

# **OLMSTED COUNTY COMPREHENSIVE LOCAL WATER MANAGEMENT PLAN**

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**2005-2010**

Prepared by the  
Olmsted County Environmental Commission  
and  
Olmsted County Environmental Services

Submitted to the Minnesota Board of Water & Soil Resources  
by the  
Olmsted County Board of Commissioners  
June 14, 2005



**2005-2010 Olmsted County  
Comprehensive Local Water Management Plan**

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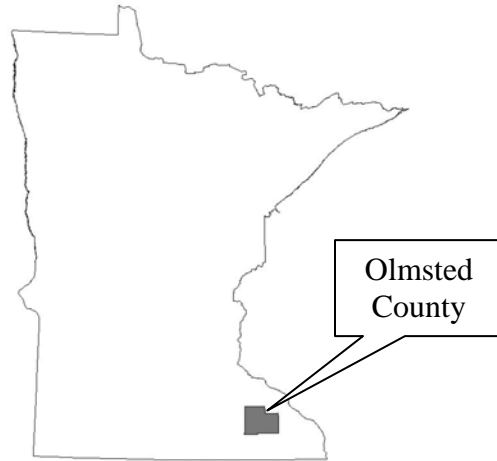


# Executive Summary

## Introduction:

Olmsted County is located in southeastern Minnesota, approximately 85 miles south of the Twin Cities Metropolitan Area (Figure 1). The County has a land area of 660 square miles, or 422,400 acres, which includes 7 incorporated cities and 18 townships. The County is drained by three major watersheds, the Root, Whitewater, and Zumbro. About 10 percent of the land in the County has been developed for residential and commercial use, 50 percent is cropped, 25% is managed as pasture and grassland, and the remainder as forest. The largest population settlement and county seat is the city of Rochester which has a population of about 92,000. The population trend in Olmsted County is increasing. The population was 124,000 in 2000 and is projected to be 170,000 in 2030.

Figure 1. Olmsted County.



The Olmsted County Environmental Services Coordinator is responsible for the *Local Water Management Plan* (LWMP). Olmsted County has established an Environmental Management Team and an Environmental Commission to provide oversight and coordination of Water Management Plan implementation. Both of these groups meet monthly with the Environmental Services Coordinator.

The original LWMP was adopted in 1990 with an update in 1998. A two-year extension was granted in 2002 extending the expiration date of the 1998 plan to December of 2004.

The 1998 Water Plan recognized four basic water management goals:

- Maintain sources of potable groundwater for public and private drinking water supplies.
- Maintain sources of non-potable water for fire protection, cooling, processing, irrigation and livestock watering.
- Maintain streams, rivers, lakes, reservoirs, wetlands, and springs for swimming, boating, fishing, wildlife, and biological diversity.
- Minimize flood damage to homes, farms, businesses and public properties.

The 1998 Plan also recognized that the most significant challenge to meeting these goals is water pollution and/or the loss of the hydrologic functions of the landscape. In response, the Plan set forth two basic resource management strategies:

- Reduce the rate of nutrient losses and pollutant loadings into surface and ground water to no more than the natural system's ability to attenuate them.
- Preserve, restore, and enhance natural systems that provide water retention, nutrient cycling, pollutant degradation, biological diversity, and recreation.

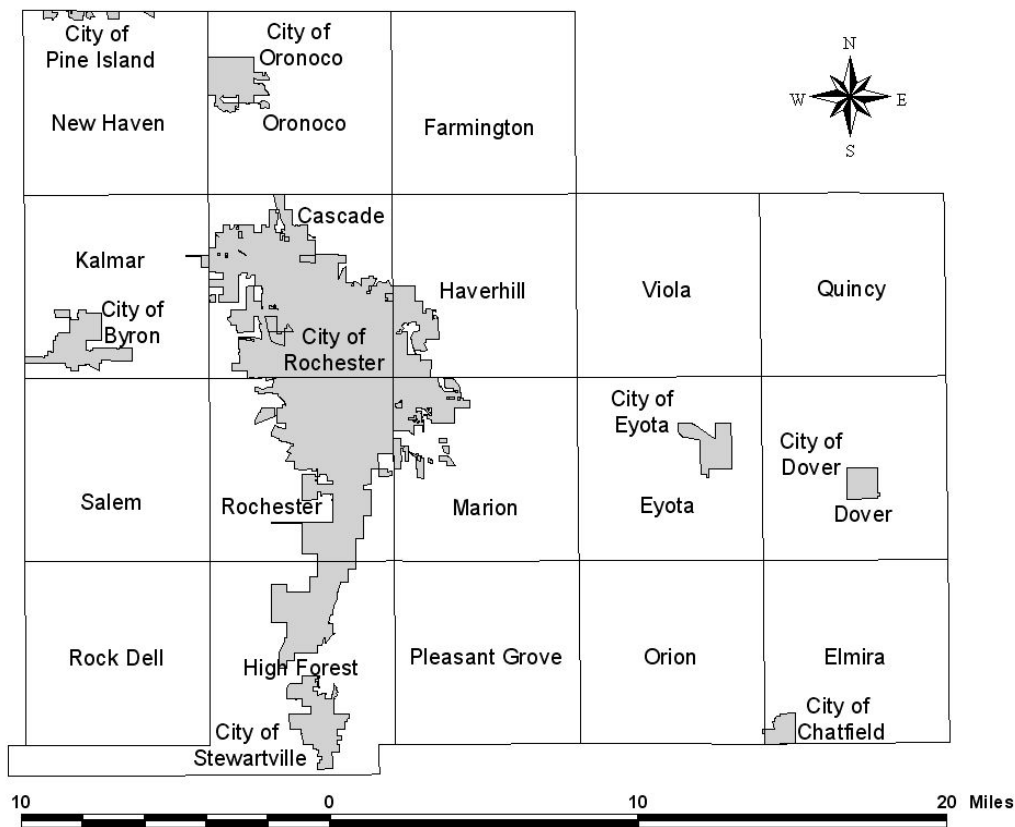
The 205 Water Plan continues to recognize these resource management goals and strategies, summarizes the water resource concerns identified in the Scoping Process, and lays out specific implementation priorities for the period 2005 to 2010.

**The Plan follows the requirements of Minn. Stat. 103B.311subd.4:**

**1. The plan covers the entire county.**

Olmsted County is comprised of 18 townships and 8 incorporated cities (Figure 2). Priorities identified in the *County Water Plan* support surface and ground water resource protection in all of the municipalities within the County. Table 2 summarizes local water management services by the organization providing services and by the jurisdiction served. Most water management services are provided county-wide.

**Figure 2. Cities and Townships in Olmsted County.**



**2. The plan addresses problems in the context of watershed units and groundwater systems.**

Olmsted County is drained by three major watersheds – the Root, Whitewater, and Zumbro (Figure 3). The Zumbro is an urbanizing watershed containing approximately 90% of the County’s population (Table 1). Land use in the Root and Whitewater watersheds is dominated by are of

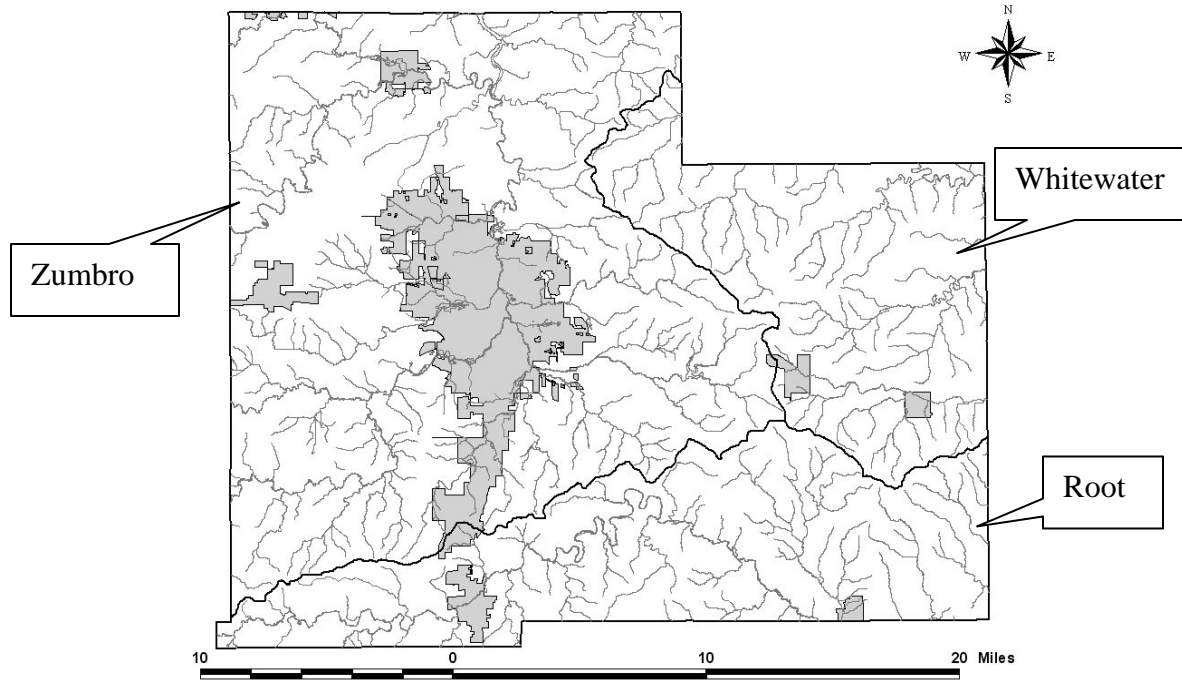
Olmsted County resides in the Zumbro Watershed. The County supports surface water management efforts in each of the major watersheds and supports groundwater and drinking water protection efforts through recharge preservation and pollution prevention in drinking waters supply management areas and wellhead protection areas (Figure 4).

