMENT CONTROL ASSESSMENT SUMMARY

Wind erosion can occur in most parts of the County but is greater in the Canby area and also on the lighter soils. Wind erosion is a high priority concern in Yellow Medicine County because it has already caused high amounts of topsoil loss. These losses range up to 12 tons per acre. The potential for severe wind erosion occurs on approximately 25% of the cropland, or 110,000 acres. The remaining cropland has slight to moderate erosion problems.

Water erosion in the County ranges up to 20 tons per acre. Up to 50% of the cropland, or over 200,000 acres, has been subject to extensive erosion. Many areas in the County are considered critical water erosion areas because of steep slopes and slow water permeability. Heavy rain and spring runoff on the steeper slopes in the Canby area, Stony Run Township and Sioux Agency Township have the most critical water erosion.

Sedimentation occurs in all County lakes, streams, rivers and ditches, however, the problem is the most severe in the downstream portion of the Yellow Medicine River and in streams in the western portion of the County. Damages associated with soil erosion include increased downstream flood damages and sediment damages to roads, drainage ditches and fish and wildlife habitat. Water quality in streams and lakes is reduced from sediment, plant nutrients, fertilizer and other chemicals contained in the runoff. The Natural Resource Conservation Service estimates 58,000 tons of sediment and other pollutants are delivered to the Minnesota River annually from the Yellow Medicine River. The potential for critical sedimentation problems in Yellow Medicine County occurs on approximately 6,280 acres.

## REDUCING PRIORITY POLLUTANTS PRIORITY ISSUE

### Feedlots

An adequate supply of healthy livestock, poultry and other animals is essential to the well-being of Yellow Medicine County's citizens. These domesticated animals provide people's daily source of meat, milk, eggs and fiber. Their efficient, economic production must be the concern of all consumers if we are to have a continued abundance of high-quality, wholesome food and fiber at reasonable prices. Livestock, poultry, and other animals produce manure, however, which may negatively affect Yellow Medicine County's environment. This only occurs when the manure is improperly stored, transferred or disposed.

As a result, Yellow Medicine County enforces an Animal Feedlot Ordinance, which requires a permit for the operation of any feedlot in the County. The basic premise of the Ordinance is to require setbacks between feedlots and incompatible land uses (i.e., residences, parks, drainage ditches, etc.).

**State Feedlot Regulations**

The Minnesota Pollution Control Agency (MPCA) regulates and controls pollution created by animal feedlots. The MPCA's feedlot rules were first adopted in 1971 and amended in 1974, 1978 and 2000. The trend in agriculture has been toward fewer but larger livestock and poultry facilities. There has also been a trend of increasing awareness about the potential environmental effects of feedlots. In accordance with MPCA feedlot regulations, the owner(s) of an animal feedlot or manure storage area with 50 or more animal units, or 10 or more animal units if in shore land (less than 300 feet from a stream or river, less than 1,000 feet from a lake) needed to register with the MPCA by January 1, 2002. Registration was accomplished one of three ways: 1) the owner(s) can fill out information on an MPCA registration form and return it to the MPCA or, in a delegated county, the delegated county feedlot officer, 2) the owner(s) can fill out a permit application (if required to obtain a permit), or 3) the owner can be listed on a current (as of October 1, 1997) Level Two or Level Three inventory that also contains the required information and the inventory has been submitted to the MPCA, this serves as fulfilling the initial registration requirement. It is the owner's responsibility to ensure that his or her registration information has been forwarded to the MPCA.

***Definition of an Animal Unit:***

A standardized measure to compare differences in the production of animal manure for an animal feedlot or manure storage area. A mature cow of about 1000 pounds (455 kg.) is the standard unit, thus being 1 animal unit. In comparison, it takes approximately 2.5 adult hogs to equal a 1000 pound cow. As a result, each adult hog is equal to a 0.4 animal unit. In other words, it takes 2.5 hogs to equal 1 animal unit.

Registration information must be updated at least once in every four-year period after January 1, 2002. The MPCA or delegated county will notify owners that they must re-register at least 90 days before their current registration expires. Also, the MPCA or delegated county will send the owner a receipt within 30 days of receiving the registration information from the owner.
Exemptions to registration**:**

- Owners of livestock facilities located on county fairgrounds were not required to register.
- Owners of pasture or grazing operations that have buildings or lots with a capacity of less than 50 animal units, or less than 10 animal units in shore land areas, were not required to register.
- Owners of pasture or grazing operations that do not have buildings or open lots were not required to register.

Once registered, owners will be directed to obtain any needed permits. The requirement for a feedlot permit is dependant upon the size of the operation and whether or not a pollution

hazard has been identified. Owners with less than 300 animal units are not required to have a permit for the construction of a new facility or expansion of an existing facility if construction is in accordance with the technical standards contained in Minnesota State Rules. For owners with 300 animal units or more, but less than 1,000 animal units, a streamlined short-form permit is required for construction activities. An Interim Permit is required for owners with 300 animal units or more, but less than 1,000 animal units, if a pollution hazard has been identified. Finally, a National Pollutant Discharge Elimination System (NPDES) permit or State Disposal System (SDS) permit is required for all feedlots with 1,000 animal units or more. NPDES and SDS permits must be issued by the MPCA. All other permits are issued by the County.

