

2013 - 2023

Olmsted County Water Management Plan



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Olmsted County Soil and Water Conservation
District

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Minnesota Department of Health

Whitewater Joint Powers Board

Zumbro Watershed Partnership

Map Disclaimer

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Table of Contents

List of Acronyms.....	6
Executive Summary.....	8
County Profile	9
Plan Purpose	11
Priority Concerns	13
Drinking Water & Groundwater Protection.....	13
Agricultural Erosion and Sediment Control, Nutrient Management, & Chemical Use.....	13
Impaired Waters, TMDLs, & Watershed Management.....	14
Urban/Suburban Storm Water Quality & Quantity.....	15
Wetland Resources & Natural Corridors.....	16
Plan Administration	17
Consistency with Other Local, State, and Regional Plans	18
Recommended Amendments to Other Plans and Official Controls	20
Assessment of Priority Concerns	21
General County Characteristics.....	22
Interconnection of the Ground and Surface Water Systems.....	22
Geology	23
Elevation	32
Land Cover	32
Agroecoregions.....	35
Demographics	37
Watershed Profiles	39
Root.....	39

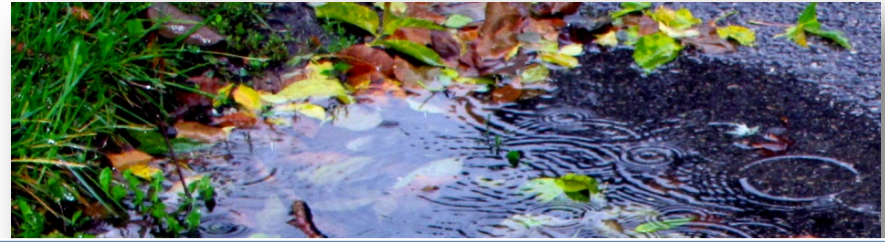
Whitewater	40
Zumbro	41
Guiding Principles	42
Drinking Water & Groundwater Protection.....	44
Public Supply.....	44
Private Wells.....	48
Olmsted County Groundwater Quality Testing and Monitoring Programs	49
Agricultural Erosion and Sediment Control, Nutrient Management, & Chemical Use	51
Pesticides.....	52
Nutrients/Manure	52
Manure.....	53
Erosion and Sediment Control.....	53
Observations.....	56
Impaired Waters, TMDLs, & Watershed Management	57
Background	57
Olmsted County's Impaired Waters and TMDLs	58
Clean Water Legacy Act.....	61
Watershed Management.....	61
Urban/Suburban Storm Water Quality & Quantity.....	64
Federal Management.....	65
State Management.....	65
Wetland Resources & Natural Corridors.....	70
Implementation of Priority Concerns	77
Plan Administration	78
Responsibility	78
The Biennial Budget Request and a Capital Improvements Program for Water Resources	78

Comparison of Old and New Biennial Budget Request Processes.....	79
Annual Reviews and 5-Year Strategic Update.....	79
Funding.....	80
Implementation.....	81
Drinking Water & Groundwater Protection.....	81
Agricultural Erosion and Sediment Control, Nutrient Management, & Chemical Use.....	87
Impaired Waters, TMDLs, & Watershed Management.....	91
Urban/Suburban Storm Water Quality & Quantity.....	95
Wetland Resources & Natural Corridors.....	98
Implementation of Ongoing Activities	103
Implementation of Ongoing Activities	104
Status of Action Items for Olmsted County Comprehensive Local Water Management Plan 2005-2010.....	111
Appendix A: Priority Concerns Scoping Document	115
Appendix B: Local Public Hearings and Approvals.....	143
Appendix C: Supporting Documentation	155
Existing Water Resource Plans, Related Studies, & Implementation Documents.....	156
2011 Minnesota Statutes Water Policies	161
2012 Draft Impaired Waters List for Olmsted County.....	166
Comparison of BWSR BBR and County Project Types.....	169
MPCA Fact Sheets	170
Water Grants Administered by Olmsted County's Member Organizations in 2012	182
Appendix D: State Review Agency Comments.....	183
Addendum 1: Summary of "Other Watercourses".....	190

List of Acronyms

AgBMP	Agricultural Best Management Practice
BMP	Best Management Practice
BWSR	Board of Water and Soil Resources
CIP	Capital Improvements Program
CRP	Conservation Reserve Program
DWSMA	Drinking Water Supply Management Area
EMT	Olmsted County Environmental Management Team
EPA	US Environmental Protection Agency
ERD	Olmsted County Environmental Resources Department
GIS	Geographic Information Systems
JPB	Joint Powers Board
LiDAR	Light Detection and Ranging (a tool for mapping surface elevations)
LGU	Local Governmental Unit
LWM	Local Water Management
LWMP	Local Water Management Plan
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
MNDNR	Minnesota Department of Natural Resources
MPCA	Minnesota Pollution Control Agency
MS4	Municipal Separate Storm Sewer System
NGO	Non-Governmental Organization
NRCS	Natural Resources Conservation Service
OCPHS	Olmsted County Public Health Services
OCPW	Olmsted County Public Works
RIM	Reinvest in Minnesota
ROPD	Rochester-Olmsted Planning Department
ROPD-GIS	Rochester-Olmsted Planning Department, GIS Division
RPW	Rochester Public Works
SEMJPB	Southeast Minnesota Joint Powers Board
SEMNRB	Southeast Minnesota Water Resources Board
SSTS	Subsurface Sewage Treatment Systems
STORET	Storage and Retrieval (of Data) – a water database system

SWCD	Soil and Water Conservation District
SWPPP	Storm Water Pollution Prevention Plan
SZJPB	South Zumbro Joint Powers Board
TMDL	Total Maximum Daily Load
U of M	University of Minnesota
U of M Ext	University of Minnesota Extension
USDA	United States Department of Agriculture
USGS	United States Geologic Survey
WHPA	Wellhead Protection Area
WRP	Wetlands Reserve Program
WRWP	Whitewater River Watershed Partnership
WWJPB	Whitewater Joint Powers Board
ZWP	Zumbro Watershed Partnership

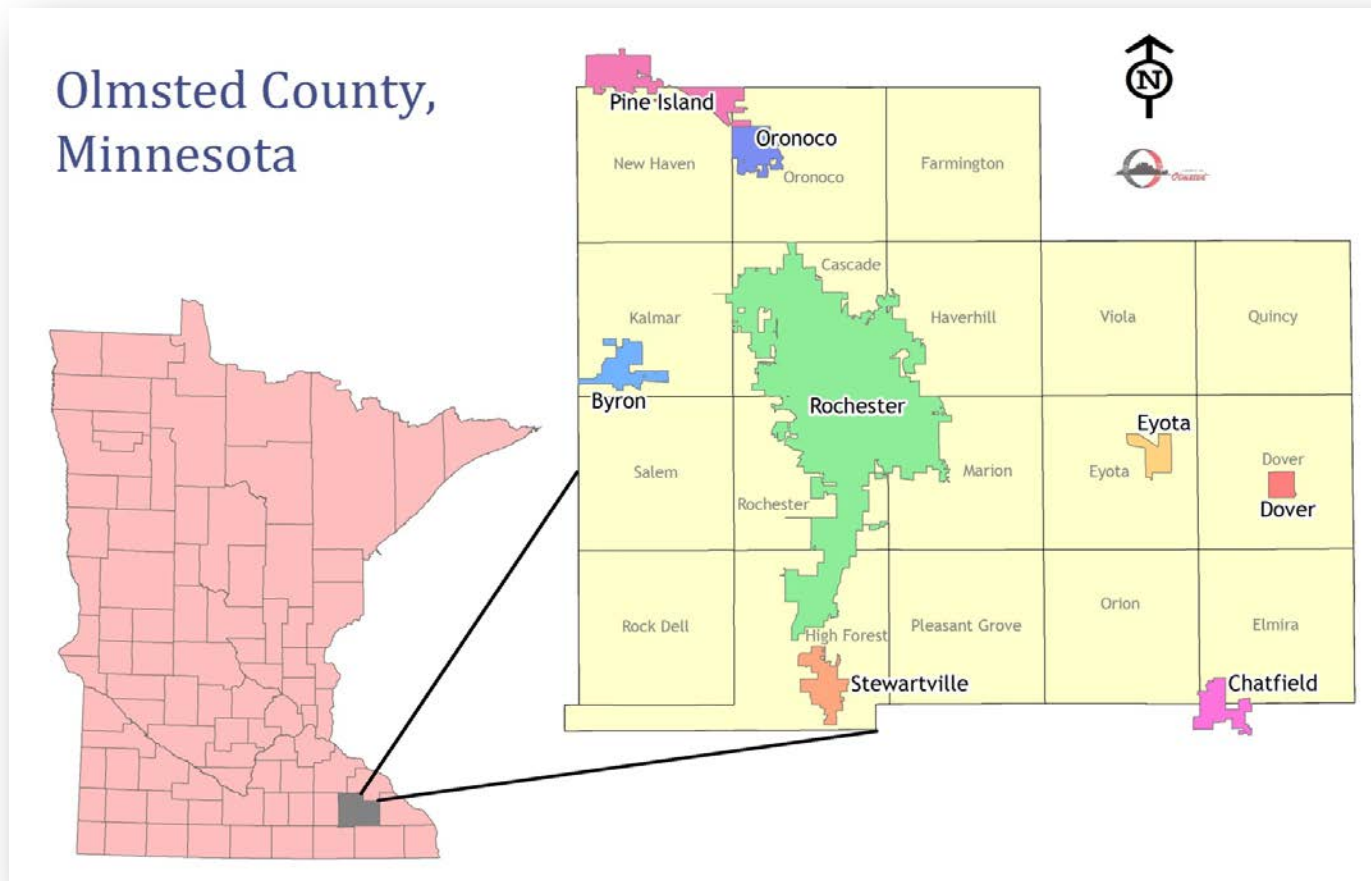


Executive Summary



County Profile

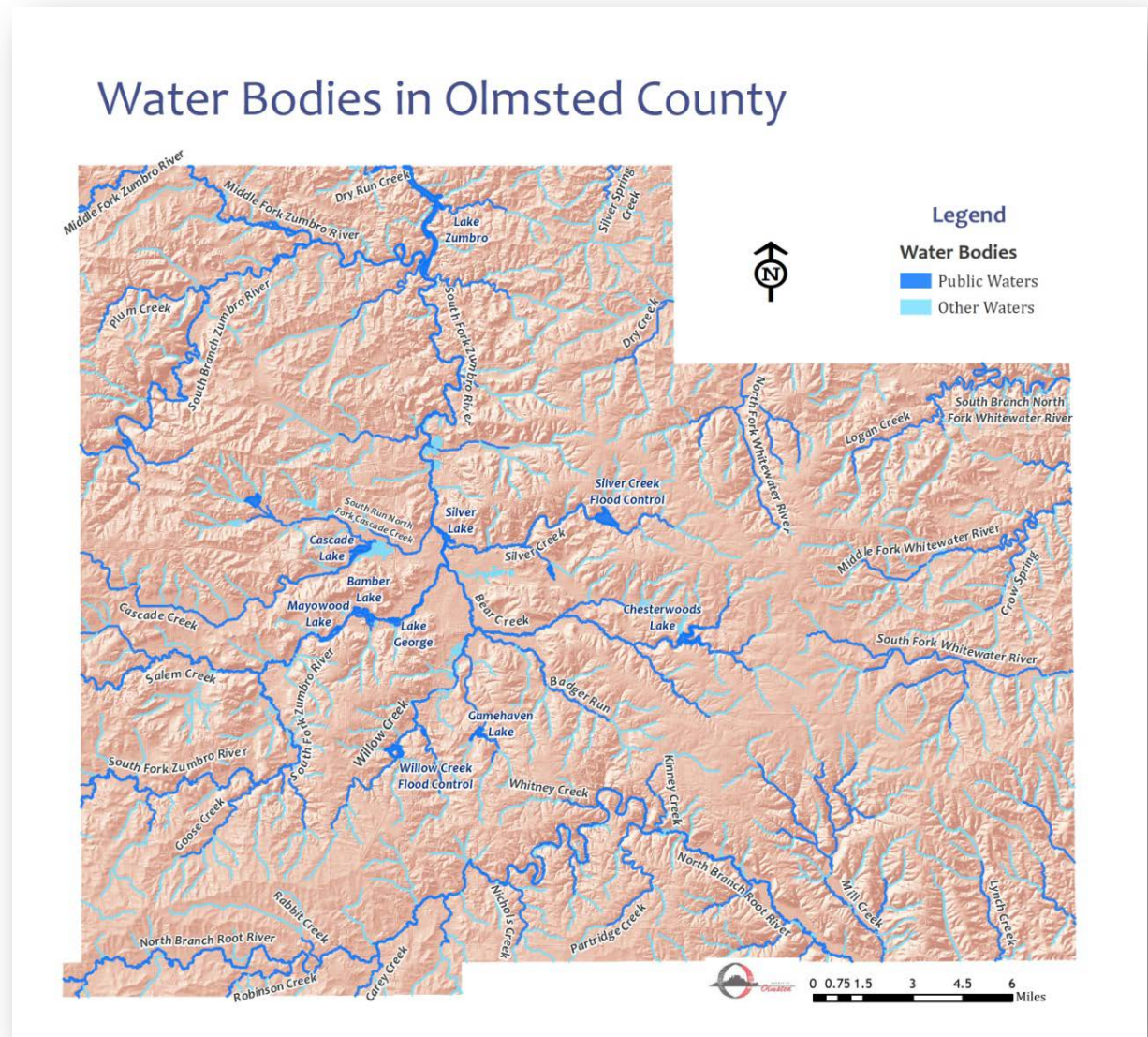
Olmsted County is located in southeastern Minnesota, approximately 85 miles southeast of Minneapolis. Comprising 660 square miles, Olmsted County includes eighteen townships, six municipalities, and portions of two border cities. The City of Rochester is the county seat.



A dendritic drainage system and no natural lakes characterize the Olmsted County landscape. The highest elevation is located in the southwest part of the county and is about 1360 feet above sea level, while the lowest is the bottom of the North Fork Whitewater River valley at about 800 feet.

Three major watersheds drain the Olmsted County landscape – the Root, Whitewater, and Zumbro. The Root drains about 99,000 acres in the county, or about 23% of it, while the Whitewater covers about 83,000 acres (20%). The Zumbro watershed encompasses over 237,000 acres, or 57% of the county.

With a population of over 144,000 and over 109,000 jobs, Olmsted County is considered to be the region's largest economic and employment hub. The dominant land cover in the county, however, is cultivated land (57%); developed areas account for only 12% of the land cover. Virtually the entire County water supply, for uses ranging from residential consumption to industrial processing, is drawn from bedrock aquifers.



Plan Purpose

The purpose of the Olmsted County Water Management Plan is to construct a ten-year framework of goals, objectives, and implementation strategies that will strive to reduce, prevent, minimize, and mitigate degradation of our county's surface and groundwater (103A.43, Minnesota Statutes) through 2023. In accordance with the requirements of Minnesota Statutes 103B.311,

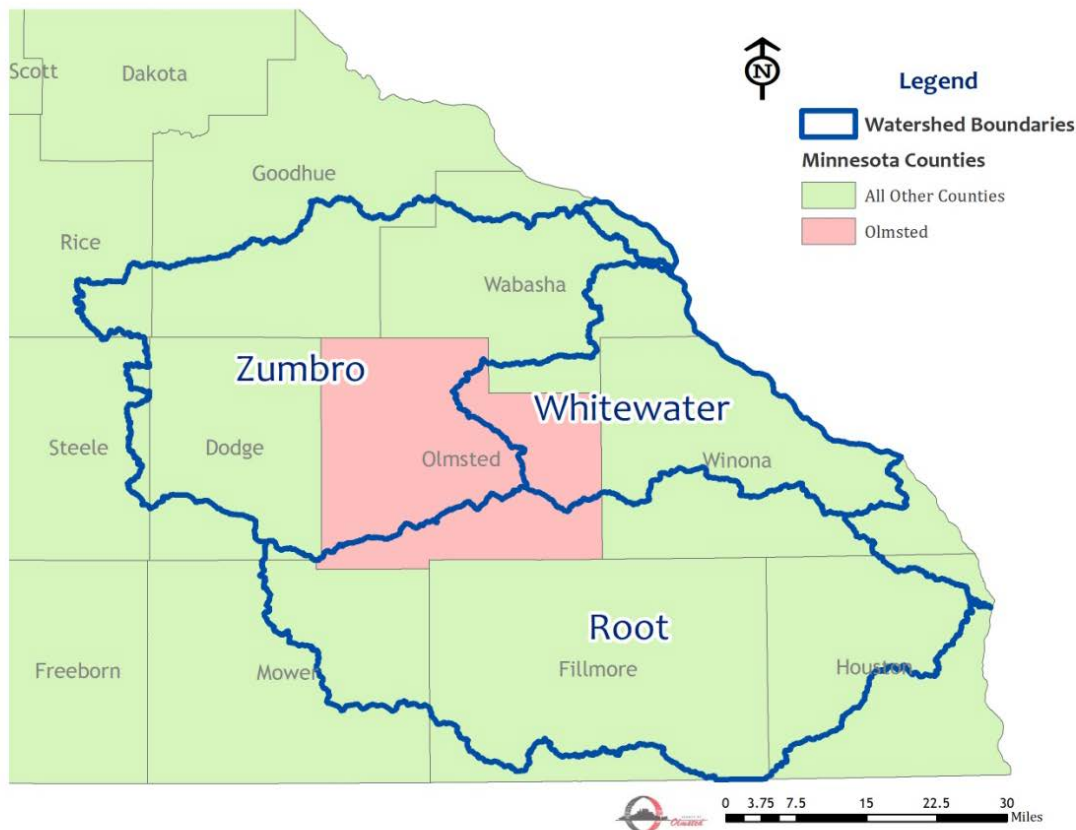
Subdivision 4, these policies and actions will address the integrated water management needs of all of Olmsted's 18 townships and 8 incorporated cities, using a watershed-based approach.

Regional cooperation and consistency are the keys to the success of the Water Management Plan. The County supports surface water management efforts in each of the major watersheds and supports groundwater and drinking water protection efforts through recharge area protection and pollution prevention in drinking water supply management areas and wellhead protection areas. Olmsted County largely relies on the advice provided by state and federal water resource management agencies and professional consultants in its assessment of water resource conditions and the development of protection strategies.

Working with local, regional, state, and federal partners, Olmsted County

Watersheds in the Olmsted County Area

Data Source: Minnesota Department of Natural Resources



will focus on five priority concerns as determined by the Priority Concerns Scoping Document:

- Drinking Water & Groundwater Protection
- Agricultural Erosion and Sediment Control, Nutrient Management, & Chemical Use
- Impaired Waters, TMDLs, & Watershed Management
- Urban/Suburban Storm Water Quality & Quantity
- Wetland Resources & Natural Corridors

Priority Concerns

Drinking Water & Groundwater Protection

Since virtually all of Olmsted County's water supply is drawn from bedrock aquifers, it is critical that the County strive to ensure that all of its residents have continued access to safe drinking water. The County's drinking water vulnerability is largely a function of ambient hydrogeologic and local land use conditions. Located 300-700 feet below the surface, the St. Peter-Prairie du Chien-Jordan aquifer is the primary drinking water source. Higher levels of contaminants, such as nitrate-nitrogen, now prohibit the construction of potable water wells in the upper aquifers. In order to sustain groundwater quality, pollutants resulting from human sources must be prevented, minimized, and mitigated.

Objectives

- ☐ Continue and enhance groundwater monitoring programs in order to improve the regional understanding of how land cover and land use impact the interaction between the landscape, surface water, karst features and groundwater.
- ☐ Support implementation of Wellhead Protection Area (WHPA) plans.
- ☐ Support community water supply and sanitary sewer system projects and appropriate installation and management of private systems.
- ☐ Design and maintain groundwater resource-related GIS databases.
- ☐ Protect sensitive landscapes related to geologic areas, features, and formations.
- ☐ Increase public awareness of the importance of protecting drinking water supplies, groundwater resources, and sensitive geologic areas from potential pollutants.

Total Estimated Cost: \$1,528,300

Agricultural Erosion and Sediment Control, Nutrient Management, & Chemical Use

The combination of topography, land cover, land use, and storm events can result in the movement of soil, nutrients, and chemicals into the County's ground and surface waters. Erosion and sedimentation from runoff and streambank failures are a significant source of surface water degradation. We must utilize and improve conservation and best management practices in order to reduce and

prevent this degradation of land and water. Landscape features that are vulnerable to degradation, such as those adjacent to streams and karst features, warrant the most concern.

Objectives

- Apply conservation and best management practices on rural land in the county.
- Coordinate plans and programs within the county and with other counties, state and federal agencies, and non-governmental organizations.
- Support continued programming for planning, research, and education by local, state, and federal agencies.

Total Estimated Cost: \$7,839,150

Impaired Waters, TMDLs, & Watershed Management

The primary goal of this priority concern is to ensure the ability of the county's and region's surface waters to meet water quality standards for their designated uses. Studies are finding that many of Olmsted County's rivers and streams are not meeting various water quality standards due to the impacts of point and non-point source pollutants.

Watershed-based TMDL studies and implementation plans, and coordinated water management programs are needed to identify, prevent, and mitigate the impacts of surface water pollutants not only in Olmsted County, but also in neighboring counties. Water responsibilities do not stop at political boundaries and must be cooperatively dealt with by all partners within the watersheds.

- Turbidity TMDL studies are underway for the Root and Whitewater Rivers. A turbidity TMDL study has been approved for the Zumbro River and an implementation plan is expected to be complete in 2013. Bear, Cascade, Silver, and Willow Creeks are among other reaches noted to have turbidity impairments.
- The Lower Mississippi River Basin – Regional Fecal Coliform TMDL addresses 39 stream and river reaches in the Lower Mississippi and Cedar River basins that are impaired due to fecal Coliform levels that violate Minnesota's water quality standards. This amended TMDL was approved by the US EPA in 2006. An implementation plan for this TMDL was adopted in 2007; numerous reaches in Olmsted County are impaired by fecal Coliform.
- Excessive nutrient loads, in particular total phosphorus (TP), lead to increased algae blooms and reduced transparency – both of which may significantly impair or prohibit the use of lakes for aquatic recreation. Eutrophication is the resulting aging process by which lakes are fertilized with nutrients. Lake Zumbro has been added to the Impaired Waters list due to this finding.

- Minnesota Rules Chapter 7050.0410 protects designated trout streams as sources of drinking water. In 2010, a reach of the Middle Fork of the Whitewater River was found to exceed the 10 mg/L federal safe drinking water standard for nitrate-nitrogen. A TMDL is underway for this reach.

As they are approved by the MPCA, the priorities identified in the TMDL implementation plans will be considered to be consistent with the priorities of the Olmsted County Water Management Plan.

Objectives

- Contribute all pertinent County data to state, regional and local water quality databases. Support continued long term monitoring of county surface waters.
- Support the development and implementation of Total Maximum Daily Load reports and implementation plans for each of Olmsted County's major watersheds.
- Identify and prioritize opportunities to leverage skill sets and project funds through collaborative partnerships within watersheds and subwatersheds.
- Support long term funding for watershed based organizations serving the people of Olmsted County.
- Support planning and implementation projects for Olmsted County's water bodies.
- Educate and involve the public in watershed and TMDL studies and programs.

Total Estimated Cost: \$1,198,000

Urban/Suburban Storm Water Quality & Quantity

Effective storm water management in the Rochester Urbanizing Area (RUA) can significantly improve our area's surface and groundwater quality by keeping runoff from moving across or improperly infiltrating through the landscape. Olmsted County, some cities and townships, and other organizations within the urbanizing area implement Storm Water Pollution Prevention Programs (SWPPP) to meet the requirements of their Municipal Separate Storm Sewer System (MS4) permits. Nonregulated communities within the county, however, also contribute to runoff pollutants. It is important, therefore, to address the unpermitted areas as well, through other programs and education.

Objectives

- Support existing municipal (MS4), industrial, and construction storm water permit programs and projects.

- ☐ Provide information and educational opportunities for Olmsted County's cities and townships on storm water management, including erosion and sediment control standards and best management practices.
- ☐ Promote the use of low impact or minimal impact design practices to development in the county.

Total Estimated Cost: \$2,709,000

Wetland Resources & Natural Corridors

Wetlands have a wide range of natural functions, from controlling floods, to filtering water pollutants, to recharging groundwater. Environmental corridors serve to link these vital natural areas. Retaining water on the watersheds' landscapes will help these features function. The County must develop strategies to better utilize the function of natural systems, such as wetlands, floodplains, and shorelands for water quality and quantity control.

Objectives

- ☐ Buffer all sensitive land and water interfaces.
- ☐ Promote and protect forest resources and grassland resources including pasture.
- ☐ Develop strategies to better utilize the natural water quality functions provided by wetland systems.
- ☐ Promote and market wetland preservation and restoration programs.
- ☐ Identify and target natural corridors to be enhanced and protected throughout the county.

Total Estimated Cost: \$1,181,000 + land costs

Plan Administration

ROPD staff began drafting Olmsted County's first Water Management Plan in 1987, with assistance from many local and state entities. The Olmsted County Board of Commissioners adopted it in 1990. The County's Water Resources Coordinator assumed responsibility for coordinating the implementation of this plan as well as for preparing its 1998 and 2005 updates. The current Water Management Plan was set to expire in 2010; however, BWSR granted the County an extension, allowing the 2005 plan to remain effective through 2012. While the Olmsted County Board of Commissioners and Olmsted County Environmental Commission have charged ROPD with developing the 2013-2023 update, responsibility for overseeing its implementation will remain with the Water Resources Coordinator as part of the Olmsted County Environmental Resources Department.

With the 2012 advent of BWSR's updated Biennial Budget Request (BBR) program, local water management plan priorities will now be used at the beginning of the State's budgeting process to determine funding appropriation categories that target the most critical strategies identified by LGUs to protect and restore ground and surface water. To facilitate this program change, Olmsted County shall develop an annual "Water Resources Improvements Program" (WRIP) to help identify, integrate, and prioritize Plan priorities for the BBR that will be implemented by the LGUs and NGOs. To further aid this process, the Water Resources Coordinator will present an annual report on the implementation progress of the Water Management Plan to the Olmsted County Environmental Commission, Olmsted County Board of Commissioners, and Olmsted County Soil and Water Conservation District Board. The feedback from this report will be considered in the formulation and aid in the formulation of the next round of "WRIP", BBR, and grant submittals.

Because this water management plan has a 10-year timeframe, it will also be necessary for the Water Resources Coordinator to coordinate a 5-Year Strategic Update in order to consider the potential impact of new water-related regulations, plans, studies, and data on Plan implementation priorities.

A number of funding sources including general tax levy, State funding sources such as Natural Resource Block Grants and other grants from public and private sources will support implementation of the action items. Funding may be provided to cooperating agencies for actions such as research and monitoring. It should be noted that some of the action items will need to be funded through competitive State grants. If grants are not secured, the action items will be delayed, curtailed in scope, or considered for deletion from the plan in a future amendment.

Consistency with Other Local, State, and Regional Plans

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, the Hiawatha Resource Conservation and Development Council, and the South Zumbro Joint Powers Board. The County also participates in the ad hoc Basin Alliance for the Lower Mississippi in Minnesota and the Zumbro Watershed Partnership 501(c)3. The Water Resources Coordinator, working in conjunction with the Environmental Management Team, is responsible for coordinating these local and regional efforts within Olmsted County and for integrating of County water management goals and objectives with the individual efforts of each organization.

The Rochester-Olmsted Planning Department staff conducted numerous meetings with watershed organizations, local governing entities and staff, state and federal staff, and other non-governmental groups during the preparation of this plan. In order to ensure consistency among area efforts when formulating the action items of this plan, ROPD staff considered any planning and program documents that these groups provided. A list of these documents is located in the Appendix.

The Olmsted County General Land Use Plan includes several policy areas that address water resources in some form, including groundwater protection, shoreland management, floodplain management, surface waters, sensitive environmental areas, and ecosystem protection. The plan was updated and approved in March, 2011.

The land use plan states that there are a number of water resource related sensitive environmental areas that “should be protected”. These areas consist of areas sensitive to human impacts such as public waters, wetlands, blufflands, undisturbed areas of native vegetation, and areas of sinkhole concentrations. These areas should be discouraged from development (Page 37).

The protection of groundwater involves a number of strategies (Page 42). The strategies suggested include:

- The use of best management practices;
- Recharge aquifers with water meeting drinking water standards;
- Develop programs to replace failing on-site treatment systems;
- Acquire easements including conservation easements in areas critical to maintaining groundwater quality (Decorah and Till Edges);
- Preserve grasslands and forestlands located in sensitive areas; and
- Manage wellhead protection areas.

Shorelands, although including significant upland areas, is identified as an area for good land management. The plan states, “Shoreland areas should be managed so as to minimize the destruction of existing vegetation, soil erosion from shoreland sites, contamination of rivers or streams from runoff from abutting uses, and streambank erosion.” (Page 42)

Surface waters are important, according to the plan, for several reasons. Trout streams are of particular interest due to the unique nature of the waters and the fisheries resource. Other waters are also an important natural resource as habitat for aquatic plants and animals, wildlife corridors, and for recreation. The plan states “Land management practices in all land use designations should maintain these values and protect these habitats.” The plan encourages “keeping sediment and other contaminants associated with land uses out of surface waters by utilizing buffer strips, controlling tile line and other discharges, and controlling urban and suburban runoff volume and rate.” (Page 42-43)

The goals, objectives, and action items identified in this water management plan are consistent with these policies adopted as part of the approved land use plan. The ongoing programs of the County and other local units of government and the specific action items in this plan represent the implementation measures that are considered minimally necessary for this implementation.

Recommended Amendments to Other Plans and Official Controls

Upon adoption, the Olmsted County Water Management Plan will become a component of the Olmsted County Comprehensive Plan. Some action items listed in this plan recommend updates or revisions to existing local ordinances. The chapter entitled “Implementation of Priority Concerns” describes the parameters of these recommended amendments.



Assessment of Priority Concerns

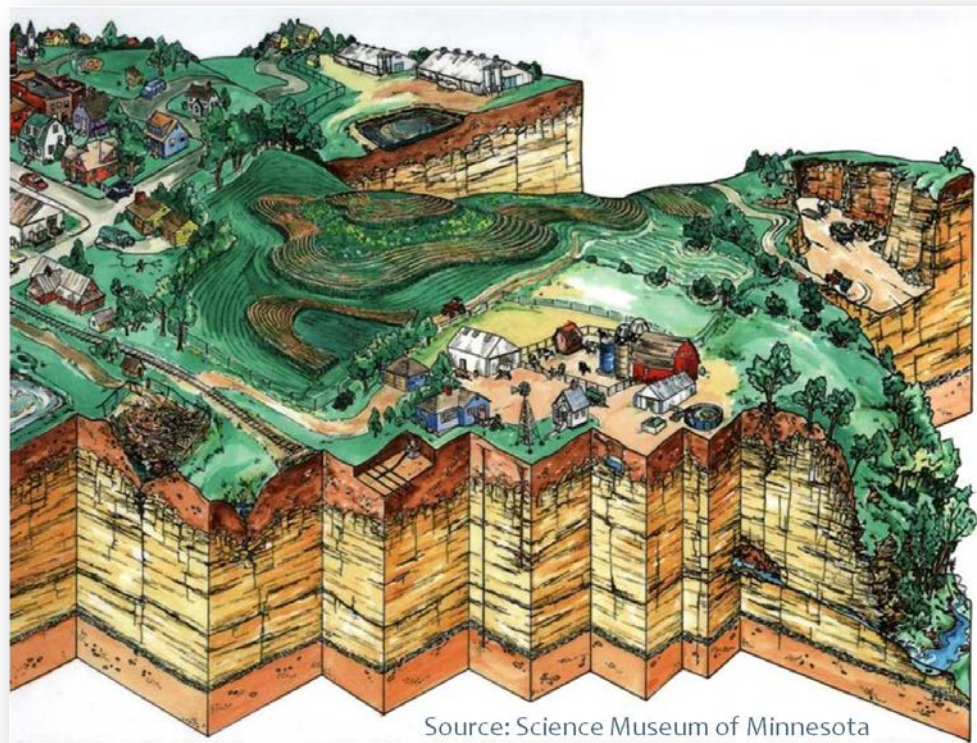


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General County Characteristics

Interconnection of the Ground and Surface Water Systems

Olmsted County has a mature landscape with well-developed, intricate drainage systems, few naturally occurring Type 3, 4, or 5 wetlands, and no natural lakes. All of the groundwater in Olmsted County originated as precipitation that entered the soil and moved into the rock formations below. The karst geology that typifies portions of southeast Minnesota, including Olmsted County, consists of distinct layers of limestones, dolomites, shales, and sandstones. These formations are the major reservoirs, or aquifers, that hold the County's water supply. The most consequential feature of karst is the dissolution of the carbonate bedrock, resulting in the creation of solution channels, small cavities and caves, and sinkholes. All of these features are conduits that allow the quick movement of surface water and pollutants into the aquifers and groundwater. Thus, while the County's groundwater is a very high quality resource, local land use activities in sensitive areas and improper well construction and abandonment have introduced contaminants such as nitrate nitrogen into the groundwater system.



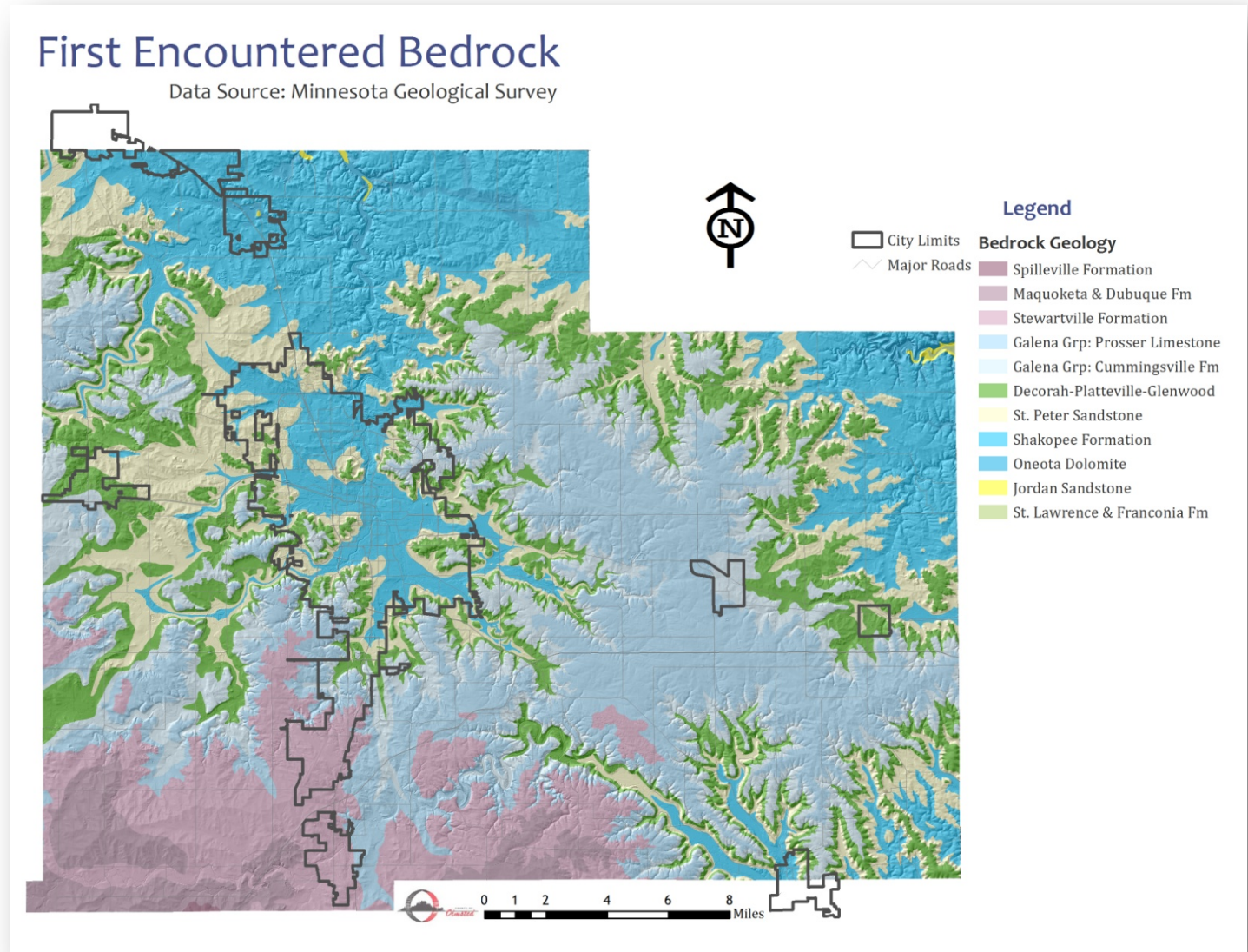
While much of Olmsted County is characterized as a karst terrain, there are large areas where glacial till deposits control groundwater recharge and discharge. In these areas, which predominate the area south and west of Rochester, thick till deposits provide natural protection of underlying aquifers.