**Table 1. Olmsted County Watershed Population Estimates Based on the 2004 State Demographer's Population Estimates.**

	2004 Estimate	Root River Watershed	Whitewater Watershed	Zumbro Watershed
Byron City	4,500	-	-	4,500
Chatfield City (part)	1,125	1,125	-	-
Dover City	555	-	555	-
Eyota City	1,788	-	1,788	-
Pine Island City (part)	408	-	-	408
Rochester City	94,820	-	-	94,820
Stewartville City	5,703	5,703	-	-
Cascade Township	3,214	-	-	3,214
Dover Township	432	24	408	-
Elmira Township	355	345	10	-
Eyota Township	435	91	133	211
Farmington Township	503	-	112	391
Haverhill Township	1,575	-	372	1,203
High Forest Township	1,063	645	-	418
Kalmar Township	1,166	-	-	1,166
Marion Township	6,175	129	-	6,046
New Haven Township	1,215	-	-	1,215
Orion Township	600	600	-	-
Oronoco City	933	-	-	933
Oronoco Township	2,391	-	-	2,391
Pleasant Grove Township	778	692	-	86
Quincy Township	345	-	345	-
Rochester Township	1,991	-	-	1,991
Rock Dell Township	628	183	-	445
Salem Township	1,053	-	-	1,053
Viola Township	531	-	472	59
Olmsted County	134,282	9,537	4,194	120,551
	100%	7%	3%	90%

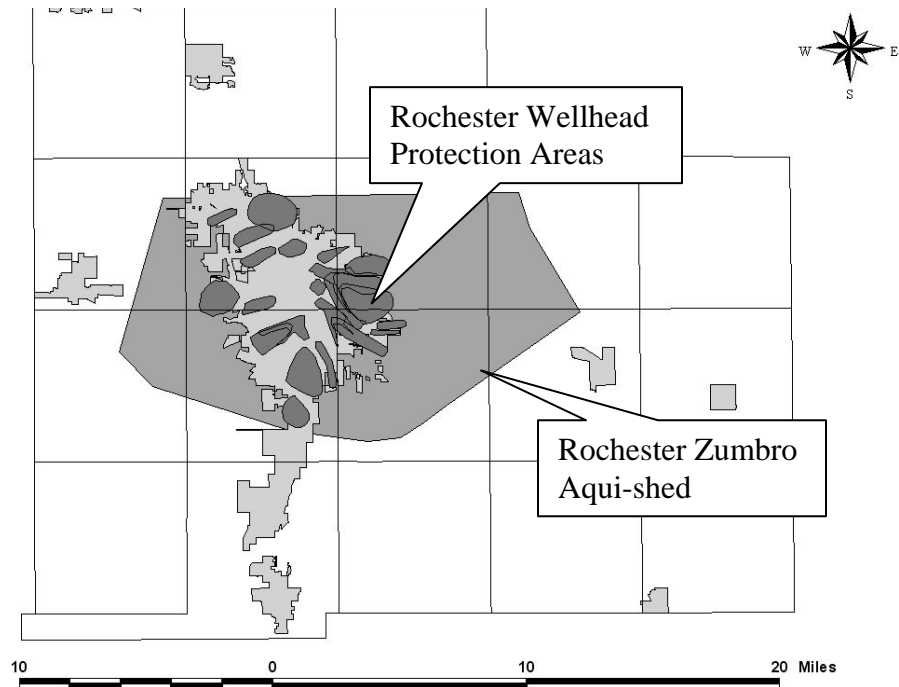
*\* Where municipalities drain to more than one watershed, the watershed population estimate is based on the percent of municipal area in the watershed.*

**Figure 3. Major Watersheds in Olmsted County.**



*Source: Minnesota Department of Natural Resources*

**Figure 4. Groundwater Protection Areas in the Rochester Area.**



*Source: US Geological Survey & Rochester Public Utilities*

**3. The plan is based upon principals of sound hydrologic management of water, effective environmental protection, and efficient management.**

Olmsted County relies largely on the advice provided by state and federal resource management agencies and professional consultants in its assessment of water resource conditions and the development of protection strategies.

**4. The plan is consistent with local water management plans prepared by counties and watershed management organizations wholly or partially within a single watershed unit or groundwater system.**

Olmsted County participates in local county and watershed planning efforts as a means of providing coordination within watershed areas and groundwater systems. The County is a Joint Powers Board member of the Southeast Minnesota Water Resources Board, Whitewater Watershed Project, and the Hiawatha Resource Conservation and Development Council. The County is also an active participant in the Basin Alliance for the Lower Mississippi and the Zumbro Watershed Partnership. The Environmental Services coordinator working in conjunction with the Environmental Management Team is responsible to see that all of these local and regional efforts are coordinated within Olmsted County and integrate County water management goals and objectives.

**5. The plan covers a five year period.**

The *Water Plan* covers the five year period 2005-2010.

Pursuant to 103B.301 Minnesota Statutes 2002, section 103B.305, Subd. 7b, priority concerns were selected by the County with consideration of the following guidance:

- That the number of priority concerns be limited and commiserate with the duration of the plan and the resources available to implement solutions.
- That the character of the priority concerns not be general, but rather limited in scope.
- That an ongoing water resource management issue in the county that has generated serious conflict should be selected, or a sound explanation provided why it will not be addressed in the plan.

A summary of all of the recommended priority concerns that were received are included in the Scoping Document which is included in the Appendix.

The following four priority concerns were recommended by the County Environmental Commission and adopted by the Olmsted County Board of Commissioners in response to the Priority Concerns identified in the Scoping Document. Effective implementation of these items will address the County's highest water management priorities as well as most of the concerns identified in the scoping process.

- Continue Current Water Management Services.
- Construct and Operate the Chester Community Sewer.
- Implement the South Zumbro Storm Water and Capital Improvement Plan.
- Support Watershed Management Organizations.

**Table 2. Water Plan Implementation Priorities.**

<b>Implementation Priority</b>	<b>Lead Agency</b>	<b>Source of Specific Implementation Actions</b>	<b>Plan Available</b>	<b>Estimated Cost</b>
Continue Current Water Management Services	Environmental Services	Annual Departmental Work Plans and Budgets	County Departments	\$520,000/yr
Construct and Operate the Chester Community Sewer	Environmental Services	Chester Heights Wastewater Collection Project Facility Plan	Environmental Services	\$2 million Plus \$53,000/yr
Implement the South Zumbro Storm Water and Capital Improvement Plan	Public Works	South Zumbro Storm Water and Capital Improvement Plan	<a href="http://www.olmstedcounty.gov">www.olmstedcounty.gov</a> website and at Public Works Department	\$1 million
Support Watershed Management Organizations	Environmental Services	Watershed Plans	<a href="http://www.zumbrowatershed.org">www.zumbrowatershed.org</a> Environmental Services	\$40,000/yr

Olmsted County Environmental Services  
 2116 Campus Drive SE  
 Rochester, MN 55904  
 (507) 285-8339

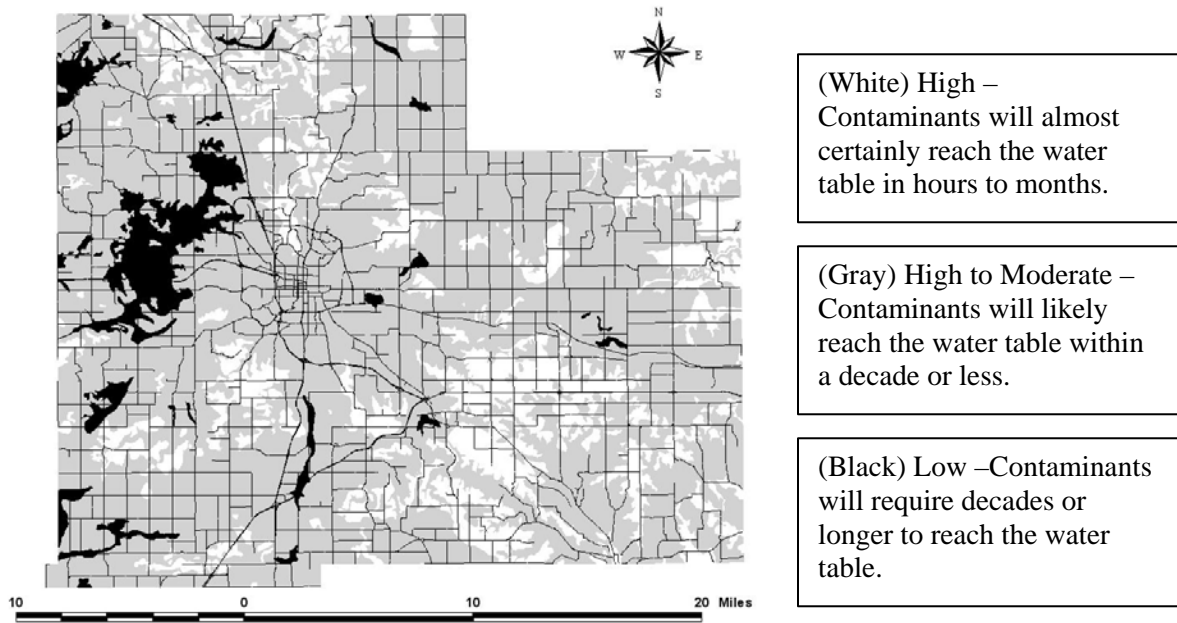
Olmsted County Public Works  
 2122 Campus Drive SE  
 Rochester, MN 55904  
 (507) 285-8231

## Priority Implementation Items for the Period 2005-2010

### 1. Continue Current Water Management Services.

The County will continue to provide a wide array of services to help residents meet their water needs. These include the administration of water programs for private wells and sewer systems, wetlands, shore lands, water testing, solid and hazardous waste, land development, as well as soil and water conservation. Most of these programs are administered county-wide. Those that aren't are administered by townships and cities.