Owners of feedlots with less than 300 animal units, with passive manure-contaminated runoff from open lots, are encouraged to sign up for the 2005/2010 Open-lot Agreement. If an owner qualifies for the agreement, they will be allowed to phase in any needed corrections to pollution problems. Owners are required to install clean-water diversions, vegetated buffer areas or filter strips for manure-contaminated runoff to flow through, or other corrective measures by October 1, 2005.

**Yellow Medicine County's Feedlot Program**

Yellow Medicine County has administered the feedlot program for the MPCA since 1982. The administration of the program is handled by the Zoning Administrator/Feedlot Officer. The feedlot permitting process begins when a landowner requests a feedlot permit application or when a building permit is received where the proposed construction is for a livestock facility. The landowner completes the application form and any other required

information. The application packet is reviewed by the feedlot officer. When all necessary information has been received and the Feedlot Officer determines that all MPCA regulations and local ordinance requirements have been met, the appropriate permit is issued. The Feedlot Officer inspects feedlots for potential pollution problems and educates producers about best management practices. On September 9, 1993, Yellow Medicine County adopted a Feedlot Ordinance which outlines the permitting requirements, setback requirements for new feedlots, animal waste utilization and manure spreading setbacks, and also defines when a conditional use permit or a variance is required. The Feedlot Ordinance was updated, revised and approved by the County Commissioners on September 22, 1998.

A Level Two Inventory of all feedlots in the County was completed in 2000. The Level Two Feedlot Inventory contains specific information, such as the number and type of livestock, type of manure storage and distance to surface water. The inventory identified 372 feedlots with ten or more animal units. The Feedlot Officer completes and submits to MPCA an annual report and work plan. The County participates in the Natural Resources Block Grant and receives funding from the State to administer the Chapter 7020 Rules regulating feedlots. The Water Plan Committee identified a few key action steps to address feedlot concerns, including the development of a GIS layer of feedlots registered under current MPCA registration guidelines.

**Individual Sewage Treatment Systems (ISTSs)**

Individual Sewage Treatment Systems (ISTSs) are used for the treatment and disposal of wastewater from individual homes, clusters of homes, isolated communities, industries or institutional facilities. When properly functioning, ISTSs are an effective means of treating wastewater. However, if improperly designed, installed or maintained, ISTSs have the potential to adversely impact water quality. Human waste contains high concentrations of microorganisms and many chemicals, including carbon, nitrogen, phosphorus and salts. These pollutants not only represent a public health concern, but also can significantly degrade the quality of the environment.

The first State law addressing failing ISTSs went into effect in 1994. This legislation is known as the ISTS Act (Minnesota Rules, Chapter 7080). Chapter 7080 requires that all new construction and replacement of ISTSs meet minimum statewide standards. It also puts into place a method to systematically address the adequacy of existing systems through requiring upgrading of failing existing systems before construction of an additional bedroom. The following are the State's objectives in regulating sewage systems through Chapter 7080:

- Keep inadequately treated sewage away from human contact to prevent disease;
- Reduce levels of pathogenic bacteria and viruses discharged to the environment;
- Reasonably and cost-effectively prevent ground-water contamination;
- Develop clear direction for design, construction and maintenance of sewage-treatment facilities;
- Strive for cost-effective methods of sewage treatment to maintain or improve property values;
- Encourage personal responsibility for treating sewage; and
- Require all counties to adopt an ISTS ordinance.

**TMDLs**

The Clean Water Act requires states to publish, every two years, an updated list of streams and lakes that are not meeting their designated uses because of excess pollutants. The list, known as the 303(d) list, is based on violations of water quality standards and is organized by river basin. To facilitate this process, Total Maximum Daily Loads (TMDLs) where designed for a number of priority pollutants. These standards define how much of a pollutant can be in a surface and/or ground water while still allowing it to meet its designated uses, such as for drinking water, fishing, swimming, irrigation or industrial purposes.

For each pollutant that causes a water body to fail to meet state water quality standards, the federal Clean Water Act requires the MPCA to conduct a TMDL. A TMDL study identifies both point and nonpoint sources of each pollutant that fails to meet water quality standards. Water quality sampling and computer modeling determine how much each pollutant source must reduce its contribution to assure the water quality standard is met. Rivers and streams may have several TMDLs, each one potentially determining the limit for a different pollutant.

The current 303(d) TMDL listing was published in July 2004. Yellow Medicine County has four water bodies identified on the list. The following text box identifies these waters, along with when each was listed, the affected use, and the pollutant identified in the TMDL study.