Geology

Bedrock Geology

All of the bedrock units shown on the Bedrock Geology map (MGS, 1988 & 2004) are marine sedimentary rocks of Early Paleozoic age (525-445 million years ago). Over time, several periods of Early Paleozoic marine deposition spread layers of silt, sand, and mud over southeastern Minnesota. The uppermost bedrock unit is youngest in the southwest corner of the county and becomes progressively older to the northeast. With the exception of the Jordan Sandstone and the St. Lawrence and Franconia Formations, all of the Lower Paleozoic units shown on the map are exposed somewhere in the county. The bedrock formations form a sequence of aquifers hydrologically separated by confining layers of low permeability.

The development of stream drainages has

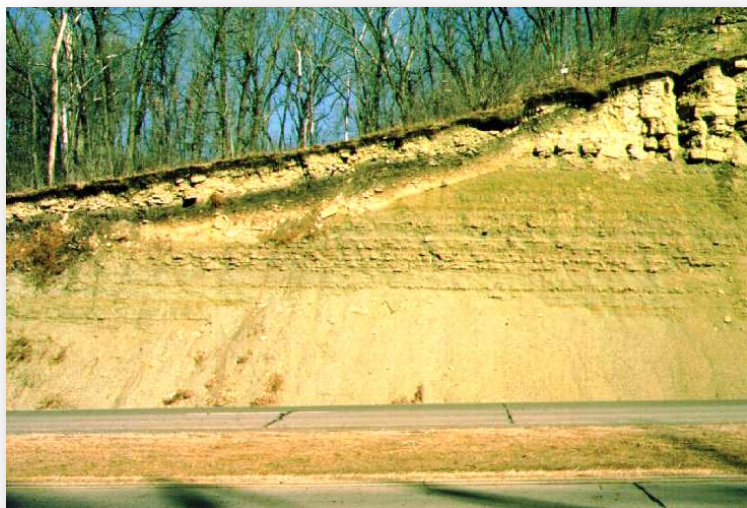


greatly affected the bedrock topography. The directions of fractures and joints in the bedrock influenced the position of stream channels and the entrenchment of river valleys in the carbonate plateaus. Valley segments reflect locally dominant northwest-southeast or northeast-southwest jointing patterns as well as a somewhat less common north-south orientation. As glacial advances filled some bedrock river valleys with sediment, stream drainages were altered and additional bedrock valleys were created. Some differ in position or orientation from the older, now buried valleys.

Upper Carbonate Aquifer

The Upper Carbonate aquifer consists of the Maquoketa, Dubuque, and Galena Group limestone and dolomite bedrock layers. The Maquoketa and Dubuque Formation is approximately 100 feet thick. The Galena Group, comprising the Stewartville Formation, Prosser Limestone, and Cummingsville Formation, is about 210 feet thick. The groundwater in this aquifer is stored in and moves rapidly through complex pathways of solution-widened fractures and caverns. Some of the carbonate rock is less affected by karst development and the groundwater moved slowly through much narrower fractures. Discharge into local stream drainage occurs where rivers have cut into the aquifer and many springs occur where the base of the aquifer is exposed or is near the land surface. Some groundwater discharge also occurs through fractures and solution channels in the Cummingsville Formation.

The Upper Carbonate aquifer supplies domestic and farm wells, but is not used for high capacity pumping in Olmsted County since nitrate-nitrogen levels commonly exceed 10 parts per million (ppm) as a result of the direct connection between surface and the aquifer. Many Upper Carbonate wells have been abandoned or are no longer used for potable supply. Olmsted County no longer permits wells drilled into this aquifer.

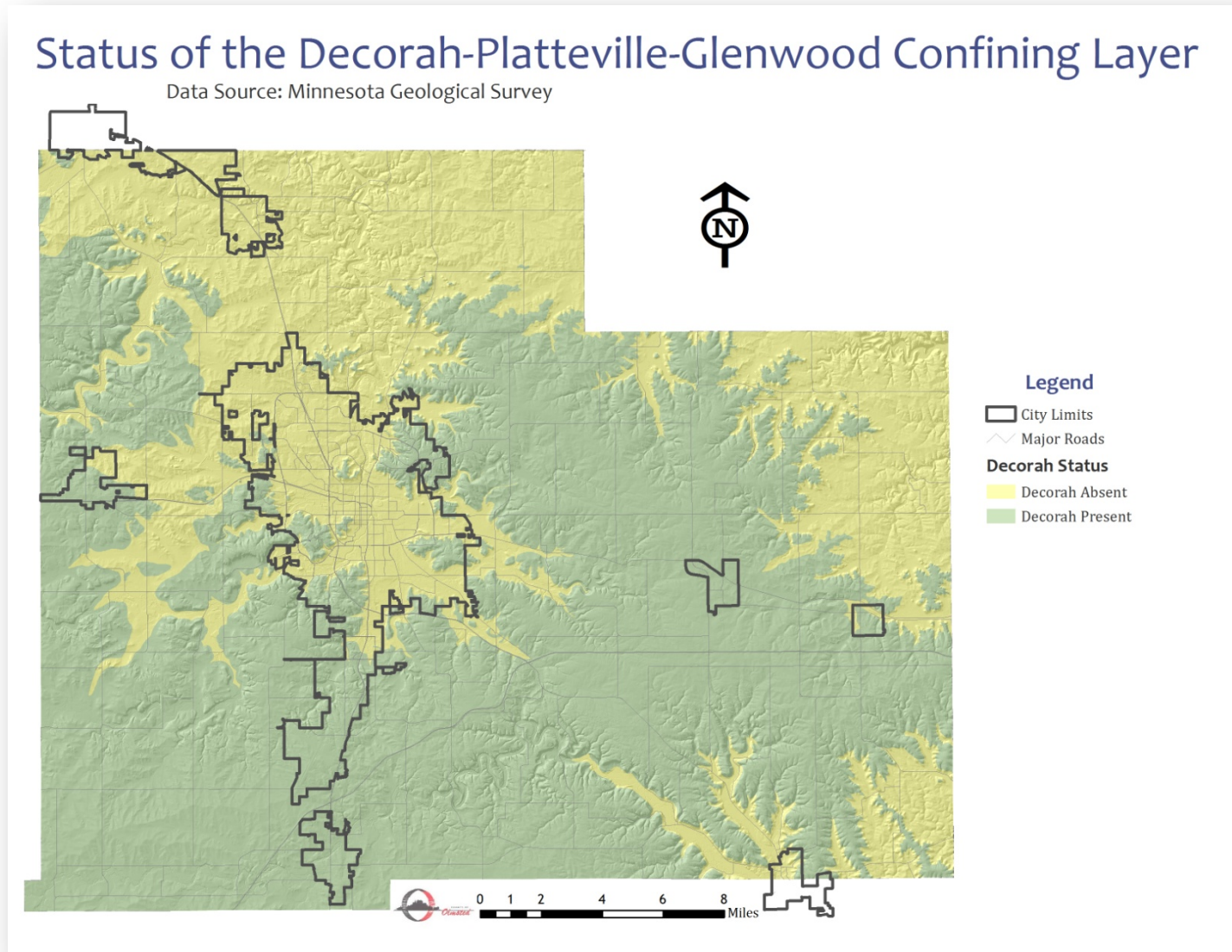


Decorah-Platteville-Glenwood Confining Layer

The Decorah-Platteville-Glenwood confining layer is an 80-foot thick sequence of rock formations that hydrologically separates the Upper Carbonate aquifer from the St. Peter-Prairie du Chien-Jordan aquifer. The entire sequence functions as a distinct hydrologic unit. The Decorah Shale, with a thickness of 45 feet, is the principal confining unit and has a very low permeability. The Platteville Formation is a 25-foot thick karsted limestone and will yield a little groundwater. The Glenwood confining layer has a thickness of 5 feet. Although this confining layer is intact below the surface of a large part of the county, there are extensive areas in the north half of the county where the Decorah-Platteville-Glenwood layer has eroded away. The County has adopted well drilling parameters and zoning provisions

that address the groundwater sensitivity created by the loss of this confining unit.

The County manages land use activities that occur on the terminal edge of the Decorah shale to preserve the natural groundwater recharge and the pollutant attenuation processes that occur in that landscape setting. Approximately half of the groundwater recharge for the underlying aquifer occurs in this setting. Alteration of the vegetation, soils, and hydrology is constrained in these areas by zoning and wetland ordinances.



St. Peter-Prairie du Chien and Jordan Aquifers

The St. Peter-Prairie du Chien, and Jordan aquifers supply most of Olmsted County's drinking water. Nearly all new residential wells are drilled into this aquifer. In some places, the three components of this aquifer are hydrologically connected: the upper 100 feet of St. Peter Sandstone, the middle 300 feet of karsted dolomite of the Prairie du Chien Group, and the base 100 feet of Jordan Sandstone. Groundwater movement in this aquifer is a mixture of intergranular percolation in the sandstone and channeled flow in the carbonate rock. This aquifer has a greater maximum yield than the Upper Carbonate because it is about 300 feet thicker and can store more water.

Nitrate-nitrogen levels in the St. Peter-Prairie du Chien-Jordan aquifer are directly related to the presence or absence of the overlying confining layer. Where it is absent, the nitrate-nitrogen levels are similar to those found in the Upper Carbonate. Where present, little nitrate-nitrogen is found. Nitrate-nitrogen is not commonly found at significant levels in the Jordan Sandstone, except in the northeast area of the county. Studies are underway to assess the extent of nitrate in county aquifers.

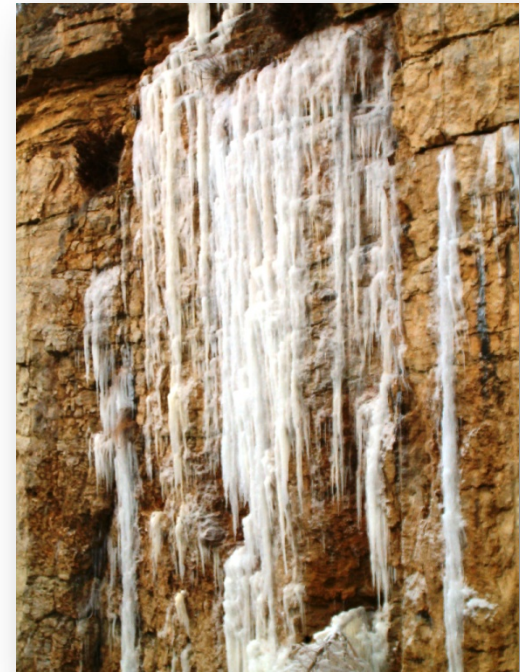
River systems have cut less deeply into the St. Peter-Prairie du Chien-Jordan aquifer than the Upper Carbonate. As a result, the groundwater watersheds are broader and flow directions are different. The Zumbro and Whitewater river valley systems influence the configuration of the potentiometric surface of the aquifer, particularly where the Prairie du Chien is the uppermost bedrock. The decline in water table elevation is roughly parallel to those valleys and the aquifer is completely dewatered in the extreme northeastern corner of the county.

Deeper Aquifers

The St. Lawrence confining layer is 75 feet of dolomitic siltstone with a low permeability. It creates a hydrogeological separation from the Franconia and lower formations. Very few wells in Olmsted County draw water from these formations.

Groundwater Flow

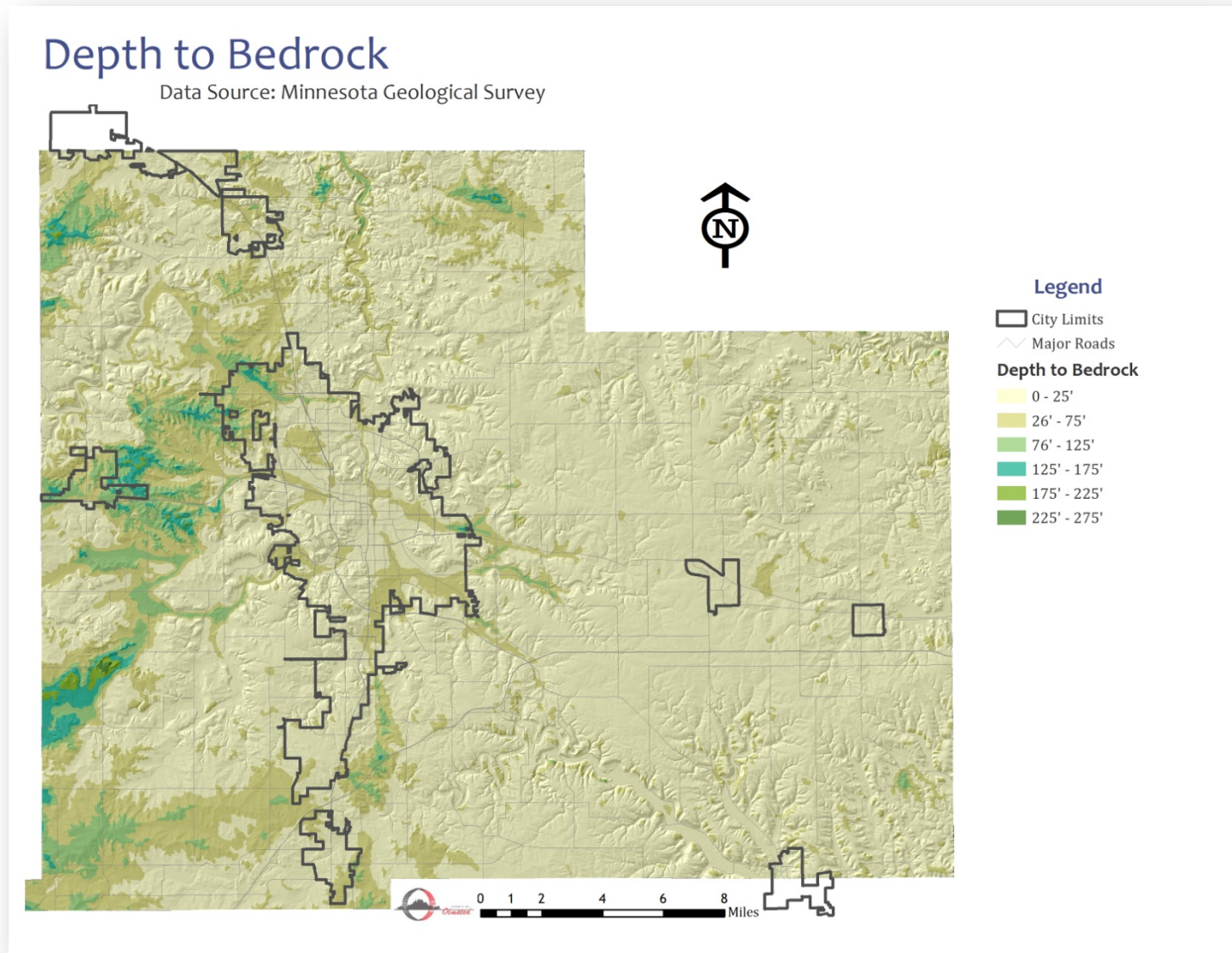
Just as surface waters have watersheds characterized by distinct flow directions and areas of drainage, so does groundwater. Olmsted County residents and businesses generally have control of their own groundwater destiny in that the groundwater flow is largely from within the county moving toward neighboring counties. According to the Geologic Atlas, Olmsted County is located at the top of the major groundwater watersheds for the St. Peter-Prairie du Chien and Jordan aquifers. Flow through the Upper Carbonate aquifer is toward the Rochester area, the Root River and Chatfield area, and Quincy Township where it provides the headwaters for the Root, Whitewater and Zumbro Rivers and in places recharges the underlying aquifers. The flow in the St. Peter-Prairie du Chien and Jordan



aquifers is toward the Rochester area and Zumbro River, Chatfield, and the northeast corner of the county, including the North Fork Whitewater River.

Depth to Bedrock

A long and complex process of deposition and erosion formed Olmsted County's surface topography. The thickness of unconsolidated materials covering the first encountered bedrock formation is quite variable across the county's landscape. The bedrock surface has just a thin coating of unconsolidated materials in most areas of the county, providing little filtration capacity and natural protection to the aquifers below.





Karst Features

In Olmsted County, mildly acid groundwater is slowly dissolving the carbonate bedrock, producing distinctive groundwater conditions and landforms called karst. Karst aquifers are highly susceptible to groundwater contamination because solution-enlarged fractures and sinkholes form passageways that funnel water and contaminants from the surface into the groundwater system, and interconnected cavities allow the water to disperse rapidly over considerable distances. The effects of karst expand over a much greater area than that directly underlain by carbonate bedrock. Groundwater flowing through the Upper Carbonate aquifer often discharges as seeps and springs that occur at the terminal edge of confining layers. Flow studies are underway in the deeper aquifers in the region to identify the springsheds that support the major springs. The water flowing from springs commonly carries surface contaminants and is generally high in calcium, magnesium, and

bicarbonate ions dissolved from carbonate bedrock.

Sinkholes occur in all of the bedrock units above the Jordan Sandstone. Sinkholes are circular or elliptical at the land surface, and the walls range from nearly vertical to shallowly inclined. Most sinkholes in the county are cone-shaped depressions, ranging in size from less than 3 feet to more than 100 feet in diameter and from 1 foot to about 30 feet in depth. Most of them are 2 to 40 feet in diameter and 5-10 feet deep.

Many sinkholes formed catastrophically when the soil collapsed under its own weight. Most catastrophic sinkholes are initially cylindrical and later become cone-shaped as the vertical walls begin to erode. However, not all sinkholes in Olmsted County formed catastrophically. Surface depressions, referred to as subsidence sinkholes, occur slowly as sediment subsides into large joints. The rate of subsidence will be affected by the amount of sediment carried by water flowing toward the enlarged joints, both from the surface and through the unsaturated zone. In general, if the rate of subsidence is rapid, the sinkhole will be cone or bowl shaped; if it

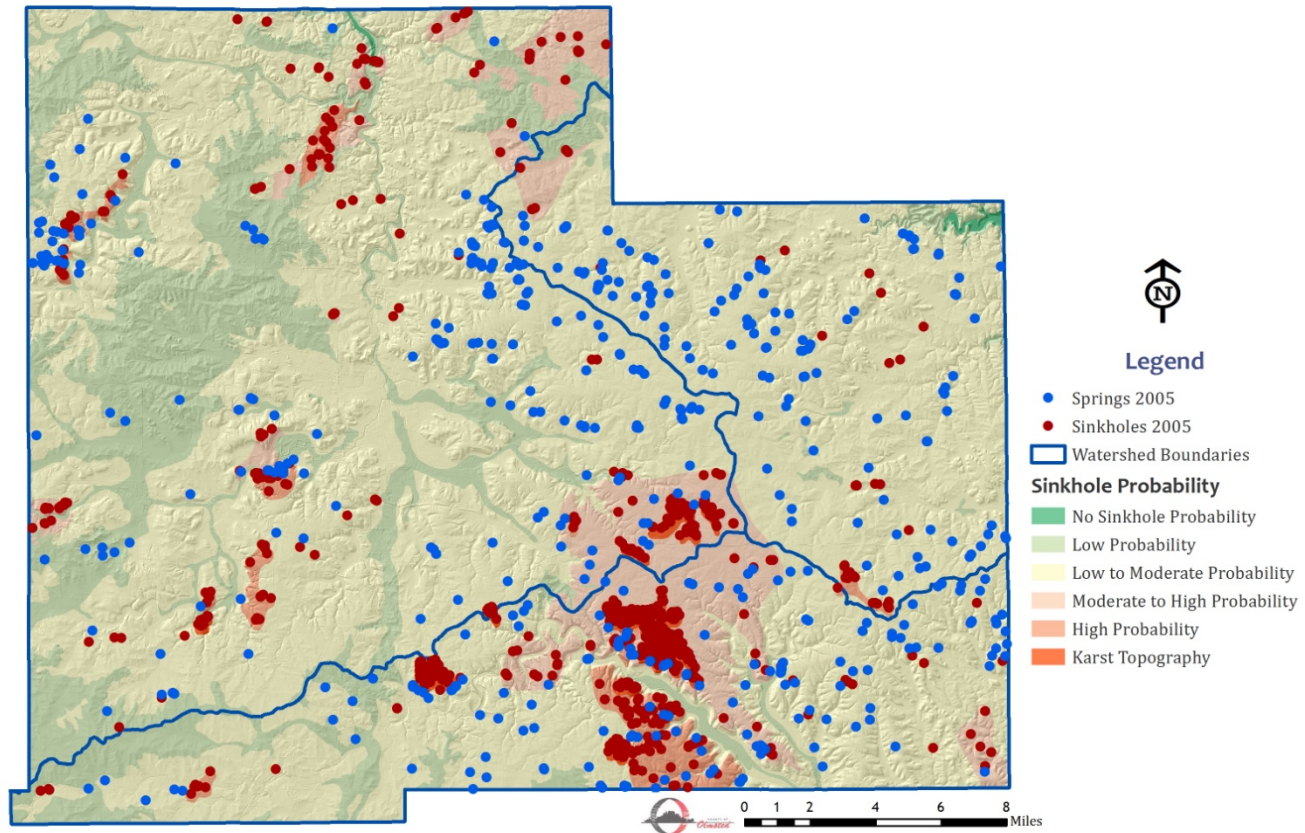
is slow, the depression will be shallow. A sinkhole initiated by catastrophic collapse may periodically collapse again or continue to grow by subsidence. Other sinkholes may begin with subsidence and later collapse catastrophically.

Once a sinkhole forms, it will grow as long as unconsolidated material continues to move through horizontal and vertical joints in the bedrock. Surface water tends to flow into the sinkhole, moving sediment deeper into the bedrock. Sediment transport is also affected by fluctuations in the water table. Thus,

the rate of sediment transfer through the sinkhole, the interaction between surface and groundwater, and the rate of bedrock dissolution determine whether the sinkhole is actively subsiding or passive. Each of these factors may change with time. At the surface, the collapse of unconsolidated rock material into sinkholes can cause structural damage to all types of facilities.

Karst Features

Data Source: Minnesota Geological Survey



The probability of additional sinkholes forming in the county has been classified and mapped as follows:

- ❑ **No Sinkhole Probability:** sinkholes cannot form as erosion has removed all carbonate bedrock
- ❑ **Low Probability:** underlain by carbonate bedrock, but no sinkholes have been observed
- ❑ **Low to Moderate Probability:** underlain by carbonate rock, but contains only widely scattered individual sinkholes or isolated clusters of 2 or 3 sinkholes – average sinkhole density is less than 1 sinkhole per square mile
- ❑ **Moderate to High Probability:** diffuse clusters of 3+ sinkholes, average sinkhole density of 1-5 per square mile
- ❑ **High Probability:** sinkhole density of 5-20 per square mile, new sinkholes periodically appear and more are expected to form
- ❑ **Karst Topography:** sinkhole density of 20 to several hundred per square mile, essentially all of the precipitation that is not lost to evapotranspiration either infiltrates or runs into a sinkhole, new sinkholes often appear, all these areas are underlain by Galena Group

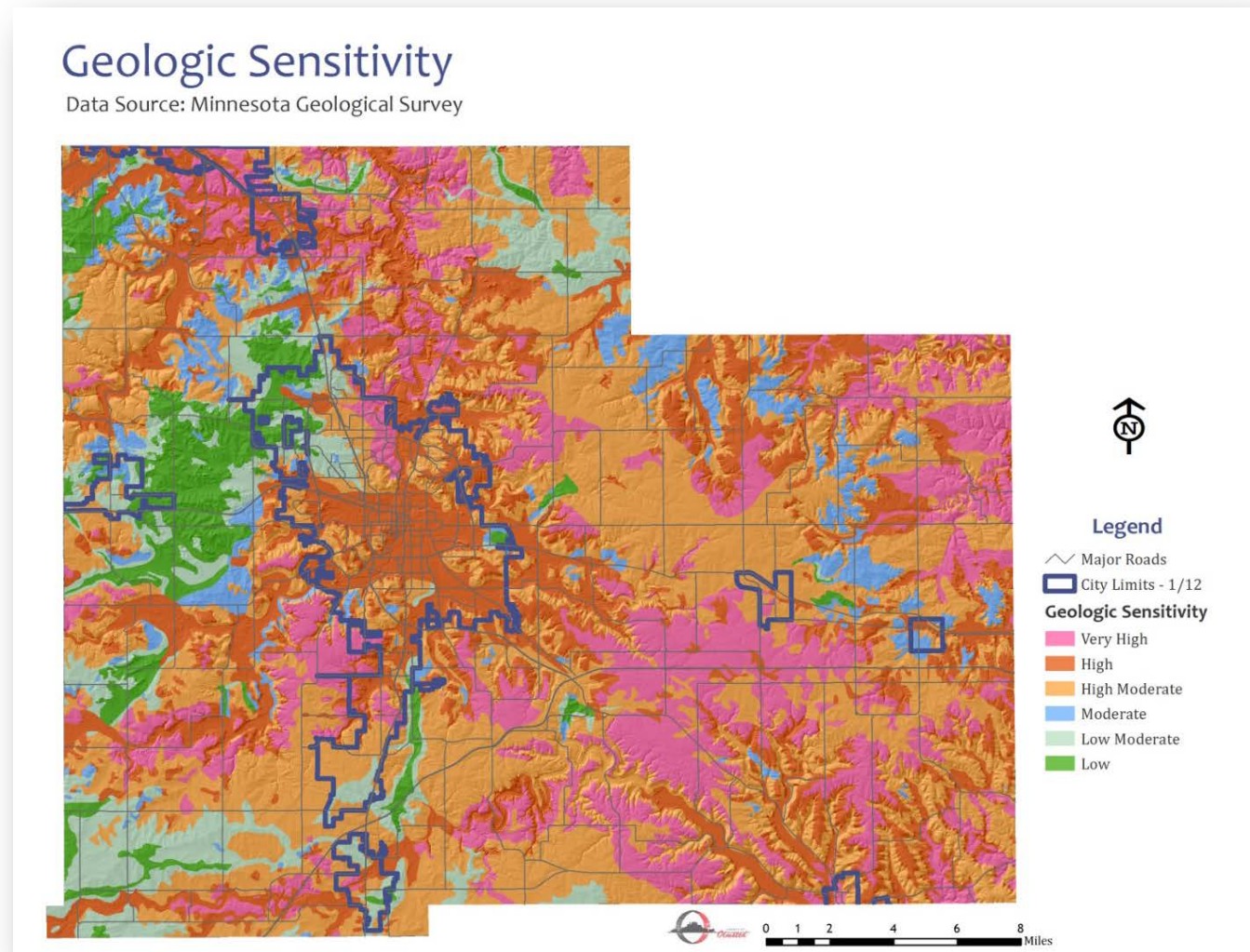
Pollution Sensitivity

Water, “the universal solvent”, has the ability to dissolve many substances. Water’s high surface tension also permits it to carry particles in suspension. Thus, precipitation or surface water that soaks into the ground and reaches the water table may carry with it a variety of contaminants. Local geologic conditions, as described above, affect the rate at which water moves downward below the land surface and therefore the rate at which surface contamination will enter groundwater resources.

Length of residence is the time that elapses from when a drop of water soaks into the ground until it is pumped by a well. The rates of horizontal and vertical movement vary, depending on local geologic conditions. Water in an aquifer may have entered along many geologic pathways, some requiring long travel times and others not. Protecting Olmsted County’s water quality over short periods of time is best accomplished by eliminating sources of contamination in areas of the watersheds that are highly sensitive. However, long-term and comprehensive protection is possible only through countywide application of better management practices.

Generally, the closer to the land surface that the water table occurs, the greater is the geologic sensitivity to contamination. However, in Olmsted County’s karst setting, even though the water table may be overlain by 100’ of rock, if that rock is dry, solution-weathered carbonate, the depth to bedrock affords no protection because fluids can cascade through caverns and solution-enlarged fractures. Karsted aquifers contain the majority of the near-surface groundwater throughout most of Olmsted County. The Minnesota Geological Survey rated geologic sensitivity to contamination from the surface by combining the attributes of both bedrock geology and surficial deposits. Depth to bedrock and depth to water table was also taken into consideration in creating the ratings below. Areas rated Very High have karsted limestone or dolomite within 5 feet of the land surface.

- **Very High:** contaminants will almost certainly reach the water table in hours to months
- **High:** contaminants will probably reach the water table in weeks to years – little natural protection exists to retard the vertical movement of liquids
- **High Moderate:** contaminants will reach the water table in several years to about a decade
- **Moderate:** contaminants will reach the water table in about a decade
- **Low Moderate:** contaminants will probably not reach the water table for more than a decade
- **Low:** contaminants will require decades or longer to reach the water table – naturally occurring layers of fine-grained material are thick and laterally persistent

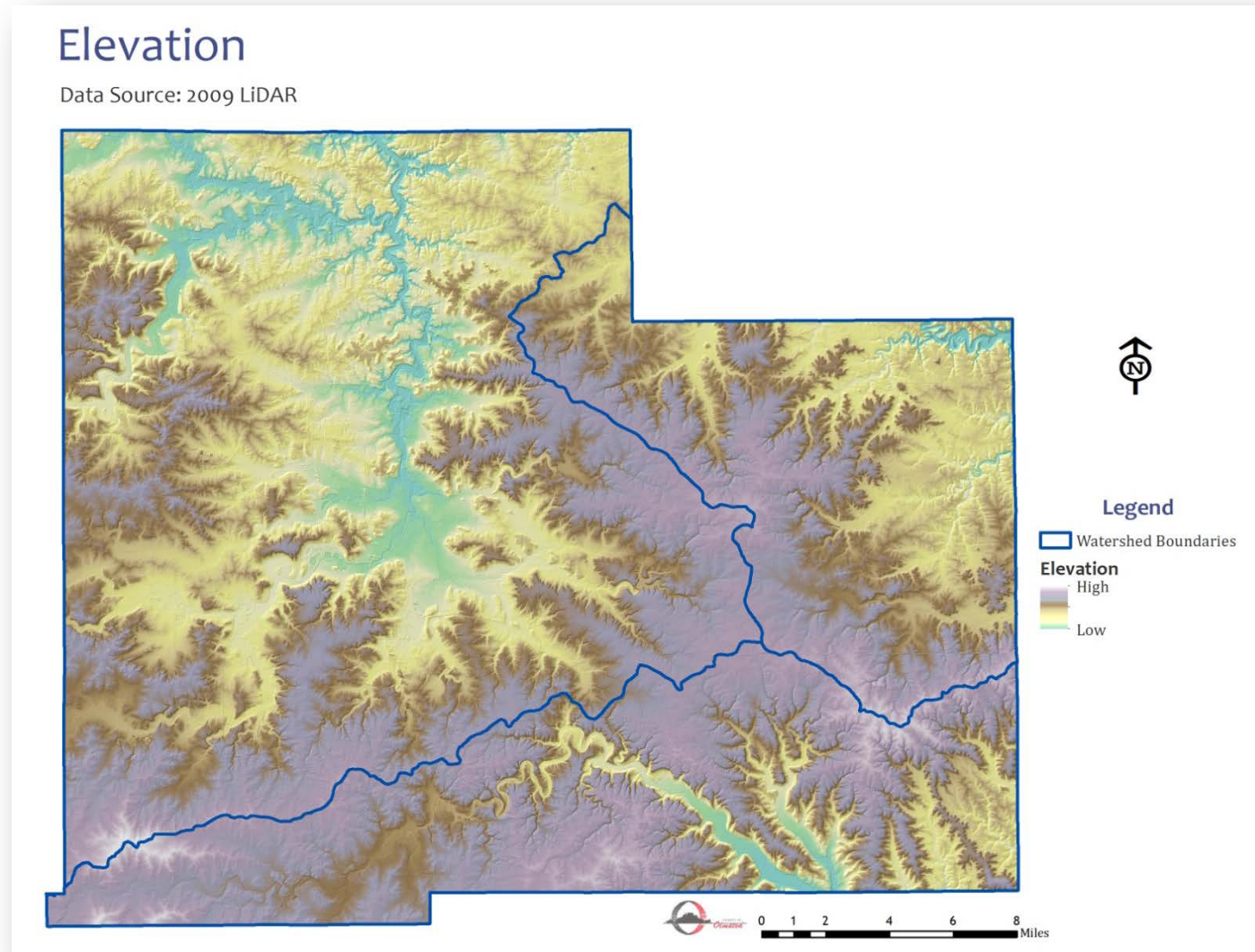


Elevation

The highest elevation is located in the southwest part of the county and is about 1360 feet above sea level, while the lowest is the bottom of the North Fork Whitewater River valley at about 800 feet. Olmsted County's flat to gently rolling terrain is marked by areas of steep slopes along its dendritic network of intermittent and permanent waterways.

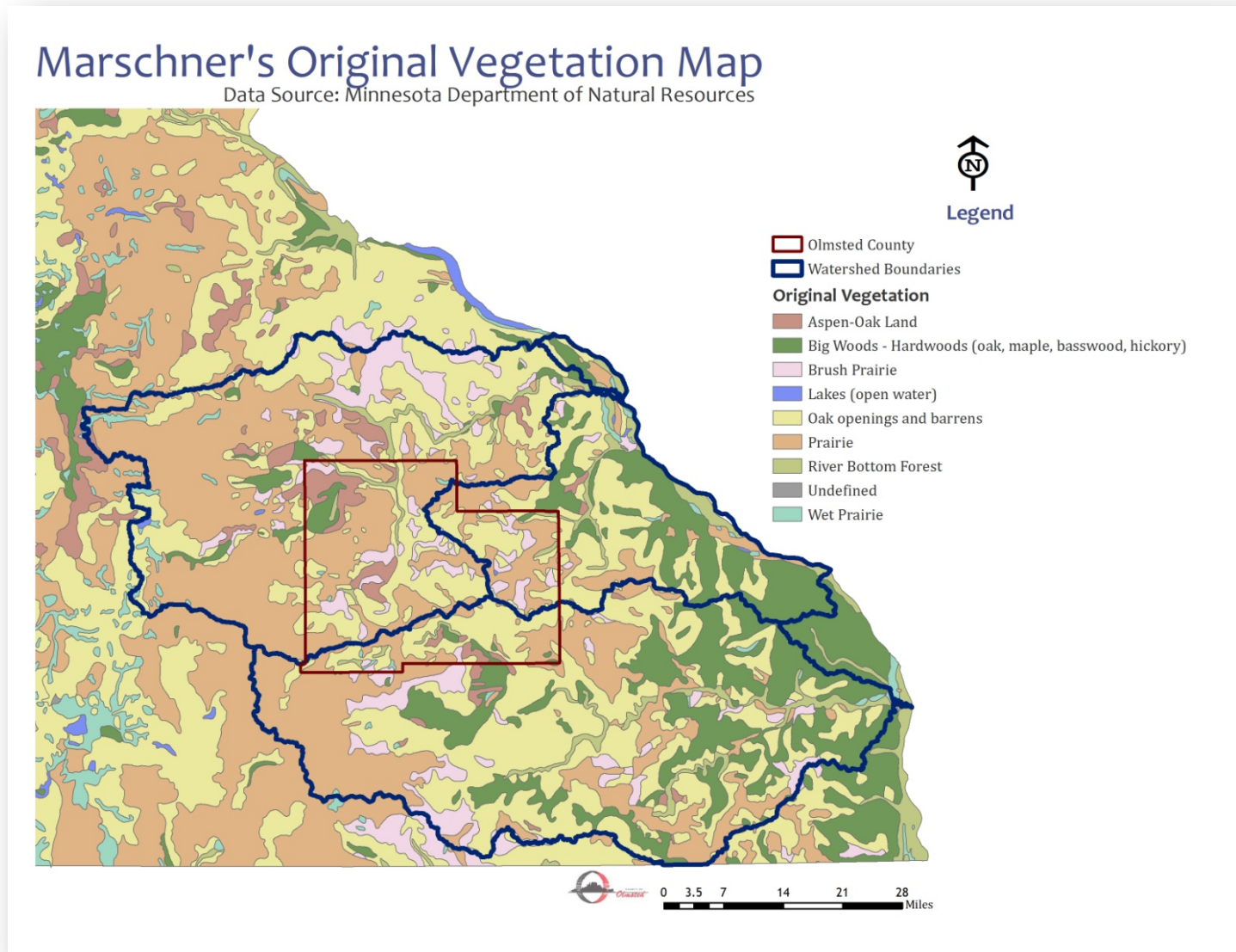
Land Cover

In sensitive geologic settings like those of Olmsted County and its watersheds, land use practices that introduce contaminants to surface water or to the soil horizon may be polluting groundwater resources. Unlike physical geologic constraints, however, land use, land cover, and land management are controlled by land owners, land managers, and governmental agencies. Uses and practices that are



found to damage our ground and surface water can be replaced or mitigated by those that do not.

According to pre-settlement field surveys as illustrated on Marschner's Original Vegetation Map, Olmsted County's landscape consisted primarily of prairie, brush prairie, aspen-oak forest, oak openings and barrens, river bottom forest, and big woods. According to the Geologic Atlas, recent geologic times have been a period of leaching, soil formation, and slow rates of erosion until the land was plowed beginning in the 1800s.