**Figure 5. Sensitivity of the Area to Ground Water Pollution.**



*Source: Minnesota Geological Survey*

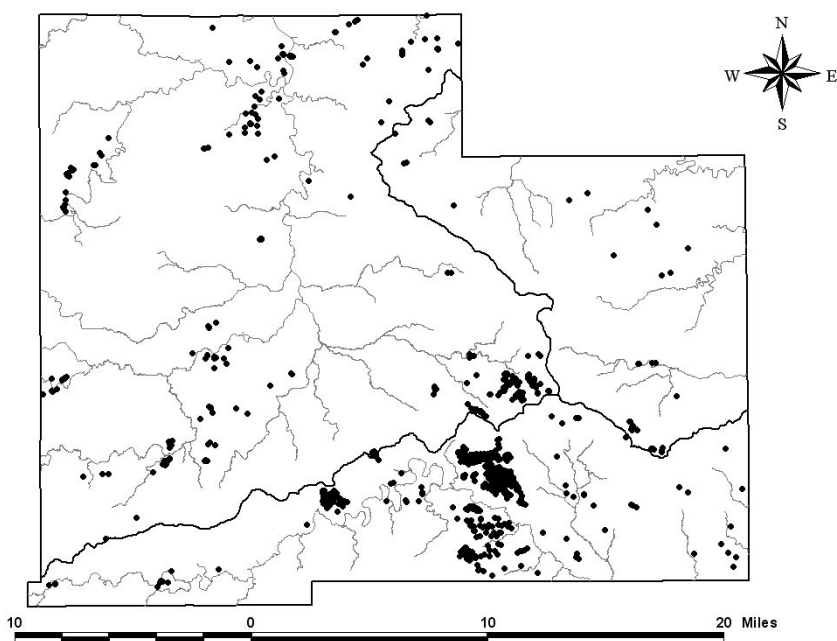
### Public Health Concern:

There are 134,282 people residing in Olmsted County and approximately 1.5 million overnight visitors per year, all of whom need access to drinking water either by a public water supply system or a private well, and many who recreate in local surface waters.

All drinking water in Olmsted County is obtained from groundwater aquifers. Because there are no natural lakes in Olmsted County, most recreational water activity in Olmsted County takes place in swimming pools, but a number also use local flood control reservoirs and inundated former gravel pits and quarries. Recreational waters at highest risk for biological contamination are pools that have a high volume of swimmers (including properly-operated public pools) and swimming beaches at surface water bodies subject to manure runoff. Vulnerability of Olmsted County's drinking water and recreational waters to contamination is largely a function of the ambient conditions found locally (Figures 5 & 6).

Olmsted County is underlain by sequences of fractured limestone and dolomite, relatively impermeable shale, and porous sandstone. Two primary aquifer systems serve Olmsted County, the Galena aquifer (“upper aquifer”) and the St. Peter—Prairie du Chien—Jordan aquifer (“lower aquifer”). The upper aquifer was largely abandoned in the late 1950’s due to widespread nitrate groundwater contamination. The primary drinking water source used by communities, suburban, and rural populations in Olmsted County is the lower aquifer. It is located 300-700 feet below the ground surface and typically produces a high volume and high quality of drinking water. Residents using private wells constructed prior to 1957 in Olmsted County are more likely to drink water from the contaminated upper aquifer, compared to those who use public water supplies from the lower aquifer, which is deeper and more regularly monitored, treated, and/or updated. The lower aquifer is at risk of being replaced by poorer quality water from the upper aquifer as groundwater migrates down to it.

**Figure 6. Sinkholes in Olmsted County.**



*Source: Minnesota Department of Natural Resources.*

From 1998-2002, 19 reports of waterborne *illness* with a suspected biological origin were received at OCPHS, up from 7 reports in the prior 5-year period. The most recent drinking water *outbreak* in Olmsted County dates to 1995, when surface water at a youth camp was contaminated with *E. coli* O157:H7, *Campylobacter jejuni*, and *Salmonella* London. Prior to that, the most recent outbreak was in 1984 when well water was contaminated with *Campylobacter jejuni*. The likely cause was determined to be feedlot runoff.

During the period from 1998-2002, 2715 samples were submitted to OCPHS Water Testing Laboratory for analysis. Only 4% of water tests submitted were requested for the purpose of detecting suspected contamination. From a smaller data set of 2280 samples during the same time period, the following results were observed:

- Coliform bacteria were present in 226 out of 949 (24%) samples submitted for testing from Drilled Driven and Unspecified Wells (DDU), and in 270 out of 1331 (21%) samples from Grouted and Cased Wells (GC).
- The percentage of samples tested each year with coliform bacteria present ranged from 7-27% for DDU wells, and from 5-25% for GC wells.

The Minnesota Department of Agriculture noted in their comments during the Scoping phase that nearly two decades of their work has shown that the routine application of pesticides and nitrogen fertilizer do impact the county's drinking water wells. They suggested that a well designed monitoring effort capable of tracking changes in detections and concentrations of ag chemicals over time is needed so proper decisions may be made. The agency recommended that the County work with the Department of Agriculture and regional groups to establish a water quality monitoring network to assess urban and agricultural impacts.

Groundwater is one of our most important natural resources, supplying water for drinking, agricultural and commercial uses, and as a source of cold water critical to maintaining trout streams and other surface waters. Fens, wetlands, and springs all exist because of groundwater, and are especially sensitive in Olmsted County due to increasing development. The Karst geology of southeastern Minnesota provides abundant groundwater, but also increases its vulnerability to contamination. Protection of groundwater through the implementation of agricultural Best Management Practices should be emphasized in order to ensure water entering aquifers, through infiltration, sinkholes, or subsurface streams, is of high quality. In addition, well sealing programs and efforts to prevent contamination from existing and new wells is critical to sustaining good groundwater quality. The Decorah Edge is an especially important recharge area that should receive high priority for protection (Figure 7).

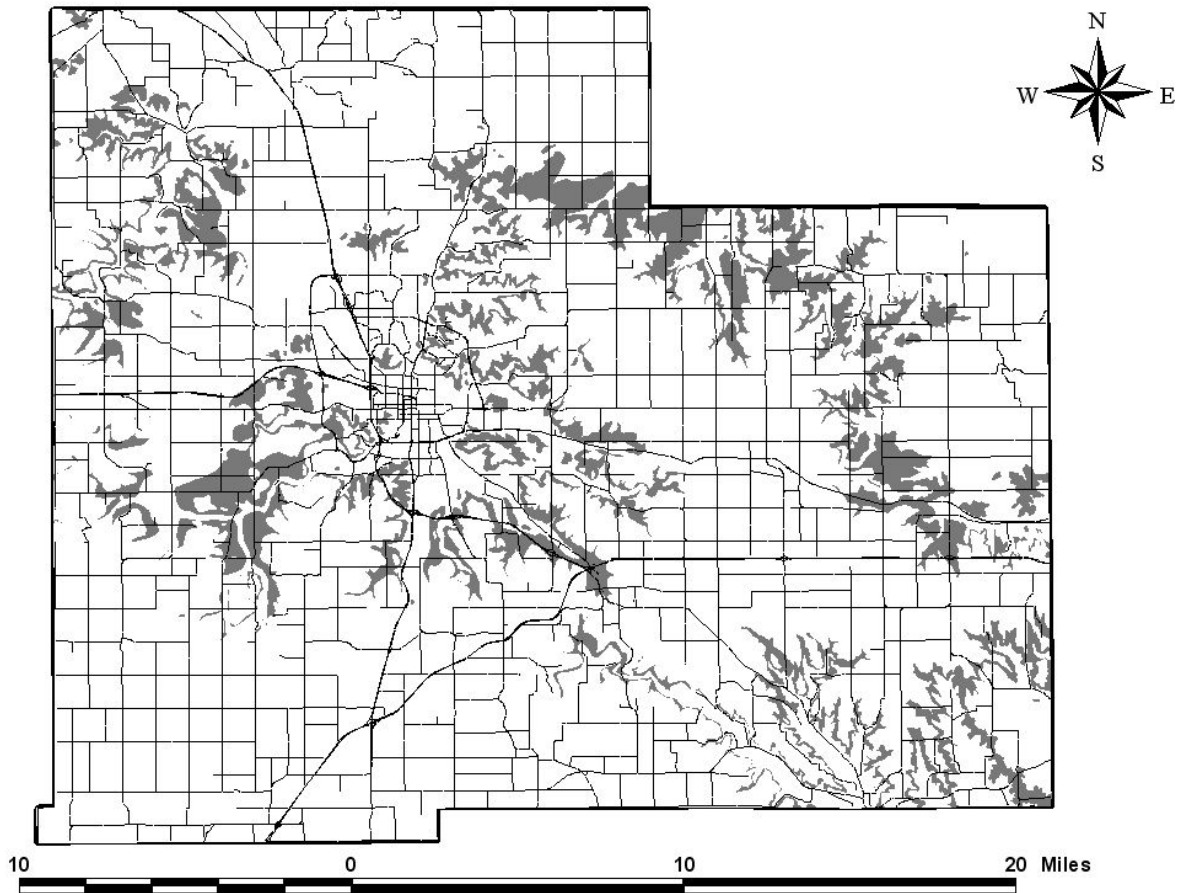
### **Environmental Concern:**

Agriculture and urban development dramatically influence how much water is retained on the landscape. The more water that can be held on the landscape, the greater the groundwater recharge and the less impact that occurs to surface waters. Implementation of agricultural Best Management Practices (BMP's) help to reduce flooding and protect stream resources by reducing sediment in the Mississippi River and its tributaries. Farming practices that help to hold water on the landscape will improve groundwater recharge, reduce flooding and soil and stream bank erosion and nutrient and chemical loading in surface and ground waters. Agricultural management practices including planting of buffers, construction of holding ponds, contour farming and permanent vegetative cover, particularly through the planting of native vegetation are important to improved water quality in the Mississippi River watershed.