**Table 2:**
**TMDL Listing for Yellow Medicine County**
**(July 2004)**

| Reach | New or Previous Listing | Affected Use | Pollutant or Stressor |
|---|---|---|---|
| Del Clark Lake | New | Aquatic consumption | Mercury and Fecal Coliform |
| Yellow Medicine River | Previous Listing | Impaired River | Mercury and Turbidity |
| Lac qui Parle River | Previous Listing | Impaired River | Mercury |
| Minnesota River | Previous Listing | Impaired River | Mercury, PCBs, Turbidity and Fecal Coliform |
| Spring Creek | Previous Listing | Impaired River | Biota |

For more information on TMDLs, please visit the following Minnesota Pollution Control Website:

**http://www.pca.state.mn.us/water/tmdl/index.html#finaltmdl**

**Information from the Yellow Medicine River Watershed Clean Water Partnership Project – Phase I assessment and Phase II implementation plan:**

The project area of concern is the Yellow Medicine River and the associated watershed. The watershed lies in the Northern Glaciated Plains ecoregion and has land use patterns typical for this ecoregion. Significant watershed, water monitoring data and resource characteristics are presented in the Greater Yellow Medicine River Diagnostic Study and Feasibility Report (Phase 1 Final Report) that is referenced here and provides important assessment and implementation direction for the Yellow Medicine County Water Plan.

Several studies have been conducted on the Yellow Medicine River in the past including: 1) USGS stream gauging and water quality investigations; 2) Area II flood routing modeling; 3) several flood control investigation and dam construction projects by the Yellow Medicine River Watershed District; 4) Minnesota State Comprehensive Soil Survey; 5) wetland and wildlife restorations by the Federal Fish and Wildlife Service and Duck's Unlimited Incorporated; 6) Minnesota Department of Natural Resources (DNR) fisheries surveys; and 7) land use and soil delineation and digitizing projects by Lincoln, Yellow Medicine and Lyon County SWCDs; 8) Clean Water Partnership Phase I Diagnostic Study. A major study of the Yellow Medicine sub-basin was conducted by the US Army Corps of Engineers and the US Soil Conservation Service under the authority of Public Law 87-639. These studies indicate the river has been subject to extreme water quality deterioration processes in the recent past related to severe flooding problems associated with local catchment loss and subsequent increasing downstream flooding problems. Crop loss due to flooding has particularly been the subject of growing debate. The average annual reduction in net income because of sheet, rill, and wind erosion on inadequately protected cropland amounts to $3,450,000 on 231,300 acres. Future projections predict total average annual damages to be at $599,410 in the Yellow Medicine sub-basin. Currently approximately 39,100 acres exceed twice the tolerable soil loss level.

Flooding, drainage, erosion, sedimentation, and poor water quality are among the foremost problems in this watershed. Water quality in the watershed's streams and lakes suffers from the sediment, nutrients, fertilizer, and chemicals in the runoff. The goal of the Yellow Medicine River Clean Water Partnership Project is to:

- Increase the implementation of best management practices for runoff;
- Reduce soil erosion;
- Improve water quality; and
- Reduce flooding.

With the development of the Phase II Implementation Plan sub watersheds were prioritized based on mass/unit area discharges of **total phosphorous, total suspended solids, and nitrate-nitrite nitrogen.**

The implementation plan highlights the prioritized sub watersheds for targeted controls. The plan promotes optimized fertilization practices and implements the most cost effective controls. The goals for the implementation plan were developed through the following steps:

- Implementation plan objectives – **the plan identifies a 25% reduction in total phosphorous (TP), total suspended solids (TSS), and nitrate-nitrite (NO23) at the priority sites based on the Phase I diagnostic study results;**
- Identification of priority management areas; and
- Best management Practice (BMP) alternatives and analysis.

**Information from the Lac qui Parle – Yellow Bank Clean Water Partnership Project – Phase I assessment and 319 implementation project proposal**

After a three-year diagnostic study, review of water quality data and input from watershed residents, three major water quality problems and priority areas were identified:

- Water quality throughout the watershed continues to be degraded by elevated levels of **fecal coliform bacteria** from both human and animal sources. All thirteen monitoring sites exceeded the fecal coliform bacteria standard (200 organisms per 100 milliliters of water) set by the Minnesota Pollution Control Agency numerous times. In addition to the possible health risk associated with the presence of elevated levels of fecal coliform bacteria, it can also be the cause of decreased water clarity, unpleasant odors, and an increased oxygen demand.

- **Elevated levels of total suspended solids and turbidity** on the Lac qui Parle River from Highway 68 to the Lac qui Parle Village is also contributing to water quality problems. A small amount of erosion per acre over a majority of the watershed's area can result in significant erosion and sedimentation problems. Sediment, nutrients, and chemicals carried into the surface water by eroded soils further degrade water resources.

- A final concern is the **high level of nitrate + nitrite nitrogen** in the Ten Mile Creek sub watershed *(note - this area of the watershed is not within Yellow Medicine County)*. Excessive nitrogen can accelerate eutrophication, causing dramatic increase in aquatic plant growth and changes in the type of plants and animals that live in the water. It also will eventually affect dissolved oxygen, temperatures, and other indicators.

A recent application for 319 implementation funding will target acceleration of best management practices in the middle reach of the main stem Lac qui Parle River from near Canby to Dawson. This middle reach has concentrations of total suspended solids near the 75$^{th}$ percentile for minimally impacted streams in Minnesota Northern Glaciated Plains Ecoregions and turbidity levels over the 75$^{th}$ percentile. The turbidity standard is 25 NTUs. Exceeding this standard may subject this reach of the river to being listed on the 303(d) list that may require a total maximum daily load (tmdl) study in the future.