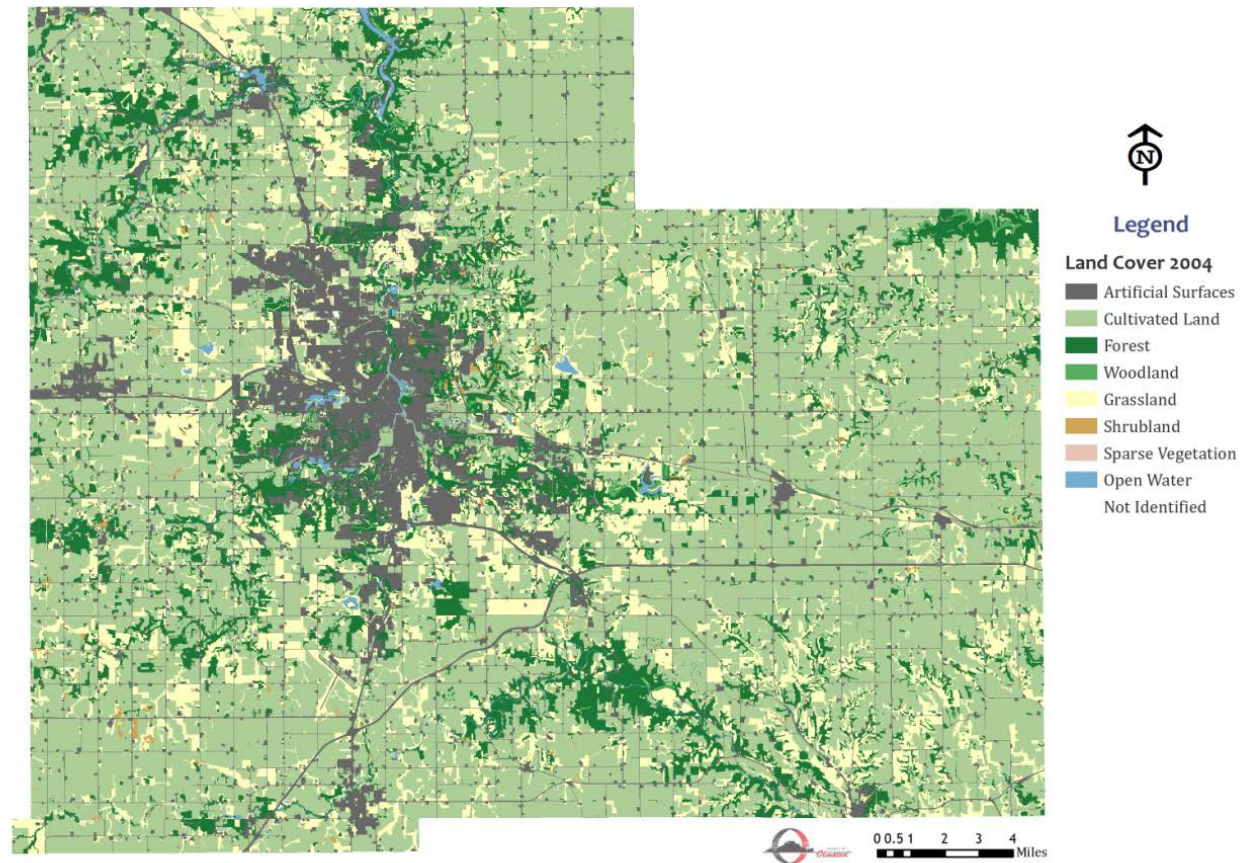
Olmsted County's 2005 Minnesota Land Cover Classification System indicates that the land cover has significantly changed in the last 200 years, as shown in the map and table below.

Summary Land Cover	Area in Acres	Percent of Total County Area
Artificial Surfaces	50394.7	12.0%
Cultivated Land	240025.0	57.3%
Forest	54323.6	13.0%
Grassland	67049.9	16.0%
Not Identified	0.0	0.0%
Open Water	2946.4	0.7%
Shrubland	2348.3	0.6%
Sparse Vegetation	57.7	0.0%
Woodland	1941.3	0.5%
TOTAL	419086.8	100.0%

“Artificial Surfaces” include such land covers as structures and roads; these are generally characterized as being impervious to precipitation. The “Cultivated Lands”, depending on the practices employed by the land managers, may be exposing the land surface to nutrient and pesticide loads as well as erosion potential not experienced prior to

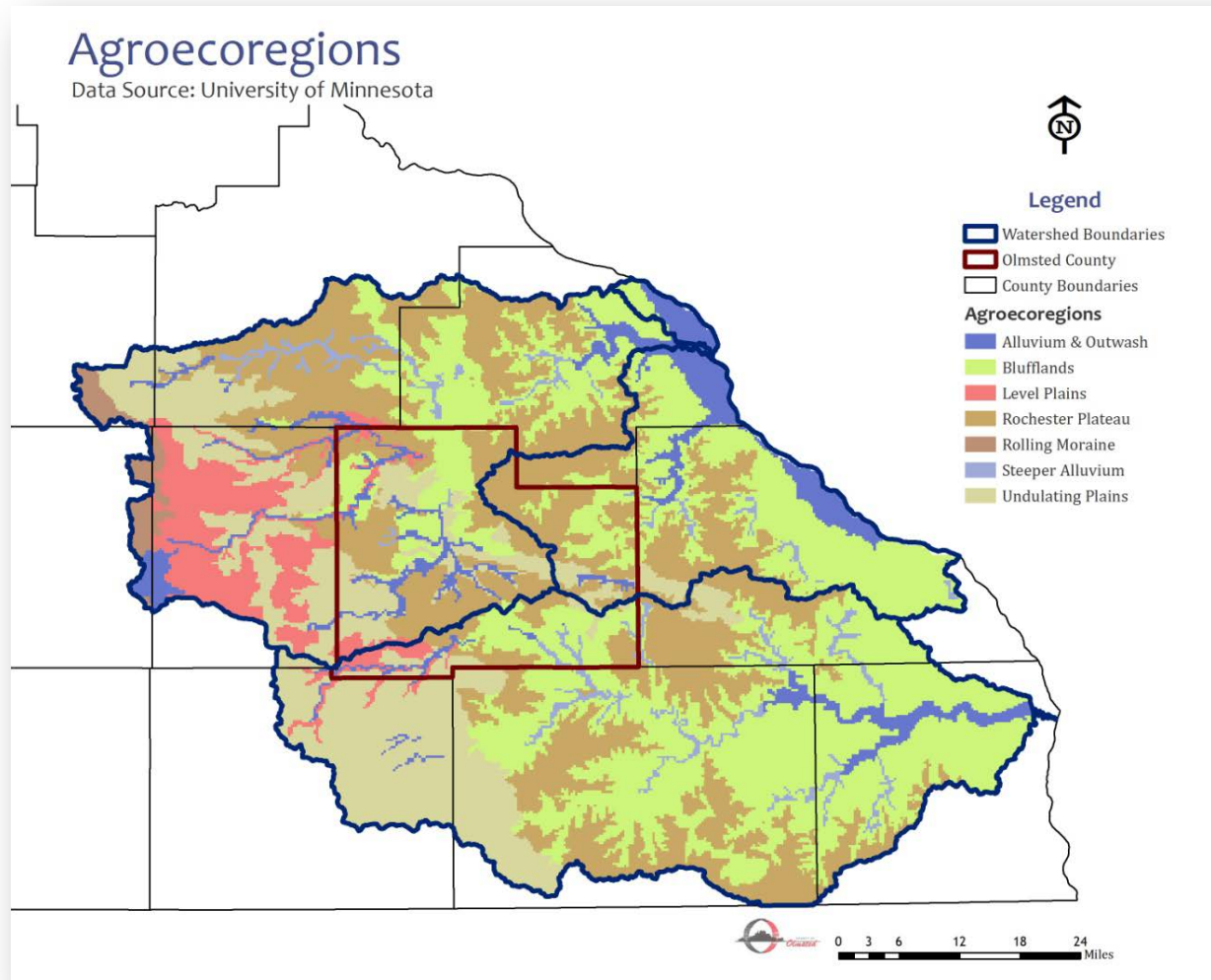
cultivation. The remaining land cover categories are considered “natural” covers. Thus, how we as citizens choose to use and manage 70 percent of our land may be impacting our ground and surface water.

Summary Land Cover



Agroecoregions

Researchers at the University of Minnesota, however, have observed that landscape characteristics that affect soil erosion and water quality often vary significantly within large watersheds (Hatch et. al., 2001). Thus, watershed-based best management practices would not meet the soil conservation, water quality, or socioeconomic needs of the area. To address this concern, they used empirical data obtained in the Minnesota River basin to quantify these variations and help target the most sensitive landscapes within the most



critical watersheds. Each “agroecoregion” is associated with a specific combination of soil types, landscape and climatic features, and land use. These researchers have just begun working with the Zumbro Watershed Partnership to identify the most critical areas in the Zumbro River watershed. The methodologies developed may then be used to identify critical areas in the other watersheds located in Olmsted County.

The major agroecoregions found in Olmsted County are the Rochester Plateau, Undulating Plains, Blufflands, Level Plains, and Alluvium and Outwash. The MPCA’s TMDL for Turbidity Impairments for the Zumbro River watershed describes the characteristics of these agroecoregions and summarizes appropriate BMPs for the range of agricultural-related water quality impacts that occur there.

Rochester Plateau

This agroecoregion consists of fine textured loessial soils developed over karstified limestones. It has a very high density of intermittent streams. Slopes are moderately steep to very steep, and soils are well drained. A relatively high density of sinkholes exists in this agroecoregion. Water erosion potentials are extreme, while wind erosion potentials are low. Stream water quality ranges from fair to poor. Phosphorus transport risks to surface waters are high to severe.

Major resource concerns in this agroecoregion are soil erosion by water, cattle and hog operation management, nutrient management from manure and fertilizer, and rapid leaching or seepage of pollutants to ground water in areas with karst topography and sinkholes. Soil erosion should be controlled by any or all of the following practices where applicable: conservation tillage, contour farming, stripcropping, terracing, grassed waterways, and sediment detention basins. Riparian buffer strips are recommended along streams. Best management practices for cattle include livestock exclusion from streams, and practices to reduce feedlot runoff.

Undulating Plains

Soils in this agroecoregion are fine textured. A very high density of intermittent streams exists. Soils are located primarily on moderately steep slopes, though some of the slopes are flat. The majority of soils are well drained, though a significant portion are poorly drained. Water erosion potentials are high, while wind erosion potentials are low. Stream water quality is generally poor. Risks of phosphorus transport to surface waters are moderate.

Streams in this agroecoregion should be protected from sediment and phosphorus carried by runoff. Erosion control practices through conservation tillage are recommended. Steep lands can be further protected by permanent grass easements or riparian forest and grass buffer strips. Proper animal and manure management practices are important, including livestock exclusion from streams, improved pasture management, and injection of liquid manure.

Blufflands

This agroecoregion consists of fine textured soils located on very steep to extremely steep slopes. Soils are well drained. Sinkholes can occur near incised stream drainage networks. This agroecoregion has a very high density of intermittent streams and a moderate density of permanent streams. Water erosion potentials are extreme, while wind erosion potentials are low. The risk of phosphorus transport to surface waters is moderate to high.

On steep lands, practices to control water erosion are important. These include avoiding row crops on steep lands, or if they must be grown on steep lands, using a combination of conservation tillage, strip-cropping, and terracing. Buffers, along with practices that provide stable conveyances of flow, should be provided for ravines and gullies.

Level Plains

Soils in this agroecoregion are generally fine textured. Slopes are generally flat or moderately steep. The majority of soils are poorly drained, while a significant portion are well drained. This agroecoregion has a very high density of intermittent streams and a moderate density of permanent streams. Water erosion potentials are high, while wind erosion potentials are low.

Practices to control soil erosion by water and sediment delivery to streams are important. These include conservation tillage, and grassed filter strips along streams. Tile intakes at the base of steep slopes should be replaced with French drains or blind inlets.

Alluvium and Outwash

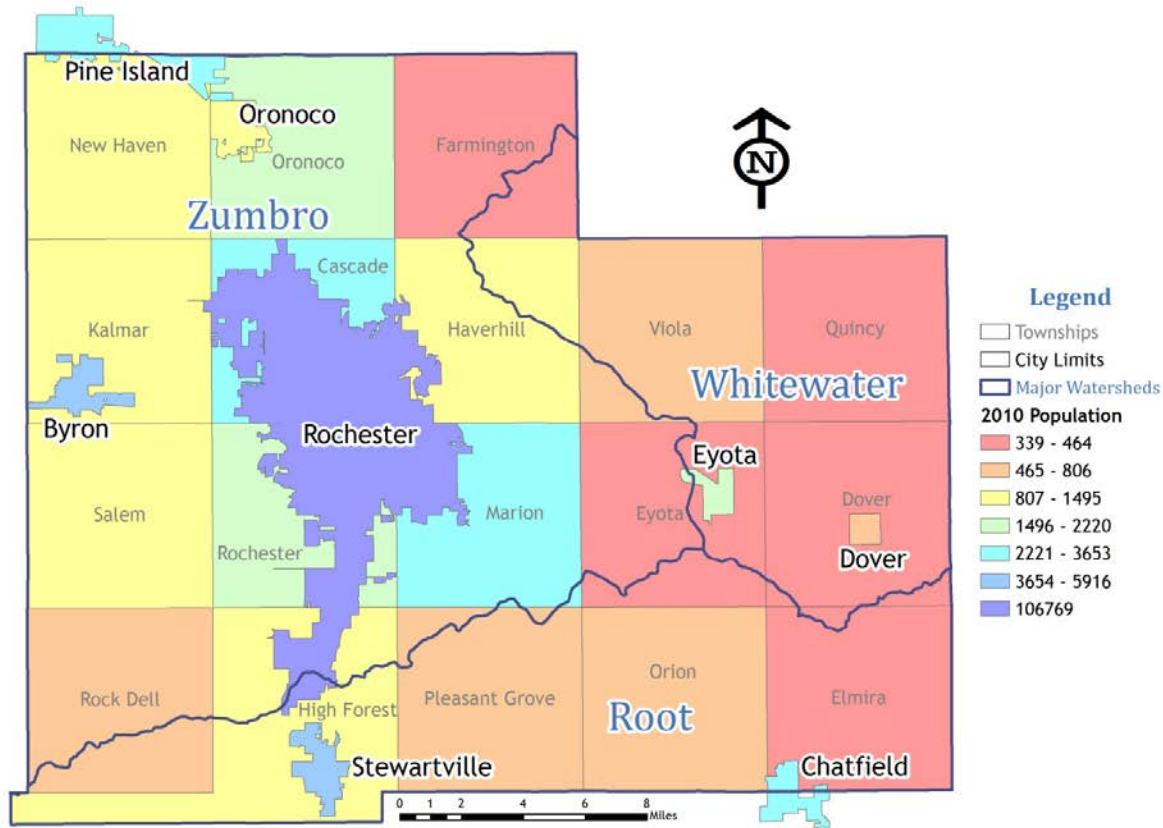
This agroecoregion consists of either fine-textured alluvium or coarse-textured outwash. Soils are generally well drained, and are located on flat to moderately steep slopes. Water erosion potentials are moderate, while wind erosion potentials are high to severe. Stream water quality is generally good, and the risk of phosphorus transport to streams is low to moderate.

Riparian forest and grass buffer strips are encouraged along streams and lake shorelines.

Demographics

Olmsted County is one of the more rapidly growing areas in the state. Ranking eighth in population among Minnesota counties, Olmsted's population grew by almost 20,000 residents from 2000 through 2010, to a total count of 144,248 people. Rochester, Minnesota's third largest city, grew by 24.4% in this same time period, adding nearly 21,000 residents for a total of 106,769 people.

Major Watersheds and City/Township Population



With over 109,000 jobs drawing people from all over Southeastern Minnesota and even into the Twin Cities metropolitan area, Olmsted County is the region's largest economic and employment hub. Mayo Clinic, IBM, and government entities are the area's largest employers; the service and agriculture sectors continue to significantly contribute to the area's economy.

Residents, visitors, the services they use, and the products they make impact the quantity of water drawn from the aquifers of southeastern Minnesota. If the area is to continue to grow and expand employment activities, the population base and employers must be assured that clean water is readily available now and in the future.

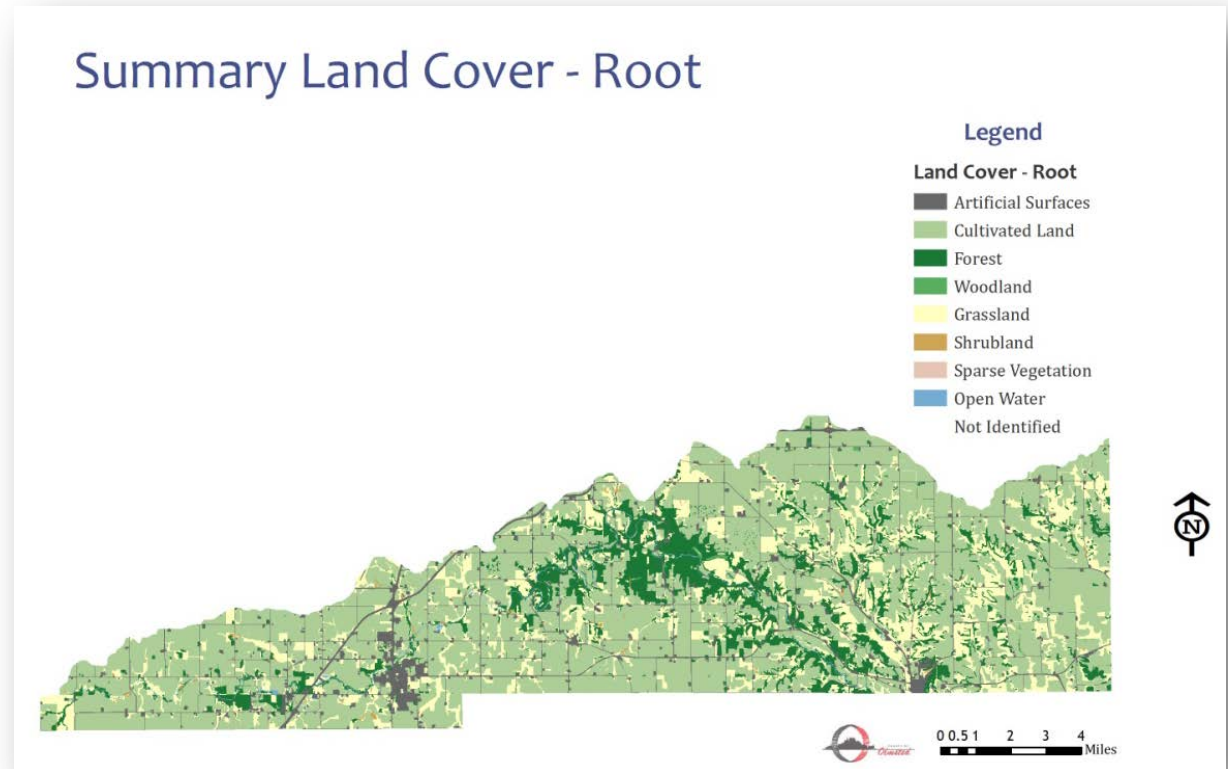
Watershed Profiles

Three major watersheds fall within Olmsted County: the Root, Whitewater, and Zumbro. The following sections describe the landscape characteristics of the Olmsted County portions of each of these watersheds.

Root

The North Branch Root River headwaters are located in Mower County. The river elevation drops from 1280 feet at the southwest corner of Olmsted County to 980 feet near Chatfield. The Root drains about 23% of Olmsted County, or about 99,000 acres. The areas along the river and its contributing waterways are generally quite steep, while the rest of the watershed is fairly flat to rolling. Land cover in the Olmsted County portion of the Root River watershed is predominantly cultivated lands, though the cities of Stewartville and Chatfield contribute urban land use impacts. There are many sinkholes in this watershed, particularly in Elmira and Orion Townships, and springs dot the landscape.

Summary Land Cover	Area in Acres	Percent of Total County Area
Artificial Surfaces	6806.2	6.9%
Cultivated Land	59564.9	60.3%
Forest	12902.3	13.1%
Grassland	18373.9	18.6%
Not Identified	0.0	0.0%
Open Water	571.9	0.6%
Shrubland	373.6	0.4%
Sparse Vegetation	32.3	0.0%
Woodland	220.2	0.2%
TOTAL	98845.3	100.0%

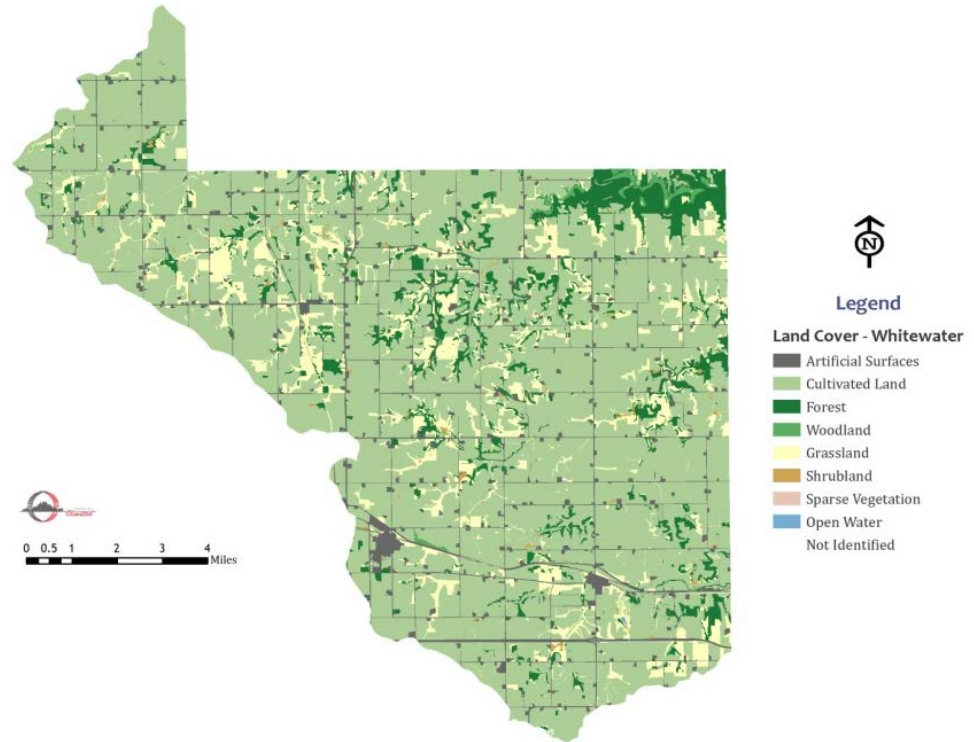


Whitewater

The North Fork and Middle Fork of the Whitewater River headwaters are located in Olmsted County. The North Fork Whitewater River elevation drops from 1200 feet to 800 feet, while the Middle Fork drops from 1300 feet to 980 feet. The Whitewater watershed drains about 20% of Olmsted County, accounting for about 83,000 acres. While there are some flatter areas in this watershed, much of the area is characterized by rolling terrain and steep slopes. Almost 74% of the land surface in Olmsted County's portion of the Whitewater watershed is cultivated, with the cities of Dover and Eyota being the only urbanized areas. There are few sinkholes in this watershed, and their likelihood to occur is in the low to moderate range. Numerous springs, however, are found, particularly where the Cummingsville Formation is the first encountered bedrock.

Summary Land Cover	Area in Acres	Percent of Total County Area
Artificial Surfaces	4830.3	5.8%
Cultivated Land	60917.4	73.6%
Forest	6684.2	8.1%
Grassland	9366.5	11.3%
Not Identified	0.0	0.0%
Open Water	69.4	0.1%
Shrubland	398.7	0.5%
Sparse Vegetation	17.2	0.0%
Woodland	467.9	0.6%
TOTAL	82751.6	100.0%

Summary Land Cover - Whitewater

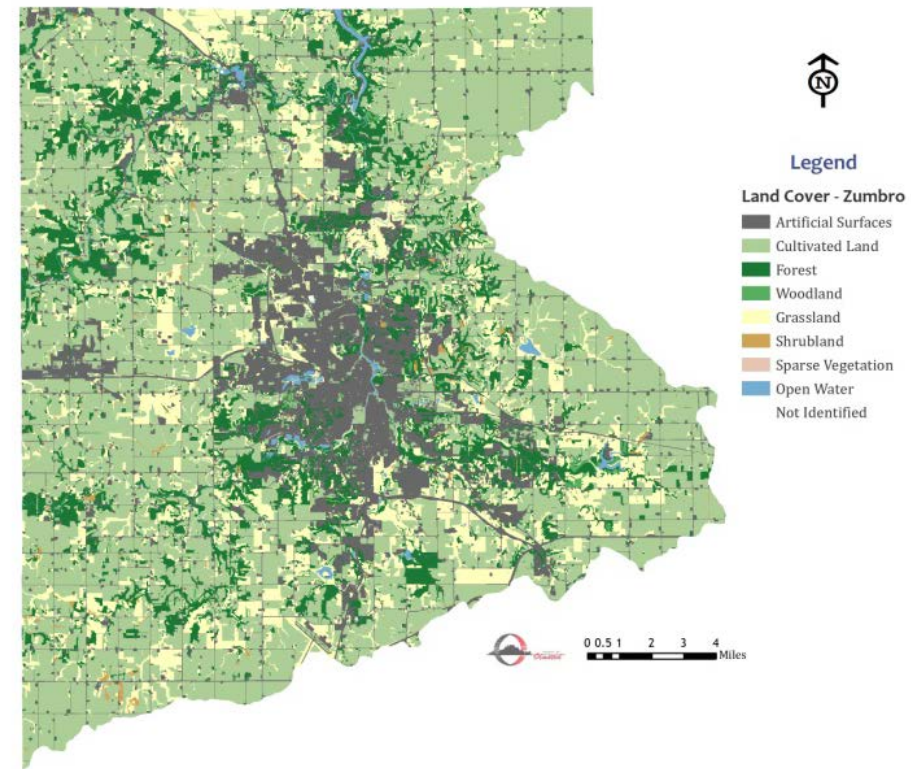


Zumbro

The Zumbro headwaters are located in Dodge and Steele Counties. The elevation of the river at the county boundary is about 1180 feet above sea level and the down river elevation at Lake Zumbro is about 910 feet. The Zumbro River watershed drains the largest portion of Olmsted County, 57% of it, and approximately 237,000 acres. While there are some areas of flatter terrain, the land surface has many rolling areas and many of the shoreland areas are characterized by steep slopes. Just over 16% of the land cover is characterized by developed surfaces; the cities of Rochester, Oronoco, Byron, and Pine Island are located in this watershed. This type of impervious cover is likely to continue to increase due to the growth seen in these communities. Just over 50% of the Olmsted County portion of the watershed is cultivated, and significant land surface is forested or grasslands. There are small concentrations of sinkholes in the watershed, particularly in Oronoco Township, and springs are found primarily where the Cummingsville Formation is the first encountered bedrock.

Summary Land Cover	Area in Acres	Percent of Total County Area
Artificial Surfaces	38618.5	16.3%
Cultivated Land	119366.8	50.4%
Forest	34684.1	14.6%
Grassland	39220.9	16.5%
Not Identified	36.3	0.0%
Open Water	2288.8	1.0%
Shrubland	1573.6	0.7%
Sparse Vegetation	8.3	0.0%
Woodland	1252.9	0.5%
TOTAL	237050.1	100.0%

Summary Land Cover - Zumbro



Guiding Principles

Olmsted County has identified the following factors as important to the Water Management Plan and has used these factors in developing action items.

All residents, landowners, and businesses in Olmsted County have a responsibility to sustain our surface and groundwater resources.

Because water crosses jurisdictional boundaries, jurisdictions in the same watershed need to coordinate water resources management in order to attain surface water sustainability. All levels of government, from the local municipality to the federal level, have a role in maintaining our water resources and should apply the resources needed to fulfill that role.

We live in a sensitive landscape and geologic setting.

The way we manage land and water resources directly affects the future use and sustainability of the resource. As confirmed by TMDL studies, human land use and land management activities are the most important factors influencing water quality and sustainable water quantity. Therefore, individual citizens also have a responsibility for our water resources and a role in making individual choices that protect water quality.

Water pollution has occurred in the past and continues today in various forms.

Groundwater quality in the Galena Group aquifer is no longer clean enough for drinking water. We must protect water resources that are in good condition and work to restore impaired streams and polluted groundwater.

Olmsted County farms and businesses compete in a global economy.

Forces outside Olmsted County influence prices and costs. Local governments lack the authority to address many of the land use and management activities that can affect water resources. Examples of these outside forces include

- ☐ market prices,
- ☐ upstream land uses and practices,
- ☐ state and federal rules and laws applying to industrial activities, pesticides, fertilizers, air quality, water quality, wetlands and other habitats, and
- ☐ incentives, subsidies, commodity programs, crop insurance, and state and federal taxes.

Nevertheless, we need to work cooperatively with all stakeholders to apply best management practices within the county.

Based upon the assessment of background data and the Guiding Principles, a set of goals, objectives, and action items has been formulated for each Priority Concern.

A number of funding sources including general tax levy, State funding sources such as Natural Resource Block Grants, and other grants from public and private sources will support implementation of the action items. Funding may be provided to cooperating agencies for actions such as research and monitoring. It should be noted that some of the action items will need to be funded through competitive State grants. If grants are not secured, the action items will be delayed, curtailed in scope, or considered for deletion from the plan in a future amendment.

Drinking Water & Groundwater Protection

Sustainable access to clean, safe water is critical to Olmsted County's health and vitality. Virtually all of the water Olmsted County residents and businesses use each day for drinking, cooking, animal care, gardening, cleaning, and materials processing comes from groundwater aquifers that underlie the county. Each year, nearly 6 billion gallons of water is drawn from public and private wells to meet Olmsted County's residential, agricultural, and industrial needs. Of the nearly 32 inches of precipitation we annually receive in this part of the state, only about six inches of that percolates through the soil and reaches the aquifer below. We cannot take this precious resource for granted; we must protect its quality for our use and that by future generations.

Public Supply

Congress passed the Safe Drinking Water Act (SDWA) in 1974 as a means to protect public health by regulating the country's public drinking water supply. Amendments in 1986 and 1996 require many actions to protect drinking water as well as its sources: rivers, lakes, reservoirs, springs, and groundwater. According to the United States Environmental Protection Agency's website, the SDWA authorizes the US EPA to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water. US EPA, states, and water systems then work together to make sure that these standards are met.

Types of Public Systems

The Minnesota Department of Health's Drinking Water Protection Program is responsible for ensuring that Minnesota's public water supply systems comply with the SDWA. The vast majority of Olmsted County residents and businesses obtain their water from a public water supply. Public water systems include municipalities, manufactured housing developments, businesses, schools, and other facilities that serve water to more than 25 people on a regular basis. Those public water systems that serve at least 25 people or 15 service connections on a year-round basis are designated as Community Public Water Supplies, and may be municipal or non-municipal in nature.

Noncommunity public water systems are facilities such as schools, factories, restaurants, resorts, and churches that are served by their own well. These facilities are also required to provide a safe and adequate supply of water under the SDWA. Noncommunity



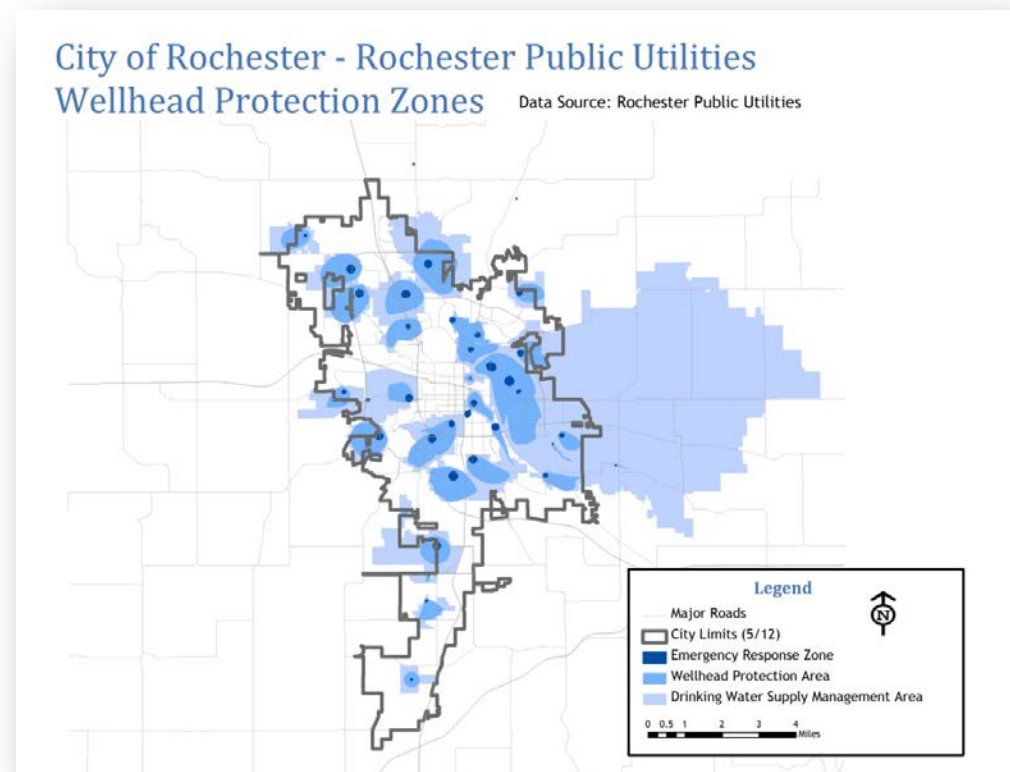
water systems serve either a transient or a nontransient population. A nontransient noncommunity public water system serves the same individuals every day (such as a school, daycare, or factory). A transient noncommunity public water system serves different individuals each day (such as a restaurant, motel, or highway rest area). Because they serve different types of populations, there are different requirements for transient and nontransient public water systems.

Source Water Protection

The MDH is also responsible for Source Water Protection. Source water refers to water from streams, rivers, lakes, or aquifers that is used for drinking. There are three primary parts to Minnesota's Source Water Protection Program: wellhead protection, source water assessments, and protection of surface water intakes.

Wellhead Protection

Wellhead protection is a way to prevent drinking water from becoming polluted by managing potential sources of contamination in the area supplying water to a public well. States are required to have wellhead protection programs under the provisions of the 1986 amendments to the federal Safe Drinking Water Act. A capture zone for the well (called the wellhead protection area) is designated and a plan is developed and implemented for managing potential contamination sources within the wellhead protection area. Public health is protected and the expense of treating polluted water or drilling new wells is avoided through wellhead protection efforts. The MDH assigns staff in the Source Water Protection Unit to assist public water suppliers with preparing and implementing wellhead protection plans. MDH administers the state wellhead protection rule [Minnesota Rules, Chapter 4720.5100 - 4720.5590](#) that sets standards for wellhead protection planning. Specific wellhead protection requirements vary for the different classifications of public water systems in Minnesota (transient noncommunity, nontransient



noncommunity, and community). The requirements for each type of system are described below:

Transient Noncommunity Public Water Systems: Transient noncommunity water systems (such as resorts, restaurants, and churches) are required to delineate a 200-foot radius around the well, known as an inner wellhead management zone, and then inventory and manage potential contaminant sources within the inner wellhead management zone. These are the only required wellhead protection steps for transient noncommunity public water systems, although they are encouraged to pursue additional wellhead protection activities.

Community and Nontransient Noncommunity Public Water Systems: Community and nontransient noncommunity public water systems are required to delineate, inventory, and manage an inner wellhead management zone. Additionally, they must also create a formal wellhead protection plan. The wellhead protection planning process itself is broken down into two parts. Part 1 involves delineation of the wellhead protection area and drinking water supply management area, as well as an assessment of the well(s) vulnerability. Part 2 involves the creation of the wellhead protection plan itself, including goals, objectives, plan of action, evaluation program, and contingency plan. The MDH has indicated that they are working on a new policy for nonmunicipal community systems since, unlike municipalities, they have no ability to adopt and enforce land use controls within the wellhead management zone.

In most cases, the MDH notifies a public water supplier when they must begin preparing a wellhead protection plan. Municipalities that add a well to their system will be required to prepare a wellhead protection plan once the well is in service as a water supply. Existing wells serving community and nontransient noncommunity water supplies will be phased into the wellhead protection program as time and resources permit; vulnerable wells have high priority. The MDH has developed a phasing list that helps determine the order public water suppliers will be brought into the program. These phasing criteria include water chemistry data, well construction information, and geological data.

Once an entity has entered the wellhead protection program, they have at least two years to prepare a wellhead protection plan. Additional six-month blocks of time are automatically awarded on a cumulative basis when

- a system has multiple wells,
- there is a lack of state and federal funding to support wellhead protection planning,
- the public water supply system is privately owned,
- the wellhead protection area is in more than two governmental jurisdictions, and
- the pumping of a well in another system affects the boundaries of the wellhead protection area.

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.