Erosion and sedimentation from agricultural runoff and stream banks are the major source of pollutants to the surface waters. The Zumbro River, Root River and Whitewater Rivers are listed on the 2004 impaired waters list of Turbidity. Flooding, particularly in the Root River Watershed, has been an issue for cities and county residents in Olmsted County. Implementation of agricultural Best Management Practices (BMPs) that retains water on the landscape where it falls helps to reduce flooding, reduce soil erosion, protect stream banks and improve water resources.

Site development can result in increased runoff and severe on-site erosion and large quantities of soil being transported off-site and into surface waters. Most of the cities within the county are not required to adopt storm water management plans at this time, however problems exist for these small cities when storm water and construction site erosion are not addressed comprehensively and planned for in the context of the water plan management goals and objectives. Development pressures in the surrounding areas of municipalities and within small municipalities will require the county to oversee and pay close attention to storm water runoff and erosion control in these areas.

**Figure 7. Area where Decorah Shale is First Bedrock and is Overlain by Less than 50-feet of Unconsolidated Materials.**



*Source: Minnesota Geological Survey*

Wetlands should be protected and restored whenever possible. Holding ponds, especially natural or created wetlands, can serve as important tools for reducing urban storm water runoff and preventing nutrients from entering surface waters.

Wetlands have a wide range of functions: controlling floods; purifying water by recycling nutrients, filtering pollutants, and reducing siltation, controlling erosion; sustaining biodiversity and providing habitat for plants and animals, recharging groundwater, augmenting water flow, and storing carbon. Retaining water on the landscape in the watershed by wetland creation and restoration will help address priority concerns of erosion control and storm water quality and quantity. The County and City of Rochester have developed watershed based plans including the Rochester Storm Water Management Plan and the South Zumbro Storm Water Management and Capital Improvement Plan that identify water retention as key to managing water resources in the county. Incorporating enhancement and preservation of wetlands and open space/environmental corridors on the landscape will address the goals and objectives laid out in these plans. Addressing this priority concern would also aid local officials in providing groundwater resource protection of the Decorah Edge through development of the local ordinances or voluntary conservation programs.

There are several calcareous fens in Olmsted County afforded a higher level of protection under Minn. R. ch. 7050. There are likely more wetlands that exhibit calcareous-fen hydrology and geochemistry and biology that are not covered under state rules that the MPCA suggests should also receive a very high level of legal protection. The agency recommends that the County develop an inventory of sensitive wetlands (listed and unlisted calcareous fens, Decorah Edge seep wetlands, etc.) and include delineations for the ground water-sheds that feed these wetlands. If the wetlands ground water supplies are not well understood, then the agency recommends delineating the ground water-sheds for these sensitive waters as well as the critical ground water recharge areas for trout streams located in the eastern parts of the County.

The bluffslands of southeastern Minnesota support some of the highest quality and most heavily fished trout streams in the Midwest. These streams are dependent upon an abundant and clean supply of cold water, primarily ground water originating from springs and/or seeps, and from clean surface water runoff. In-stream habitat, which influences trout reproduction and growth is greatly impacted by surface water runoff affected by riparian land uses. Agricultural Best Management Practices provide natural riparian buffers along stream banks and near springs and seeps that will maintain stable banks, reduce erosion and provide cover and food for trout. Holding water on the landscape to minimize flooding will reduce sedimentation and minimize the impact of nutrients, pesticides and herbicides on water quality. Urban development should route warm storm water away from trout streams.

Riparian cropland areas, cropland in groundwater recharge areas, erodible lands that need BMPs to retain profitable farm land production, highly erodible lands that should not be farmed and drained wetlands in areas that would improve water quality, wildlife habitat and help reduce flooding issues. Also working lands that would benefit from BMPs such as conservation tillage and erosion control practices.

**Goal:** To continue administration of the following programs:

- State Wetlands Conservation Act
- State Shorelands Regulations
- State Well Construction Program

- State Individual Sewage Treatment System (ISTS) Program
- County Solid & Hazardous Waste Programs
- County Drinking Water Testing Laboratory
- County Water Planning Program
- County Land Use Planning & Zoning Programs
- District Soil and Water Conservation Programs

**Objectives:**

- To provide adequate staff to administer the programs
- To provide adequate funding through county levies, fees, and grants

**Initiatives:** Departments will be responsible for developing and implementing initiatives for program administration. The most notable new initiative to be undertaken during the period 2005-2010 is the Conservation Reserve Enhancement Program. That program will be implemented by the Olmsted Soil and Water Conservation District. Specific recommendations received during the scoping process will be considered in the development of annual departmental work plans. The final decision as regards the work plans will be made by the Olmsted County Board of Commissioners.

**Table 3. Summary of Water Management Services and Providers.**

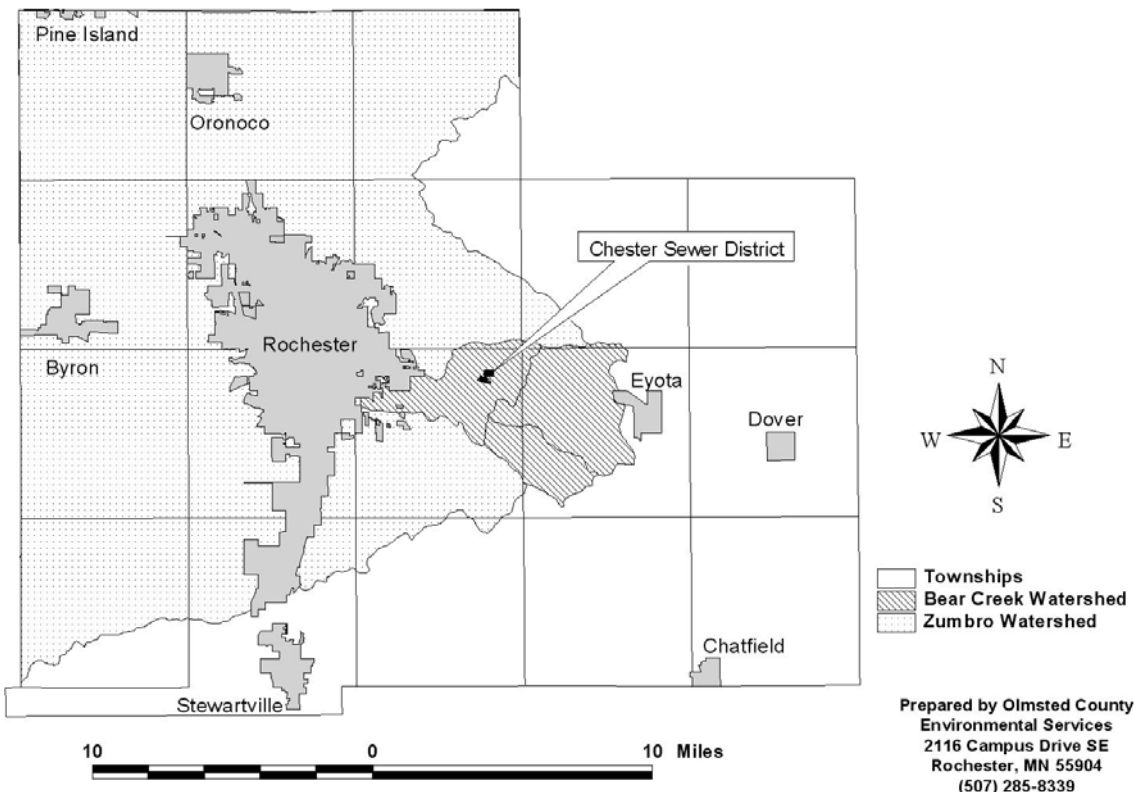
<b>Program or Service</b>	<b>Service Area</b>	<b>Primary Service Provider</b>
State Wetlands Conservation Act	Olmsted County except for the City of Rochester	Olmsted Soil and Water Conservation District
	City of Rochester	Rochester-Olmsted Consolidated Planning
State Shorelands Regulations	Olmsted County	Rochester-Olmsted Consolidated Planning
Well and Water Supply Program	Olmsted County	Rochester-Olmsted Consolidated Planning
State Individual Sewage Treatment System (ISTS) Program	Marion, Eyota, Oronoco, Quincy, & Viola Townships	Rochester-Olmsted Consolidated Planning
	Cascade, Dover, Elmira, Haverhill, High Forest, Kalmar, Orion, Pleasant Grove, Rochester, Rock Dell, Salem Townships	Township Cooperative Planning Association
	Farmington Township	Farmington Township
	New Haven Township	New Haven Township
County Solid & Hazardous Waste Programs	Olmsted County	Olmsted County Public Works Department
County Drinking Water Testing Laboratory	Olmsted County	Olmsted County Public Health Services
County Water Planning Program	Olmsted County	Olmsted County Environmental Services
County Land Use Planning	Olmsted County	Rochester-Olmsted Consolidated Planning
Zoning	Marion, Eyota, Oronoco, Quincy, & Viola Townships & City of Rochester	Rochester-Olmsted Consolidated Planning
	All other municipalities in the County administer their own zoning regulations	
Soil and Water Conservation Programs	Olmsted County	Olmsted Soil and Water Conservation District
County Storm Water Management Program	Olmsted County urbanizing areas outside of the City of Rochester	Olmsted County Public Works

## 2. Construct and Operate the Chester Community Sewer.

Olmsted County is committed to constructing and operating a community sewer to serve the 110 homes and six businesses in the Chester Sewer District. Construction of the sewer collection system will be completed in 2005. The County will then own and operate the sewer system. The sewer collection system will replace the failing septic systems that are a source of groundwater pollution and an imminent public health threat. Sewage will be piped to the Rochester sewer and treated at the City's Water Reclamation Plant.