The Lower Lac qui Parle River from Dawson to Ten Mile Creek (*note – this area of the watershed is not within Yellow Medicine County*) is already on the 303(d) 2004 Listing of Impaired Waters – for low oxygen levels. It is imperative to manage the water quality concerns in this watershed because they compound as the water flows downstream. This project is in the upper reaches of the Minnesota River watershed and as such impact the Lower Minnesota River Low Dissolved Oxygen TMDL. Finally, excessive levels of fecal coliform bacteria are throughout the entire Lac qui Parle – Yellow Bank Watershed. All thirteen monitoring sites exceeded the fecal coliform standard of 200 organisms per 100 ml., which will likely cause listing on the 303(d) list of impaired water requiring a TMDL study in the future.

## REDUCING PRIORITY POLLUTANTS ASSESSMENT SUMMARY

Yellow Medicine County identified the priority of reducing priority pollutants related to feedlots and non-conforming individual sewage treatment systems during the County's water plan scoping process. These two issues were discussed throughout the planning process and third category, addressing the County's waters found on the Pollution Control Agency's TMDLs list, was also added as part of the County's overall priority issue.

The Feedlot section of this Chapter identified a number of statewide feedlot issues along with Yellow Medicine County's information. The primary feedlot-related implementation steps found in Chapter Two represent the continuation of the County's desire to proactively work with the Minnesota Pollution Control Agency on properly administering the County's Feedlot Program. This includes creating a GIS layer of the feedlots registered with the State and incorporating the database with MPCA's database. The additional key steps primarily involve assisting the County's feedlot operators with the various feedlot regulations.

Although this Chapter does not provide much information on the County's network of individual sewage treatment systems, properly administering the State's ISTS regulations remains a major component in the County's overall water plan. This is because of the direct relationship between failing treatment systems and water quality. Due to this relationship, the County identified assisting with 50 ISTS upgrades per year as one of the action steps found in Chapter Two. This would primarily be achieved by seeking funding and offering landowners low interest loans. In addition, the County committed to creating a GIS layer of all the septic systems in the County. Much like a drainage inventory, having a good database is often the first step to good program management.

The County's waters found on the 303d list of impaired waters became an increasingly important water planning issue as the water planning process progressed. This is primarily because of the emphasis the Minnesota Pollution Control Agency has placed on working with local water planning organizations during the TMDL plan development and implementation stages. Often the actions steps found in a County's water plan collectively represent which direction the county needs to be moving to properly remove bodies of water off the TMDL designation. As a result, the county made a number of commitments in Chapter Two that will prioritize assisting throughout the TMDL process. In short, removing Del Clark Lake, the Minnesota River, the Yellow Medicine River, the Lac qui Parle River, and Spring Creek off the 303d list of impaired waters would be a major accomplishment for the County's water planning efforts.

## FLOOD MANAGEMENT PRIORITY ISSUE

Flooding in Yellow Medicine County occurs primarily in the spring during periods of peak conditions (rainfall and snowmelt) and in areas where the soil has low permeability qualities. Damages are mainly confined to the Yellow Medicine and Lac qui Parle watersheds. Some loss of topsoil occurs during these events with major damages resulting in drowned crops and a loss of nutrients from within the soil. This results in decreased crop yields, increased herbicide and tillage costs and increased fertilizer costs. Flooding damages also include channel erosion problems and sedimentation. The drainage of wetlands with the resulting loss of natural flood water storage has increased the severity of cross-over flooding.

According to estimates by the Army Corps of Engineers and the Natural Resource Conservation Service, there are approximately 27,657 acres in the 100-year floodplain within the Lac qui Parle and Yellow Medicine watersheds (See Map 5). Within the Lac Qui Parle watershed, average annual damages resulting from flooding amount to about $390,030. In the Yellow Medicine River watershed annual damages amount to about $471,080. Thus, total average annual flood damages in the two watersheds amounts to $861,110. These figures were determined using 1985 cost benefit figures. Therefore, the damage figures given are underestimated in today's economy.

### Floodplain Ordinance

The Floodplain Ordinance was updated in 1993 and is being adequately enforced. The purpose of the Floodplain Ordinance is to promote the public health, safety, and general welfare and to minimize, within the flood hazard areas, the potential loss of life, loss of property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures or flood protection and relief, and impairment of the tax base. The Ordinance apples to all lands within the jurisdiction of Yellow Medicine County shown on the Official Zoning Map.

### Federal Emergency Management Agency Maps

The Digital Flood Insurance Rate Map (DFIRM) Database depicts flood risk information and supporting data used to develop the risk data. The primary risk; classifications used are the 1-percent-annual-chance flood event, the 0.2- percent-annual-chance flood event, and areas of minimal flood risk. The DFIRM Database is derived from Flood Insurance Studies (FISs), previously published Flood Insurance Rate Maps (FIRMs), flood hazard analyses performed in support of the FISs and FIRMs, and new mapping data, where available. The FISs and FIRMs are published by the Federal Emergency Management Agency (FEMA). The file is georeferenced to earth's surface using the UTM projection and coordinate system. The specifications for the horizontal control of DFIRM data files are consistent with those required for mapping at a scale of 1:12,000.