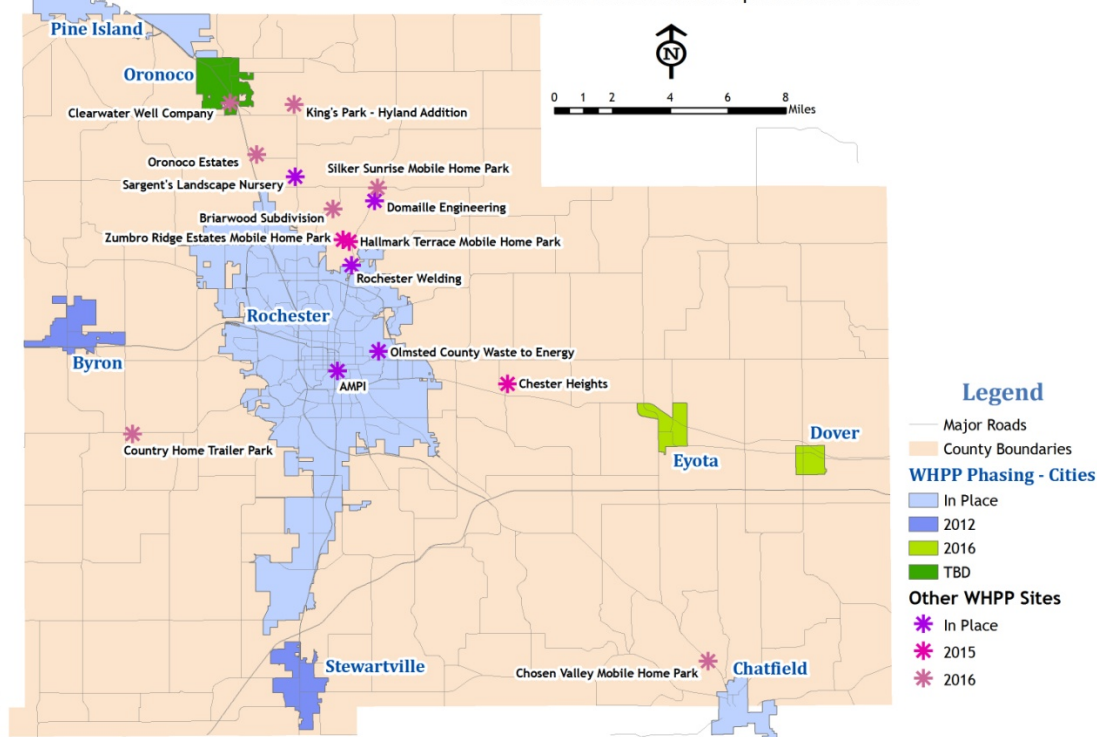
The 1996 amendments to the federal Safe Drinking Water Act require states to produce source water assessments for all their public

water systems and to make the results of those assessments available to the public. MDH completed assessments for the over 7,000 public water systems in the state, 75 of which are in Olmsted County. 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.

A source water assessment and a wellhead protection plan are two different documents, with separate and distinct purposes. However, the source water assessment can aid a water system in its wellhead protection planning process and provides an update of the system's progress in source water protection. Note that the source water assessment is produced by MDH, while the wellhead protection plan is developed by the water system and its wellhead protection planning team. Assessments are

Tentative Dates for Bringing Community Systems Into the Wellhead Protection Program

Data Source: Minnesota Department of Health



now available to the public at <http://www.health.state.mn.us/divs/eh/water/swp/swa/swainfo/default.cfm> .

According to the 2010 update to the Olmsted County Community Health Report Card, all 18 of the community water supplies in the county met the state drinking water standards in 2009.

Protection of Surface Water Intakes

Protection for surface water intakes is not required, but 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 has convened a work group to help determine how these plans should be prepared and who should approve them. The work group has prepared a guidance document to define Minnesota's approach to source water protection for surface water intakes. There are no established surface water intakes in Olmsted County.

Private Wells

All residences, businesses, and industries not served by a public water system rely on private wells for their water. Wells and borings used for drinking water, irrigation, industry, groundwater monitoring, heat pumps, hydraulic elevators, and other purposes must be properly constructed, maintained, and sealed when removed from service, to protect both public health and our invaluable groundwater resources. The MDH's Well Management Program protects both public health and groundwater by assuring the proper construction of new wells and borings, and the proper sealing of unused wells and borings.

- Establishes standards for construction and sealing of wells and borings ("Minnesota Well Code")
- Licenses contractors who construct, repair, and seal wells and borings
- Administers permits and notifications to construct and seal wells and borings
- Inspects the construction of new wells and borings, and the sealing of old wells and borings
- Follows up with property owners after property transfer to seal unused wells
- Maintains records on wells and borings
- Provides information, training, and technical assistance to contractors, other professionals, and the public
- Responds to well and well water quality problems caused by groundwater contamination events and natural disasters such as floods

Olmsted County's adoption of the Water Well and Water Supply Ordinance enables the Olmsted County Inspections Division to administer the Minnesota Department of Health water well program as a local program, under a delegation agreement with the State. The ordinance provides for the review of water systems at the time of subdivision platting, establishes construction requirements for new wells, procedures for well sealing and establishes criteria for the use of existing wells. Inspection Division activities include permit processing, responding to inquiries, investigating complaints and field inspections.

The administration of the Water Well and Water Supply Ordinance can only be accomplished through a Board of Health. The Olmsted County Board is the Board of Health for Olmsted County, which has delegated some of its authority in these matters to the Olmsted County Environmental Commission. All of the environmental health related ordinances of Olmsted County are administered under the Environmental Services Administrative Ordinance.

Olmsted County Groundwater Quality Testing and Monitoring Programs

Olmsted County has three water monitoring programs that provide information for assessing the safety of drinking water supplies and groundwater quality:

- Private well testing
- Decorah Edge Recharge Area monitoring
- Volunteer Nitrate Network monitoring

Approximately 500 private wells are tested each year at the County Water Lab for various reasons. Most samples are submitted to fulfill property transfer or refinancing requirements. Lab costs are paid by the well owner. According to the 2010 update to the Olmsted County Community Health Report Card, about 7% of the 6,500 private wells in the county were tested in 2009. Of those tested, 73% met the drinking water standards for nitrate and coliform bacteria, the two most common contaminants found in drinking water supplies.

Each decade, 58 wells in the vicinity of Olmsted County's Decorah Edge groundwater recharge area are tested for nitrate, chloride, and sulfate. The purpose of this monitoring program, which began in 1991, is to assess groundwater quality trends. All testing is done at the County Water Lab.



Since 2007, 72 private well owners have agreed to annually sample their wells as part of a regional volunteer nitrate monitoring network. State grant funds are used to pay costs for testing at the County Water Lab.

Goal: Ensure that all Olmsted County residents have access to safe drinking water, now and in the future.

- Objective 1:** Continue and enhance groundwater monitoring programs in order to improve the regional understanding of how land cover and land use impact the interaction between the landscape, surface water, karst features and groundwater.
- Objective 2:** Support implementation of Wellhead Protection Area Plans.
- Objective 3:** Support community water supply and sewer system projects and appropriate installation and management of private systems.
- Objective 4:** Design and maintain groundwater resource-related GIS databases.
- Objective 5:** Protect sensitive geologic areas, features, and formations.
- Objective 6:** Increase public awareness of the importance of protecting drinking water supplies, groundwater resources, and sensitive geologic areas from potential pollutants.

Agricultural Erosion and Sediment Control, Nutrient Management, & Chemical Use

Over 70 percent of the land area of Olmsted County is non-urbanized agricultural land - farms of various sizes and types of operations. On average, about 58 percent is in row crop production. With hundreds of miles of rivers, streams, reservoirs, and land/water interfaces in the county, there is significant contact between the agricultural lands and the county's vast dendritic waterway system.

Numerous studies have identified agricultural land uses and management as the source of various water resource impacts including biological health, physical structure of the rivers and streams, and chemical properties (suspended and dissolved). While water resource assessments continue in all three watersheds, recent studies have concluded that there are widespread water quality impairments for turbidity, nutrients, and fecal coliform. Other studies indicate that agricultural chemicals have been and are pollutants.



Image by Robin Arnold © Robin One Photography

The agricultural census provides a recent look at the changes to the landscape.

DATA	2007	2002	1997
Farms*	1,384	1,395	1,317
Land in Farms (ac.)	296,039	313,020	303,665
Percent of County	70.6%	74.7%	72.4%
Total Cropland (ac.)	227,550	255,083	244,678
Percent of County	54.3%	60.9%	58.3%
Livestock & Poultry**	288,391	268,480	222,340
Corn (ac.)	118,975	107,822	97,352
Soybeans (ac.)	57,449	71,193	58,684
Hay (ac.)	21,311	28,078	30,007

* \$1000 or more in sales

** major increase is in hogs and pigs
(County size is 419,082 acres)

Recent observations indicate that additional lands have been taken out of conservation programs and placed back into production, so these figures for land in cropland likely do not reflect current cropland figures.

Pesticides

The Minnesota Department of Agriculture started surveying for pesticides in groundwater in 1985. They began surface water monitoring in 1991. A regionally based water quality monitoring network has been established. The monitoring and analyses focuses on a substantial list of target pesticides and non-target analytes.

The two most recent reports cover the years 2011 and 2010. Hundreds of surface and groundwater samples were collected and analyzed. In 2010, none of the 616 surface water samples collected and analyzed from Minnesota surface waters measured concentrations greater than the established aquatic life standards for acetochlor, atrazine, and metolachlor. The MDA Commissioner has identified atrazine and metolachlor as “pesticides of concern”. Chloropyrifos was added to that list in 2012. Acetochlor, atrazine, dimethenamid, and metalochlor were detected routinely in both base and storm flows in 2011. Acetochlor, atrazine, and metalochlor were detected in the Root and Whitewater River watersheds (Zumbro River was not part of the sampling regime).

Nutrients/Manure

Modern agriculture is dependent on outside inputs of nutrients for successful crop yields. Inputs can be from chemical fertilizers and/or manure, depending on the farm operation. Historically, research shows the loss of nitrogen by various processes into the air and the soil and groundwater system. This is an ongoing challenge for farmers due to the costs of the inputs and application. The MDA reports that determining optimum agronomic inputs is a complicated process involving many variables of soils, farm operation, and weather conditions. In this region of Minnesota, agronomically conservative inputs still often result in elevated levels of nitrogen in wells and in rivers and streams. Phosphorus loss occurs with soil erosion and occurs at varying levels in surface waters in southeast Minnesota.

A Basin Alliance for the Lower Mississippi in Minnesota (BALMM) report indicates that the level of nitrogen over-use is relatively modest, but despite that, the “nitrogen levels in the Whitewater River remain high”. The Winona County water plan states that two reaches of the Whitewater River (Middle, South Fork) “exceed the nitrate standard such that the drinking water use is considered impaired”. None of the reaches of the Root or Zumbro watersheds is listed as impaired for nitrogen at this time, although studies in the Root River from 1999-2000 indicated elevated nitrogen levels. The BALMM study found that “during lower stage readings, nitrate concentrations were the highest, but dropped during the biggest runoff event”. Recent studies show losses from the shallow groundwater system being found in tile flows.

Manure

Selected rivers and streams in the Lower Mississippi basin are routinely monitored for fecal coliform bacteria. The MPCA produced TMDL documents (2002, 2006) and an implementation plan in 2007 that included information for the Root, Whitewater and Zumbro Rivers. While not all fecal coliform bacteria are harmful to humans, they are monitored because they are indicative of pathogens of concern in surface waters. As noted in the implementation plan, “if fecal coliform bacteria levels exceed state water quality standards, it is an indication that fecal matter is entering the stream in quantities that pose a potential threat to public health”. Like nitrogen, the relationship of land use and fecal coliform concentrations in streams is a complex relationship. Sources of fecal coliform include agricultural runoff from various sources, inadequately treated domestic sewage, wildlife, and urban storm water. In the Lower Mississippi basin, the “widespread problem of fecal coliform impairment is caused by thousands of ubiquitous pollutant sources including the main sources – feedlots, manure spreading, wildlife, and failing septic systems”. Manure management decisions by operators also can lead to elevated nutrient (nitrogen, phosphorus) levels in surface waters.

There are State rules that cover many point sources of pollution related to manure. Non-point source best management practices have been the focus of a number of animal and manure management programs and projects in Olmsted County. With pressure to place maximum acres in crop production, producers may graze cattle in environmentally sensitive areas that are prone to erosion, have poor soils conditions, or are near waterways. Some of these lands are overgrazed or otherwise mismanaged and are potential sources of fecal coliform. Feedlots without adequate runoff controls are a source of fecal coliform, especially during the early spring and in high surface water runoff events. Poor manure management (spills, over-application, location near sensitive lands/waters, application timing, and soil incorporation) in sensitive locations also contributes to impaired waters. Low soil organic matter can contribute to conditions that lead to fecal coliform runoff. All of these factors play a role in the health of rivers and streams in Olmsted County - some of which are found to exceed the water quality standards for fecal coliform.

Erosion and Sediment Control

A turbidity TMDL study was completed for the Zumbro watershed in 2012, and a watershed restoration study was completed for the Logan Branch of the Whitewater watershed in 2010. Both address turbidity impairments in these surface waters. A turbidity TMDL will be completed in 2012 for the Root River watershed. Some of the water quality findings of these and other studies addressing soil erosion and sedimentation are summarized below.

On the Whitewater River, sediment is a major problem. Concentrations of suspended sediment range from lows of several milligrams/liter to 5000-7000 during high flow events. A sediment budget for the watershed suggests that 68% is from sheet or rill erosion, 3% from ephemeral erosion, 8% from gully erosion, and 21% from streambank erosion (BALMM Scoping Document, 2001).

Turbidity impairments in the Zumbro watershed are significant. High flow and flood events cause water quality exceedances, and some portions of the watershed experience exceedances during moderate and low flow conditions. The primary sources of



Image by Robin Arnold © Robin One Photography

suspended solids from the agricultural landscape include streambank and bed erosion, row cropland, inadequate buffers near streams and waterways, channelization of streams, ravine and gully erosion, and overgrazed pastures. Some of these sources are similar in urbanized areas, such as streambank, bed, ravine, and gully erosion. Eighteen stream reaches in the Zumbro watershed exceed the water quality standards for turbidity (Zumbro River Watershed Total Maximum Daily Loads for Turbidity Impairments, 2012).

According to the Winona County Water Plan, flooding events, particularly in the bluffland watershed, have caused significant erosion from gullies, streambeds, streambanks, and excessive erosion in ravines. Also occurring was channel widening and widespread deposition of material in the floodplain that resulted in an instable landscape.

There have been improvements in water quality in the period from 1973-2008. The monitoring site three miles north of Rochester on the South Zumbro River saw a 64% decrease in the concentration of Total Suspended Solids. In a DNR fish survey of the Middle Fork Zumbro River, there were positive changes in species abundance and composition except on the main stem. However, the water quality standards are regularly exceeded within the watershed (Draft Zumbro Watershed Management Plan).

Increased rainfall patterns in the upper Midwest are a probable factor affecting the turbidity of surface waters. For the Root and Blue Earth River watersheds included in a study, the volume of flow per unit of precipitation increased by around 50% between the time periods of 1940-1979 and 1980 to 2009. These rainfall patterns along with land use/cover changes and tiling are correlated with increased flow in agricultural watersheds. "Tile drainage appears to increase high, sub-peak flows to a greater extent than peak flows (ZWP, 2012)." Some similar findings were made in a study of some Iowa watersheds. This is a critical factor for streambank stability and related pollutants including sediment, fecal coliform, and nutrients embedded in streambanks.

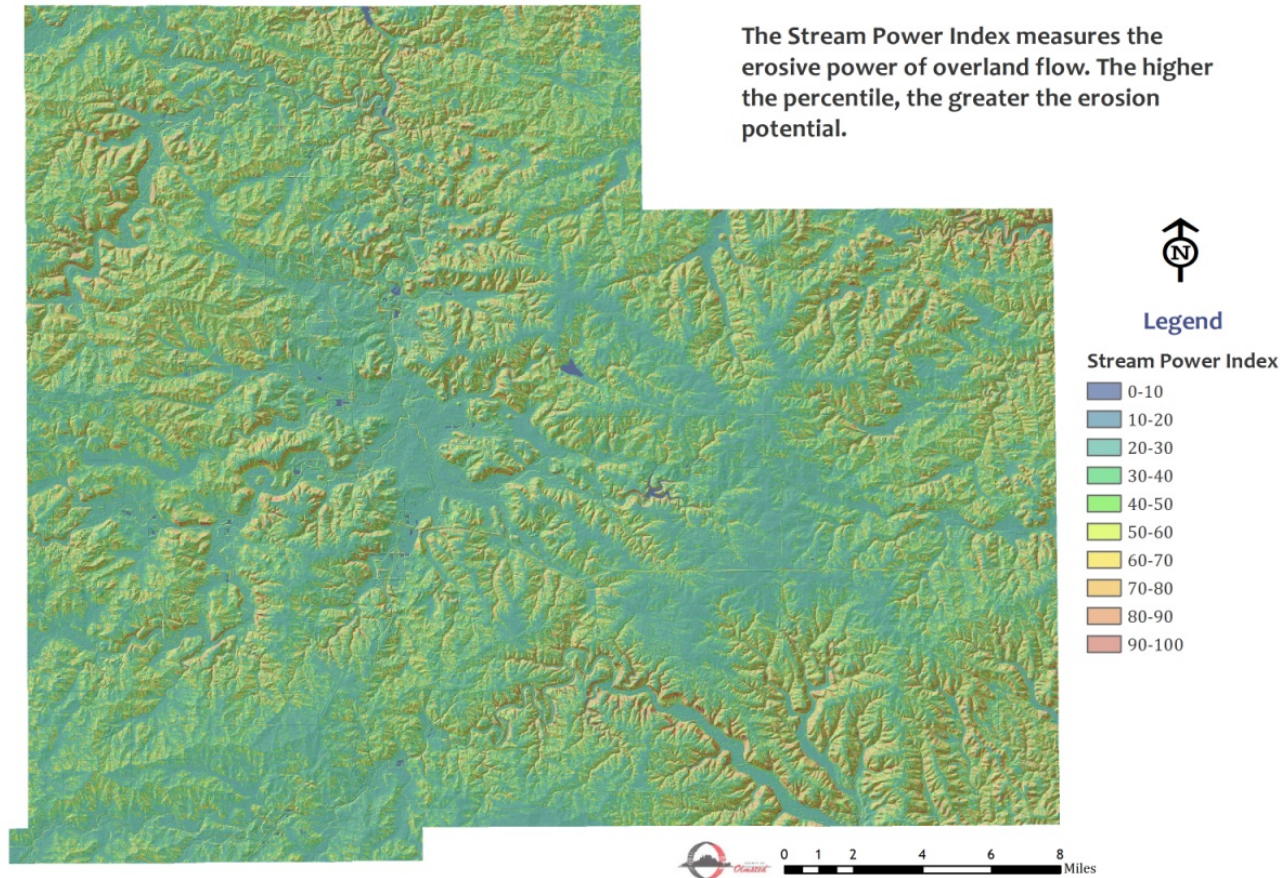
Eleven stream reaches in the Root River watershed exceeded water quality standards for turbidity in recent testing. A TMDL study will be completed by the end of 2012.

The Logan Branch of the Whitewater watershed was studied in 2010 to determine the most cost effective restoration measures that could be used in the watershed. The study models possible future land use/cover options to determine the most effective way to reduce soil erosion. Turbidity problems are exacerbated by the "flashy" runoff that occurs after rainfall and snowmelt events. Logan

Creek is impaired for aquatic recreation due to fecal coliform bacteria and for aquatic life due to turbidity. The study notes that there have been a significant number of conservation practices implemented in the watershed. The study evaluated best management practices to “minimize flow volume from the landscape (and) slow the overland flow rate and function”. A load reduction goal of 55% is needed to bring the water quality up to minimum water quality standards. Various scenarios using best management practices, such as conservation tillage and detention ponds, along with a mix of crops, were modeled. The study is instructive in its results; streambank stabilization is critical, detention of water and infiltration is needed, conservation tillage is needed, and a mix of crop and perennial vegetation replacing conventional crops could provide additional

Stream Power Index (Percentile)

Data Source: 2009 LiDAR



water quality improvements. This study shows the need for additional watershed monitoring and field scale assessments of best management practices.

Observations

Best management practices for the agricultural landscape that are cost effective need to be fitted to the landscape setting (agroecoregion) within each watershed. Landowners, operators, and the public sector have made considerable efforts and investments over the decades in each agroecoregion. Given the current agricultural economy, water quality impacts, and surface water impairments, the plan recommends a continuation of ongoing programs and implementation of new programs. Continued support beyond the 10-year time frame of this plan is necessary in order to institute improvements in each watershed's surface waters.

Goal: Protect ground and surface water from any potentially adverse impacts of rural land management activities and implement effective measures to meet all water quality standards in each watershed.

Objective 1: Apply conservation and best management practices on rural land in the county.

Objective 2: Coordinate plans and programs within the county and with other counties, state and federal agencies, and non-governmental organizations.

Objective 3: Support continued programming for planning, research, and education by local, state, and federal agencies.

Impaired Waters, TMDLs, & Watershed Management

Background

The federal Clean Water Act (CWA) requires states to adopt water quality standards to protect lakes, streams, and wetlands from pollution. These standards define how much of a pollutant (e.g., nutrients, turbidity, fecal coliform) can be in the water and still have the water body meet its designated use for things such as drinking water, fishing, or swimming. A water body is deemed “impaired” if it fails to meet one or more water quality standard. According to the Minnesota Pollution Control Agency (MPCA), monitoring programs suggest that about 40 percent of Minnesota’s lakes and streams are impaired for conventional pollutants; this rate is comparable to what other states are finding. Minnesota’s health and economy rely heavily on the quality of our water; we must take these impairments seriously and direct our resources toward their restoration.

Section 303(d) of the Clean Water Act requires states to identify and restore impaired waters as follows:

- Assess all waters of the state to determine if they meet water quality standards,
- List waters that do not meet standards (also known as the 303d list) and update every even-numbered year,
- Conduct TMDL (total maximum daily load) studies in order to set pollutant reduction goals needed to restore waters, and
- Implement restoration measures in order to meet TMDLs.

The MPCA is responsible for monitoring and assessing water quality, listing impaired waters, and conducting TMDL studies in Minnesota. They coordinate with other state and local agencies on restoration activities. Impaired waters identified through the MPCA’s assessment process are placed on the state’s Impaired Waters List. First published in 1992, the state’s Impaired Waters List is updated every two years. Since only a small percentage of Minnesota’s lakes and stream miles have been assessed thus far, the list of impaired waters will expand as assessments continue throughout the state. The Impaired Waters List is used to prioritize funding and activities for restoring impaired waters.



The CWA requires that a TMDL study be prepared for each impairment on the list. Note that the term “TMDL” describes both a process and a number. The process is typically a two-four year technical study involving intensive stakeholder and public input. The number is the calculation of the maximum amount of a pollutant the water body can receive and still meet water quality standards. A TMDL study results in a pollution reduction plan that identifies all the sources of the pollutant in the watershed and allocates needed reductions among them. It must include a margin of safety for uncertainties in the calculation, account for seasonal variation in water quality, and may leave room for future expansion in discharges (reserve capacity).

TMDLs may be developed by the MPCA, other state agencies, or local governments that have been determined by MPCA to be qualified to do this work. Work plans and draft TMDLs must be approved by the MPCA. The assessment and listing process involves many MPCA staff, other state agencies, and local partners. The goal of this effort is to use the best data and best science to assess the condition of Minnesota’s surface water. The process requires a high level of planning and cooperation among MPCA staff and partners.

Throughout the process, the MPCA provides oversight, technical assistance, and training to ensure regulatory and scientific requirements are met. Following a formal public comment period, the MPCA submits the TMDL report to the US EPA for final approval.

After a TMDL report is completed, a detailed implementation plan is developed to meet the TMDL’s pollutant load allocation and achieve the needed reductions to restore water quality. Depending on the type, severity, and scale of the impairment, restoration may require years or even decades, and several million dollars. Restoration activities typically include infrastructure improvements of wastewater treatment plants or urban storm water systems, upgrading failing septic systems, and implementing “best management practices” to minimize polluted runoff or soil erosion in urban and agricultural settings. When a water body is restored to meet applicable water quality standards, it can be removed from the impaired waters list. Monitoring will continue over the long term to ensure standards are maintained.

Olmsted County’s Impaired Waters and TMDLs

Numerous reaches of the major water bodies that traverse Olmsted County have been placed on the state’s Impaired Waters List. The 2010 Impaired Water List inventories 23 impaired reaches that fall in Olmsted County. The new draft 2012 list proposes five more. This list does not include region-wide TMDLs. The impairments measured in Olmsted County fall into four categories, each impacting a different aspect of aquatic health. The complete table for Olmsted County is found in the Appendix.

Aquatic Life – Turbidity

“Minnesota” and “fishing” are practically synonymous. Not only do many Minnesota residents enjoy countless hours fishing the state’s waters, but this activity also draws tourists from around the world. The quality trout streams are a particularly popular destination in

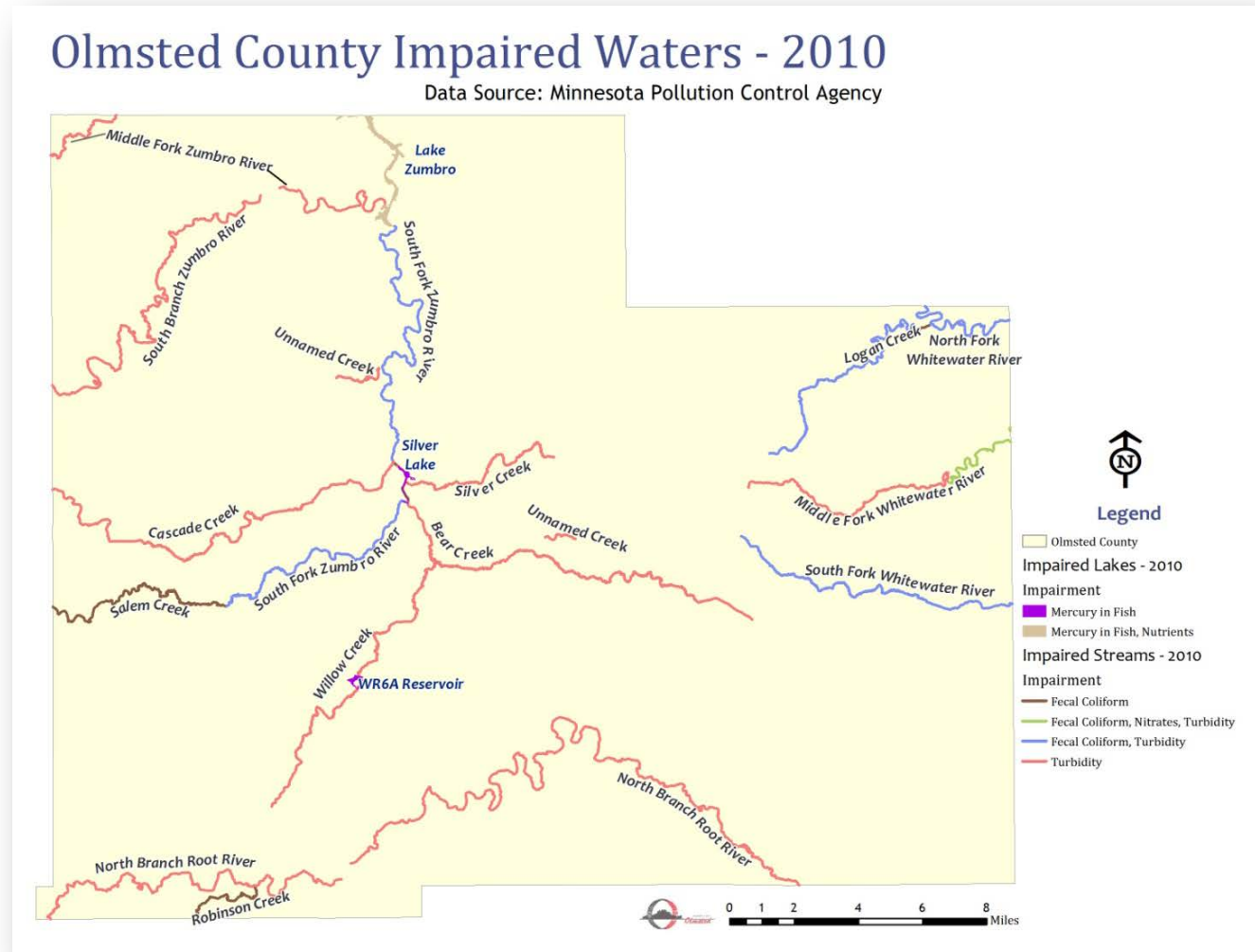
the southeast portion of the state. Protection of “aquatic life” with applicable standards means protection of the aquatic community from the direct harmful effects of pollutants as well as protection of human and wildlife consumers of fish or other aquatic organisms.

Turbidity is one pollutant found to impair the aquatic life found in Olmsted County. Turbidity is caused by suspended soil particles, algae, etc., that scatter light in the water column making the water appear cloudy. Exceedance of the state’s turbidity standard, especially for prolonged periods of time, can harm aquatic life. Turbidity reduces the ability of sunlight to penetrate into the water and may result in the decreased ability of aquatic organisms to find food, impacts to gill function may be affected, and spawning beds may be covered.

Turbidity TMDL studies are underway for the Root and Whitewater Rivers. A turbidity TMDL study has been approved for the Zumbro River and an implementation plan was approved in September, 2012. Bear, Cascade, Silver, and Willow Creeks are among other reaches noted to have turbidity impairments.

Aquatic Recreation - Fecal Coliform

Swimming, canoeing, kayaking, and other recreational activities that are inhibited by poor water quality. Fecal





Coliform is an impairment of some Olmsted County waters that impacts their suitability to support these established uses. Fecal Coliform are bacteria that originate in the intestinal tract of mammals. Not all fecal coliform bacteria cause disease, but their presence is used as an indicator that fecal matter is getting into the waterbody, and that other potentially harmful contaminants may be also be entering the waterbody. The main sources of these bacteria are from animal and human waste. Animal sources of bacteria include feedlot and manure runoff, urban runoff, and wildlife. Improperly treated human waste may come from overflows from sewage treatment systems in cities and towns, unsewered areas with inadequate community or individual wastewater treatment, or a single home with a failing septic system. The Lower Mississippi River Basin – Regional Fecal Coliform TMDL addresses 39 stream and river reaches in the Lower Mississippi and Cedar River basins that are impaired due to fecal Coliform levels that

violate Minnesota's water quality standards. The initial report, including 20 reaches, was approved by the US EPA in November 2002. This TMDL was revised to include additional reaches and an amended TMDL was approved by the US EPA in 2006. An implementation plan for this TMDL was adopted in 2007. As indicated on the Impaired Waters map, numerous reaches in Olmsted County are impaired by fecal Coliform.

Aquatic Recreation – Nutrient/Eutrophication Biological Indicators

Fecal Coliform is not the only impairment found to inhibit aquatic recreation in Olmsted County. Excessive nutrient loads, in particular total phosphorus (TP), lead to increased algae blooms and reduced transparency – both of which may significantly impair or prohibit the use of lakes for aquatic recreation. Eutrophication is the resulting aging process by which lakes are fertilized with nutrients. Natural eutrophication will very gradually change the character of a lake, but cultural eutrophication is the accelerated aging of a lake as a result of human activities. Lake Zumbro has been added to the Impaired Waters list due to this finding.

Drinking Water – Nitrates

Minnesota Rules Chapter 7050.0410 protects designated trout streams as sources of drinking water. In 2010, a reach of the Middle Fork of the Whitewater River was found to exceed the 10 mg/L federal safe drinking water standard for nitrate-nitrogen. Nitrate nitrogen poses a risk to human health at concentrations exceeding this standard in drinking water. Humans, especially infants under

six months of age, who are exposed to nitrate in drinking water at concentrations exceeding the limit can develop methemoglobinemia, a blood disorder that interferes with the ability of blood to carry oxygen. The 10 mg/L standard is an acute toxicity standard. Long term, chronic exposure to nitrate in drinking water is less well understood but has been linked to the development of cancer, thyroid disease, and diabetes in humans.

Clean Water Legacy Act

The Clean Water Legacy Act (CWLA) was signed into law on June 2, 2006. This law was designed to:

- Accelerate assessment of Minnesota's waters,
- Target additional financial resources to existing state and local programs designed to improve water quality,
- Leverage additional federal, local and private resources where possible, and
- Provide resources to develop TMDLs.

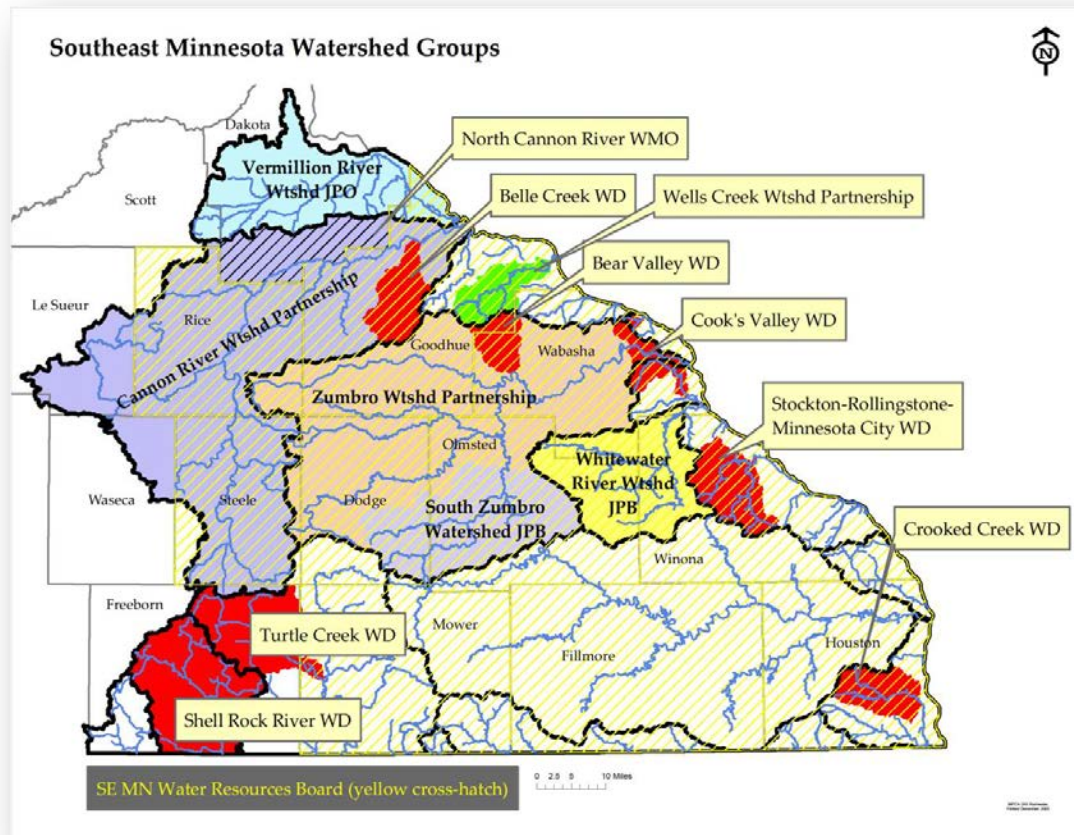
The 2006 legislative session resulted in appropriations totaling approximately \$25 million for critical clean water priorities and the creation of a citizen/state advisory group called the Clean Water Council. In May 2007, the legislature passed \$31 million for continued Clean Water Legacy funding in 2008 and 2009. Olmsted County needs to take advantage of this funding to develop and implement TMDL implementation plans that address the water impairments discussed earlier in this section.

Watershed Management

Water resources in Minnesota are a part of the “commons”; in other words, water is owned by all and yet owned by none. In addition, water flows beyond artificial political boundaries and activities on one side of the line impact the water of those living on the other side. Water resources, therefore, may best be managed using natural boundaries, such as watersheds.

According to the MPCA, a watershed is the area of land where all of the water that drains off of it goes into the same place—a river, stream or lake. The smallest watersheds are the drainage areas for small streams and lakes. Each small watershed is part of the more extensive watershed for a larger stream or lake in the vicinity. These larger watersheds are in turn part of even larger drainage networks, and so on. The largest-scale watershed is called a basin. Minnesota has 10 basins, some of which include portions of neighboring states or Canada. Olmsted County has parts of three major watersheds in it: the Root, Whitewater, and Zumbro. These major watersheds are part of the Lower Mississippi River Basin.

Recognizing the advantages of watershed-level management, watershed and regional organizations have formed to address issues at this scale. The Whitewater Watershed Project works to provide education, technical and financial assistance for conservation projects



within the watershed. The watershed project is directed by a Joint Powers Board comprised of representatives of County Commissioners and Soil and Water Conservation Districts from Winona, Wabasha, and Olmsted Counties.

The Zumbro Watershed Partnership is similar in mission to that of the Whitewater Watershed Project. The Zumbro Watershed Partnership (ZWP) formed in 2005 as a member-based, nonprofit organization dedicated to helping residents "Clean, Protect and Enjoy" the lakes, rivers, and wetlands in the Zumbro River Watershed. The citizen-driven partnership includes local citizens, private and nonprofit organizations, federal and state resources agencies, and county conservation districts who work together to restore water quality, wildlife habitat, and the economic and recreational values of the watershed. In February of 2005, the Zumbro Watershed Partnership, Inc. (ZWP) filed its Articles of Incorporation and Bylaws and achieved its

official 501(c)3 federal nonprofit status.