The sewer project will eliminate a source of groundwater pollution in the Bear Creek watershed area of the Zumbro watershed (Figure 8).

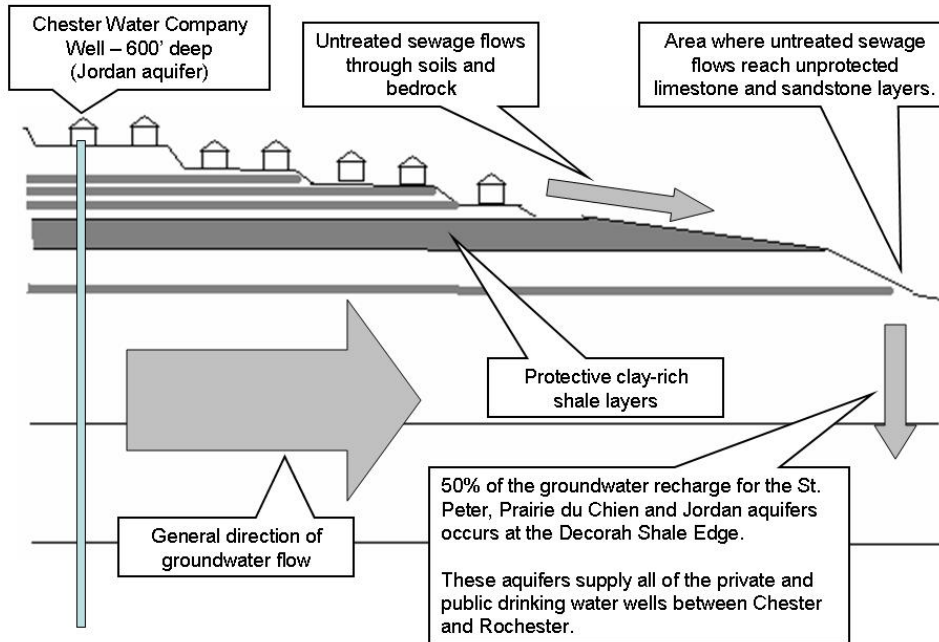
**Figure 8. Chester Sewer Project Area.**



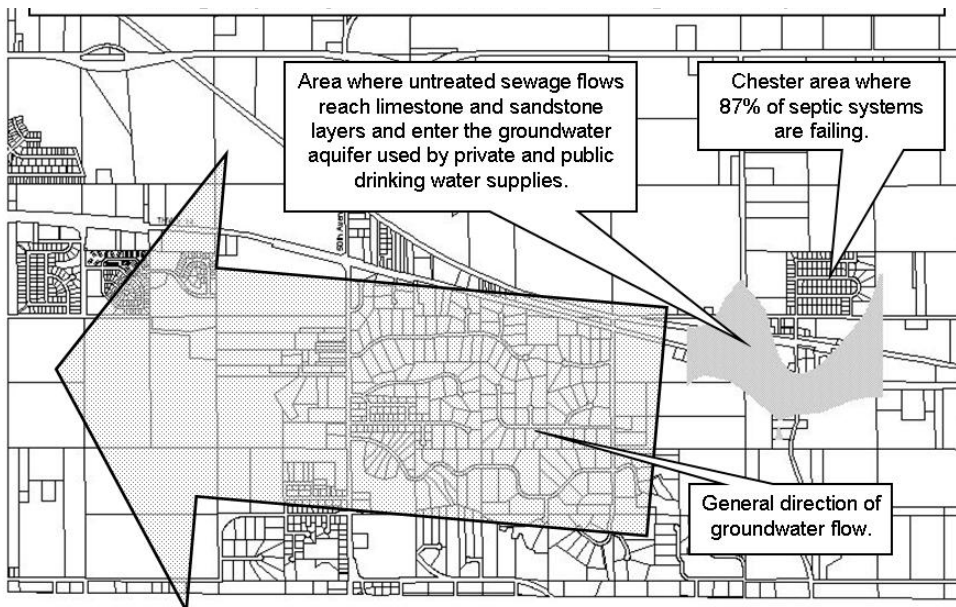
### Health Concern:

Chester Heights is a manufactured housing development where groundwater contamination from failing individual septic systems and unique underlying geology, has left residents with an inability to individually address the need to upgrade their systems. In 1996 the County Environmental Management Team identified the Chester area as the most critical sewer problem area in the County. An independent contractor (Septic Evaluation Services, Inc) surveyed the sewer systems in Chester Heights and found that 87% of the systems in the area are failing. Based on this and other information collected by Olmsted County, the Chester area was identified as an area that presented an imminent threat to public health and safety as defined in Minnesota Statute 115.55 and Minnesota Rules Chapter 7080.19a (Figures 9 & 10).

**Figure 9. Groundwater and Sewage Flows in the Chester Area.**



**Figure 10. Area of Marion Township where Untreated Sewage from Chester's Failing Septic Systems Enters the Drinking Water Aquifer.**



Map prepared by Olmsted County Environmental Resource Services based on information from the Minnesota Geological Survey, the US Geological Survey, and Septic Evaluation Services, Inc.

**Goal:** To provide adequate sewage treatment in the Chester Sewer District

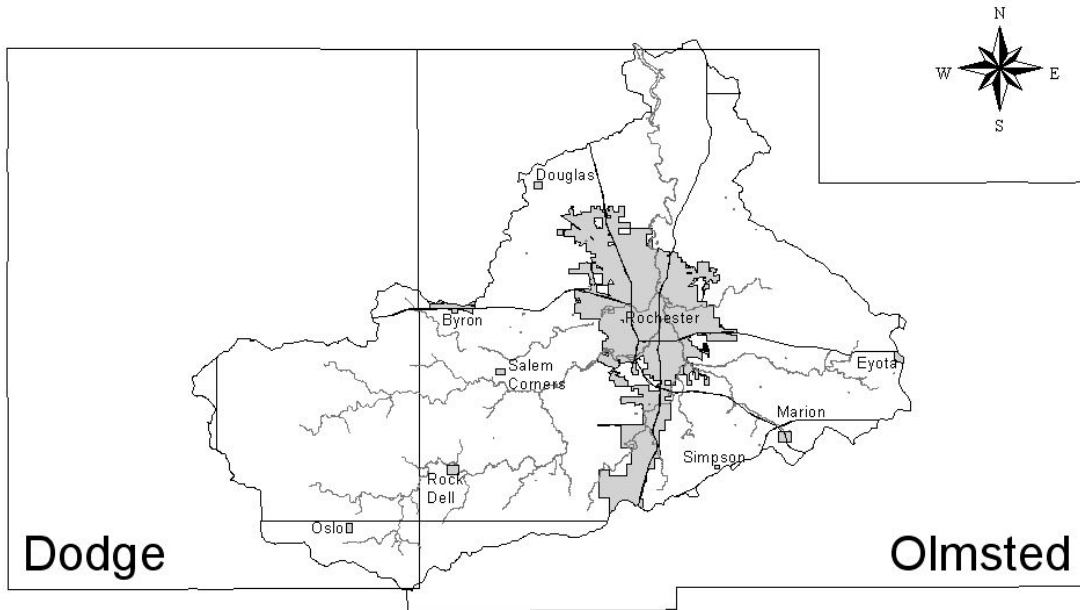
**Objectives:** The County's objectives are to construct a community sewage collection system that serves the District and once constructed, to operate and maintain the system.

**Initiatives:** Olmsted County has arranged financing, engineering, and construction of the sewage collection system. The project is estimated to cost \$2 million and be completed in 2005. Olmsted County will operate and maintain the sewage collection system via a contract with an outside vendor. The \$53,000 per year operation and maintenance cost will be provided through sewer fees. The utility will be overseen by the Environmental Services Coordinator. There is no implementation ending date.

### 3. Implement the South Zumbro Storm Water and Capital Improvement Plan.

Olmsted County is committed to implementing the recently adopted South Zumbro Storm Water and Capital Improvement Plan. Implementing the Plan will benefit both the South Zumbro watershed as well as the downstream Zumbro River corridor (Figure 11). The Zumbro has been identified as an Impaired Water in Olmsted County as well as in the downstream area of Wabasha County (Figure 12).

**Figure 11. South Zumbro Watershed.**



#### **From the South Zumbro Storm Water and Capital Improvement Plan prepared by Bonestroo, Rosene, Anderlik & Associates:**

In the South Zumbro Watershed the alteration of the natural hydrology by roadways is now so extensive that the distinction between transportation and water management has become blurred.

As is the case in many rural and suburban areas across the country, road ditches in the watershed now function as the headwaters of the tributary streams—intersecting and redirecting upland drainages. The natural drainage system is bisected and influenced by culverts and bridges. These are also the points at which roadways are at the greatest risk of flooding and where road safety is the most compromised. To address these concerns, Olmsted and Dodge Counties decided to examine an approach that integrates storm water management with transportation planning design principals. *The South Zumbro Watershed Storm Water and Capital Improvement Plan* determined that implementing a watershed-based bridge replacement approach would:

- Reduce runoff flow volumes and velocities
- Improve water quality
- Lower transportation and maintenance costs
- Improve road safety
- And perhaps most importantly of all, provide enough cost savings to pay for the installation of upstream storm water management systems

Bridges and culverts have dramatically altered the landscape of the South Zumbro Watershed, specifically the drainage characteristics of our local waterways. Historically, bridges were not constructed with storm water (runoff) rate control in mind, but were designed to pass flows quickly downstream—a practice that results in hydraulic overloading, channel instability, degradation of recreational waters, and diminished wildlife habitat. These downstream problems are compounded because the stream corridors become isolated from the riparian wetlands and their floodplains that would, under natural conditions, help slow and temporarily store floodwaters. Without these critical storage areas, a cascading effect took place in the watershed; storm water flows increased as stream corridors were progressively degraded, resulting in undue stress on transportation infrastructure and a need for larger and larger bridges downstream.