The FIRM is the basis for floodplain management, mitigation, and insurance activities for the National Flood Insurance Program (NFIP). Insurance applications include enforcement of the mandatory purchase requirement of the Flood Disaster Protection Act, which "... requires the purchase of flood insurance by property owners who are being assisted by Federal programs or by Federally supervised, regulated or insured agencies or institutions in the acquisition or improvement of land facilities located or to be located in identified areas having special flood hazards," Section 2 (b) (4) of the Flood Disaster Protection Act of 1973. In addition to the identification of Special Flood Hazard Areas (SFHAs), the risk zones shown on the FIRMs are the basis for the establishment of premium rates for flood coverage offered through the NFIP. The DFIRM Database presents the flood risk information depicted on the FIRM in a digital format suitable for use in electronic mapping applications. The DFIRM database is a subset of the Digital FIS database that serves to archive the information collected during the FIS.

The enclosed Yellow Medicine County Floodplain Map was recreated using FEMA's preliminary 2004 FIRM release. The information presented in the map is not official and should not be used to site planning purposes. The final Yellow Medicine County FIRM map will be adopted sometime in either 2005 or 2006.

**Flood Management Structures**

Through a combination of federal, state and local efforts several floodwater retarding structures have been constructed to reduce flooding and associated damages in the Yellow Medicine basin. An important secondary benefit of these structures is sedimentation control (although sometimes they can actually be the cause of additional erosion downstream). One of these structures is located west of Porter on a tributary of Mud Creek; two reservoirs have been constructed on tributaries in Lincoln County and one is located in Lyon County. Another reservoir, about six miles southwest of Canby on Lazarus Creek, should be completed in early 2005. In addition, Yellow Medicine County has constructed its first flood retention structure (downsized culvert) in 1994 located one mile northwest of Porter. This technology reverses the trend of replacing culverts with larger sized culverts which only transfers additional water downstream. Although this is only the first road retention project within Yellow Medicine County at present, Area II continues to promote this form of flood damage reduction for all member counties.

In addition, a large reservoir (Del Clark Lake) has been constructed on Canby Creek to reduce flood damages in the Lac qui Parle watershed. A number of other reservoirs in both the Lac qui Parle and Yellow Medicine sub basins were identified and studied as part of the P.L. 87-639 Study.

In 1993, Yellow Medicine County cooperated with Lincoln County in the construction of a flood control retention structure on Lincoln County Road #19. This structure will significantly reduce the amount of flooding in Yellow Medicine County. Yellow Medicine County will continue to explore the possibilities of cooperative flood control projects with neighboring counties. Especially with this county's narrow width, the potential exists to

# Yellow Medicine County

## Flood Plain Map

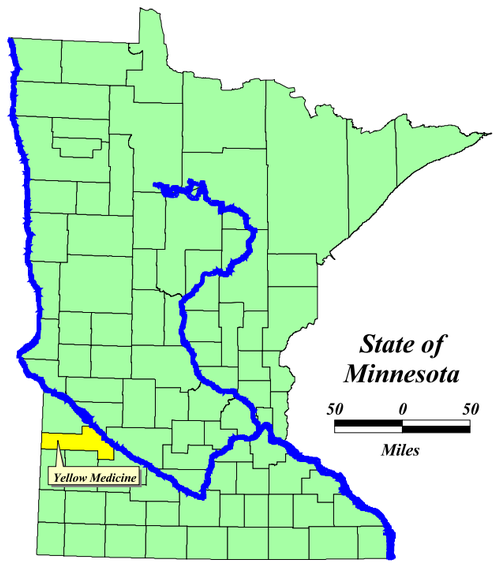
N
W MCP E
S
Midwest Community Planning, LLC

Minnesota River
Granite Falls
Clarkfield
Hazel Run
St. Leo
Canby
Porter
Hanley Falls
Wood Lake
Echo

Lac Qui Parle River Watershed
MN River Watershed
Yellow Medicine Watershed
MN River Watershed
Redwood River Watershed

Florida
Hammer
Lisbon
Stony Run
Omro
Tyro
Friendship
Hazel Run
Minnesota Falls
Oshkosh
Wergeland
Fortier
Norman
Swede Prairie
Burton
Normania
Sandnes
Wood Lake
Sioux Agency
Posen
Echo

59
67
75
68
23
274




**Flood Zones***

- 0.2 % Annual Chance Flood Hazard
- Zone A 100-Year Flood Plain
- Zone AE 100-Year Flood Plain
- Zone AO 100-Year Flood Plain
- Zone X - Outside the Flood Plain

*Please refer to the text for zone definitions

Cities
Townships

Minnesota River
Major Watershed
Major Road

5 0 5 Miles

*Disclaimer: This map was created by using information provided by the Federal Emergency Management Agency (FEMA). This is not an official Yellow Medicine County Flood Plain Map.*

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cost-share road retention projects with Lincoln and Lac qui Parle counties when benefits extend downstream. Area II encourages this watershed-based approach where the most flood damage reduction benefit is gained, costs are shared, and peak flows are reduced.