The Root River Watershed does not yet have a watershed partnership.

The Southeast Minnesota Water Resources Board (SEMNRB) and the Basin Alliance for the Lower Mississippi in Minnesota (BALMM) are two regional water resources groups with whom Olmsted County partners. According to their mission statement,

The Southeast Minnesota Water Resources Board exists to help sustain the quality of life in the nine counties of Southeastern Minnesota by improving and protecting the water resources through coordination of local water planning efforts. The Board recognizes that the impacts on the shared watersheds in our sensitive karst region span political boundaries and that increased efficiency, productivity, and creativity can be gained through regional cooperation. The Board will seek to accomplish this mission by

recognizing that all aspects of the natural and man-made environment are interrelated and will therefore ultimately impact water quality.

Since they formed in 1999, BALMM has approached water quality issues from a regional perspective. Comprising local, state and federal agencies, the alliance continues today with the purposes of making water quality restoration and protection in southeast Minnesota a top priority for decision-makers at all levels and coordinating efforts to protect and restore water quality in southeast Minnesota. To fulfill those purposes, BALMM emphasizes land use practices to improve or protect water quality, particularly in the areas of watershed management, aquifer protection and floodplain management.

Goal: Ensure the ability of the county and region's surface waters to meet their designated uses.

- Objective 1:** Contribute all pertinent County data to state, regional and local water quality databases. Support continued long term monitoring of surface waters in the county.
- Objective 2:** Support the development and implementation of Total Maximum Daily Load reports and implementation plans for each of Olmsted County's major watersheds.
- Objective 3:** Identify and prioritize opportunities to leverage skill sets and project funds through collaborative partnerships within watersheds and subwatersheds.
- Objective 4:** Support the formation of and long term funding for community-based watershed organizations for the Root, Whitewater, and Zumbro watersheds. Support watershed planning activities carried out by each watershed organization.
- Objective 5:** Support planning and implementation projects for water bodies in Olmsted County.
- Objective 6:** Educate and involve the public in watershed and TMDL studies and programs.

Urban/Suburban Storm Water Quality & Quantity

The federal Clean Water Act (CWA) of 1972 established the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The CWA made it illegal to discharge any pollutant from a point source into navigable waters without obtaining a permit. The US Environmental Protection Agency's (EPA's) National Pollutant Discharge Elimination System (NPDES) permit program controls these discharges. Point sources are discrete conveyances such as



Photo Courtesy of Rochester Public Works Department

pipes or constructed ditches. Individual homes that are connected to a municipal storm sewer system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial sites, construction sites, and operators of small municipal separate storm sewer systems (MS4s) must obtain storm water permits if their discharges go directly to surface waters.

According to the US EPA, the quality of the country's waters has improved dramatically since the passage of the CWA. However, their 2000 National Water Quality Inventory, a biennial summary of State surveys of water quality, indicated that approximately 40 percent of surveyed U.S. waterbodies are still impaired by pollution and do not meet water quality standards. A leading source of this impairment is polluted runoff. In fact, according to the Inventory, 13 percent of impaired rivers, 18 percent of impaired lake acres and 32 percent of impaired estuaries are affected by untreated urban/suburban storm water runoff.

The urban and suburban areas of Olmsted County are characterized by higher densities of impervious surfaces than what is found in the rural areas of the county. Concentrations of streets, sidewalks, parking lots, and rooftops reduce the opportunities for rainfall and snowmelt to infiltrate into the land's surface upon impact. Instead, storm water collects pollutants from human settlement, such as lawn chemicals, fertilizers, pet waste, and debris, as it travels across these hard surfaces. These pollutants are eventually discharged – often untreated – into area waterways via nearby storm sewers, culverts, and ditches. The result? Excessive plant growth in our streams and lakes, recreation areas no longer suitable for swimming and fishing, the destruction of spawning and wildlife habitat, and

the potential for the infiltration of contaminated storm water into our future drinking water supply: groundwater. Collectively, and as individuals, we can choose to adopt behaviors and practices to reduce and mitigate these negative impacts on our waterways.

Federal Management

Phase I of the EPA storm water program was promulgated in 1990 under the CWA. Phase I relies on NPDES permit coverage to address storm water runoff from:

- “medium” and “large” MS4s generally serving populations of 100,000 (as of 1990) or greater (in Minnesota, this only included the cities of Minneapolis and St. Paul),
- construction activity disturbing 5 acres of land or greater, and
- ten categories of industrial activity.

The Stormwater Phase II Final Rule was the next step in EPA’s effort to preserve, protect, and improve the Nation’s water resources from polluted storm water runoff. The Phase II program expands the Phase I program by requiring permits from operators of “small” MS4s in urbanized areas (populations generally between 10,000 and 100,000 as of 2000), operators of small construction sites (generally, sites larger than one acre), and additional industrial activity categories. Phase II is intended to further reduce adverse impacts to water quality and aquatic habitat by instituting the use of programs and practices to manage sources of storm water discharges that have the greatest likelihood of causing continued environmental degradation.

State Management

To better manage storm water across the state, the Minnesota Pollution Control Agency (MPCA) has been delegated authority by the US EPA to administer these requirements of the federal Clean Water Act, in addition to its own State Disposal System (SDS) requirements. The Phase II Industrial, Construction, and MS4 programs authorize storm water discharges when permittees are in compliance with the requirements of the respective general permit that incorporates federal and state requirements for Minnesota storm water management.

Municipal Separate Storm Sewer System Permit (MS4) Program

An MS4 is a conveyance or system of conveyances (e.g., roads with drainage systems, municipal streets, curbs/gutters/storm drains/storm sewers, constructed ditches and channels, and storm water treatment structures) that is:

- owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including

special districts under State law such as a sewer district, flood control district or drainage districts, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the Clean Water Act that discharges to waters of the United States;

- ☐ designed or used for collecting or conveying storm water;
- ☐ not a combined sewer; and
- ☐ not part of a publicly owned treatment works.

There are three categories of regulated small MS4s: mandatory, designated and petition (proposed by others). Small MS4s include municipalities, townships, counties, military bases, hospitals, prison complexes, highway departments, and universities.

Mandatory MS4s: MS4s in urbanized areas, as defined by the 2000 Census, are required to obtain a NPDES/SDS storm water permit. An "urbanized area" is defined as a land area comprising one or more places ("central places") and the adjacent densely settled surrounding area ("urban fringe") that together have a residential population of at least 50,000 and a density of at least 1,000 people per square mile. The definition also includes any other public storm sewer system located fully or partially within an urbanized area. Mandatory MS4s are listed in federal rule.

Designated MS4s: MS4s outside of urbanized areas that have been designated by the MPCA for permit coverage under Minn. R. ch. 7090 are also required to obtain a NPDES/SDS storm water permit. MS4s designated by rule are cities and townships with a population of at least 10,000; and cities and townships with a population of at least 5,000 and discharging or the potential to discharge to valuable or polluted waters.

Petition MS4s: MS4s that are designated through the petition process under Minn. R. ch. 7090 are required to obtain a NPDES/SDS storm water permit. The public can petition the Commissioner for the designation of an MS4 based on the designation criteria established in the rules.

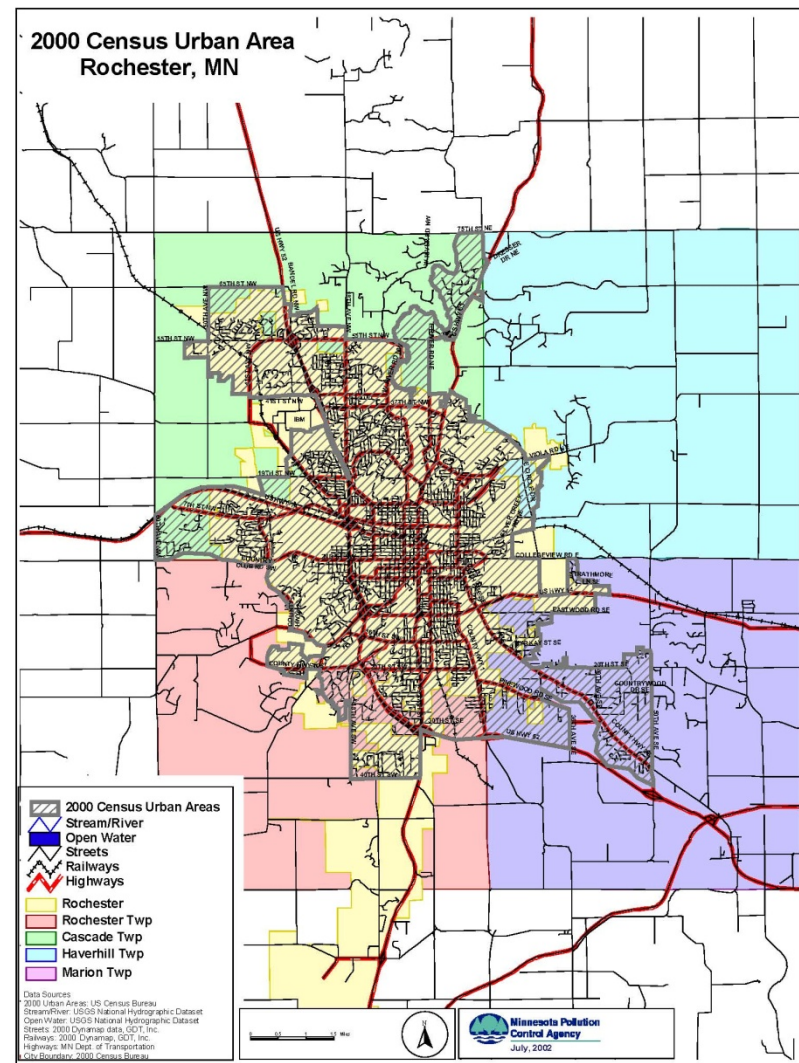


Nine governmental units located within Olmsted County must manage storm water to improve water quality according to the requirements of MPCA's MS4 permit:

- ☐ Cascade Township
- ☐ Haverhill Township
- ☐ Rochester Township
- ☐ Marion Township
- ☐ City of Rochester
- ☐ Olmsted County
- ☐ MN Department of Transportation (Outstate Districts, including District 6)
- ☐ Rochester Community and Technical College, as part of the Minnesota State Colleges and Universities (MnSCU) permit
- ☐ Federal Medical Center

It is expected the State will require that additional governmental units in Olmsted County be added to this list based on 2010 Census figures.

These MS4s are required to develop and implement a storm water pollution prevention program (SWPPP) meeting the requirements of the MS4 permit to reduce the discharge of pollutants from their storm sewer system to the Maximum Extent Practicable (MEP). MEP is the discharge standard for the MS4 permits, since there is not one discharge point to which numeric effluent standards could be applied. Each permittee's SWPPP must include best management practices grouped according to the



permit's six Minimum Control Measures, as outlined below:

- ☐ Public Education and Outreach
- ☐ Public Participation/Involvement
- ☐ Illicit Discharge Detection and Elimination
- ☐ Construction Site Runoff Control
- ☐ Post-Construction Runoff Control
- ☐ Pollution Prevention/Good Housekeeping

The MS4 permittees must submit an annual report to the MPCA on the progress of SWPPP implementation. To learn more about the extensive contents of a SWPPP, go to www.rochesterstormwater.com to see an example of a SWPPP and annual reports, as they apply to the City of Rochester.

Construction Storm Water Program

When storm water drains off a construction site, it carries sediment and other pollutants that harm lakes, streams and wetlands. The EPA estimates that 20 to 150 tons of soil per acre is lost every year to storm water runoff from construction sites that lack adequate erosion and sediment controls.

Many studies indicate that controlling erosion can significantly reduce the amount of sedimentation and other pollutants transported by runoff from construction sites. To keep Minnesota's valuable water resources clean, the MPCA issues permits to construction site owners and their operators to prevent storm water pollution during and after construction.

Site owners and their construction operators must apply for and implement their NPDES/SDS Construction Storm Water General Permits. As part of the application for this legal document, the owner and operator must create a SWPPP that explains how they will control storm water on their site.

An NPDES/SDS permit is required for the owner or operator of any construction activity disturbing:

- ☐ One acre or more of soil.
- ☐ Less than one acre of soil if that activity is part of a "larger common plan of development or sale" that is greater than one acre.
- ☐ Less than one acre of soil, but the MPCA determines that the activity poses a risk to water resources.



Most construction activities are covered by the general NPDES storm water permit for construction activity, but some construction sites need individual permit coverage. Owners and operators are both responsible for submitting the permit application, installing and maintaining appropriate erosion and sediment controls, and regularly inspecting their sites to insure permit compliance.

Industrial Storm Water Program

The Industrial Storm Water Program's goal is to reduce the amount of pollution that enters surface and ground water from industrial facilities in the form of storm water runoff. This goal is accomplished by requiring permitted facilities to:

- ☐ Apply for and comply with the Industrial Storm Water Multi-Sector General Permit.
- ☐ Develop and implement an effective SWPPP that contains storm water best management practices.
- ☐ Manage storm water runoff by meeting the permit requirements or certifying a condition of No Exposure and providing annual reports of compliance to the MPCA.

Goal: Improve our area's water quality through better urban and suburban storm water management.

- Objective 1:** Support existing storm water management programs, including construction site erosion and sediment control activities.
- Objective 2:** Provide information and educational opportunities for Olmsted County's cities and townships on storm water management, including erosion and sediment control standards and best management practices.
- Objective 3:** Apply low impact or minimal impact design practices to development in the county.

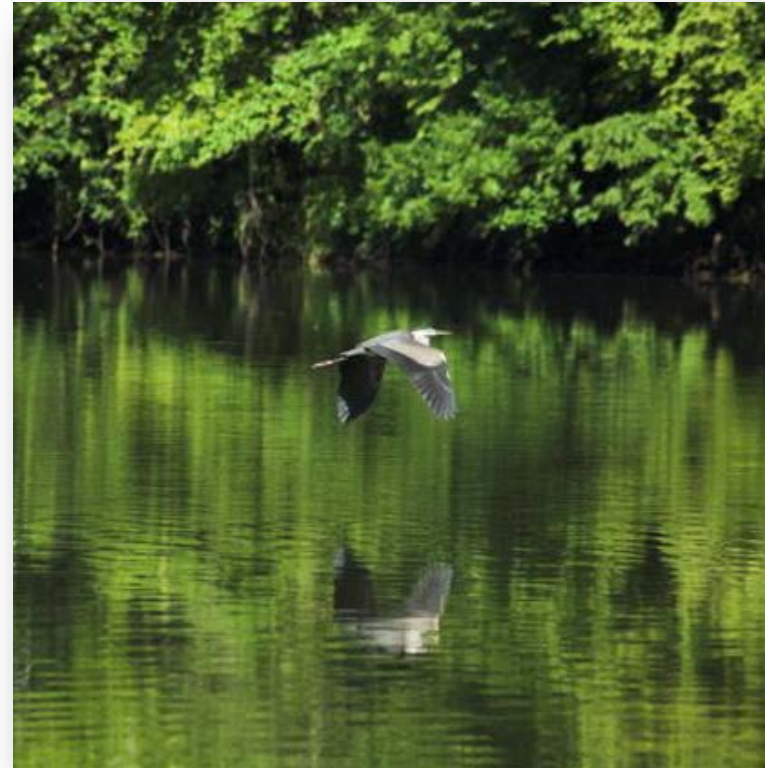
Wetland Resources & Natural Corridors

Wetlands are a critical interface of the terrestrial and aquatic environments. Natural corridors, in various forms, can include wetlands as well as the transition environment of the surface water system and related terrestrial environments, such as floodplains. The Minnesota Wetland Conservation Act was enacted by the Minnesota Legislature in 1991 to address the extensive and widespread loss of wetlands. The purpose of the act is to achieve a no net loss of the quantity, quality, and biological diversity of Minnesota's existing wetlands and to replace wetlands where loss does occur. The act identifies a number of critical benefits that are important for water resources and water resource planning in Olmsted County. Those benefits, as stated in state law, include:

- Water quality, including filtering pollutants out of surface water and groundwater, using nutrients that would otherwise pollute public waters, trapping sediments, protecting shoreline, and recharging groundwater supplies;
- Floodwater and storm water retention, including reducing the potential for flooding in the watershed;
- Public recreation and education, including hunting and fishing areas, wildlife viewing areas, and nature areas;
- Commercial benefits, including wild rice and cranberry growing areas and aquaculture areas;
- Fish and wildlife benefits; and
- Low-flow augmentation during times of drought.

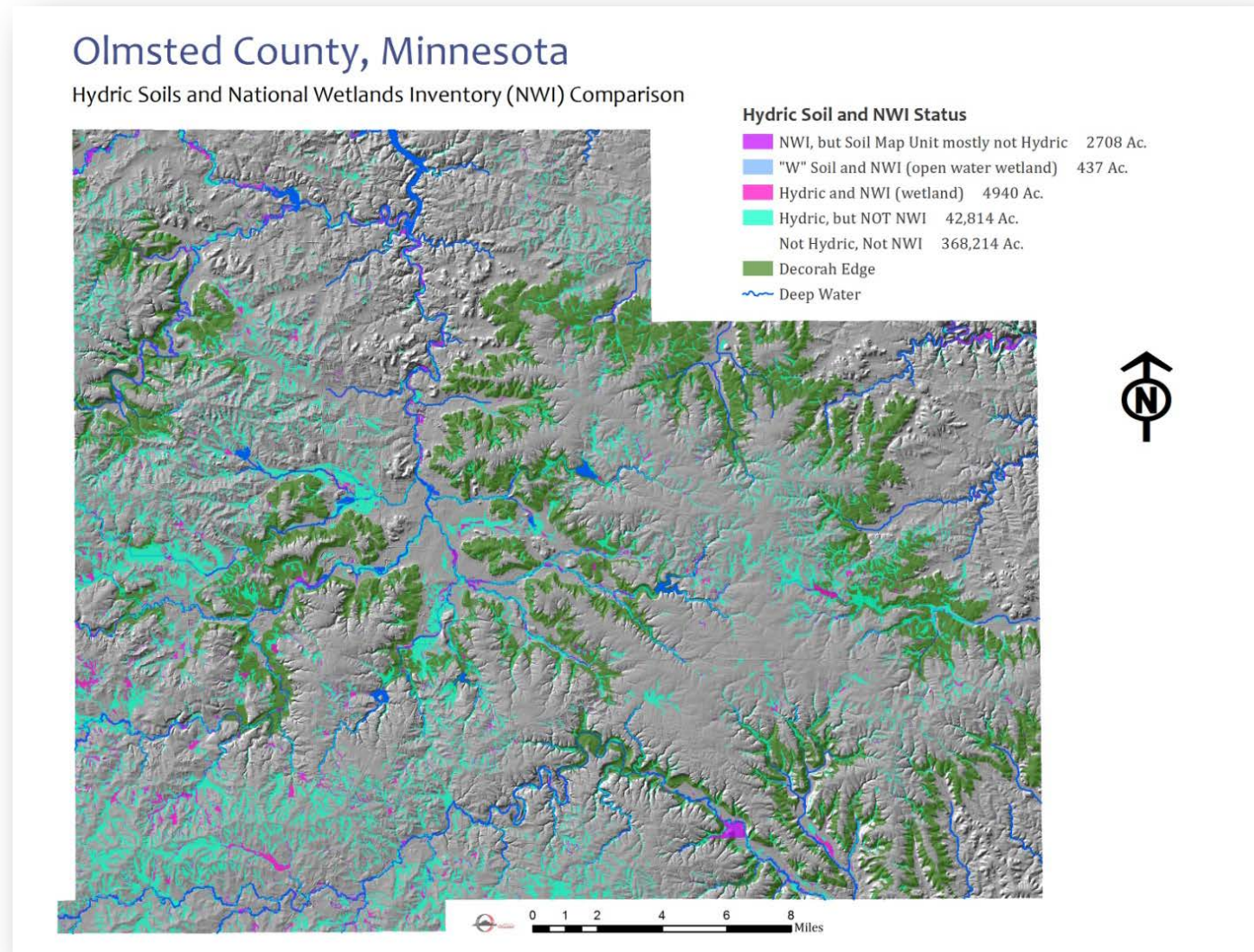
Minnesota has determined that it is in the public interest to

- Achieve no net loss in the quantity, quality, and biological diversity of Minnesota's existing wetlands and

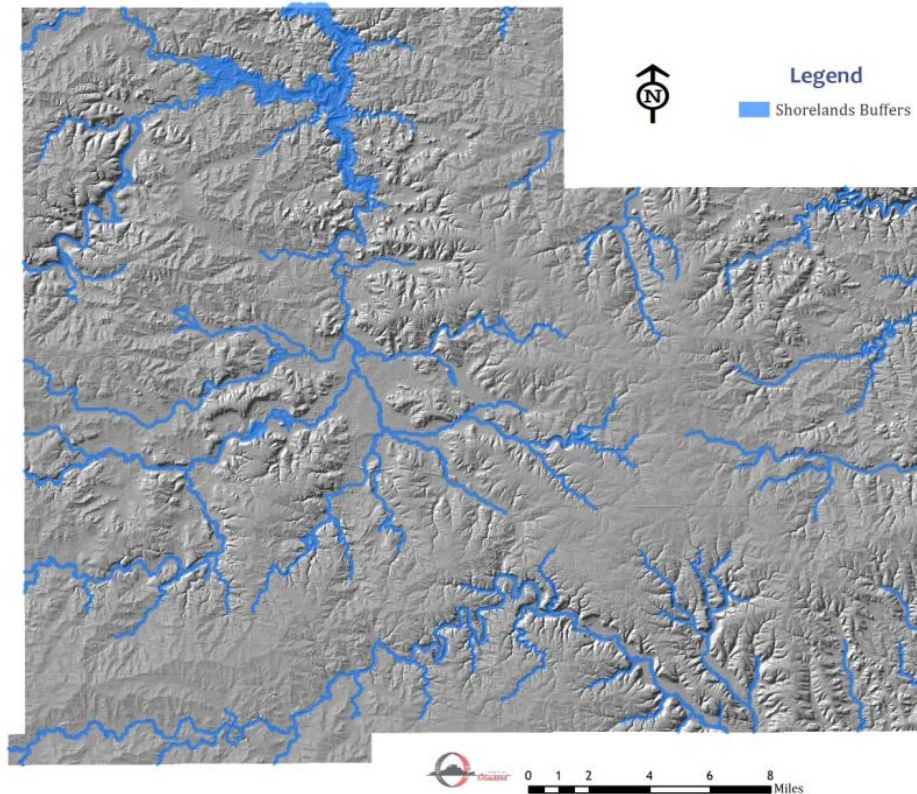


- Increase the quantity, quality, and biological diversity of Minnesota's wetlands by restoring or enhancing diminished or drained wetlands.

A 2010 report by the Minnesota Department of Natural Resources found that, depending on the data sources, there is between 4.05 and 5.35% (includes deepwater habitat) of the Paleozoic Plateau that is wetland in the 2006-2008 timeframe (Status and Trends of Wetlands in Minnesota: Wetland Quantity Baseline, December, 2010). The Paleozoic Plateau includes Olmsted County and much of southeastern Minnesota. A 2012 MPCA reports on a wetland quality survey that was initiated in 2006 (Status and Trends of Wetlands in Minnesota: Depressional Wetland Quality Baseline, March, 2012). Wetland conditions were described for three different ecoregions and for constructed and natural wetlands. For the mixed woods plains ecoregion, covering southeastern Minnesota, the findings are mixed.



Shorelands Buffers



Plant community health is rated as poor for 61% of the wetlands while for macroinvertebrates 60% of the wetlands are rated as good. The study was limited in time so it does not provide a cause and effect determination of wetland impacts.

Other land/water interface resources or riparian zones include shorelands and floodplains, which overlap under state and federal law. Shorelands are connected to all “public waters” of the State of Minnesota (MN Rules 6120.250-3900). The shoreland rules are administered by local units of government to provide for orderly development and protection of Minnesota’s shorelands. Floodplain rules are part of a larger program of flood insurance administered at the federal level but required of local units of government. The shoreland and floodplain corridors are also sensitive lands that are part of the land/water interface and provide many similar water resource and habitat benefits as wetlands.

The purpose of the shoreland rules and local ordinances are multiple and overlap to some degree with the floodplain rules. The shoreland rules are meant to:

- Regulate the subdivision, use and development of shorelands of public waters;
- Conserve the economic and natural environmental values of surface waters; and
- Provide for wise use of waters and related land resources.

These wetlands and riparian zones are highly sensitive settings due to the direct connection of the terrestrial and aquatic systems. Wetlands are a critical component for retaining surface waters on the landscape; they are necessary to protect surface waters and provide additional benefits as noted in the state law. Wetlands and riparian areas are also important components of a broader set of natural habitat corridors, part of our “environmental capital” that benefits wildlife, flood storage and drought mitigation, groundwater recharge and filtering, and carbon sequestration.

Other natural corridors can be identified with:

- The Decorah Edge , especially those areas that exhibit shallow groundwater and that are not developed or cropped;
- Public lands including parks, wildlife management areas, forest units, and scientific and natural areas;
- Private lands protected by easements and managed in permanent/native vegetation including forest, grasslands,/prairies; and
- Private lands owned by non-governmental organizations that manage for native species and conservation of other natural resources.

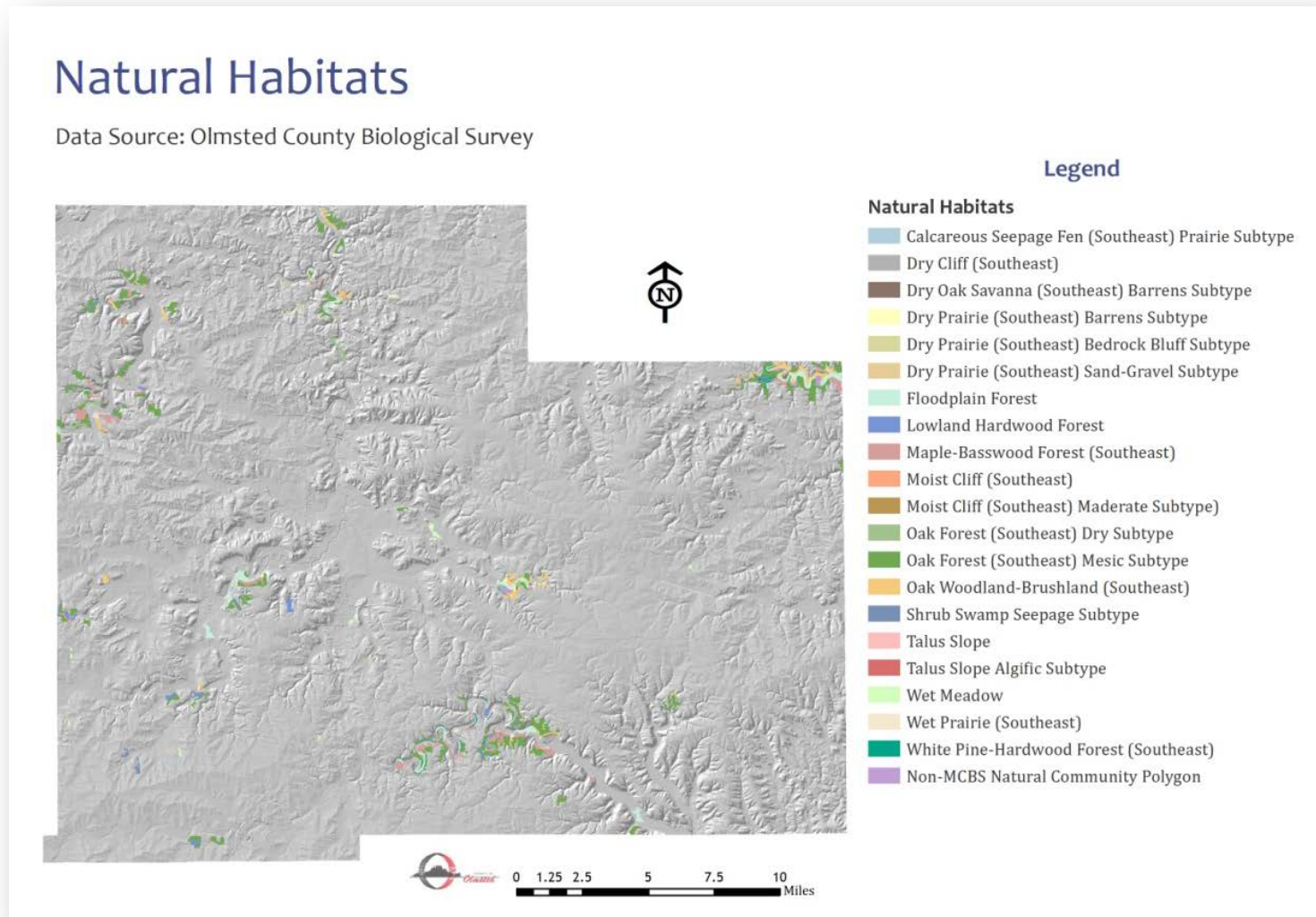
Significant portions of the public lands are located in the land/water interface, the floodplain, and associated valley slopes. As with the remaining wetlands in the county, the public lands are somewhat isolated islands of natural habitat. All of these lands and the accompanying resources are part of the foundation of the Olmsted County community.



The Decorah Edge is regulated in Olmsted County and the City of Rochester. The edge is located along the hillslopes of the Zumbro, Root, and Whitewater Rivers. A portion of the edge is located on moderately sloped lands buried by glacial till between Rochester and Byron. For the Zumbro watershed, the edge is located mainly on the Rochester Plateau agroecoregion, while in the Root and Whitewater it is located in the Blufflands agroecoregion.

The 1997 Minnesota County Biological Survey for Olmsted County identified natural communities covering approximately 9,040

acres or 2.2% of the land area of the county at the time of the survey. While unique habitat and species are scattered throughout the county, the main clusters of natural communities are located primarily on public lands (about 40%), in forested areas, on steep slopes above river valleys, and in permanently wet areas such as fens and other wetlands. Additional remnant lands and locations are identified based on rare species and small areas of relatively



undisturbed habitat.

Wetlands are scattered throughout the landscape, in some locations connected to the larger surface water system, and are also found in isolated locations connected to the groundwater system. Wetlands in Olmsted County include primarily Types 1, 2, 3, and 6 (seasonal wetlands, wet meadows, shallow marshes, and scrub-shrub wetlands). Wetlands continue to be lost in Minnesota even with the state and federal laws and other conservation programs in effect (2001-2003 Minnesota Wetland Report, BWSR).

Calcareous fens are a rare and distinctive category of Type 2 wetlands. They are characterized by non-acidic peat soil and dependent on a constant supply of cold, oxygen-poor groundwater rich in calcium and magnesium bicarbonates. This calcium-rich environment supports a plant community dominated by "calciphiles", or calcium-loving species, several of which are state-listed as endangered, threatened or special concern. Because they are so rare, calcareous fens are afforded special protection under the Minnesota Wetlands Conservation Act (Minn. Statutes 103G.223).

Olmsted Fens				
High Forest 15	8275	T105N	R14W	NENENE15
Dover 13	2936	T106N	R12W	NENESW13
Dover 7	8257	T106N	R11W	NESWSW07
High Forest 35	8276	T105N	R14W	NENESW35
Marion 8	31964	T106N	R13W	NWSW8
Joyce Park Fen	31964	T106N	R13W	NWSW8
Marion 30	8274	T106N	R13W	NWSWNW30
Nelson Fen WMA	13727	T105N	R15W	SWSE16
Rochester 23	31980	T106N	R14W	SWNW23
Rock Dell 23 Fens	20563	T105N	R15W	NW23, SWNWNW23
Haverhill 19	31983	T107N	R13W	NENW19

Pursuant to the provisions of *Minnesota Statutes*, section 103G.223, the following described lands contain calcareous fens as defined in *Minnesota Rules*, part 8420.0935, subpart 2. These calcareous fens have been identified by the commissioner by written order published in the State Register on June 2, 2008 (32 SR 2148-2154), August 31, 2009 (34 SR 278) and December 7, 2009 (34 SR 823-824). Additional sites may be added to this list as new calcareous fens are discovered and existing sites may be removed from the list if it is determined that the wetland no longer meets the definition of a calcareous fen. Future revisions to the list will be published in the *State Register*. The current list will also be posted on the DNR's web site at:

http://files.dnr.state.mn.us/publications/waters/calcareous_fen_list_nov_2009_rev1.pdf

Land management activities are a major influence on the surface and ground water systems. Yet land use has been shown to be a major and critical factor as well. Regulations of urban/suburban storm water impacts aside, the Logan Branch Restoration Project (July 2010) provides insight into the impact that land use has within the watershed on hydrology and streambank stability. The Logan Branch of the Whitewater River watershed is impaired for fecal coliform and turbidity “although a significant number of conservation practices have already been implemented in the watershed”. More permanent land cover in the form of grassland, along with other best management practices and no change in the forestland component of the watershed, is necessary to reduce the turbidity levels on the creek. With adequate planning, land use decision making, and use of best management practices, wetlands and natural corridors can provide many benefits and help conserve the water resources of the county. Local governments and land managers will play a vital role in that decision-making to foster good stewardship of our “environmental capital”.

Utilize the natural functions of Olmsted County’s landscape to improve water quality.

- Objective 1:** Buffer all sensitive land and water interfaces.
- Objective 2:** Promote and protect forest and grassland resources, including pasture.
- Objective 3:** Develop strategies to better utilize the natural water quality functions provided by wetland systems.
- Objective 4:** Promote and market wetland preservation and restoration programs.
- Objective 5:** Identify and target natural corridors to be enhanced and protected throughout the county.



Implementation of Priority Concerns



Photo Courtesy of Rochester Public Works Department

Plan Administration

Responsibility

Drafted by the Rochester-Olmsted Planning Department with assistance from many local and state entities, Olmsted County's first Water Management Plan was adopted in 1990. The County's Water Resources Coordinator assumed responsibility for coordinating the implementation of this plan as well as its 1998 and 2005 updates. The current Water Management Plan was set to expire in 2010; however, an extension was granted allowing it to remain effective through 2012. While the Olmsted County Board of Commissioners and Olmsted County Environmental Commission have charged the Rochester-Olmsted Planning Department with developing the 2013-2023 update, responsibility for overseeing its implementation will remain with the Water Resources Coordinator as part of the Olmsted County Environmental Services Department.

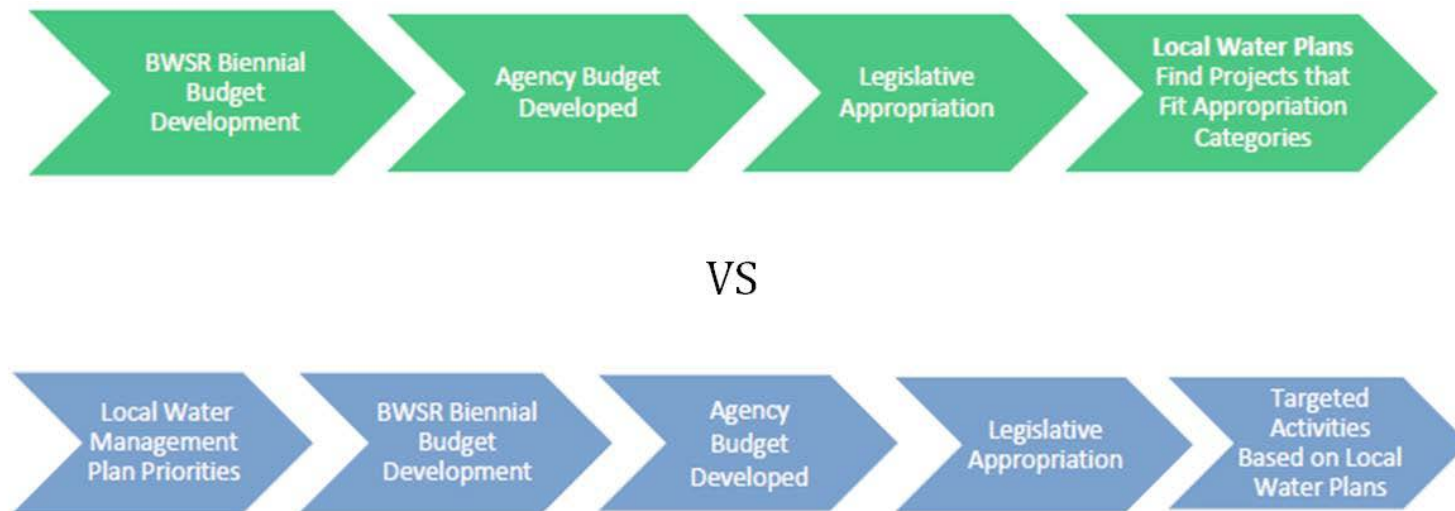
The Biennial Budget Request and a Capital Improvements Program for Water Resources

With the goal of better predicting and maximizing water-related State and grant funding demands, the Minnesota Board of Water and Soil Resources (BWSR) has adopted a new Biennial Budget Request (BBR) program. Under BWSR's previous budget and appropriation processes, the agency budget was developed and appropriated before grant opportunities were made available through local water management planning. As a result, the applicants had to tailor their projects to fit the State's appropriation categories rather than the priorities of their water plans. BWSR felt this process was backwards and unpredictable for local governments and in 2012 adopted the new BBR process. The BBR now puts the local water plans at the front end of the State process by targeting appropriations for those activities deemed most critical by local water management plans to protect or restore surface and groundwater.