A big-picture, watershed-based approach that integrates storm water management with transportation planning can solve these problems. Rather than reactively designing individual bridges, this approach advocates installing strategically placed upstream flow-control structures to offset peak flows from different subwatersheds. By simply retaining water longer in the watershed's upper reaches, "flashy" storm water flows are attenuated and downstream bridge crossings can be reduced in size. Downsizing of the transportation infrastructure provides an overall costs savings compared to the traditional construction approach, and the installation of the upstream storm water management structures provide an added water quality benefit to downstream receiving waters.

The basic concept is to use riparian overflow areas for temporary water storage, and to create low berms and flow structures that provide rate control near the priority bridge crossings. When designed in conjunction with each other, these ecologically sensitive improvements can attenuate flows, stabilize streams, and improve water quality. Ultimately, Dodge and Olmsted Counties will be able to replace downstream bridges with less expensive, lower capacity culverts (or appropriately sized bridges), resulting in significant cost savings to their bridge replacement programs.

Implementing the high potential improvements is dependent on the schedule of the bridge replacement program. Ideally, flow control improvements should be implemented before downstream bridges are replaced. A feasibility study should precede the replacement so the bridge (major culverts included) can be appropriately sized when considering upcoming flow control improvements.

Improvements in the upper reaches of the watershed are of the highest priority, since they will benefit the greatest number of bridge-stream crossings (Table 3). However, the implementation schedule depends on available funding.

Of these high priority sites, those that are downstream of the flood reservoirs would not necessarily require a flow control structure. The appropriate size bridge could be replaced considering the attenuation provided by the reservoirs. Bridge 92149, immediately downstream of reservoir SR-2 (Silver Creek), would not require a berm and could easily be downsized. Other bridges that could be downsized are Bridges L6236 and L8565 below reservoir BR-1 (Chester Woods Park Dam on the Bear Creek), and Bridge 7092 below reservoirs WR-6A & WR-4 in Willow Creek. However, these sites will require a more detailed study.

Improved upstream water management means bridges can be replaced with less costly, less maintenance-intensive culverts. The ultimate goal is to use funds from the Counties' bridge replacement programs, and other sources, to build upstream structures that allow smaller, less expensive stream

crossings. Potential savings-to-cost ratios can be greater than 1.2 (savings is 1.2 times the cost) just by constructing the upstream improvements in the watershed.

Temporarily storing water in natural upstream riparian areas gives pollutants an opportunity to settle rather than being immediately transported downstream. Ponding helps remove phosphorus and total suspended solids, improving water quality in the stream corridor. Reduced pollutant loads benefit downstream waterbodies such as Cascade Lake and Lake Zumbro. Also, because flow rates are decreased, channel erosion and bank sloughing decreases.

In summary, integrating storm water management and transportation efforts delivers the following benefits:

- Reduced runoff flow volumes and velocities, resulting in greater flood protection for bridges, roads, and property owners
- Improved water quality
- Stabilized drainage and stream systems
- Reduced sediment and streambank erosion
- Enhanced wildlife habitats
- Protected groundwater recharge areas
- Lower transportation construction and maintenance costs
- Increased connectivity between streams, wetlands and uplands
- Restored wetlands

Several different types of analytical tools were used in this study to evaluate the watershed conditions. Site assessments were conducted at priority bridge crossing locations to determine the hydrologically important characteristics of the drainage area. Hydrologic modeling was performed to identify potential locations for upstream flow control structures. Wetland assessments were conducted to determine where water storage could potentially impact each wetland basin, and where creating berms or flow control structures could enhance and/or restore historic water regimes. Finally, topographic data was analyzed with geographical information system (GIS) software to explore storage opportunities near each priority bridge crossing.

At the beginning of the study, a Technical Advisory Committee (TAC) and Policy Advisory Committee (PAC) were established to oversee the project. The TAC included land and water resource managers, technicians, and educators, as well as transportation engineers. This committee guided the development of the study and reviewed technical aspects of the project. The PAC included elected officials from the Dodge and Olmsted County Boards of Commissioners, Rochester City Council, Olmsted County Township Representatives, and the Olmsted Soil and Water Conservation District (see Appendix A). The core members of this committee represented the South Zumbro Watershed Joint Powers Board. The PAC provided support in analyzing specific policy initiatives and their implications, and with facilitating contact with local landowners.

**Table 3. High Priority Flow-Control Improvements.**

No	Sub-watershed	Bridge No.	Location (road, Township-Section)	Down- sizing Potential at bridge location	Down- sizing Potential Upstream of bridge location	Comments
<b>OLMSTED COUNTY:</b>						
1	Cascade Creek	89160	County Hwy 5, Salem-5	High	High	Demonstration site upstream 89160b (Tvedt's).
2	Cascade Creek	89155	County Hwy 3, Salem-10	High	High	Medium priority if demonstration site upstream 89155b (Stork's) is built
3	Cascade Creek	88708	County Hwy 3, Salem-3	High	Low	
4	Cascade Creek	4075	70th Ave SW, Salem-11/12	High	High	
5	Cascade Creek	L6262	45th Ave SW, Rochester-5	High	High	
6	Salem Creek	89180	County Hwy 25, Salem-17	High		
10	South Zumbro	L6180	County Hwy 5, Rock Dell-17/16	High	High	
12	South Zumbro	L6204 L6205	110th Ave SW, Rock Dell-6/5	High	Medium	Raise road 2 to 3 ft
15	SZ-Goose Creek	L6151	80th Ave SW, Rock Dell-22/23	High		
27	Bear Creek	L6236	County Hwy 11 (50th Ave SE), Marion-9/10	High		Chester Woods Park Dam (SR-1) upstream
28	Bear Creek	L8565	County Rd 143 (20th St SE), Marion-8/17	High		Chester Woods Park Dam (SR-1) upstream
30	Silver Creek	92149	County Hwy 11 (55th Ave NE), Haverhill-27	High		SR-2 Dam just upstream
32	Northeast area	1571	Dresser Dr NE, Haverhill-6	High		Hwy 63 crossing before Zumbro river
33	Northwest area	88712	County Hwy 3, Kalmar 12	High		Flows to Kings Run. More than 9 crossings to Zumbro R.
36	North	88746	County Rd 114 (11th Ave NE), Oronoco-1	High		
<b>DODGE COUNTY:</b>						
38	Salem Creek	97542	240th Ave, Canisteo-17/16	High	High	Raise road about 2 ft?
39	Salem Creek	L6472	670th St, Canisteo-15/22	High	High	Bridge being designed; to be done by April 15 2002
40	Salem Creek	L5500	260th Ave, Canisteo-22/23	High	High	Ideal for ponding
A1	Salem Creek	89102	County Hwy 9 (220th Ave), Ashland-12/13/Canisteo-7/18	High		Not in 5-yr bridge replacement plans
A2	Salem Creek	89099	County Hwy 9 (220th Ave), Ashland-24/Canisteo-19	High		Not in 5-yr bridge replacement plans
A3	Salem Creek	2350	County Hwy 9 (220th Ave), Ashland-25/Canisteo-30	High		Not in 5-yr bridge replacement plans
A4	South Zumbro	89101	County Hwy 9 (220th Ave), Hayfield-1/Vernon-6	High		Not in 5-yr bridge replacement plans

As the study progressed, the Counties worked closely with individual stakeholders and riparian landowners to identify problem areas, priority locations for farm ponds, wetland restoration opportunities, and potential sites for the installation of the flow control structures. Based on their input and review of the data, an ordered ranking system was established to identify optimal locations for flow control structures, wetland restoration, upland restoration, and rural section rain gardens.

The main source of financing for this watershed-based approach is expected to come from the savings in the Counties' bridge replacement programs. However, to demonstrate these savings, an initial investment from other sources (governmental programs and private grants) will be needed to kick-off the project. The Minnesota Department of Transportation (MnDOT) could facilitate this financing by recognizing the benefits of this integrated approach to bridge construction.

In addition, the new National Pollutant Discharge Elimination System (NPDES) Phase II Municipal Separate Storm Sewer Systems (MS4s) program provides an opportunity for local governmental units to work together to implement watershed-wide storm water management approaches. The MS4 program currently regulates storm water activities in a significant portion of the South Zumbro Watershed, including Olmsted County, the City of Rochester, Cascade Township, Haverhill Township, Marion Township, and Rochester Township. Cooperation is essential among these regulated communities. Working jointly on developing storm water best management practices (BMPs) can reduce storm water management costs, meet established water quantity and quality goals for recreational waterbodies, and improve the overall water quality of the entire watershed.

The study's financial analysis found that the savings achieved by using smaller bridges/culverts, while providing similar flood protection, could pay for the upstream improvement measures. The benefit/cost ratio is expected to be greater than 1.2 for the entire watershed, as estimated by the hydrologic and hydraulic study for the Cascade Creek Subwatershed. The benefits could be even greater if environmental enhancements (sediment deposition and streambank erosion) were considered in the analysis.