- ✓ In 1997, Area II worked in cooperation with the County's Highway Department on the Fortier 15 Road Retention project. This project consisted of downsizing a culvert.

- ✓ In 1999, in cooperation with the Lac qui Parle – Yellow Bank Watershed District, Area II worked to restore the Fortier 8 dam to its original condition.

- ✓ In 2001, in cooperation with the Lac qui Parle – Yellow Bank Watershed District, Area II constructed a small dam ('Norman 16') and created a wetland measuring 1.62 acres.

- ✓ In 2002, in cooperation with the SWCD, Normania Township and the Watershed District, Area II designed a stream bank stabilization along 550' feet to redirect the Yellow Medicine River away from a township road.

**Flood Management Programs**

The voluntary retirement of flood-prone agricultural lands into a number of available conservation programs has been an increasingly viable "win-win" option for the agriculture community. According to 1994 statistics from the Minnesota Board of Water and Soil Resources (BWSR), Yellow Medicine County has approximately 6.1% of its cropland enrolled in conservation programs (please refer to the "Percent of Cropland Enrolled in Conservation Programs" map found in Appendix C). This compares to 8.8% in Lac qui Parle County, 5.6% in Chippewa County, 3.5% in Renville County, 4.2% in Redwood County, 5.3% in Lyon County, and 14.2% in Lincoln County (the Statewide average is 8.2%). The major conservation programs commonly used in Yellow Medicine County are briefly described below:

***Conservation Reserve Program***

The Conservation Reserve Program (CRP) is a voluntary program for agricultural landowners. Through CRP, you can receive annual rental payments and cost-share assistance to establish long-term, resource conserving covers on eligible farmland. The Commodity Credit Corporation (CCC) makes annual rental payments based on the agriculture rental value of the land, and it provides cost-share assistance for up to 50 percent of the participant's costs in establishing approved conservation practices. Participants enroll in CRP contracts for 10 to 15 years. The program is administered by the CCC through the Farm Service Agency (FSA), and program support is provided by Natural Resources Conservation Service, Cooperative State Research and Education Extension Service, state forestry agencies, and local Soil and Water Conservation Districts. A BWSR Conservation Land Summary fact sheet is provided in Appendix C (dated 8/19/04). According to this document, Yellow Medicine County has approximately 18,192 CRP acres. This compares closely to the Statewide average of 19,328 CRP acres per county.

### *Conservation Reserve Enhancement Program*

The Conservation Reserve Enhancement Program combines the USDA Conservation Reserve Program with the state's Reinvest in Minnesota Reserve (RIM) program to protect environmentally sensitive land and marginal cropland in the state. The CREP initiative is an effective way to partner state and federal resources to improve water quality, erosion control, and wildlife habitat related to agricultural use. It creates and restores wildlife habitat, which has spillover benefits for the state's tourism industry. The family farmer also benefits by retiring marginal lands and establishing conservation practices.

The first CREP in Minnesota was in the Minnesota River Watershed. The 100,000-acre goal for this CREP was reached in 2002. According to BWSR records, Yellow Medicine County has approximately 5,453 acres enrolled in CREP (equaling just over 5% of the State's total of 100,465 acres). These 5,453 acres consisted of 127 easements with payments over $3.3 million from the State. Additional CREP data can be found in Appendix C, along with a map showing the distribution of CREP easements in the Minnesota River Basin.

### *Reinvest in Minnesota*

The Reinvest in Minnesota (RIM) Reserve Program, one of the first such programs of its kind in the country, began in 1986 and is managed at the state level by the Minnesota Board of Water and Soil Resources. It protects and improves water quality, reduces soil erosion, and enhances fish and wildlife habitat by retiring private marginal cropland from agricultural production, planting permanent native vegetation, and restoring previously drained wetlands. Other benefits include flood control and groundwater recharge.

Landowners are paid a percentage of the assessed value of their land to voluntarily enroll it in a conservation easement. A variety of land types are eligible, including wetland restoration areas, riparian agricultural lands, marginal cropland, pastured hillsides, and sensitive groundwater areas. After land is enrolled, it is managed under a conservation plan, which generally includes items like wetland restoration (for areas with drained wetlands), native grass plantings, and tree plantings.

RIM Reserve has several different arms under which it enrolls land: "regular" RIM Reserve; the Conservation Reserve Enhancement Program (CREP); and Permanent Wetland Preserves (PWP), which enrolls existing at-risk wetlands. Most recently, RIM Reserve funds have been used to leverage federal funds through CREP in the Minnesota River basin. The state funds this program primarily through bonding. The RIM Reserve Program provides direct payments to landowners for conservation easement acquisition. Soil and Water Conservation Districts (SWCDs), which administer the program locally, receive funding through grants from BWSR for administrative and technical support. That grant program is called the RIM Service Grant. As of August 2004, Yellow Medicine County had approximately 1,554 acres enrolled in RIM.

## FLOOD MANAGEMENT ASSESSMENT SUMMARY

This section highlights that the Yellow Medicine Soil and Water Conservation District (SWCD) and Federal Natural Resource Conservation Service (NRCS) have been quite successful working with landowners to retire many acres of marginal farmland throughout the County. The "win-win" scenarios of conservation easements, along with the numerous environmental benefits, make the future implementation of these programs a top water planning issue for Yellow Medicine County. These benefits include soil loss reduction, sediment reduction, phosphorus reduction, increased water storage, wildlife habitat enhancement and economic incentives.