In order to identify project priorities at a level of detail sufficient for the BBR, it would be prudent for local units of government to develop a Capital Improvements Program (CIP) or similar document for use in BWSR's water resource grant application process. The Olmsted County Board of Commissioners currently uses a CIP to schedule and finance major physical facilities. The CIP is prepared on an annual basis and has a five-year window. This process allows the County to fund projects in the first year while planning for other projects five years out. A local CIP-type process for water resources projects will allow the County (as the local water resource planning authority), in collaboration with other units of government and non-governmental organizations (NGOs), to establish a systematic process for establishing priorities, projects, scheduling, and financial planning for water resources projects that in turn will serve as the basis for the development of the Water Resources Coordinator's BBR submittals to BWSR. As a result, the opportunities to obtain non-local funding that support the Olmsted County Water Management Plan should be enhanced.

Comparison of Old and New Biennial Budget Request Processes

Source: Minnesota Board of Water and Soil Resources



Annual Reviews and 5-Year Strategic Update

In order to facilitate the BBR, water resources “CIP”, and grant application processes, the Water Resources Coordinator will provide the Olmsted County Environmental Commission, Olmsted County Board of Commissioners, and Olmsted County Soil and Water Conservation District Board with an annual update on the progress of the Water Management Plan’s implementation. Feedback from these entities would set the following year’s priorities for achieving the Plan’s goals and objectives and aid in the formulation of the next round of “CIP”, BBR, and grant submittals.

Because this water management plan has a 10-year timeframe, it will also be necessary for the Water Resources Coordinator to coordinate a 5-Year Strategic Update in order to consider the potential impact of new water-related plans, studies, and data on Plan implementation priorities.

Funding

The County Board of Commissioners and other local governing bodies must establish an adequate and sustainable funding source for implementing this plan. While numerous grant-funding sources are available, all require matching funds, none are guaranteed, all have use limitations, and all are inadequate by themselves. A number of funding sources including general tax levy, State funding sources such as Natural Resource Block Grants, and other grants from public and private sources will support implementation of the action items. Funding may be provided to cooperating agencies for actions such as research and monitoring. It should be noted that some of the action items will need to be funded through competitive State grants. If grants are not secured, the action items will be delayed, curtailed in scope, or considered for deletion from the plan in a future amendment.

Implementation

The implementation schedule prescribes the actions needed to achieve the Plan’s goals and objectives. These items, and the accompanying summary tables, provide the following details:

- actions to be taken
- agencies and organizations responsible for implementation
- cost
- timing of implementation
- surface or groundwater to benefit from the action

In addition, the tables describe what “type” of action each item is. These classifications correspond with those found in the BBR process, and a correlation table is found in the Appendix. This piece of information should be useful to all partners participating in the yearly CIP and biennial BBR process.

The implementation measures identified in this water management plan update consist of action items that are consistent with M.S. 103B.314, Subd. 4. There are no formal agreements for the implementation of the plan that have been made as a part of this planning process. However, this plan does recognize the existing water resource and related plans as a part of this planning document and have determined that the plans are generally consistent with these plans. The related plans appear in the document entitled “Existing Water Resource Plans, Related Studies, & Implementation Documents”, located in the Appendix. The action items listed in the plan do not constitute a legal document such as a zoning ordinance and the listing of action items does not in and of itself constitute the adoption or establishment of rules or regulations. These action items are considered timely for this plan update; however, as new information or data is compiled and analyzed, and changes occur in state law or in the water resource itself, Olmsted County will strive to review and amend the plan to be consistent with the changes.

Drinking Water & Groundwater Protection

Objective 1: Continue and enhance groundwater monitoring programs in order to improve the regional understanding of how land cover and land use impact the interaction between the landscape, surface water, karst features and groundwater.

- Action Item 1. Support upgrading the Olmsted County Environmental Laboratory's data management system to a regional system, incorporating E911 addressing and property record investments.
- Action Item 2. Support and provide administrative assistance to the Southeast Minnesota Volunteer Nitrate Monitoring Network and the Volunteer Targeted Nitrate Monitoring Network. Maintain the County's network of citizen volunteers.
- Action Item 3. Support state, federal, and academic water quality monitoring programs and hydrogeologic studies conducted in Olmsted County.

Objective 2: Support implementation of Wellhead Protection Area Plans.

- Action Item 1. Provide support and assistance on Wellhead Protection Area planning committees for public water suppliers. Assist public water suppliers with completing Wellhead Protection Area plans and implementation efforts, including water demand management programs.
- Action Item 2. Seek funding for Source Water Protection programming with a focus on Wellhead Protection Areas and implementation of Wellhead Protection Plans. Included in this process is the sealing of abandoned wells located within wellhead protection areas of each city as well as writing and administering grants.
- Action Item 3. Cooperate with public water suppliers in inventorying and mapping potential contaminant sources within the Drinking Water Supply Management Areas for each city. Particularly support the Class V Injection Well implementation plan.
- Action Item 4. Support MDH and non-community public water suppliers to achieve WHPA goals and objectives (land development controls).
- Action Item 5. Support the implementation of conservation and best management practices within the highly sensitive portions of the wellhead protection areas identified for each city in their wellhead protection plan. The coordination of programs will be for land management practices focused on:
 - ☐ use and storage of agricultural fertilizer and pesticides;
 - ☐ urban use of fertilizer and pesticides;
 - ☐ feedlot and manure management and feedlot management plans;
 - ☐ protective measures for aggregate mining

- ☐ funding for incentive programs for application of agricultural and urban/suburban best management practices that enhance groundwater protection; and
- ☐ educational programs related to the bullets above.

Objective 3: Support community water supply and sewer system projects and appropriate installation and management of private systems.

- Action Item 1. Pursue funding opportunities to create a cost-share program for sealing abandoned and non-conforming contaminated wells.
- Action Item 2. Implement financial assistance and incentive programs that encourage homeowners to improve non-compliant and failing SSTs.
- Action Item 3. Assist Cascade Township and the City of Rochester in a study to determine the potential for connecting the Hallmark Terrace and Zumbro Ridge manufactured home parks to the City of Rochester sanitary sewer system.
- Action Item 4. Assist the City of Oronoco in the development of citywide sanitary sewer and water system plans and implementation of Phase II water system plans.
- Action Item 5. Inventory and study existing development areas in the county that may contain concentrations of nonconforming SSTs and wells, including development along Lake Zumbro, rural service centers, and rural/suburban subdivisions and manufactured home parks. This analysis should include identification of possible funding sources for replacing non-compliant systems, including the Minnesota Public Facilities Authority's Small Community Wastewater Treatment Program and other MPCA programs.
- Action Item 6. Complete the update of and adopt the County's SSTs ordinance. New provisions could include
 - ☐ requiring countywide inspection of all new and reconstructed septic systems,
 - ☐ requiring submittal of all applications and related design information into a central county database, and
 - ☐ developing and implementing a point of sale requirement for all properties in the county served by an SSTs.

Objective 4: Design and maintain groundwater resource-related GIS databases.

- Action Item 1. Map county springsheds to identify Source Water Areas for springs in order to identify contribution areas in the event of leaks and spills (e.g., fuel spills).

- Action Item 2. Improve the water quality data reporting system and expand it to include an annual report on water quality including results from the private drinking water well testing and the county's water monitoring networks (Decorah Edge, stream, lake, and reservoir), and the MPCA's Citizen Stream and Lake Monitoring Programs.

Objective 5: Protect sensitive geologic areas, features, and formations.

- Action Item 1. Evaluate the need for a countywide sinkhole ordinance.
- Action Item 2. Contact and educate landowners that have sinkholes on their property about sinkhole BMPs. Provide incentives to implement BMPs that reduce the potential for groundwater pollution in karst terrain.
- Action Item 3. Develop a program to incentivize protection of sensitive Decorah Edge features identified by the criteria in the Olmsted County Wetland Conservation Ordinance. The program should include landowner education and contact, cost share for BMPs, and utilization of RIM and similar programs.

Objective 6: Increase public awareness of the importance of protecting drinking water supplies, groundwater resources, and sensitive geologic areas from potential pollutants.

- Action Item 1. Produce new educational materials that update the general public understanding of groundwater resources, source water protection, pollutant impacts, and best management practices.
- Action Item 2. Develop educational materials and programs, based on the most recent findings of ongoing research in southeast Minnesota, that focus on landowner implementation of best management practices in karst terrain.
- Action Item 3. Educate private well owners about the well code, proper well construction and maintenance, testing, sealing, and related best management practices and requirements. Educate SSTS owners about the construction and maintenance of such systems. Design education programs for use in multiple venues.
- Action Item 4. Provide copies of "Septic System Owners Guide" (U of M Extension) to the owners of newly installed or reconstructed systems.

Drinking Water & Groundwater Protection

ACTION ITEM	TYPE*	PRIMARY PARTNER AGENCIES	TOTAL COST	IMPLEMENTATION PERIOD	WATERSHED/ SOURCE
OBJ 1: Continue and enhance groundwater monitoring programs in order to improve the regional understanding of how land cover and land use impact the interaction between karst features and groundwater.					
AI 1	M	ERD, MPCA	\$20,000	ST,MT	G
AI 2	M	ERD, MDA	\$36,000	ST	G
AI 3	P	ERD, ROPD, Cities	\$36,000	ST,MT	G
OBJ 2: Support implementation of Wellhead Protection Area Plans.					
AI 1	IP,CC	ROPD, ERD, Cities	\$32,000	ST,MT,LT	G
AI 2	G	Cities	\$168,000	ST,MT,LT	G
AI 3	GIS	ROPD-GIS, Cities	\$120,000	MT	G
AI 4	P,(R)	ROPD, Cities	\$108,000	MT,LT	G
AI 5	BMP	Cities, SWCD, ZWP, U of MN Ext	\$100,000	ST,MT,LT	G
OBJ 3: Support community water supply and sewer system projects and appropriate installation and management of private systems.					
AI 1	G	ERD, SEMNWRB	\$240,000	ST,MT,LT	G
AI 2	I,G	ERD, SEMNWRB,	\$240,000	ST,MT,LT	G
AI 3	CIP ¹ ,G	ERD, City of Rochester	\$1,600	ST,MT	G,Z
AI 4	CIP ² ,G	ERD., City of Oronoco	\$3,200	MT,LT	G,Z
AI 5	RI,G	ROPD	\$20,000	ST,MT	G,Z
AI 6	R	ROPD	\$40,000	ST	G
OBJ 4: Design and maintain groundwater resource-related GIS databases.					
AI 1	RI	ERD, ROPD	\$17,500	MT,LT	G
AI 2	GIS	ROPD	\$30,000	Ongoing	G
OBJ 5: Protect sensitive geologic areas, features, and formations.					
AI 1	RI	ROPD	\$12,000	ST	G
AI 2	E,I	SWCD	\$50,000	ST,MT,LT	G
AI 3	IP,BMP,E,I	SWCD, ROPD	\$50,000	ST,MT	G
OBJ 6: Increase public awareness of the importance of protecting drinking water supplies, groundwater resources, and sensitive geologic areas from potential pollutants.					
AI 1	E	ERD, ZWP, WWJPB, SWCD	\$45,000	ST,MT,LT	G
AI 2	E	ERD, U of MN Ext	\$45,000	ST,MT	G
AI 3	E	ROPD, MDH	\$45,000	ST,MT	G
AI 4	E	ROPD, Townships	\$5,000	Ongoing	G

Table Legend

*Type

BMP	Resource Management/BMPs
CC	Coordination/Collaboration
CE	Civic Engagement
CIP	Capital Investment/Infrastructure (including land or easement purchase)
E	Education/Training/Marketing
G	Grants/Administration
GIS	GIS/Mapping
I	Incentives
IP	Implementation Program
M	Monitoring
P	Planning
R	Regulation
RI	Research/Inventories
S	Staffing

¹ Primarily a study to determine the options for improved wastewater treatment. The study will determine the type of capital improvement project will be the most cost effective and how to complete the project.

² Primarily a study of city needs. Refer to the Oronoco Phase II Water Distribution Project Feasibility Report.

³ Recognizes that additional access to the river system in the county is needed as has been noted in the Zumbro Watershed Management Plan and more recent input in the Zumbro River Watershed Management Plan - Sediment Reduction Component. In order to improve access a study will be necessary to determine exact locations and costs for the access points. Number, location, financing, and schedule will be determined through the study.

⁴ Requires that plans be completed and possible coordination among local and state agencies and possibly nongovernmental organizations to determine high priority sites for purchase. The open space plan for Olmsted County is being developed and once adopted may provide a basis for future land acquisition.

Implementation Period

An approximate timing of the initiation of the item over the next 10-year planning period

ST	Short Term	1-3 years
MT	Mid-Term	3-6 years
LT	Long Term	7-10 years
	Ongoing	

Watershed/Source

R	Root River watershed
W	Whitewater River watershed
Z	Zumbro River watershed
ASW	All surface waters
R	Reservoirs and lakes
G	Groundwater system

Primary Partner Agencies

These agencies are those most likely to be involved in implementing the action items. The listing of these agencies in no way implies their acceptance of the identified roles.

BWSR	MN Board of Water and Soil Resources
EMT	Olmsted County Environmental Management Team
ERD	Olmsted County Environmental Resources Department
LGU	Local Governing Unit
MDA	MN Department of Agriculture
MDH	MN Department of Health
MNDNR	Minnesota Department of Natural Resources
MPCA	MN Pollution Control Agency
NGOs	Non-Government Organizations
NRCS	Natural Resources Conservation Service
OCPHS	Olmsted County Public Health Services
OCPW	Olmsted County Public Works
ROPD	Rochester-Olmsted Planning Department
ROPD-GIS	Rochester-Olmsted Planning Department, GIS Division
RPW	Rochester Public Works
SEMNRWB	Southeast MN Water Resources Board
SWCD	Soil and Water Conservation District
SZJPB	South Zumbro Joint Powers Board
U of M Ext	University of MN Extension
WWJPB	Whitewater Watershed Joint Powers Board
ZWP	Zumbro Watershed Partnership

Total Cost

The costs listed in the table are estimates and may be subject to change.

Hit Alt+Left Arrow to return to your previous page.

Agricultural Erosion and Sediment Control, Nutrient Management, & Chemical Use

Objective 1: Apply conservation and best management practices on rural land in the county.

- Action Item 1. Develop a program to inspect, maintain, and oversee maintenance of conservation structures (grade stabilization structures, farm ponds, and similar BMPs) according to BWSR and NRCS guidelines.
- Action Item 2. Actively market existing agricultural cost share, loans, and other incentives to landowners and operators.
- Action Item 3. Increase the amount of planted woodland on marginal row crop areas on highly erodible soils and those overlying focused groundwater recharge areas (Decorah Edge and sandy soils).
- Action Item 4. Develop a field tile map for land in the county that can be used for land development reviews, to coordinate drainage improvements, and to understand ground and surface water flow dynamics.
- Action Item 5. Research the impact of agricultural tiling and identify management and design improvements that will reduce impacts on individual properties and watersheds. Consider alternative measures to minimize downstream impacts of tile installation.
- Action Item 6. Restore the Decorah Edge in the agricultural areas of the county. Submit a Legacy grant that will provide the incentives to effectively conserve the critical portions of the Decorah Edge.
- Action Item 7. Expand the Zumbro Watershed Partnership Critical Restoration Sites (digital terrain analysis for TMDL implementation) project funded by the LCCMR beyond the initial 50 “critical source areas” identified in the initial study to each subwatershed within the Zumbro River watershed in Olmsted County and also to the Root River and Whitewater River. Pursue grant funding for bank stabilization for the sites identified in the current study and any future inventories.

Objective 2: Coordinate plans and programs within the county, and with other counties and state and federal agencies, and non-governmental organizations.

- Action Item 1. Establish the necessary county resources to market, coordinate, provide technical expertise, and administer the new Minnesota Agriculture Water Quality Certification program (a program involving the USDA, USEPA, and the State of MN).
- Action Item 2. Establish and maintain an electronic data management system that allows for easy access and analysis of conservation practices and other water related information utilizing GIS capabilities.

- Action Item 3. Conduct a study of the existing county feedlot administration program. The purpose of the study will be to provide guidance to the County Board on the feasibility of County delegation of feedlot regulations from the MPCA and the capacity of the County to carry out a more comprehensive program.
- Action Item 4. Establish farmer-led watershed councils for high priority watersheds in the county.
- Action Item 5. Synchronize conservation implementation and evaluation into the 10-year MPCA watershed schedule. On a two to four year schedule, determine priority watersheds to focus conservation program work and application of Clean Water Fund grants.
- Action Item 6. Populate and routinely maintain the County's water-related websites with resources needed by landowners and water partners.

Objective 3: Support continued programming for planning, research, and education by local, state and federal agencies.

- Action Item 1. Encourage ongoing monitoring of surface and groundwater for agricultural pesticides and nutrients and cooperate with regional, state, and federal agencies in the collection, analysis, and application of the data. Support continued monitoring of area surface waters.
- ☐ Coordinate research findings such that it is useful to field staff.
 - ☐ Support the continued collaboration of state agencies and local units of government in reviewing river segments and watersheds.
 - ☐ Develop summaries of data and provide the data/summaries to field personnel in the SWCD's and NRCS offices.
 - ☐ Ensure that locally collected data meets minimum standards and is provided to the MPCA for TMDL planning.
 - ☐ Review water quality data with the SWCD board and Environmental Commission on an annual basis.
 - ☐ Utilize the data collected annually for the TMDL studies/ listing decisions for review and decisions made on proposed pollutant source proposals for establishment or expansion, i.e., feedlots, mining sites, and other point sources of water pollution.

- Action Item 2. Continue the flood control reservoir trophic state study and improve it by collecting additional data on reservoir characteristics and water resource data (chemical, temperature, biologic). Consider expanding the program to other impoundments and secure funding to do so. Develop an index of soils information to supplement the existing Soil Survey and the eventual updated Survey. Request that the NRCS update the Soil Survey.
- Action Item 3. Update the Olmsted County MLCCS (land cover) dataset on a biennial basis and populate the land use attribute.

Agricultural Erosion and Sediment Control, Nutrient Management, & Chemical Use

ACTION ITEM	TYPE*	PRIMARY PARTNER AGENCIES	TOTAL COST	IMPLEMENTATION PERIOD	WATERSHED/SOURCE
OBJ 1: Apply conservation and best management practices on rural land in the county.					
AI 1	IP,(I, BMP)	SWCD	\$4,300,000	ST,MT	ASW
AI 2	E	SWCD, ZWP, WWJPB	\$80,000	ST,MT,LT	ASW
AI 3	IP	SWCD, NRCS, ZWP	\$40,000	MT,LT	ASW
AI 4	RI,GIS	SWCD, ROPD, ROPD-GIS	\$200,000	ST	ASW
AI 5	RI,R	ERD, SWCD	\$50,000	ST, MT	ASW
AI 6	G,IP	ERD, ROPD, SWCD	\$44,000	MT	ASW
AI 7	G,IP	ZWP, ERD, SWCD, WWJPB, Cities	\$2,062,400	ST, MT,LT	ASW
OBJ 2: Coordinate plans and programs within the county, and with other counties and state and federal agencies, and non-governmental organizations.					
AI 1	S,G	SWCD	\$200,000	ST	ASW
AI 2	GIS	SWCD, ROPD, ROPD-GIS	\$48,000	ST,MT,LT	ASW
AI 3	S	SWCD	\$16,000	ST	ASW
AI 4	CE	ZWP, WWJPB	\$250,000	ST	ASW
AI 5	CC	SWCD, ERD, ROPD	\$27,500	MT,LT	ASW
AI 6	E	SWCD, ERD, ROPD	\$68,250	ST,MT,LT	ASW,G
OBJ 3: Support continued programming for planning, research, and education by local, state and federal agencies.					
AI 1	M	ERD	\$90,000	ST,MT,LT	ASW
AI 2	M,CC	ERD	\$75,000	ST,MT,LT	R
AI 3	GIS	ROPD-GIS	\$288,000	MT,LT	ASW

[*See Legend on Page 86 for descriptions](#)

Impaired Waters, TMDLs, & Watershed Management

Objective 1: Contribute all pertinent county data to state, regional and local water quality databases. Support continued long term monitoring of surface waters in the county.

- Action Item 1. Coordinate, track, and analyze water monitoring projects and programs for the entire county. Annually review a priority list of waterbody monitoring data. Create a GIS geodatabase with updated County water body linework and data.
- Action Item 2. Expand the County's stream and reservoir water monitoring networks to include more frequent sampling and a wider range of parameters.
- Action Item 3. Promote volunteer monitoring through development and support of volunteer workshops. Increase school and citizen participation in the MPCA Citizen Stream Monitoring Program, MPCA Citizen Lake Monitoring Program, and macro-invertebrate community monitoring projects.
- Action Item 4. Annually submit ongoing and historic surface water quality data to the MPCA to be entered into the STORET database.
- Action Item 5. Identify the primary sources and rates of stream sediment in Olmsted County. Provide support and encourage the continued study of stream sediment in regional watersheds. As part of the study, identify and evaluate historic water mill sites and associated sediment deposits and restore stable stream channels.
- Action Item 6. Expand the testing capabilities of the County's Water Testing Lab to include Total Maximum Daily Load parameters and stream health indicators.

Objective 2: Support the development and implementation of Total Maximum Daily Load plans for each major watershed.

- Action Item 1. Support and cooperate with watershed organizations and the MPCA on the ongoing and planned TMDL technical studies and implementation plans for each watershed.
- Action Item 2. Support the completion of the Root River TMDL for Turbidity. Support the preparation of the TMDL plan for the watershed.

- Action Item 3. Implement the TMDL plans and watershed plans for each watershed – Root, Whitewater, and Zumbro Rivers. The County will need to work with each watershed organization and county to coordinate activities, find funding for implementation measures, and carry out the identified implementation measures.

Objective 3: Identify and prioritize opportunities to leverage skill sets and project funds through collaborative partnerships within watersheds and subwatersheds.

- Action Item 1. Track and report the schedule for state, federal, and non-profit grant processes. Integrate the information into the County's monthly Environmental Management Team meetings.
- Action Item 2. Develop a water resources improvement program process that:
- ☐ develops a document identifying county and other jurisdiction and organization annual investments and projects similar to the Transportation Improvement Program,
 - ☐ meets biennially to discuss and coordinate efforts with the SWCD, county and state agencies, cities, the surrounding counties, SEMWRB staff, SZJPB, WWJPB and ZWP to identify priority projects and programs to submit in the BWSR Biennial Budget Request,
 - ☐ develops an understanding of all Clean Water Fund and other funding sources, and
 - ☐ coordinates annual meetings with County agencies, townships, cities, NGOs, watershed organizations, other counties, SEMNWRB, and JPBs to discuss, prioritize, and jointly determine possible Clean Water Fund applications.

Objective 4: Support the formation of and long term funding for community-based watershed organizations for the Root, Whitewater, and Zumbro watersheds. Support watershed planning activities carried out by each watershed organization.

- Action Item 1. Work with adjacent counties to determine organizational structures for the Root, Zumbro, and Whitewater Rivers to implement watershed/TMDL plans. Support and assist established watershed organizations and their partners in the Whitewater and Zumbro River watersheds. Support the formation of a watershed group for the Root River watershed.
- Action Item 2. Initiate and complete a study of long term financing options and sources for the existing watershed organizations covering the Zumbro and Whitewater watersheds and for the newly developing Root River watershed organization.

Objective 5: Support planning/implementation projects for waterbodies in Olmsted County.

- Action Item 1. Continue to pursue organizational and funding resources for the following projects: Lake Zumbro Restoration, Zumbro River Restoration (in the former Lake Shady lakebed), Cascade Creek/Lake Project, Logan Creek Priority Watershed Project, and Bear Creek Priority Watershed Project.
- Action Item 2. Work with the South Zumbro Joint Powers Board to identify major sources of sediment and nutrients impacting the reservoirs managed by the JPB. Develop programs to address these impacts.

Objective 6: Educate and involve the public in watershed and TMDL studies and programs.

- Action Item 1. Coordinate public educational programs on water resources for adults and children in Olmsted County. Develop public understanding and support for watershed-based management through education, information sharing, park informational kiosks and exhibits, and volunteer projects. Provide the general public an annual summary of surface water quality monitoring data through the County or watershed organizations websites.
- Action Item 2. Make annual presentations to the Olmsted County Environmental Commission, County Board, Olmsted SWCD, and in other forums about county water resource management efforts and the condition of water resources. Collaborate with other local, state, and federal agencies in developing an annual status report on county water resources. Data and analyses should be presented on a watershed basis.

Impaired Waters, TMDLs, & Watershed Management

ACTION ITEM	TYPE*	PRIMARY PARTNER AGENCIES	TOTAL COST	IMPLEMENTATION PERIOD	WATERSHED/SOURCE
OBJ 1: Contribute all pertinent county data to state, regional and local water quality databases. Support continued long term monitoring of surface waters in the county.					
AI 1	M,GIS	ERD, OCPHS, ROPD, ROPD-GIS	\$120,000	ST,MT,LT	ASW,G
AI 2	M,G	ERD	\$57,500	MT,LT	ASW
AI 3	M,CE	ERD, ZWP, Cities	\$15,000	ST,MT,LT	ASW
AI 4	M	ERD	\$22,500	ST,MT,LT	ASW
AI 5	RI	ERD, ZWP, SEMNWRB	\$40,000	ST	ASW
AI 6	M	ERD	\$195,000	ST,MT	ASW
OBJ 2: Support the development and implementation of Total Maximum Daily Load plans for each major watershed.					
AI 1	CC	ERD, ZWP	\$60,000	ST	ASW
AI 2	CC	ERD	\$12,000	ST	R
AI 3	IP,G	ERD, SWCD, ZWP, Cities, WWJPB, SZJPB	\$240,000	MT,LT	ASW
OBJ 3: Identify and prioritize opportunities to leverage skill sets and project funds through collaborative partnerships within watersheds and subwatersheds.					
AI 1	G	ERD	\$15,000	ST,MT,LT	ASW,G
AI 2	CC	ERD, EMT, LGU's, NGOs	\$150,000	ST,MT,LT	ASW,G
OBJ 4: Support long term funding for watershed based organizations serving the people of Olmsted County.					
AI 1	CC	ERD, ZWP, SEMNWRB, SWCD, Cities, WWJPB	\$16,000	ST,MT	ASW
AI 2	CC	ERD, ZWP, SEMNWRB, SWCD, Cities	\$10,000	ST,MT,LT	ASW
OBJ 5: Support planning/implementation projects for waterbodies in Olmsted County.					
AI 1	CC,G,CIP	ERD, SWCD, WWJPB, City of Rochester	\$100,000	ST,MT,LT	ASW
AI 2	CC,IP	SWCD, ZWP, SZJPB	\$20,000	MT	Z
OBJ 6: Educate and involve the public in watershed and TMDL studies and programs.					
AI 1	E	ZWP, MS4s, WWJPB	\$80,000	ST,MT,LT	ASW
AI 2	E	ERD, ZWP	\$45,000	ST,MT,LT	ASW

*See Legend on Page 86 for descriptions

Urban/Suburban Storm Water Quality & Quantity

Objective 1: Support existing storm water management programs, including construction site erosion and sediment control activities.

- Action Item 1. Assist small cities and townships (non-MS4 communities) and MS4 permittees in developing and implementing illicit discharge ordinances.
- Action Item 2. Develop and implement an urban forest master plan for Rochester.
- Action Item 3. Review and update the Olmsted County regulations that address storm water erosion and runoff control, grading plan approval, and grading and drainage standards.
 - ☐ Use the LiDAR dataset to update the Olmsted County Soil Erosion model and ordinance.
 - ☐ Work with the townships on ordinance improvements and implementation (plan reviews, administration, inspections, and enforcement)
 - ☐ Determine if a coordinated effort with shared resources can be organized and implemented.
- Action Item 4. Develop additional resources for the County and townships to adequately regulate storm water in new residential subdivision and commercial/industrial development under County/township jurisdiction. Train County field staff to identify erosion problems, monitor compliance with grading/storm water plans, and perform other management activities.
- Action Item 5. Coordinate an annual MS4 report review process among all permittees in Olmsted County, at which time the Olmsted County MS4 program manager will assess the reports in order to identify program components that could benefit from further cooperation and coordination, if any. If there are opportunities for additional countywide collaboration, the County's MS4 program manager will prepare recommendations and facilitate a meeting to address those concepts.
- Action Item 6. Pursue funding to support retrofit activities in previously developed areas, such as construction of new BMPs and enhancement of existing BMPs to expand storm water management capacity.
- Action Item 7. Conduct an inventory of ravines and other highly eroded areas to identify sites for stabilization. Develop an implementation program to prioritize the upland sites and impacted stream channels, applicable best management practices, and costs. Pursue funding for stabilization of priority sites and for sediment/debris removal projects to restore in-channel morphology and habitat.

Objective 2: Provide information and educational opportunities for cities and townships on storm water management, including erosion and sediment control standards and best management practices.

- Action Item 1. Encourage all of the non-MS4 cities in the county to meet the principles of the EPA Phase II storm water requirements.
- Action Item 2. Minimize compaction on construction sites and restore soils where it occurs, using education programs, revised models, and BMP's.
- Action Item 3. Promote Olmsted County and other LGU projects that demonstrate Low Impact Design or Minimum Impact Design technologies.
- Action Item 4. Develop a community-wide survey to assess baseline awareness about local water issues, the water protection behaviors already adopted by citizens, and citizen readiness to adopt new water quality behaviors.

Objective 3: Apply low impact or minimal impact design practices to development in the county.

- Action Item 1. Continue to support and apply the Peak Flow Reduction Opportunities in the Cascade Creek Tributaries Final Report and the related Cascade Turbidity Reduction Through Rural Retention and Stream Restoration Program implementation project. Pursue funding for implementation projects.
- Action Item 2. Encourage development proposals to incorporate Low Impact Design strategies (and Minimal Impact Design strategies when made available by MPCA) to manage storm water runoff. Research how to incorporate the concepts into the existing zoning ordinances and land development manuals in the county.

Urban/Suburban Storm Water Quality & Quantity

ACTION ITEM	TYPE*	PRIMARY PARTNER AGENCIES	TOTAL COST	IMPLEMENTATION PERIOD	WATERSHED/SOURCE
OBJ 1: Support and strengthen existing storm water management, construction site erosion, and sediment control programs and projects including MS4 permit activities.					
AI 1	R	MS4s, Cities, ROPD, Townships, OCPW	\$7,000	MT,LT	ASW
AI 2	P,IP	City of Rochester	\$48,000	ST	Z
AI 3	R	ROPD, OCPW	\$64,000	ST	ASW
AI 4	S	Cities, SWCD, ROPD, ZWP,MS4 Permittees, OCPW	\$34,000	ST,MT	ASW
AI 5	CC,S	ROPD, Townships	\$122,000	MT	Z
AI 6	G	Cities	\$200,000 - \$500,000 per project	ST,MT,LT	ASW
AI 7	RI,IP,G	Cities, SWCD	\$200,000 - \$500,000 per project	MT	R,Z
OBJ 2: Provide information and educational opportunities for cities and townships on storm water management, erosion and sediment control standards, and best management practices.					
AI 1	CC	ERD, Cities	\$4,000	MT,LT	ASW
AI 2	BMP	Cities	\$20,000	MT,LT	Z
AI 3	E,CE,(G)	ERD, OCPW, Cities, ROPD	\$20,000	MT,LT	ASW
AI 4	CE	Cities, SWCD, ZWP	\$80,000	ST	ASW
OBJ 3: Apply low impact or minimal impact design practices to development in the county.					
AI 1	G,BMP,CIP	SWCD, OCPW, City of Rochester	\$2,080,000	ST,MT,LT	Z
AI 2	P,(R)	ROPD, Cities, Townships	\$290,000	MT,LT	Z

[*See Legend on Page 86 for descriptions](#)

Wetland Resources & Natural Corridors

Objective 1: Buffer all sensitive land and water interfaces.

- Action Item 1. Assist landowners and managers with shoreland and riparian best management practices and funding options.
- Action Item 2. Work with the Minnesota Department of Natural Resources to identify and implement management strategies for trout stream watersheds and the areas contributing groundwater to springs associated with trout streams.
- Action Item 3. Pursue funding to conduct a countywide inventory of streambank stability on all perennial streams. Identify high priority sites for in-stream habitat improvement and streambank stabilization and develop an implementation program. Develop a demonstration project(s) for cost-effective streambank stabilization.
- Action Item 4. Conduct a study of Olmsted County's surface water system to determine best management practices and if there is a need for buffer requirements for croplands adjacent to non-public stream reaches. At a minimum, the study will consist of the following:
- ☐ Identification/mapping of public waters for each watershed;
 - ☐ Identification/mapping of the watershed and subwatershed boundaries;
 - ☐ Identification/mapping of the surface water system within each subwatershed above the public water designation;
 - ☐ Describe the surface water channels and designate on the surface waters map;
 - ☐ Conduct an assessment of each subwatershed to determine the extent of surface flow and best management practices; and
 - ☐ Submit the information and analysis to the County Board.
- If warranted by the study results, develop programs to address water quality in non-public waters.
- Action Item 5. Evaluate adopting and applying the proposed model shoreland standards developed by the Minnesota Department of Natural Resources. Consider amending land use regulations to require subdivisions to provide for shoreland buffers through easements or dedication.

Objective 2: Promote and protect forest resources and grassland resources, including pasture.

- Action Item 1. Provide and promote technical assistance for best management practices in pasture management plans. Continue funding for the pasture management specialists available in the Root, Whitewater, and Zumbro River watersheds.
- Action Item 2. Encourage the Minnesota Department of Natural Resources to maintain the forest stewardship plan program. Encourage the MN DNR to provide adequate staffing for plan preparation and sustainable forestry practices on private lands.
- Action Item 3. Increase the amount of forestland managed under best management practices.
- Action Item 4. Utilize the plans of the Minnesota Forest Resource Council – Landscape Committee for Southeast Minnesota to conserve and expand forest resources. Work with the landscape committee and the Minnesota Forest Resource Council to implement the approved plans. The plans include the updated landscape plan and landscape stewardship plans being developed for the Root River and Whitewater watersheds.
- Action Item 5. Study the concept and develop a forest resources element to the County's land use plan.

Objective 3: Develop strategies to better utilize the natural water quality functions provided by wetland systems.

- Action Item 1. Develop a countywide plan to identify “high priority areas” that meet the requirements of MR 8420.0835. High priority areas should be
 - ☐ designated by minor watershed or subwatershed;
 - ☐ in watersheds that contain high value wetlands that are at risk of degradation and are integral to maintaining the ecology and condition of the watershed;
 - ☐ located on the Decorah Edge,
 - ☐ based on criteria that can be used to identify individual wetlands and on criteria established in MR 8420.

Conduct an inventory of drained wetlands and identify high priority areas for restoration for the purposes of wetland banking for development and agricultural needs. Encourage wetland replacement to be located within Olmsted County.
- Action Item 2. Develop an Agricultural Wetland Bank program for Olmsted County.

- Action Item 3. Organize annual meetings to identify wetland replacement needs for public projects and create cooperative plans for replacement.
- Action Item 4. Encourage the use of the “exceptional natural resource value” provisions of the Wetland Conservation Act rules on lands that are located within the Decorah Edge district, or within the watershed of designated trout waters, shorelands, or lands identified by the County’s open space plan (when adopted).
- Action Item 5. Implement a countywide system to record wetland boundaries, impacts, and wetland establishment. The system should be organized in a GIS database. (This program has been initiated within the City of Rochester.)

Objective 4: Promote and market wetland preservation and restoration programs.

- Action Item 1. Promote and market wetland preservation and restoration programs such as CRP, WRP, RIM, and BWSR wetland banks each year.
- Action Item 2. Promote and educate landowners/managers about wetland preservation programs such as the Wetland Preserve Area Program and the Rural Preserve Property Tax Program in order to minimize property taxes on wetlands. Prepare a summary tax sheet that explains the wetland and rural preserve programs for landowners and managers.

Objective 5: Identify and target natural corridors to be enhanced and protected throughout the county.

- Action Item 1. Complete the County’s open space plan and develop an implementation plan. Include a tool kit for implementation of the plan. Develop an open space improvement plan both as a part of the CIP process and as a separate document for implementation of the plan. (Not all implementation measures will be capital investments by the County.)
- Action Item 2. Work with the MN DNR, County, cities, and non-governmental organizations in applying for Legacy grants to acquire, protect, and enhance open spaces. Organize annual reviews for the purpose of collaborating on the submittal of applications wherever feasible.
- Action Item 3. Collaborate with the Minnesota Forest Resource Council Southeast Landscape Committee and the MN DNR on the protection of forestland and lands suitable for protection for wildlife habitat, fisheries habitat, or native vegetation/habitat. The priority should be on shoreland areas and other sensitive water/land interfaces.
- Action Item 4. Improve public access to the rivers, streams, and reservoirs in Olmsted County. Establish outdoor interpretive signage adjacent to water resources for “point-of –service” education about water quality issues, aquatic life and habitats, or the positive effects of human impacts on those resources.