A financing strategy must be established to implement this study's recommendations, particularly the storm water components that would be integrated with the Counties' road and bridge replacement programs. In addition to capturing other funding sources, Olmsted and Dodge Counties should integrate relevant storm water projects into their transportation improvement funding, as the program will generate immediate and direct savings and other benefits to their transportation system, among them, reduced construction and maintenance costs.

**Table 5. Strategies and practices for Stream Corridors.**

Strategies	Practices
Floodway Preservation	Minimize filling and disturbance within the floodway to maintain stream capacity, preserve ecosystem and reduce impacts to infrastructure.
Stream Bank Stability	Promote best management and conservation practices, such as flow control structures, and buffers from agricultural and urban/suburban land uses.
Wetlands	Promote wetland restoration/enhancement and minimize wetland impacts to the extent possible. Enhance their water-regulating function.
Corridor Connectivity and Wildlife Habitat	Promote the connection of natural vegetation areas. Preserve existing trees and sensitive plant communities. Promote perennial vegetation growth. Minimize actions that break corridors into segments. Promote the establishment of buffer areas to enhance environmental quality and biodiversity.
Steep Slopes	Minimize removal of trees and disturbance of steep slopes.
Storm Water Runoff	Promote storm water best management practices (BMPs), such as rain gardens, check dams, farm ponds. Promote regulating flows from frequent storms.
Education	Educate citizens on the value and functions of the corridor for a healthy environment that protects infrastructure. Emphasize the impact of activities on water quality, storm water peak flows and infrastructure protection from flooding.

**Goal:** To implement the South Zumbro Storm Water and Capital Improvement Plan adopted by the Olmsted and Dodge County Boards.

**Objectives:** The primary objective is to secure funding for implementing the specific action items. To accomplish that Olmsted County will work with state and federal natural resource agencies as well as land owners.

**Initiatives:** Grant applications and other funding sources will be developed by Olmsted County Public Works staff to secure funding. The Public Works Department and Environmental Services staff will work with the Minnesota Department of Natural Resources to identify and address potential natural resource concerns regarding specific implementation items. This work has already begun. The projected cost for Olmsted County’s part of the Implementation Plan is approximately \$1 million.

#### 4. Support Watershed Management Organizations.

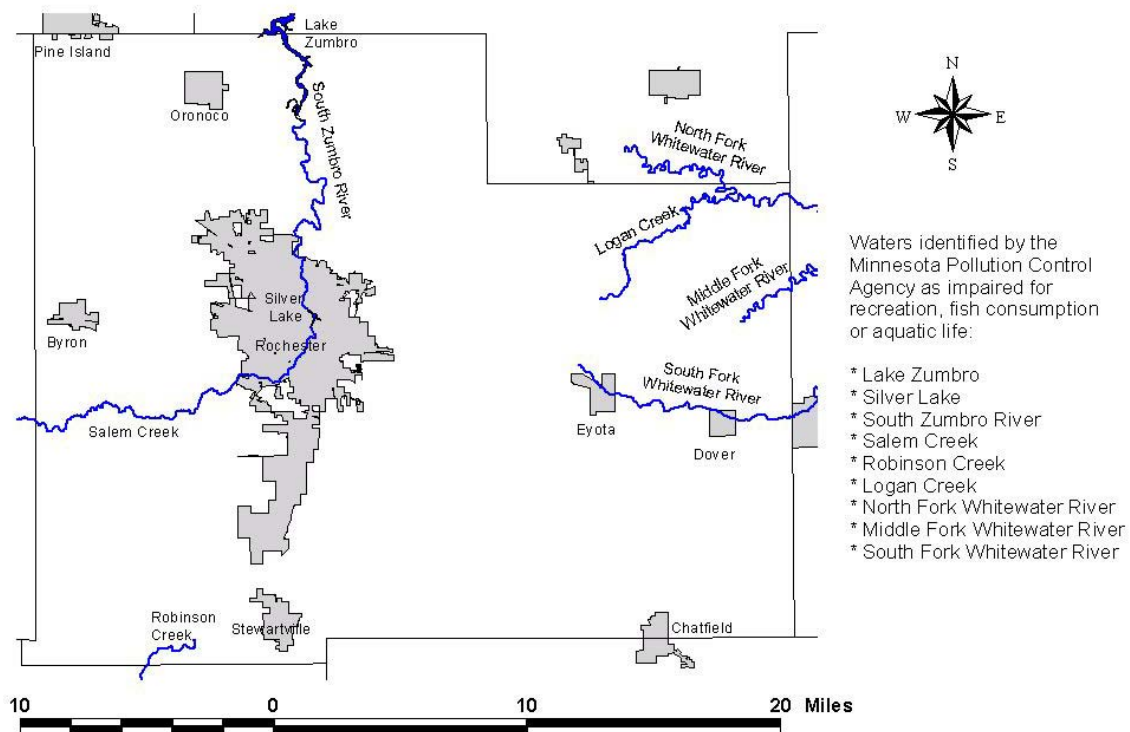
Olmsted County will support watershed efforts to improve stream quality in all three of the County's watersheds -- Root, Whitewater, and Zumbro. Many responses to the Priority Concerns Survey identified the need to correct stream impairments associated with excess nutrients, pesticides, turbidity, and fecal coliform bacteria, and the need to reduce sedimentation in lakes and reservoirs. The respondents recommended that work be done in urban and rural areas to reduce pollutants. Suggested actions included working with the state's Impaired Waters/Total Maximum Daily Loads (TMDL) Program, supporting the use of state and federal conservation programs for riparian buffers and wetlands, and compliance with state feedlot regulations.

#### Concerns:

The federal Clean Water Act requires states to adopt water quality standards to protect the nation's waters. 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. Many of Minnesota's water resources cannot currently meet their designated uses because of pollution problems from a combination of point and nonpoint sources.

As of 2003, 70 of the 500 miles of streams and rivers in Olmsted County have been assessed using state water quality standards. So far, all of the assessed waters have failed to meet the state standards (Figure 12). Consequently, the Minnesota Pollution Control Agency has categorized all of the assessed streams in the County as "Impaired Waters" which pose risks to human health, aquatic life, and recreation.

**Figure 12. Olmsted County Waters Identified as Impaired.**



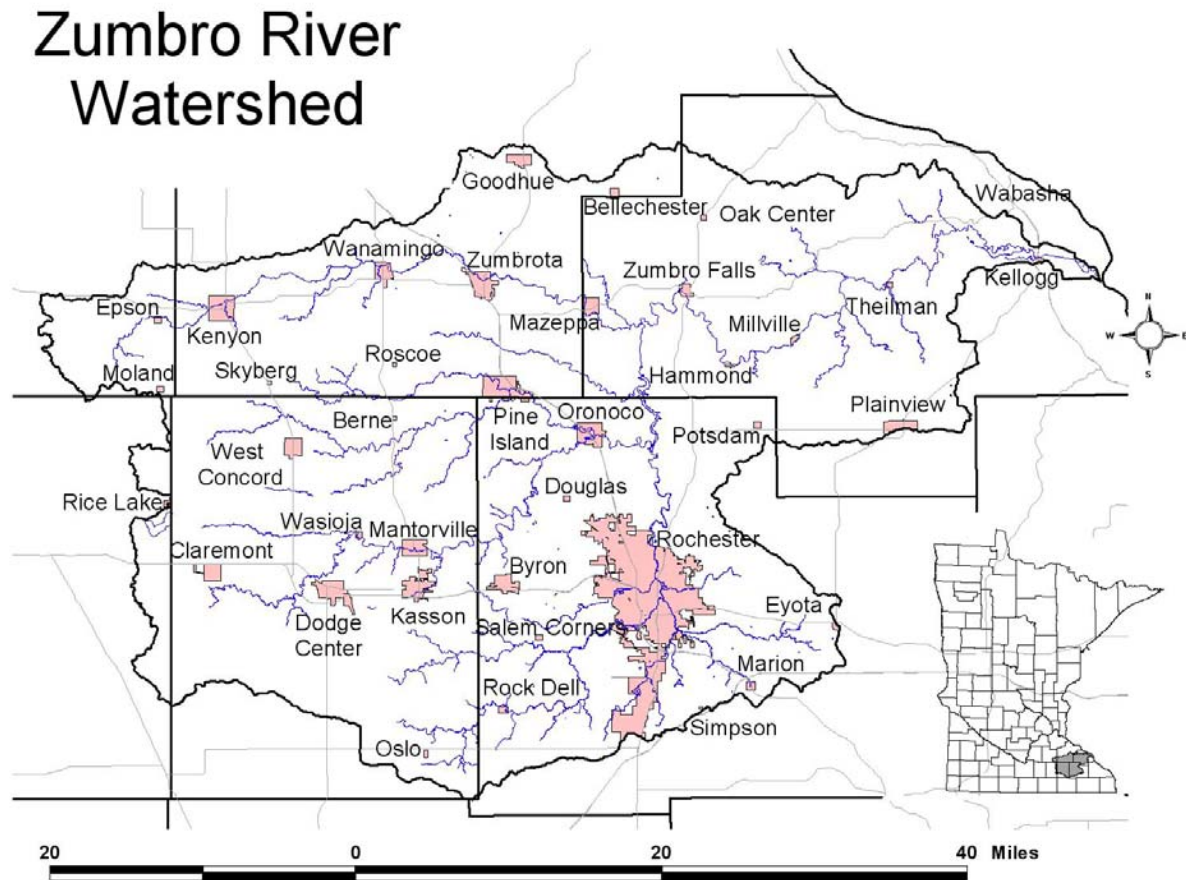
**Table 5. Olmsted County Waters Identified as Impaired.**