According to the map, "Pollution Reduction Benefits: Easements," found in Appendix C, Yellow Medicine County has experienced the highest category of benefits in sediment, soil loss, and phosphorus reduction in the State. According to BWSR records, however, 67% of the County's riparian zone, or 39,068 of 58,084 riparian acres, is still being cultivated (please refer to the handout "Minnesota Riparian Landuse" found in Appendix C). This presents a large opportunity for Yellow Medicine County to take full advantage of the remaining conservation programs in the near future.

The Yellow Medicine Soil and Water Conservation District has had a specific staff person designated and funded to assist landowners with conservation programs since 1999. This position is key to the continued future success of these conservation efforts. This position could also assist with using the newly created flood plain maps and insuring landowners are aware of the many voluntary program opportunities available to protect their land.

The County's priority issue of "manage flooding and its' effects minimizing the losses associated with the flooding of agricultural lands," highlights the county's main emphasize of being kind to its agricultural community. This is similar to the approach taken by many rural counties in Minnesota. As a result, today's water management strategies often look for "win-win" situations where landowners are willing to participate in the variety of programs that assist with establishing both temporary and permanent upland water storage. The water plan committee recognized this by creating action steps aimed at maximizing existing programs such as CRP, RIM, WRP, and applying other best management practices to remove flood prone land out of crop production. The additional action steps focus on working with FEMA on sound floodplain management.

## SURFACE WATER AND DRAINAGE MANAGEMENT PRIORITY ISSUE

Yellow Medicine County has extensive, well-developed artificial drainage systems that allow modern farming practices to occur. As previously noted, only about forty percent of the County was used for row crop production in 1950, whereas today about seventy percent of the land produces row crops. This transformation in land use was accomplished primarily through drainage of naturally wet soils.

In Yellow Medicine County there are approximately 250 miles of public drainage ditch along with an undetermined number of private ditches and tile lines. It is estimated that only seven miles of the public systems are subject to the M.S. 106A provision requiring permanent vegetation sixteen and one-half feet in width on both ditch banks. It is also estimated that of these seven miles requiring a buffer strip only four currently have the

required width of vegetation and then only on one side of the ditch. Drainage activities within the County are subject to the drainage law which establishes environmental and land use criteria for proposed drainage systems (106A.015). Before establishing a drainage project the drainage authority, county or watershed district, and the Natural Resource Conservation Service, must consider: (1) private and public benefits and costs of the proposed drainage project; (2) the present and anticipated agricultural land acreage availability and use in the drainage project or system; (3) the present and anticipated land use within the drainage project or system; (4) flooding characteristics of property in the drainage project or system and downstream for 5, 10, 25, and 50-year flood events; (5) the waters to be drained and alternative measures to conserve, allocate, and use the waters including storage and retention of drainage waters; (6) the effect on water quality of constructing the proposed drainage project; (7) fish and wildlife resources affected by the proposed drainage project; (8) shallow ground water availability, distribution, and use in the drainage project or system; and (9) the overall environmental impact of all the above criteria.

It is suspected that flooding in the County, particularly in the Yellow Medicine basin, has intensified as a result of drainage system expansions in recent years. There are no available data to substantiate this contention, but findings of the P.L. 87-639 study suggest a positive correlation between wetland drainage and increased flood damages. It is suggested that wetland conversion has increased the effective drainage area and thereby increased peak stream flows. The study does not, however, give any indications of the effect of routine ditch maintenance or installation of tile systems to improve previously drained land. Additionally, sediment loadings in County and regional streams have been aggravated by agricultural practices that have converted prairie sod and steeply sloping marginal land into crop production.

Current regulations affecting drainage of existing wetlands include the "swampbuster" provision of the 1995 Food Security Act (1990 Farm Bill) and the 404 permit program (Section 404 of the Clean Water Act) administered by the U.S. Army Corps of Engineers. Both of these programs have generated controversy and created confusion in the public's mind over what constitutes permissible drainage activities. The net effect of the programs, however, has been a substantial, though not complete, reduction in loss of wetlands. It is anticipated that as ambiguities in the 404 program are removed conflicts surrounding wetland alterations will be reduced.

Essentially, the 404 program regulates the discharge of dredged or fill material into waters of the United States. Projects involving these types of activities require a permit that will only be issued in cases found to be in the public interest. Activities that are not "water dependent" (e.g., channel improvements) are discouraged by the regulations; and,

in most instances, the applicant for a permit must demonstrate there are no practical alternatives to the proposed project. If the applicant chooses to proceed with a project without securing a permit, mitigation is required to offset adverse effects of the project. This occurs through creation or enhancement of waters of the United States thereby avoiding an overall loss of environmental values.