- Action Item 5. Focus the use of Reinvest in Minnesota Reserve (RIM) and Reinvest in Minnesota Critical Habitat programs on those areas of the county identified as critical habitat by the MNDNR and upon adoption of a county open space plan.
- Action Item 6. Purchase additional recreation, wildlife habitat, and forest along the Root and Whitewater Rivers. The focus is forested parcels that are part of the DNR management or forest units and possible expansion of the County park system.

Wetland Resources & Natural Corridors

ACTION ITEM	TYPE*	PRIMARY PARTNER AGENCIES	TOTAL COST	IMPLEMENTATION PERIOD	WATERSHED/SOURCE
OBJ 1: Buffer all sensitive land and water interfaces.					
AI 1	BMP,I	SWCD, ROPD	\$200,000	ST,MT,LT	ASW
AI 2	CC,IP	ERD, SWCD, MNDNR	\$50,000	MT, LT	W,R
AI 3	RI,G,I	ROPD, SWCD, MNDNR, Cities	\$63,000	MT	ASW
AI4	RI,R	ROPD, MNDNR, SWCD	\$80,000	ST,MT	ASW
AI 5	R	ROPD	\$16,000	ST,MT	ASW
OBJ 2: Promote and protect forest resources and grassland resources including pasture.					
AI 1	E,G	ERD, SEMWRB	Prorated \$100,000	ST,MT	ASW
AI 2	CC,S	ERD, MNDNR	\$1,000	ST	ASW,G
AI 3	BMP	MNDNR, U of M Ext, SWCD	\$40,000	ST,MT,LT	ASW,G
AI 4	P	ROPD, SEMNWRB	\$2,000/bi	ST,MT	ASW,G
AI 5	P	ROPD	\$24,000	MT	ASW,G
OBJ 3: Develop strategies to better utilize the natural water quality functions provided by wetland systems.					
AI 1	P	SWCD, ROPD, BWSR	\$24,000	ST	ASW
AI 2	IP	BWSR, SWCD	\$48,000	ST	ASW
AI 3	CC	SWCD, ROPD, Cities	\$20,000	ST,MT,LT	ASW
AI 4	E,I	SWCD	\$40,000	ST,MT,LT	ASW
AI 5	GIS	SWCD, ROPD	\$34,000	ST,MT,LT	ASW
OBJ 4: Promote and market wetland preservation and restoration programs.					
AI 1	E,I	SWCD	\$20,000	ST,MT,LT	ASW
AI 2	E,I	SWCD, Property Records	\$35,000	ST,MT,LT	ASW
OBJ 5: Identify and target natural corridors to be enhanced and protected throughout the county.					
AI 1	P	ROPD	\$32,000	ST	ASW
AI 2	CC,G	OCPW, MNDNR, Cities, NGOs	\$30,000	ST,MT,LT	ASW
AI 3	CC	SWCD, ROPD, SEMWRB	\$4,000	ST,MT	W,R
AI 4	CIP ³	ZWP, SWCDs,OCPW, SZJPB, MNDNR, Cities	\$306,000 + \$2000/sign	MT,LT	ASW
AI 5	I	SWCD, ROPD	\$4,000	ST,MT,LT	ASW
AI 6	CIP ⁴	OCPW, MNDNR, NGOs	Dependent on land identified	MT,LT	W,R

[*See Legend on Page 86 for descriptions](#)

Implementation of Ongoing Activities



Implementation of Ongoing Activities

Olmsted County has managed its water resources for decades. Many existing programs and regulations directly address water resources, while others affect resources that in turn have an impact on overall resource management. These programs, projects, and regulations are not discussed in the action items section unless there are improvements or new approaches to their implementation or administration. However, in order to build a better system for water resource management, these existing programs and regulations should be identified and recognized for their critical roles. These locally administered programs may have origins in State law and rule, and for the most part do not include a listing of the many State programs, regulations, or projects or those administered at the regional level. Listing them under the action items section of the plan would be repetitive and unnecessarily complicate the decision-making process to identify priority programs.

The water resources work at the federal, state, regional, and local levels appears to be moving to a watershed-based approach. The delivery system for a watershed-level approach in southeast Minnesota and Olmsted County is built around levels of government rather than water resource areas. Therefore, there is an overlapping nature to the organization of water resource management. In order to continue to develop an effective system of water resource management, the local units of government will need a coordinated and collaborative effort. At the state and local levels, that collaborative work is continuing through watershed organizations such as the Whitewater Watershed Joint Powers Board, the Zumbro Watershed Partnership, the Root River Collaborative, as well as through a regional approach by the Southeast Minnesota Water Resources Board. State agencies are also collaborating at the watershed level. This plan recognizes that those ongoing efforts are critical to developing, implementing, and expanding cost effective programs and projects.

These ongoing programs are supported by an expansive list of funding sources from federal, state, local, and non-profit sectors. This plan recognizes the current support and funding levels for these programs. An important factor in plan implementation is a recognition that the funding levels may change somewhat from year to year but that the program funding is adequate to perform the basic functions of the program. This plan also recognizes the need to find addition funding sources. The staffs of the various agencies plan to support and improve existing programs by providing the necessary resources to stay current with local regional, state, or federal grants and opportunities to obtain additional funding. The Legacy Amendment approved by the voters in 2008 will be a focus for grant related opportunities to improve the existing programs.

Wetland Conservation Act (WCA)

Olmsted County and the City of Rochester adopted wetland conservation ordinances that incorporated the Wetland Conservation Act of 1991. Other cities adopted the regulations following Olmsted County. The purpose of the law and ordinances is to achieve a “no net loss” and further avoid direct and indirect impacts to wetland quantity, quality, and biological diversity by regulating the filling,

draining, excavation, or conversion of wetlands. Local governmental units are responsible for administering the regulations, educating landowners, developers and operators; and seeking incentive programs to apply to wetland conservation.

Shoreland Management Standards – Zoning Ordinances

The uncontrolled use of shorelands of Olmsted County, Minnesota, affects the public health, safety, and general welfare not only by contributing to pollution of public waters, but also by impairing the local tax base. Therefore, it is in the best interests of the public health, safety, and welfare to provide for the wise subdivision, use, and development of shorelands of public waters. The Legislature of Minnesota has delegated responsibility to local governments of the State to regulate the subdivision, use, and development of shorelands of public waters and thus preserve and enhance the quality of surface waters, conserve the economic and natural environmental values of shorelands, and provide for the wise use of waters and related land resources. This responsibility is hereby recognized by Olmsted County. With the exception of the City of Byron (lack of public waters), all cities, townships, and Olmsted County have shoreland regulations within their zoning ordinance.

Of current concern and attention is the administration and enforcement of the 50-foot agricultural buffer requirements of the shoreland ordinance. The County will continue this program to address compliance by agricultural landowners and operators of the required buffer. The goal is to develop effective permanent buffers along all public waters in the county. The SWCD will continue to assist in education, identifying best management practices, and administering incentive programs for the establishment of the buffers. Non-governmental organizations may also be able to assist in long-term establishment of agricultural buffers.

Floodplain Management Standards – Zoning Ordinances

The intent of the flood district regulations is to guide development in the flood plain consistent with the magnitude of the flood threat, in order to minimize loss of life and property, disruption of commerce and governmental services, extraordinary public expenditure for public protection and relief, and interruption of transportation and communication, all of which adversely affect the public health, safety, and general welfare. With the exception of the City of Byron (no FEMA floodplain), all cities, townships and Olmsted County have floodplain regulations.

Erosion Control Regulations – Zoning Ordinances

Olmsted County and the City of Rochester have erosion control regulations within their zoning ordinances that address construction related grading and storm water plans. The State of Minnesota also requires permits through the National Pollutant Discharge Elimination System for all construction on development sites of one acre or more in size.

Septic System Ordinance (Ordinance #41)

Olmsted County and several townships administer Minnesota Rules Chapter 7080 through 7083. The jurisdictions provide technical assistance, education, plan review, and inspections to protect water quality, prevent and control water borne diseases, and prevent or eliminate nuisance conditions.

Water Well Ordinance (Olmsted County)

Minnesota Statutes 103I permits the Minnesota Commissioner of Health to enter into an agreement with the county board of health to delegate administrative responsibilities pertaining to the permitting, construction, repair, and sealing of wells. Olmsted County has an ongoing program to administer the well ordinance and program.

Municipal Wastewater Treatment Plants

Municipal wastewater treatment facilities exist for all cities within Olmsted County with the exception of the City of Oronoco. The Minnesota Pollution Control Agency regulates and monitors municipal wastewater treatment facilities.

Municipal Separate Storm Sewer System (MS4) Permit Plans and Programs – Multiple Entities in Olmsted County

Eight entities with storm sewer systems in Olmsted County are regulated by the Minnesota Pollution Control Agency. The urbanized area of Rochester is covered by this regulation. The storm water program is designed to reduce the amount of sediment and pollution that enter surface and groundwater from storm sewer systems to the maximum extent practicable. The MS4 permittees organized several years ago and meet annually to collaborate on permit responsibilities as identified in the storm water pollution prevention plans. This collaboration will continue and may expand as the MPCA identifies additional permittees.

Solid Waste Management (Including Waste Pesticides and Hazardous Waste/Materials)

Olmsted County operates an integrated solid waste management system that provides comprehensive solid waste services to Olmsted and Dodge Counties as directed by Minnesota Statutes Chapters 115A and 400. The system consists of:

- waste reduction and waste education programs including business waste management assistance;
- mandatory curbside recycling and a publicly-owned and operated recycling center;

- a yard waste composting site;
- a regional hazardous waste management facility;
- a mass-burn municipal solid waste (MSW) combustor that co-generates steam and electricity for sale to a district heating system; and
- the Kalmar Landfill consisting of MSW, demolition debris, and ash cells.

Wellhead Protection Program

MDH administers the state wellhead protection rule [Minnesota Rules, Chapter 4720.5100 - 4720.5590](#) that sets standards for wellhead protection planning. The cities of Rochester, Chatfield, and Pine Island have completed the inventory/delineation of wells had wellhead areas and a wellhead protection plan. Rochester will be updating their plan starting this year. Other cities within the County will be preparing plans over the next several years, according to the most recent listing from the MDH.

Feedlot Program

MN Rules 7020 establish the feedlot regulations and program that is administered by the Minnesota Pollution Control Agency in Olmsted County. Olmsted County is not a delegated county. A feedlot technical assistance program is provided by the county through the SWCD. The feedlot inventory is maintained by the County Feedlot Technician with the District offering several supporting roles to assist the livestock industry here in Olmsted County. District technicians assisted SRF engineers with Best Management Practice surveys, data gathering, and producer meetings. Database and mapping support has also been included in the staff's workload.

Agricultural Programs Including SWCD, NRCS and FSA

These agricultural agencies at the state and local levels offer a full menu of agricultural technical assistance, cost share, and other grant related funding for numerous agricultural programs including state cost share from BWSR, CRP, EQIP, and the federal farm support programs as well as some related programs such as the University of Minnesota Extension Service River Friendly Farmer Program and the AGBMP Loan Program of the Minnesota Department of Agriculture. Many of the programs and funding sources support the establishment of best management practices, pollution control from feedlots, habitat conservation, and woodland management (with the assistance of the MNDNR).

Forestland Management

There are ongoing programs and projects on forestland in the region that can have an impact on water resources in subwatersheds and at the major watershed level. The Minnesota Department of Natural Resources has a number of programs that apply to public and private lands that support the use of best management practices. A number of planning efforts have been completed over the years and some new planning efforts have been undertaken. The Minnesota Forest Resource Council will launch a new planning effort for through the Southeast Landscape Committee and there is an ongoing Root River Landscape Stewardship Plan that is being formulated at the same time as this plan. The County supports these ongoing programs and encourages the implementation of the plans and search for additional funding to expand the planning efforts and implementation programs in all three watersheds. Adequate resources are necessary at the state and local levels to get the practices on the ground in order to have a positive impact on the water resource.

Olmsted County Public Health Services – Environmental Laboratory

The Environmental Laboratory provides the following ongoing programs:

- testing services for public and private drinking water supplies, and for public swimming pools;
- communication of health risks associated with test results;
- analysis of test results data to guide health and environmental protection planning; and
- contract laboratory services for the Southeast Minnesota Water Resources Joint Powers Board, local water utilities, and other parties.

Chester Sewer District

The County owns and operates a sewer district that provides services to residences and businesses in the Chester area. Sewage from the district is pumped to the City of Rochester for treatment at the Water Reclamation Plant.

All Hazard Mitigation

The County prepared an all hazard mitigation plan, which was adopted in 2010. The plan was prepared in accordance with the requirements set forth in Section 104 of the Disaster Mitigation Act of 2000 (DMA 2000), Public Law 106-390, codified at 42 USC Sections 5121 et seq. Hazard Mitigation Planning, 44 CFR Part 201, established criteria for state and local hazard mitigation planning

as authorized by DMA 2000. Among other things, the plan addressed several water resource related matters including flooding, landslides and karst, hazardous materials/waste, water supply, and wastewater treatment.

Community Park and Recreation Departments – Parkland Resource

Each city has park programs and the City of Rochester and Olmsted County have parks departments. The cities provide mainly for active sporting activities but also for some passive activities and the related parkland that in some cases is focused on habitat protection. Such resources can have a positive effect on water resources. The staff of the management agencies and several related agencies or groups such as Quarry Hill Nature Center and ZWP/Cascade Meadows Environmental Learning Center, provide water resource educational opportunities as well.

Water Resource Management Activities

The Olmsted County Environmental Resources Department coordinates local, state, and federal water resource management programs and projects undertaken in the county.

- Assists the county departments, communities, joint powers boards, and other agencies in planning and implementing water resource management projects
- Provides coordination and facilitation for implementation of environmental resource programs of the County including supporting the Environmental Commission and Environmental Management Team

The water coordinator and other County staff participate in communication and coordination activities at the watershed and regional level through several existing organizations including the Southeast Minnesota Water Resources Board, the Whitewater Watershed Joint Powers Board, the Zumbro Watershed Partnership, and the South Zumbro Joint Powers Board. The County will continue to participate in these organizations and related activities.

Watershed 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 ongoing projects and programs and also projects 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 and the Logan Creek Agricultural Restoration Project.

Zumbro River Watershed

Olmsted County supports the implementation of the Zumbro River Watershed Total Maximum Daily Loads for Turbidity Impairments (MPCA, 2012), and the MPCA initiated and funded Zumbro River Watershed Management Plan - Sediment Reduction Component (currently in draft form). The project 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 in the implementation of the recommended strategies, actions, and research needs that are consistent with the County's water management plan. These plans can be seen on the MPCA TMDL website and Watershed Partnership Website www.zumbrowatershed.org and at the Olmsted County Environmental Resources office.

Root River Watershed

Olmsted County will support the many ongoing multi-county programs and projects within the watershed. Olmsted County will support other water management initiatives in the Root River Watershed as they are proposed after completion of the TMDL study in 2012.

Status of Action Items for Olmsted County Comprehensive Local Water Management Plan 2005-2010

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 countywide. Those that are not, are administered by townships and cities.

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.

Current Status: Ongoing

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. 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.

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.

Current Status: Construction completed, system is operating, but a problem has arisen with hydrogen sulfide gas being formed in the force main that connects Chester and Rochester sewer systems. The hydrogen sulfide has caused approximately \$30,000 in damage to the Rochester sewer system and estimates for correcting the hydrogen sulfide problem range upwards of \$17,000 per year.

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. The Zumbro has been identified as an Impaired Water in Olmsted County as well as in the downstream area of Wabasha County.

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.

Current Status: This project is currently in progress. The City of Rochester and the Olmsted Soil and Water Conservation District are working with landowners in the watershed to find funding and apply conservation practices that control surface water flow within the watershed.

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.

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.

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.
- ❑ 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.
- ❑ 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.

Current Status: This project is currently in progress.



Appendix A: Priority Concerns Scoping Document



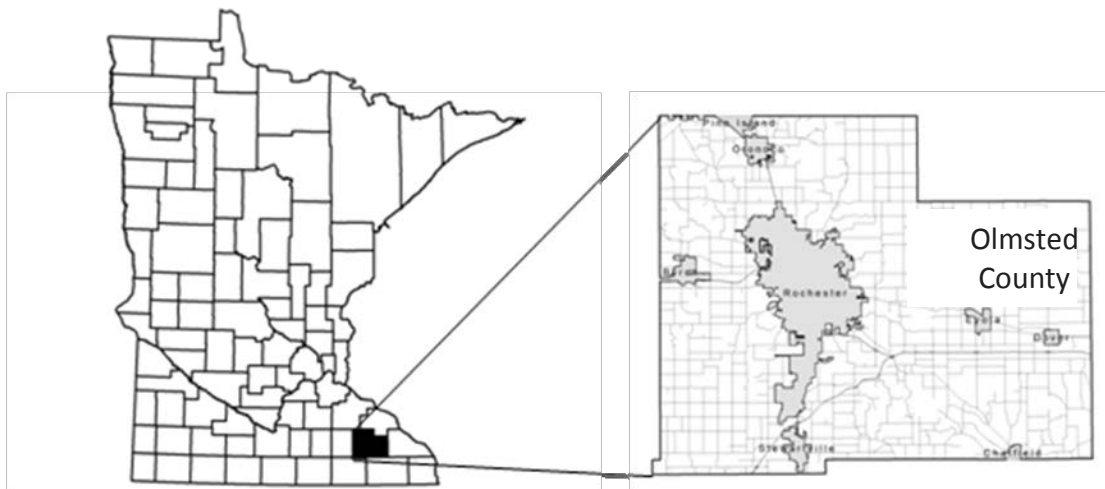
OLMSTED COUNTY LOCAL WATER MANAGEMENT PLAN

PRIORITY CONCERNS SCOPING DOCUMENT

2010-2015

**Prepared by Olmsted County Environmental Commission
Adopted by the Olmsted County Board**

December 2009



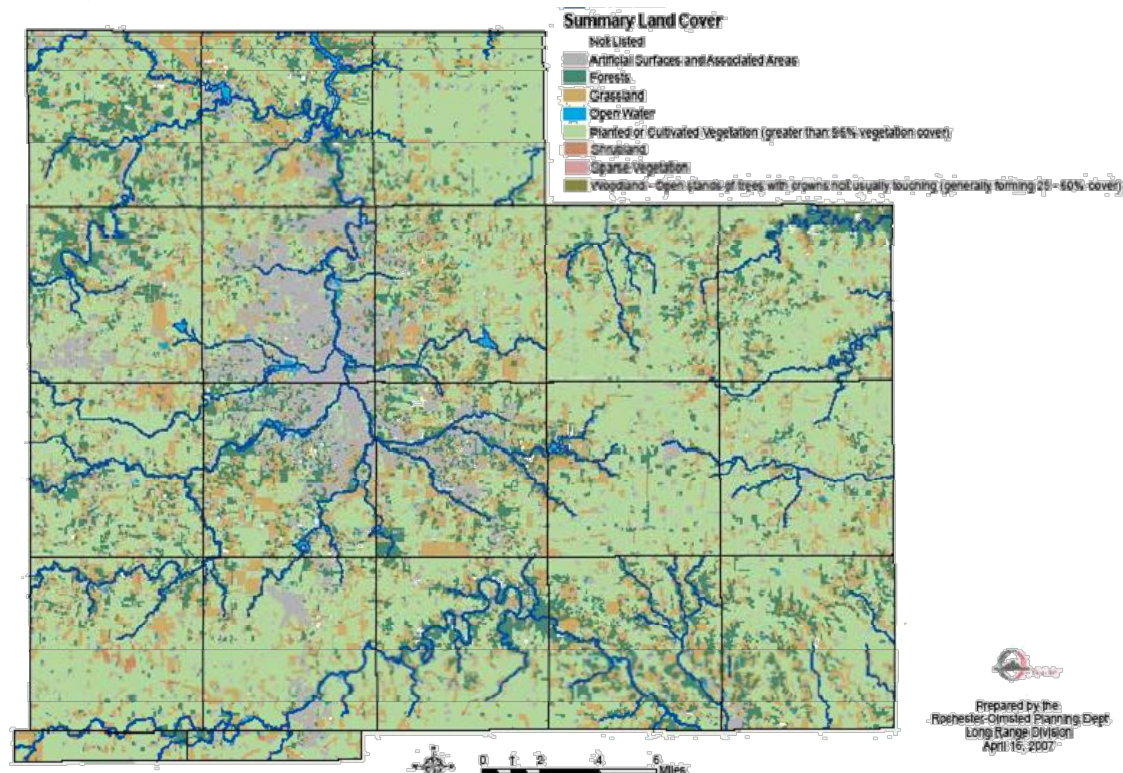
INTRODUCTION

Olmsted County is located in southeastern Minnesota, approximately 85 miles south of the Twin Cities Metropolitan Area. The County has a land area of 660 square miles, or 422,400 acres, which includes seven incorporated cities and eighteen townships. The County is drained by three major watersheds -- the Root, Whitewater, and Zumbro. The highest elevation which is in the southwestern part of the county is about 1,360 feet above sea level, and the lowest, on the bottom of stream valleys that exit the north and east sides of the county, is 850 feet above sea level.

Population and Land Cover Trends

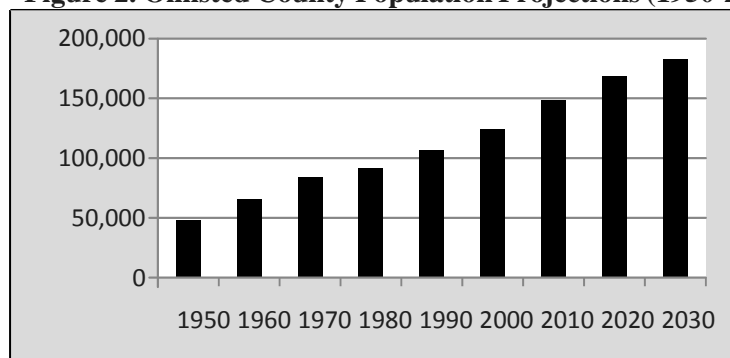
Land cover mapping was completed using data from year 2000 aerial photos (Figure 1). Based on that work, 10 percent of the land in the County has been developed for residential and commercial use, 50 percent is cropped, 25 percent is managed as pasture and grassland, and the remainder is forest. The largest population settlement and county seat is the city of Rochester which had a population of approximately 102,000 in 2008. The population trend in Olmsted County is increasing (Figure 2). The population was estimated to be 141,000 in 2008 and is projected to exceed 180,000 by the year 2030.

Figure 1. Land Cover in Olmsted County in 2000.



From: Rochester-Olmsted Planning Department

Figure 2. Olmsted County Population Projections (1950-2030).



From: Rochester-Olmsted Planning Department

PLAN RESPONSIBILITY

The Olmsted County Environmental Services Coordinator is responsible for the Local Water Management Plan (LWMP). The original LWMP was adopted in 1990 and was updated in 1998 and in 2005. The current Water Plan will expire in December of 2010.

PRIORITY CONCERNS IDENTIFICATION PROCESS

The priority concerns scoping document for the Olmsted County Local Water Management Plan was developed in accordance with the changes to the Comprehensive Local Water Management Act; Statutes:

103B.304 – 103B.355. This scoping document lists the priority concerns as identified by the Olmsted County Environmental Commission. The Commission has been charged by the County Board with overseeing the update of the County Water Management Plan.

Olmsted County Environmental Commission members include:

- Jim Bier, County Commissioner
- Matt Flynn, County Commissioner
- Michael Wojcik, Rochester City Council
- Nathan Redalen, Olmsted Township Officers Association
- Eric Counselman, citizen representative
- Chris Larson, citizen representative
- Jay Hoecker, citizen representative
- Phillip Lermom, citizen representative
- Charles Fried, citizen representative

The Olmsted County Local Water Management planning process of addressing priority concerns has included the following steps/actions:

May 20, 2009: The Olmsted County Environmental Commission recommended that the County Board initiate the Water Plan Update.

June 9, 2009: The Olmsted County Board of Commissioners signed a resolution to update the Local Water Management Plan.

June 16, 2009: Written notice of the Water Plan Update, a request for input on priority water management concerns, and a request for copies of local plans and official controls was sent to all surrounding counties, all 18 county townships, seven county cities, Township Cooperative Planning Association, Olmsted Soil and Water Conservation District, South Zumbro Joint Powers Board, Whitewater Joint Powers Board, Southeast Minnesota Water Resources Board, and Hiawatha Resource Conservation District, Minnesota Department of Agriculture, Minnesota Environmental Quality Board, Health, Minnesota Department of Natural Resources, Minnesota Pollution Control Agency, and the Minnesota Board of Water and Soil Resources. The notice and request was also posted on the County's website.

June 17, 2009: The Olmsted County Environmental Commission received a presentation by Justin Watkins from the Minnesota Pollution Control Agency on the need to integrate the Total Maximum Daily Loads Implementation Plans as a priority concern.

August 5, 2009: Response period ended. Written comments were received from the Minnesota Department of Agriculture, Minnesota Board of Water and Soil Resources, Minnesota Pollution Control Agency, the Rochester Public Works Department, City of Stewartville, Elmira Township, Pleasant Grove Township, Whitewater Watershed Project, Winona Soil and Water Conservation District, and Winona County.

August 13, 2009: Staff from Olmsted and Winona Counties met with the Whitewater Watershed Project Joint Powers Board to review the priority concerns they would recommend be included in the Water Plan Updates.

August 19, 2009: Results of the Priority Concerns Input Survey were reviewed by the County Environmental Commission.

August 27, 2009: A presentation on the Water Plan Update process was made to Olmsted County Planning Commission and input was solicited regarding priority concerns.

September 16, 2009: At the request of the Olmsted County Environmental Commission, Barb Huberty from the Rochester Public Works Department made a presentation about the City's storm water management program and gave an overview of the state's storm water permit programs.

October 21, 2009: The Olmsted County Environmental Commission received a presentation by Todd Osweiler from the Rochester Public Utilities to review the information that is becoming available from groundwater studies being conducted by the US Geological Survey and the Minnesota Geological Survey.

November 3, 2009: The Rochester Izaak Walton League hosted a public presentation on the County Water Plan Update. The results of the Priority Concerns Input Survey were reviewed and additional input was requested.

November 18, 2009: County Environmental Commission reviewed the draft priority concerns scoping document and recommended that the County Board submit it to the state agencies for formal review.

LIST OF PRIORITY CONCERNS CHOSEN

The Environmental Commission was charged with selecting the priority concerns that the plan will address. With regard to the selection, the following guidance was considered:

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

RECOMMENDED PRIORITY CONCERNS

The following priority concerns are recommended to be considered in the Water Plan Update:

1. Impaired Waters/Total Maximum Daily Loads (TMDLs);
2. Storm water quality and quantity;
3. Drinking water source/groundwater protection;
4. Erosion and sediment control/nutrient management;
5. Wetland resources and natural corridors;
6. Agricultural chemical use and potential impacts to groundwater and surface water; and
7. Watershed management.

1. Impaired Waters/Total Maximum Daily Loads (TMDLs)

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 groundwater while still allowing it to meet its designated uses, such as drinking water, fishing, swimming, irrigation or industrial purposes. Many of Minnesota's water resources do not currently meet their designated uses because of pollution problems from a combination of point and nonpoint sources.

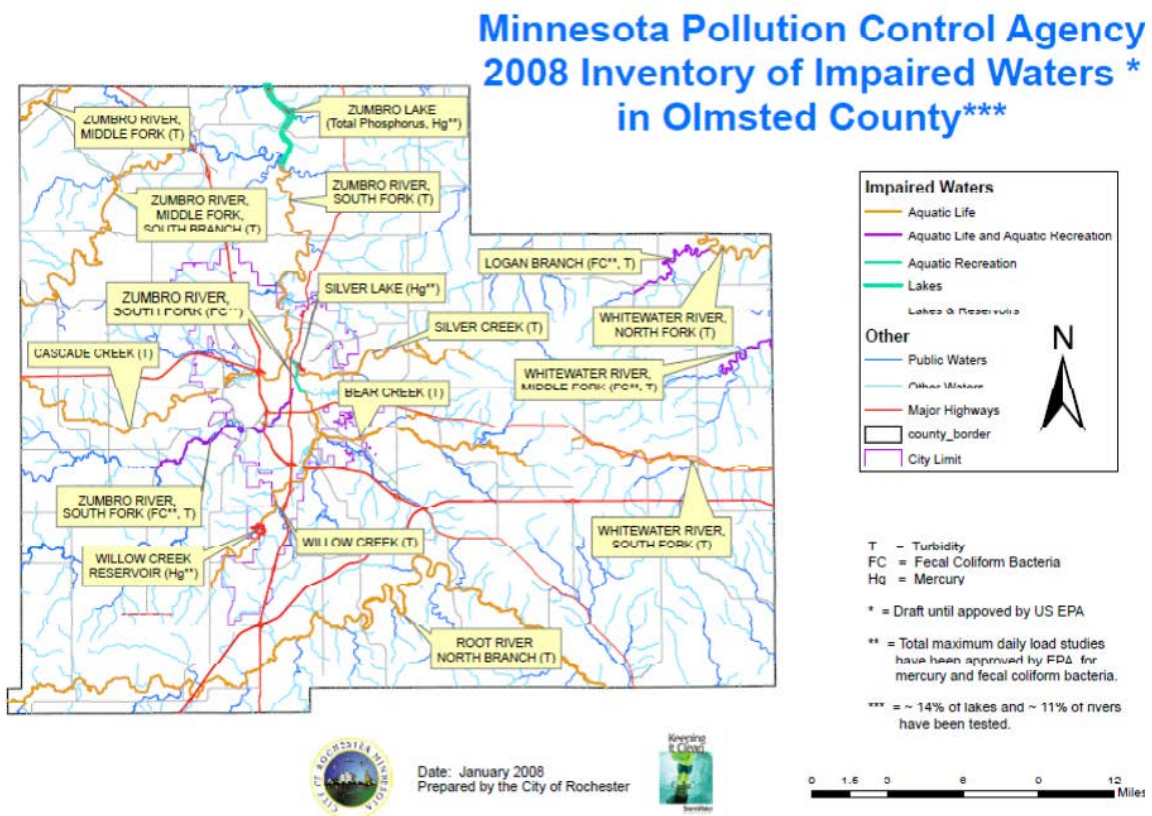
Addressing impaired waters in LWM Plans is voluntary. However, the MPCA strongly encourages counties to consider how their LWM Plans address impaired waters, as identified on the "TMDL List of Impaired Waters in Minnesota" available on MPCA's Web site at:

<http://wwwpca.state.mn.us/water/tmdl/index.html#tmdl>

It is suggested that the LWM Plan:

- identify the priority the County places on addressing impaired waters, and how the County plans to participate in the development of total maximum daily load (TMDL) pollutant allocations and implementation plans of TMDLs for impaired waters;
- include a list of impaired waters, pollutants causing the impairments and types of impairment(s);
- address the commitment of the County to submit any data it collects to MPCA for use in identifying impaired waters for a more comprehensive assessment of waters in the County; and describe actions and timing the County intends to take to reduce the pollutant(s) causing the impairment, including those actions that are part of an approved implementation plan for TMDLs.
- Turbidity is the predominant impairment throughout Olmsted County. There should be a recommendation in the LWP to develop, after the turbidity TMDL is approved and its Implementation Plan is completed, a plan for how the County will help non-permitted pollutant sources reach their TMDL load reduction goals.

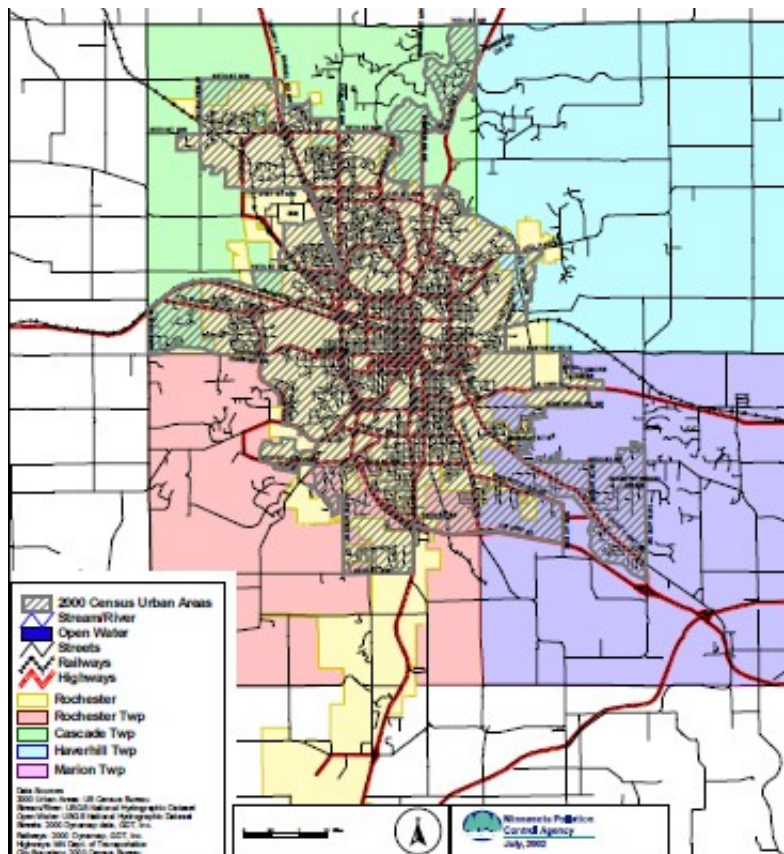
Figure 3. Impaired Waters in Olmsted County.



2. Storm Water Quality and Quantity

Some cities, townships, and other organizations within the Rochester Urbanizing Area (RUA) implement Storm Water Pollution Prevention Programs (SWPPP) to meet the requirements of their Municipal Separate Storm Sewer System (MS4) permits. The gray shaded area shown in Figure 4 represents the RUA. Owners of municipal separate storm sewer systems that are located within the RUA have MS4 permit obligations for storm water management within their jurisdiction that is within the urbanizing area. The permittees within the RUA are: Olmsted County, the City of Rochester, Rochester Township, Marion Township, Cascade Township, Haverhill Township, Rochester Community and Technical College, and the Minnesota Department of Transportation Outstate Districts. Each permittee's SWPPP and their associated Storm Water Management Plans and Capital Improvement Plans should be incorporated into Olmsted County's LWP, by reference.

Figure 4. Rochester Urbanizing Area.



From: Minnesota Pollution Control Agency

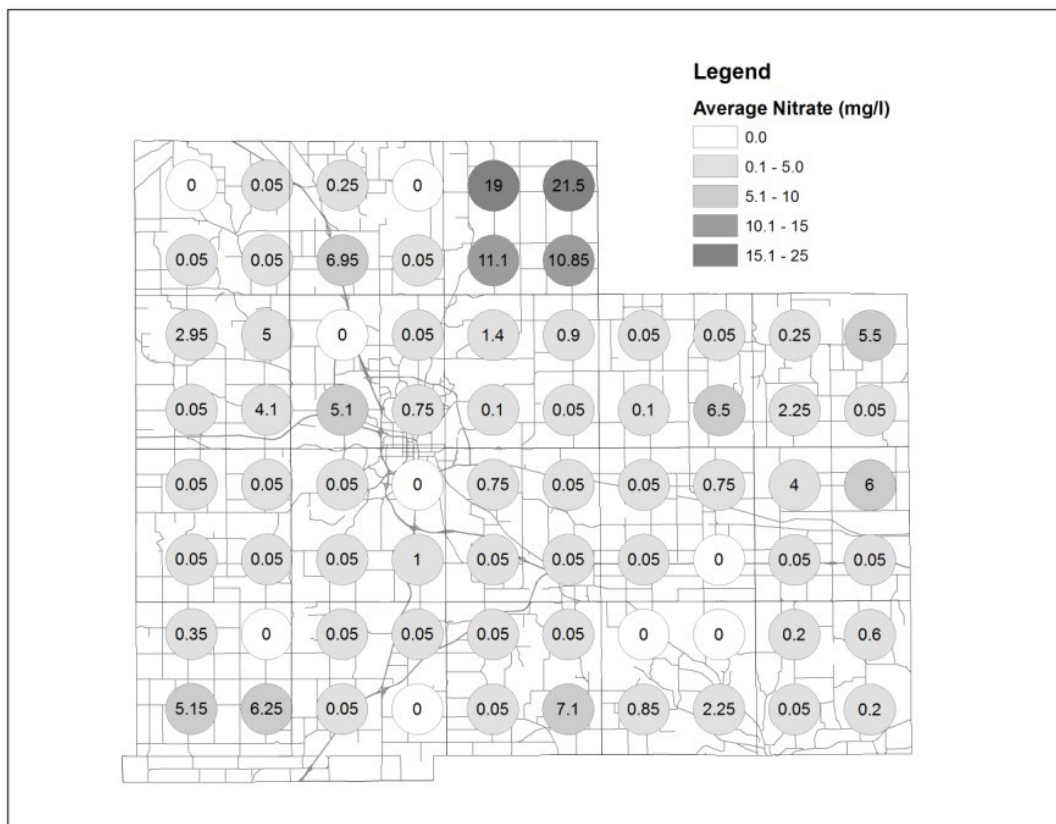
The areas without permits, including agricultural areas, are also contributors of pollutants that result in the listed turbidity, fecal coliform bacteria, and total phosphorus impairments. Therefore, it is important to address the unpermitted areas through other programs and education.