Stream Reach or Lake	Affected Use	Pollutant or Stressor
Whitewater R, Middle Fk; trout stream portion	Aquatic recreation	Fecal coliform
Whitewater R, Middle Fk; trout stream portion	Aquatic life	Turbidity
Whitewater River, North Fk; Unnamed Cr to Unnamed Cr	Swimming	Fecal coliform
Whitewater River, North Fk; Unnamed Cr to Unnamed Cr	Aquatic life	Turbidity
Whitewater River, North Fk; Unnamed Cr to Mid Fk Whitewater R	Aquatic recreation	Fecal coliform
Whitewater River, North Fk; Unnamed Cr to Mid Fk Whitewater R	Aquatic life	Turbidity
Whitewater River, South Fork; Headwaters to trout stream portion	Aquatic recreation	Fecal coliform
Whitewater River, South Fork; Headwaters to trout stream portion	Aquatic life	Turbidity
Whitewater River, South Fork; trout stream portion above N Fk Whitewater R	Aquatic recreation	Fecal coliform
Whitewater River, South Fork; trout stream portion above N Fk Whitewater R	Aquatic life	Turbidity
Whitewater River; South Fk Whitewater R to Beaver Cr	Aquatic consumption	Mercury 1FCA
Zumbro River; Zumbro Lk to North Fk Zumbro R	Aquatic consumption	PCB FCA
Zumbro River, South Fk; Salem Cr to Bear Cr	Aquatic recreation	Fecal coliform
Zumbro River, South Fk; Bear Cr to Oakwood Dam	Aquatic recreation	Fecal coliform
Zumbro River, South Fk; Silver Lk Dam to Cascade Cr	Aquatic recreation	Fecal coliform
Zumbro River, South Fk; Cascade Cr to Zumbro Lk	Aquatic recreation	Fecal coliform
Zumbro River, South Fk; Cascade Cr to Zumbro Lk	Aquatic life	Turbidity (estim. from TSS)
Silver	Aquatic consumption	Mercury 1FCA
Zumbro	Aquatic recreation	Excess nutrients
Zumbro	Aquatic consumption	Mercury 1FCA

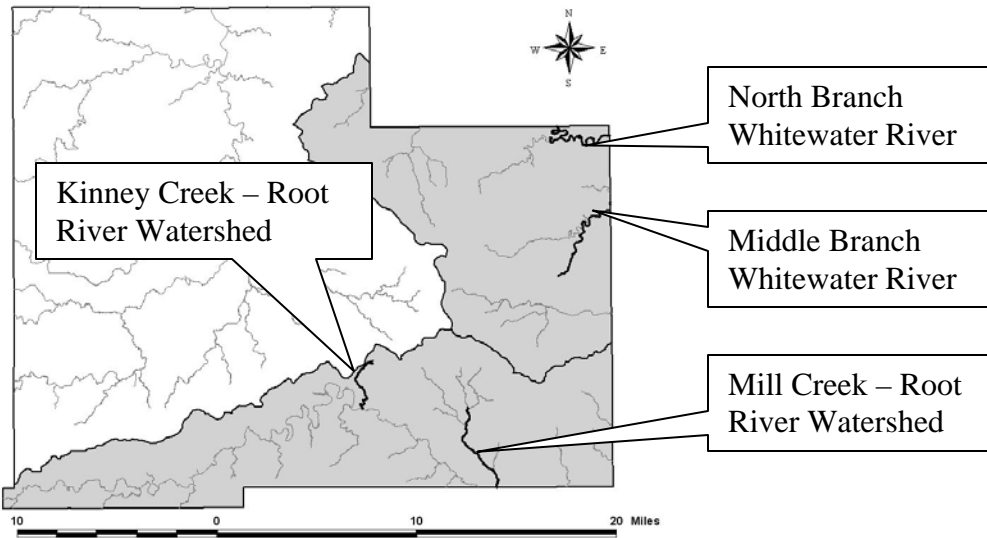
The Minnesota Pollution Control Agency (MPCA) noted in their comments on the Water Plan Update that the Zumbro River watershed is the largest water resource in the County and is in need of a multi-county watershed collaborative to improve the integrity and water quality of the river and its tributaries. Although the City of Rochester has invested efforts to manage this river system, these efforts have historically been focused on flood control and were not specifically targeted for water quality and habitat preservation. The agency recommended that the County support the newly formed Zumbro River Watershed Partnership.

The Zumbro River in the County has several tributaries that are being degraded by urbanization and by nonpoint erosion in watershed areas feeding in from Dodge County. Lake Zumbro reservoir will also require a multi-county effort to protect or improve water quality. In their comments, the MPCA recommended that the County formulate a management scheme or activities to comprehensively manage riparian areas and contributing watershed areas of the Zumbro River and its tributaries (Figure 13).

**Figure 13. Cities in the Zumbro Watershed.**

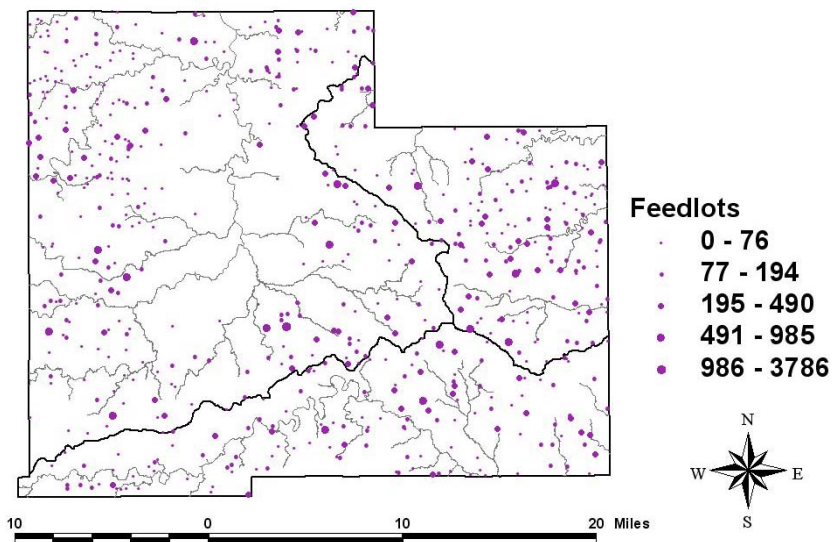


**Figure 14. Designated Trout Streams in Olmsted County.**



In addition to the efforts at improving impaired waters in the Whitewater River watershed, there are many other efforts taking place to protect and improve the water quality and physical integrity of the Whitewater River and its tributaries. The MPCA encouraged the County to include specific action items to reduce stream bacterial levels in the Whitewater River Watershed related to feedlots and manure management (Figure 15). The basic need is to have action items which provide for critical participation in the management of the headwaters of the Whitewater River. The work in this watershed can then be applied to the other two major watersheds in the County.

**Figure 15. Feedlots in Olmsted County.**



Root River Watershed: The Root River Watershed has been identified by the Pawlenty Administration as a priority watershed. Most of the same issues related to the Whitewater River Watershed also apply to the Root River system, of which, the County is in a headwaters area. The support and participation by all the local units of government in the Root River Watershed will be critical for this effort to be a success.

**Goal:** To support the following watershed projects:

- The Whitewater Watershed Project which is organized as a three county Joint Powers Board -- Olmsted, Wabasha, and Winona Counties.
- The Zumbro Watershed which is organized as a non-profit with County Board and Soil and Water Conservation board members from Dodge, Goodhue, Olmsted, Rice, Steele, and Wabasha Counties.
- The Root River Watershed which is not formally organized but has been identified by the State as a high priority watershed.

**Objectives:** All three watersheds have been awarded special federal funding through the US Department of Agriculture. Olmsted County will support the implementation of the federal programs in collaboration with state and federal agencies and land owners.

The 2005 Water Plan will continue to recognize the five implementation strategies identified in the 1998 Water Plan:

1. Help communities identify their potable, non-potable, recreational, and flood protection water needs.
2. Help individuals and communities recognize and understand what must be done to meet their water resource needs -- both current and future needs.
3. Help communities develop partnerships with residents, businesses, farmers, governments, and other organizations within watershed, subwatershed, or aquifer areas.
4. Help watershed-based community partnerships develop measurable goals and objectives with systems for monitoring, evaluating and reporting progress.
5. Help individuals and communities meet their water needs through education, technical assistance, incentives, capital improvement, monitoring, regulation, and enforcement.

**Initiatives:**

Whitewater River Watershed -- Olmsted County will continue to provide funding and staff support for the Whitewater Watershed Joint Powers Board for their implementation of the federal PL-566 program and any other projects and programs for which funding can be secured. Olmsted County has supported the watershed project since its formation in 1987 and will continue to do so. The County will continue to assist the Whitewater Watershed Joint Powers Board in implementing its other goals and objectives as described in the Whitewater Watershed Plan. The Plan is available at the Olmsted County Environmental Services office.

Zumbro River Watershed – Olmsted County will support the implementation of the US Department of Agriculture Conservation Partners Initiative project. The project is the Watershed Partnership’s first project and is being undertaken as a collaborative project with federal and state agencies as well as counties and Water Conservation Districts within the watershed. The County will assist the Zumbro Watershed Partnership in implementing its goals. These goals can be seen on the Watershed Partnership Website [zumbrowatershed.org](http://zumbrowatershed.org) and at the Olmsted County Environmental Services office.

Root River Watershed – Olmsted County will support the Conservation Security Program implementation within the watershed. Olmsted County will support other water management initiatives in the Root River Watershed as they are proposed.

The Environmental Services Coordinator will work with the Environmental Management Team and the Environmental Commission to coordinate implementation of the watershed initiatives and to integrate county water management goals and objectives. The projected cost for supporting the watershed initiatives is \$40,000 per year.

## **APPENDIX: Priority Concerns Scoping Document**