In 1991, the Minnesota Legislature approved the Wetland Conservation Act (WCA) to promote the no-net loss of wetlands and to protect the benefits wetlands provide. The Act moves towards its no-net loss goal by requiring persons proposing to drain or fill a wetland to: first, try to avoid disturbing the wetland; second, try to minimize any impact on the wetland; and finally, to replace any lost wetland functions and values. The law also contains a list of certain activities that qualify for an exemption under this act. Yellow Medicine County delegated the responsibility of administering this act to the Yellow Medicine Soil and Water Conservation District.

**Wetland Restoration**

One of the best ways to manage water on the land is through wetland restorations and the promotion and implementation of land retirement programs. Drainage has changed the hydrology of our watersheds: more than 90% of the original wetlands in the Minnesota River Watershed have been drained or filled. Restoration of wetlands and changes in land use practices can work in concert to provide a way of keeping the water in place, reducing peak run off events, recharging groundwater aquifers, slowing the movement of surface water, providing habitat, and trapping nutrients and sediment.

According the U.S. Farm Service Agency and Yellow Medicine Soil and Water Conservation District records, there have been approximately 2,500 acres of wetlands restored in Yellow Medicine County over the last 15 years. These were completed through the various State and Federal wetland restoration programs, offering 'win-win' opportunities for willing landowners in the past and should be pursued for willing landowners in the future.

**Statewide Drainage Management Efforts**

The following information is taken from a presentation given by Al Kean, BWSR Chief Engineer. The presentation - Drainage Management Options – An Overview, was given on December 2, 2004 at the Minnesota Drainage and Natural Resource Enhancement Seminar. With much interest and discussion centering around drainage management across Minnesota in the last several years – what is trying to be accomplished? This presentation suggests that a proposed goal may be as follows:

> *"Better integrate drainage, flood control and natural resource enhancement, when and where feasible."*

Key facts, guiding principles and proposed goal:

1. Drainage is necessary for agriculture, roads and other infrastructure.
2. Drainage, flooding and natural resources are interrelated, but often in complex ways.
3. MN drainage law, state and federal conservation programs, and ongoing research provide drainage authorities with various drainage management options.
4. Drainage, flood damage reduction and natural resource enhancement should be better integrated, when and where feasible.

Key Benefits of Ag Drainage:

1. Enable earlier field access to reduce planting and harvesting risks and to help soil rutting and compaction.
2. Minimize crop drowning in low spots.
3. Avoid prolonged soil saturation during the growing season that limits soil oxygen, plant root depth and crop production.

Ag Drainage Status in Minnesota:

1. Relatively few new public drainage systems are being established.
2. However, many private drainage systems originally targeted to drain depressions are being extended and intensified with laterals and pattern tile.
3. And, many public drainage ditches and tiles are in need of repair and improvement.

Natural Resource Concerns Related to Drainage:

1. Erosion and sedimentation.
2. Nutrients and Bacteria (lake and river algae, hypoxia in the Gulf of Mexico).
3. Fish and Wildlife habitat and corridors (diversity and connectivity of habitats).

Downstream Flooding Concerns Related to Drainage:

1. Timing of runoff relative to downstream flood peaks. Acceleration of runoff can cause higher peak flows and higher velocities downstream, resulting in more flooding, erosion and infrastructure damage.
2. Runoff volumes. Increased runoff volumes can increase the frequency, peak flow and / or duration of flooding.

Key Drainage System Variables:

1. Timing of runoff
2. Frequency and volume of flood runoff

*Recall the Proposed Goal – Better integrate drainage, flood control and natural resource enhancement, when and where feasible.*

Drainage Management Options:

- Field Runoff Control – (e.g. perennial crops, conservation tillage, grass waterways, terraces, water and sediment control basins, strategic retirement of highly erodible and high runoff lands)
- Grass buffers (103E.021 – for new, repair or improvement)
- Voluntary grass filters and buffers
- Side inlet structures
- Impoundments (wetland restorations, road retention, dams)
- Culvert sizing
- 2-Stage channels
- Shallow or controlled subsurface drainage
- Alternative tile intakes

It is understood that all of these have pro and con aspects to them, but each is a tool in managing drainage systems.

Applicable State and Federal Programs:

- Reinvest in Minnesota (RIM) Reserve – BWSR
- Wetland Reserve Program (WRP) – NRCS
- Wetland Banking – BWSR
- Conservation Reserve Program (CRP) – FSA
- CRP Enhancement (CREP) – FSA, BWSR, SWCDs
- WRP Enhancement (WREP) – NRCS, BWSR, SWCDs
- Flood Damage Reduction (FDR) Program – DNR
- Watershed Protection and Flood Prevention (PL 566) – NRCS
- Wildlife Habitat Improvement Program (WHIP) – NRCS
- Wildlife Management Programs – USFWS, DNR, Nonprofits
- Section 205 and 206 – Corps of Engineers

## SURFACE WATER AND DRAINAGE MANAGEMENT ASSESSMENT SUMMARY

The shift in row crop cover from 40% coverage in the 1950s to 70% today has created some environmental consequences. The numerous wetlands lost to crop production now present themselves as opportunities for the agricultural community to seek out "win-win scenarios to be compensated through the various conservation programs for no longer farming some of these marginal farmland areas. Drainage authorities, landowners and project partners have various drainage management options that can help to integrate drainage, flood control and natural resource enhancement, when and where feasible.