It is suggested that, for areas without MS4 permits, the LWM Plan:

- Develop county wide standards for storm water management and construction site erosion and sedimentation control for all general and plat development plans within the county. It is recommended that Low Impact Development (LID) approaches be utilized.

- Provide incorporated cities and townships with information concerning these county wide standards; provide educational opportunities for these LGUs to learn more about storm water management and erosion and sediment control regulations and their associated best management practices.
- Use the authorities available to the county under M.S. 103B.331.2 that gives counties with an approved water plan the authority to regulate the use and development of water and related land resources within incorporated areas when county standards are not met.
- Encourage open space/corridor management in development plans to reduce impervious surfaces and improve water quality.
- Implement county wide erosion and sediment control plan review and inspections on a fee-for-service basis.
- Support the implementation of the Peak Flow Reduction Opportunities in the Cascade Creek Tributaries Report.

Figure 5. Average Nitrate Concentrations in Drinking Water Supplies included in the Volunteer Nitrate Monitoring Network in 2009. The drinking water standard is 10 mg/l.



From: Olmsted County Environmental Resource Services

3. Drinking Water Source/Groundwater Protection

All drinking water in the County is obtained from groundwater aquifers. The County's drinking water vulnerability is largely a function of ambient hydrogeologic and land use conditions found locally. The main aquifer used is the St. Peter-Prairie du Chien-Jordan located 300-700 feet down. However, some older wells use a higher aquifer (Galena) that has a higher likelihood of nitrate contamination.

The Minnesota Department of Agriculture notes that routine application of pesticides and nitrogen fertilizer has been shown to impact some drinking water wells in the county.

It is suggested that the LWM Plan:

- Support mapping of groundwater resources including aqui-sheds, water withdrawals, and static water level changes,
- Support communities in implementing Wellhead Protection Area Plans,
- Continue groundwater monitoring programs, and
- Support water supply demand management programs.
- Support the City of Oronoco's expansion of their community water supply to serve the remainder of the City and the development of a community sewer system.

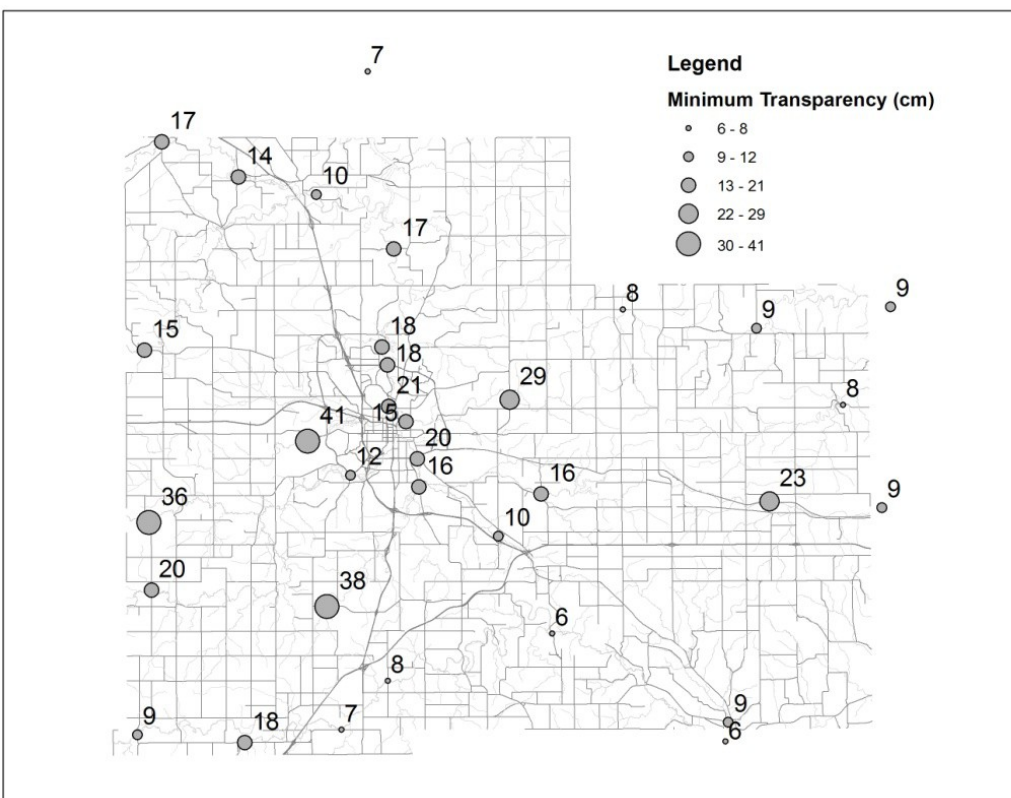
4. Erosion and Sediment Control/Nutrient Management

Erosion and sedimentation from runoff and stream banks are a major source of pollutants to surface waters (Figure 6). Soil erosion on agricultural lands contributes to surface water quality degradation in such a landscape setting. The Basin Alliance for the Mississippi in MN (BALMM) Plan has recommended increased adoption of soil erosion control practices and nutrient management on all land uses. The Zumbro River Watershed Partnership has similar goals. The Olmsted SWCD / NRCS Local Work Group for the Environmental Quality Incentives Program identified soil erosion control and water quality as their highest resource concerns.

It is suggested that the LWM Plan:

- Promote and market conservation programs, such as the USDA Farm Bill Programs, state conservation programs and local programs that cost-share with landowners to implement BMPs on working lands to reduce erosion, retain runoff, and manage nutrient applications and execute long-term easements on marginal agricultural land.
- Identify measurable actions for selected best management practices. For example: use the land cover information in the County GIS to assess the need for riparian filter or buffer strips. From this, determine an estimated number of riparian acres that are already protected and establish an action plan of X number of acres of increased riparian enrollment in the next five years.
- Actively promote and demonstrate conservation tillage and nutrient application methods that are cost effective and environmentally friendly, especially in areas where hay production has decreased and corn and soybean rotations have increased.
- Continue to provide SWCD technical assistance to landowners for planning and implementing agricultural BMPs within the county.

Figure 6. Minimum Transparency Readings from Stream Monitoring Network Sites in 2008. Values less than 20 cm are indicative of stream impairments.



From: Olmsted County Environmental Resource Services

5. Wetland Resources and Natural Corridors

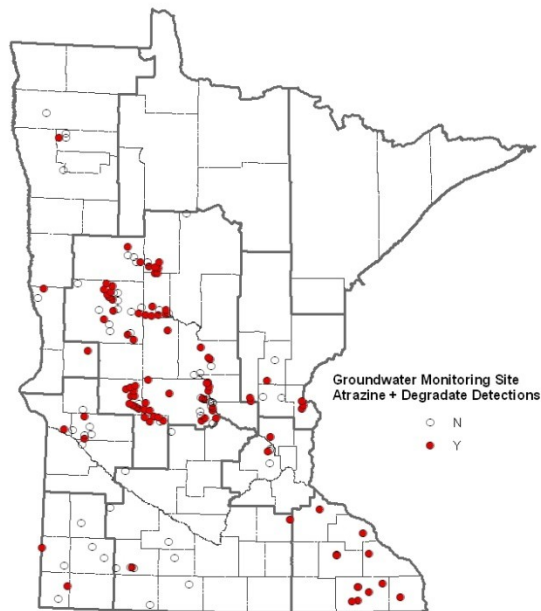
Wetlands have a wide range of functions: controlling floods; purifying water by recycling nutrients; filtering pollutants; reducing siltation; controlling erosion; sustaining biodiversity and providing habitat for plants and animals; recharging groundwater; augmenting water flow and storing carbon. Retaining water on the landscape in the watershed by wetland creation and restoration will help address these priority concerns: 1) Impaired Waters/TMDLs by controlling erosion; 2) storm water quality and quantity; 3) drinking water source/groundwater protection; 4) erosion and sediment control/nutrient management.

The County and the 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. The City's Plan also addresses the creation of environmental corridors to link natural resources, like wetlands, with storm water management areas. 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 and the lower St. Lawrence Edge through development of the local ordinances or voluntary conservation programs.

It is suggested that the LWM Plan:

- Complete a drained wetland inventory in all the undeveloped areas of the County, establish criteria to set priorities for restoration of drained wetlands, and identify high priority areas for wetland restoration and enhancement.
- In areas of the County that have not been assessed, inventory existing wetlands, assess those wetlands based on their function and values, establish criteria to prioritize preservation or enhancement opportunities, and identify high priority areas for preservation or enhancement.
- Promote and market wetland preservation and restoration programs, such as RIM, WRP, CREP, WPAs and Wetland Banking Programs.
- Adopt and implement the Wetland Preservation Areas Program, through the MN Wetland Conservation Act, and give the landowner an added incentive to preserve high priority wetlands and restore wetlands that have been degraded, drained or filled.
- Identify and target natural corridors to be enhanced and protected throughout the county.
- Determine protection level for targeted areas through local ordinance development and voluntary conservation programs.

Figure 7. Atrazine and/or Degradates Detected at Groundwater Monitoring Sites (MN Dept. of Agriculture).



From: Minnesota Department of Agriculture

6. Agricultural Chemical Use and Potential Impacts to Groundwater and Surface Water

Olmsted County is an area of intense agricultural production. The county is also underlain by karst geology; areas where groundwater is susceptible to pollution from surface activities due to the presence of sinkholes, fractured bedrock and shallow soils. It is imperative that the County work to protect its groundwater resource from human impacts. Groundwater quality monitoring in the multi-county region

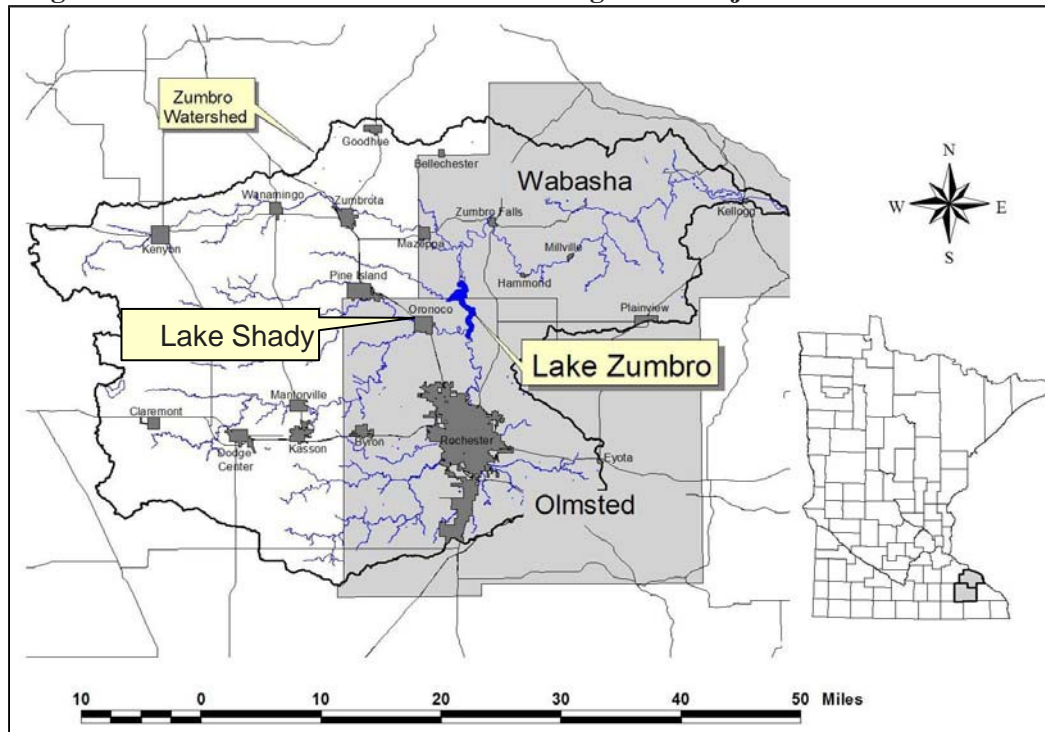
that includes Olmsted County regularly detects nutrients and pesticides in the groundwater within this region

Lands adjacent to streams or sinkholes are the largest concern. It is imperative that the county work to protect its highly valuable surface and groundwater resources from human impacts.

It is suggested that the LWM Plan:

- Review groundwater and surface water monitoring data related to agricultural chemicals. Identify areas where contaminants do not meet water quality standards or are trending upward to exceed the standards. Assess which agricultural BMPs have the greatest potential to reverse these conditions and promote them to farmers in those areas.

Figure 8. Collaborative Surface Water Management Projects in the Zumbro Watershed.



7. Watershed Management

The County encompasses three separate watersheds: the Zumbro River, the Whitewater River, and the Root River. All three have waters identified as impaired for turbidity, excess nutrients, fecal coliform bacteria, or pesticides.

All watersheds have active TMDL studies at various stages and have formed stakeholder and technical committees. The opportunity is there for County employees to provide unique insight into the project areas by joining these committees. The County has already attended meetings for each watershed and is involved in the Whitewater Watershed Project, Zumbro Watershed Partnership, Lake Zumbro Joint Powers Board and Lake Shady Stakeholders Group, and Root River Turbidity TMDL Technical Group.

An effort should be made to pair LWM goals with implementation goals of the TMDL studies which would help accomplish tasks at an accelerated rate.

It is suggested that the LWM Plan:

- Identify and prioritize opportunities to leverage project funds by identifying cooperative partners within a sub-watershed that have mutually supportable water resource management objectives.
- Improve coordination among organizations pursuing education, research, protection, or restoration grants and projects that impact water quality or aquatic habitats within Olmsted County.
- Support restoration work at Lake Zumbro and the development of a lake or stream restoration plan for Lake Shady (Figure 8).

PRIORITY CONCERNS NOT ADDRESSED BY THE PLAN

Most of the priority concerns that were considered for inclusion in the Water Plan Update are covered either directly or indirectly by other agencies that provide water management services in Olmsted County. These include state and federal agencies, townships, and cities. Additionally, the County directly participates in providing services through Joint Powers Boards (Whitewater Watershed Project, Southeast Minnesota Water Resources Board, Resource Conservation and Development JPB, the Soil and Water Conservation District JPB, and the Lake Zumbro JPB). Less formal partnerships for water management service delivery include the Zumbro Watershed Partnership, the Root River watershed collaborative, and the Basin Alliance for the Lower Mississippi in Minnesota.

Appendix A

PRIORITY CONCERNS IDENTIFIED BY RESPONDENTS TO WATER PLAN UPDATE SURVEY

Submitted by: Michelle Schaefer, BWSR

Priority Concern 1: Urban Stormwater and Construction Site Erosion Management- Low Impact Development

Why is it important the plan focus on this concern? Development pressures in Olmsted County are significant. Development can result in increased runoff and severe construction site erosion resulting in sediment loading into surface waters. Several 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.

What actions are needed? 1. Develop countywide standards for storm water management and construction site erosion/sedimentation (Low Impact Development-LID) for all general and plat development plans within the county.
2. Provide incorporated cities with information concerning these county wide standards; provide educational opportunities for these LGUs to learn more about erosion and sediment control regulations and techniques available from the MPCA and Minnesota Erosion Control Association (MECA).
3. Use the authorities available to the county under M.S. 103B.331.2 that gives counties with approved water plan the authority to regulate the use and development of water and related land resources within incorporated areas when county standards are not met.
4. Encourage open space/corridor management in development plans to reduce impervious surfaces and improve water quality.
5. Implement countywide erosion control plan review and inspections on a fee-for-service basis.

What Resources may be available to accomplish the actions? 1. Statutory authorities of 103B (water plan) 2. Information available from MPCA and MECA on regulations and BMP techniques.

What area(s) of the county is high priority? County wide where development & construction is occurring and where storm water management would protect water resources.

Priority Concern 2: Erosion and sediment control; nutrient management on agricultural land.

Why is it important the plan focus on this concern? Erosion and sedimentation from runoff and stream banks are a major source of pollutants to surface waters. Cultivated land is identified as making up approximately 70% (based on FSA numbers, which may include some hay/pasture land) of the land use in Olmsted County. Soil erosion on agricultural lands, sedimentation and surface water quality degradation are recognized issues in such a landscape setting. The Basin Alliance for the Mississippi in MN (BALMM) Plan has recommended increased adoption of soil erosion practices and nutrient management on all land uses. The Zumbro River Watershed Partnership has similar goals. The Olmsted SWCD / NRCS Local Work Group for the Environmental Quality Incentives Program identified soil erosion control and water quality as their highest resource concerns.

Olmsted has several streams/rivers listed on the 2006/2008 impaired waters list for turbidity. The 2008 Draft list includes the following streams/rivers impaired due to turbidity: North Branch Root River,

Zumbro River (South Fork & Middle Fork, South Branch), Cascade Creek, Willow Creek, Silver Creek, Logan Branch, Bear Creek, and Whitewater (South, Middle, and North Forks). The Zumbro and the Whitewater Watersheds are currently working on the TMDL study. Results from both of the TMDL studies and implementation plan (Zumbro should be completed prior to the final draft of the water plan) should be incorporated into your water plan as much as possible.

Olmsted County sees impacts from land use and surface water runoff from within their jurisdiction as well as upstream activities. The importance of participating and collaborating with adjacent counties and basin activities is significant. Continued participation with the watershed management groups such as the Whitewater JPB and the Zumbro River Partnerships will be necessary to address this concern.

What actions are needed? 1. Promote and market conservation programs, such as the USDA Farm Bill Programs, state conservation programs and local programs that cost-share with landowners to implement BMPs on working lands and execute long-term easements on marginal ag land.

2. Identify measurable actions for selected best management practices. For example: use Ross Hoffman's (Cannon River Partnership) GIS buffer layers in conjunction with the Olmsted County land use layer to assess the need for riparian filter or buffer strips. From this, determine an estimated number of riparian acres that are already protected and establish an action plan of X number of acres of increased riparian enrollment in the next five years.

Other best management practices:

- engineered practices (sediment basins, grassed waterways, etc.)
- residue management
- nutrient management
- wetland restoration
- other sensitive land retirement
- stream bank stabilization projects
- tree establishment (field, farm, wildlife)
- other practices

3. Actively promote and demonstrate conservation tillage and nutrient application methods that are cost effective and environmentally friendly, especially in areas where hay production has decreased and corn and soybean rotations have increased. - BMP Challenge and MN Dept of Agriculture's "Nutrient Management Initiative".

4. Continue to provide SWCD technical assistance to landowners for planning and implementing agricultural BMPs within the county.

5. Collaborate with partners

What Resources may be available to accomplish the actions? Through the Olmsted County SWCD / NRCS office – USDA Farm Bill conservation provisions: Conservation Reserve Program, Continuous Conservation Reserve Program, Wetland Reserve Program, Environmental Quality Incentive Program, Wildlife Habitat Incentives Program and the Conservation Stewardship Program (if funded). State conservation programs: State Cost-Share program, RIM/WRP, Clean Water Amendment funds, Local Water Management Challenge Grants, State Revolving Fund loan dollars, etc. Other resources could include: BALMM, SE MN Water Resources Board, MPCA, MDA, and MECA. Use Lidar to assist in identifying priority areas in order to target practices where they are most beneficial.

What area(s) of the county is high priority? Agricultural areas - 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. Working lands that would benefit from BMPs, such as conservation tillage and erosion control practices.

Priority Concern 3: Maintain, Enhance, and Increase Wetland Resources and Natural Corridors Within the County

Why is it important the plan focus on this concern? 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 and the lower St. Lawrence Edge through development of the local ordinances or voluntary conservation programs.

What actions are needed? Additional actions that will help implement water resources goals that the county and cities have identified include:

1. Complete a drained wetland inventory and identify high priority areas for wetland restoration and enhancement.
2. Inventory remaining wetlands, prioritize wetlands based on function and values and identify areas for preservation.
3. Promote and market wetland preservation and restoration programs, such as RIM, WRP, CREP, WPAs and Wetland Banking Programs.
4. Adopt and implement the Wetland Preservation Areas Program, through the MN Wetland Conservation Act, and give the landowner an added incentive to preserve high priority wetlands and restore wetlands that have been degraded, drained or filled.
5. Identify and target natural corridors to be enhance and protected throughout the county.
6. Determine protection level for targeted areas through local ordinance development and voluntary conservation programs.

What Resources may be available to accomplish the actions?

There are several resources available for these actions. Below are just a few:

1. Wetland Inventory Guidebook-June 1991, Available thru BWSR/DNR
2. City of Rochester Storm water Management Plan
3. South Zumbro Watershed Storm Water Management and Capital Improvement Plan
4. The MN Wetland Conservation Act Rules
5. Work completed by the county on the Decorah Edge Initiative
6. County Natural Resources inventory
7. Conservation partnerships with local SWCD, NRCS, and FSA agencies and multi-county groups, such as the Southeast MN Water Resources Board, Basin Alliance for the Lower Mississippi in Minnesota, SE SWCD Technical Support JPB, Hiawatha RC&D, and others that bring additional support and resources to the county
8. Use Lidar and related tools to identify and target sensitive areas.

What area(s) of the county is high priority? County wide with an emphasis on inventories and assessments of critical areas.

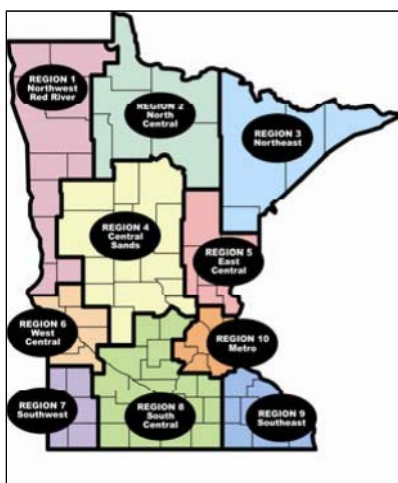
Priority Concerns Input

Agency: Minnesota Department of Agriculture

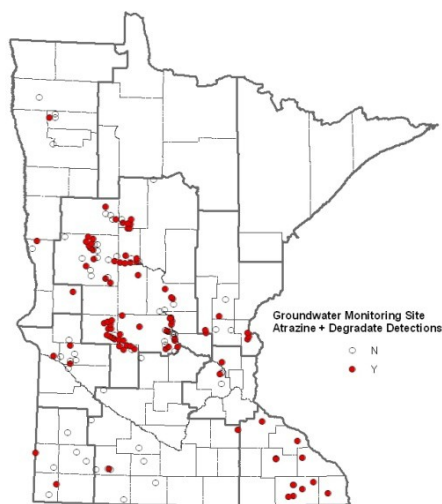
Submitted by: John Hines

Priority Concern 1): Agricultural chemical use and potential impacts to groundwater

- **Why is it important the plan focus on this concern (include or cite relevant data)?** Olmsted County is an area of intense agricultural production and karst geology. The county also contains many areas where groundwater is susceptible to surface activities due to the presence of sinkholes, fractured bedrock and shallow soils. It is imperative that the County work to protect its groundwater resource from human impacts. The MDA maintains a groundwater quality monitoring program in the multi-county region that includes Olmsted County. Pesticides and nutrients have been detected in the groundwater within this region (see graphic below).
- **What actions are needed?** Review of monitoring data and information regarding pesticides in groundwater and promotion of applicable pesticide groundwater quality BMPs.
- **What resources may be available to accomplish the actions? (include contact names, funding sources, partnerships, citizen volunteers, etc.)** The MDA Monitoring and Assessment program may be contacted for pesticide water quality data or for information on monitoring water resources. Contact Heather Johnson at (651)201-6098 or by e-mail at Heather.Johnson@state.mn.us. Check the MDA web site for water quality data and associated management practices <http://www.mda.state.mn.us/chemicals/pesticides/maace.htm> Contact Joe Zachmann at (651)201-6588 or Joseph.Zachmann@state.mn.us for information on the state pesticide management plan.
- **What area(s) of the County is a high priority?** Groundwater is a concern throughout the county.



MDA Monitoring Regions.



Atrazine results for PMR 9

Priority Concern 2): Agricultural chemical use and potential impacts to surface water.

- **Why is it important the plan focus on this concern (include or cite relevant data)?** Olmsted County's intense agricultural production provides a readily available source of potential contamination to surface water resources. The county also contains areas that are susceptible to runoff from the land surface directly into rivers and streams and indirectly by first entering sinkholes. Lands adjacent to streams or sinkholes are the largest concern. It is imperative that the county work to protect its highly valuable surface water resources from human impacts. The MDA maintains a surface water quality monitoring program throughout the state and has detected pesticides in the area's streams (PMR 9) see table.
- **What actions are needed?** Review current and ongoing water quality sample results and promote BMPs appropriate for specific conditions where surface water is or may be a concern.
- **What resources may be available to accomplish the actions? (include contact names, funding sources, partnerships, citizen volunteers, etc.)** The MDA Monitoring and Assessment program may be contacted for pesticide water quality data or for information on monitoring water resources. Contact Heather Johnson at (651)201-6098 or by e-mail at Heather.Johnson@state.mn.us. Check the MDA web site for water quality data and associated management practices <http://www.mda.state.mn.us/chemicals/pesticides/maace.htm> Contact Joe Zachmann at (651)201-6588 or Joseph.Zachmann@state.mn.us for information on the state pesticide management plan.
- **What area(s) of the county is a high priority?** Surface water is a concern throughout the county although it is of particular concern where ag lands are in close proximity to surface water bodies.

Tier 1 and Tier 2 acetochlor, atrazine, dimethenamid and metolachlor results by PMR

	Positive Samples/Total Samples (and %) for Pesticide	Maximum Value Detected (ug/L)	90 th percentile (ug/L)	75 th percentile (ug/L)	Median Value of Samples (ug/L)	Samples, Exceeding 50% of Reference Value (%)	Positive Samples/Total Samples (and %) for Pesticide	Maximum Value Detected (ug/L)	90 th percentile (ug/L)	75 th percentile (ug/L)	Median Value of Samples (ug/L)	Samples Exceeding 50% of a Reference Value (%)
Surface Water Samples Collected in 2008	Acetochlor						Atrazine					
PMR 1	10/26 (38%)	3.08	0.34	P	nd	1 (4%)	20/26 (77%)	0.97	0.5	P	P	0 (0%)
PMR 4	9/18 (50%)	0.91	0.20	0.07	nd	0 (0%)	18/18 (100%)	0.77	0.15	0.08	P	0 (0%)
PMR 5	6/16 (38%)	0.85	0.15	P	nd	0 (0%)	13/16 (81%)	0.96	0.28	0.07	P	0 (0%)
PMR 6	13/16 (81%)	0.5	0.3	0.12	P	0 (0%)	16/16 (100%)	0.96	0.09	0.05	P	0 (0%)
PMR 7	13/17 (76%)	4.88	0.67	0.11	P	1 (6%)	16/17 (94%)	0.78	0.46	P	P	0 (0%)
PMR 8	48/51 (94%)	1.82	0.58	0.26	0.06	1 (2%)	49/51 (96%)	0.68	0.25	0.12	P	0 (0%)
PMR 9	28/31 (90%)	1.62	0.39	0.14	P	0 (0%)	31/31 (100%)	3.52	0.81	0.31	0.14	0 (0%)
PMR 10	23/61 (38%)	2.17	0.14	P	nd	1 (2%)	53/61 (87%)	1.45	0.26	0.06	P	0 (0%)
Statewide Total	150/236 (64%)	4.88	0.36	0.08	P	4 (2%)	216/236 (92%)	3.52	0.33	0.09	P	1 (.4%)
	Dimethenamid						Metolachlor					
PMR 1	6/26 (23%)	0.06	P	nd	nd	NA	12/26 (46%)	1	0.25	P	nd	0 (0%)
PMR 4	2/18 (11%)	P	nd	nd	nd	NA	12/18 (67%)	0.11	P	P	P	0 (0%)
PMR 5	1/16 (6%)	0.05	nd	nd	nd	NA	9/16 (56%)	0.2	P	P	P	0 (0%)
PMR 6	9/16 (56%)	0.17	0.05	P	P	NA	13/16 (81%)	0.2	0.12	P	P	0 (0%)
PMR 7	5/17 (29%)	0.06	P	P	nd	NA	14/17 (82%)	0.31	0.2	P	P	0 (0%)
PMR 8	25/51 (49%)	0.4	0.05	P	nd	NA	46/51 (90%)	0.91	0.33	0.13	P	0 (0%)
PMR 9	16/31 (52%)	0.8	0.22	P	P	NA	31/31 (100%)	9.84	0.79	0.26	0.1	0 (0%)
PMR 10	14/61 (23%)	0.29	P	nd	nd	NA	38/61 (62%)	1.78	0.21	P	P	0 (0%)
Statewide Total	78/236 (33%)	0.8	P	P	nd	NA	175/236 (74%)	9.84	0.27	P	P	0 (0%)

Agency/Organization: City of Rochester, Public Works Department, Storm Water Management
Submitted by: Barb Huberty

Priority Concern #1: Append the City's Storm Water Management Plan (SWMP) and Storm Water Pollution Prevention Plan (SWPPP) or incorporate them by reference to the OCLWP

- Why is it important the plan focus on this concern (include or cite relevant data)?** The Olmsted County Local Water Plan (OCLWP) is required to cover the entire area within a County (Mn Stat 103B.311, subd. 4(a)1). The 2005 – 2010 OCLWP stated "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." Table 2 did not provide such a summary and the water management services implemented by non-County organizations were not incorporated by reference or appended to the plan. Therefore, the Plan technically applied only to those geographic areas outside the City of Rochester. This oversight should be corrected in the 2010-2015 OCLWP so that the City is eligible for grants that require inclusion of their priorities in a local water management plan. In particular, reference to plans and programs administered within the geographic boundaries of the County by organizations other than the County should be recognized in a manner that enables updates to plans and programs (such as the

City's 2010-2015 SWPPP and the forthcoming Storm Water Management Plan Update) to be automatically appended and/or incorporated as soon as they are completed or adopted.

The City, as a Municipal Separate Storm Sewer System (MS4) permittee, is required to implement the provisions of its SWPPP (which incorporates the SWMP) under the terms of their storm water permit in order to be in compliance with its permit. Accordingly, the City's storm water management activities and expenditures are focused on programs and projects within the City limits that are outlined in the SWPPP or that support the permit requirements. It should be noted that the SWPPP includes provisions for coordinating with Rochester Public Utilities on the implementation of their Wellhead Protection Plan, collaboration with other Rochester Urbanizing Area permittees on educational efforts, and liaison with state agencies to address impaired waters and Outstanding Resource Value Waters.

(It should also be noted that there are 7 other MS4 permittees within the Rochester Urbanizing Area and each is responsible for developing and implementing their own SWPPP. Permittees within a given watershed or county are not required to coordinate during the development or implementation of their SWPPPs; however, since all are required to meet the permit requirements, working together toward a common goal is implied. Implementation of Rochester's MS4 SWPPP helps improve downstream water quality within the South Fork of the Zumbro River watershed.)

2. **What actions are needed?** The OCLWP should acknowledge the City's obligation to implement its SWPPP through the efforts of several City Departments, partnering organizations, volunteers and individuals.
3. **What resources may be available to accomplish the actions?** The City funds its storm water management activities, including implementation of its SWMP and SWPPP, from a combination of sources: grants, revenue from its monthly Storm Water Utility Fee, and revenue collected at the time of development (known as the Storm Water Management Plan Area Charge). The City also benefits from volunteers that assist with program elements and from citizens that take individual action to prevent pollution. There is no cost to the County to incorporate the City's SWPPP by reference into the OCLWP.
4. **What area(s) of the county is high priority?** The City's SWPPP and SWMP apply to actions within the City limits, including newly annexed areas and City lands outside the City limits.

Priority Concern #2: Improved coordination among organizations pursuing education, research, protection, or restoration projects that impact water quality or aquatic habitats within Rochester's city limits.

1. **Why is it important the plan focus on this concern (include or cite relevant data)?** There are two types of situations that necessitate improved coordination. First, jurisdictional issues arise when a land use activity or circumstance outside one jurisdiction impacts another jurisdiction. For example, sediment deposited in a lake or a river bank failure within Rochester may have been caused by upstream activities. In these cases, the City does not have an obligation to correct impacts within the City and it seldom has the authority to conduct or pay for work completed outside the City that could mitigate or alleviate the cause. The OCLWP should compile a directory of organizations that provide water-related services that includes each organization's name, contact information, regulatory programs and responsibilities and voluntary program areas, along with a map denoting jurisdictional areas within the County. This will help prevent citizens

from developing unrealistic expectations for service, help them get to the appropriate entities for assistance more quickly, and reduce duplication of effort among water agencies.

Second, the recent adoption of the Clean Water, Land, and Legacy Amendment will provide new sales tax money for implementing education, research, protection, or restoration initiatives associated with water quality or aquatic habitat. This will likely stimulate more interest by multiple organizations interested in developing grant proposals to accomplish these types of projects. The OCLWP should promote and support organizational collaboration among interested parties whenever an organization proposes a multi-jurisdictional project or even a project completely within another's jurisdiction. This will avoid turf issues and promote less competition and more synergism for limited funds.

2. **What actions are needed?** Development of an *Olmsted County Citizens' Directory for Water Programs and Services*.

The SE MN Water Resources Board and the Basin Alliance of the Lower Mississippi in MN are two regional organizations that coordinate efforts, including grant submittals, on a multi-county scale. Olmsted County, through the Environmental Commission, could take on a similar coordination role for grant proposals that affect multiple jurisdictions within the County or where organizations wish to pursue projects within an area for which they have no jurisdictional authority.

3. **What resources may be available to accomplish the actions?** The Olmsted County Water Coordinator could produce the directory. The Olmsted County Environmental Commission and its Environmental Management Team could provide this coordination function.

4. **What area(s) of the county is high priority?** All jurisdictions within Olmsted County.

Priority Concern #3: Address the following county-wide issues: complete Olmsted County Hazard Mitigation Plan; enforce shoreland buffer requirements; assist township and small community staff with the development and/or enforcement of construction storm water permit requirements at sites in small cities, in suburban subdivisions, and in rural areas; and encourage conservation practices in the headwater areas of major watersheds.

1. **Why is it important the plan focus on this concern (include or cite relevant data)?** The Hazard Mitigation Plan must be completed so that federal and state hazard mitigation funding can be secured for projects needing expensive mitigation as a result of severe storm events (like the 2007 flood).

Shoreland buffer requirements are not being actively enforced. Establishment and maintenance of shoreland buffers is an effective way to reduce sediment, nutrient, and bacteria loads contributing to listed water quality impairments.

The Minnesota Pollution Control Agency Construction Stormwater Permit outlines storm water management and erosion and sediment control requirements for construction sites. Construction site inspection and enforcement to insure implementation of these requirements in small cities and at suburban and rural construction sites could be improved to help address our listed impairments.

According to the Center for Watershed Protection, protecting headwater streams is crucial in watershed management because they dominate the landscape through their number and length.

2. **What actions are needed?** Staff from the Rochester-Olmsted Planning Department have begun preparation of the Olmsted County Hazard Mitigation Plan, but its completion, review and approval needs to be expedited.

Enforcement of the shoreland regulations is the responsibility of the Rochester-Olmsted Planning Department; however, they have inadequate staff resources to address this task. Near-term hiring freezes will preclude hiring new staff, but perhaps other means for assessing shoreland buffer compliance can be developed (e.g., grant-funded temporary staff; seasonal student workers to conduct a combination of aerial photography and in-field assessments, etc.)

Each of the MS4 permittees is required to have a regulatory program to address construction site runoff management in their 4th Minimum Control Measure. The Environmental Commission could request a summary report of the SWPPP implementation activities from each permittee and, where programs need improvement, provide formal comment during the permittee's annual public meeting. Areas of the County not covered by MS4 permits also experience construction activity. The County, perhaps by Soil and Water Conservation District staff, could provide assistance to unpermitted small cities and townships in developing a similar construction site runoff management program in unpermitted jurisdictions. Standard operating procedures, ordinance language, standards, forms and communications templates already prepared by other permittees could be used as the foundation to build a similar program in the unpermitted areas.

The SWCD can prioritize promotion of conservation programs in watershed headwater areas.

3. **What resources may be available to accomplish the actions?** Existing staff, grant funded staff, and program materials already developed by MS4s.
4. **What area(s) of the county is high priority?** The shoreland buffer assessment should begin in watersheds with listed impairments or draining to reaches with listed impairments. Construction site runoff management programs should be targeted in growth areas (e.g., Stewartville, Pine Island, Oronoco, etc.). Conservation program promotion should concentrate in headwater areas of watersheds with impaired waters.

You also requested copies of water plans so they can be reviewed to ensure consistency with the LWP. Here is the hyperlink for the City's 1999 Storm Water Management Plan (and its 2004 addenda):

http://www.rochesterstormwater.com/permits_plans/permitplans_plans.asp

We have just started the process of updating our Storm Water Management Plan. We are currently at the internal discussion stage but expect to be at the public input stage by this fall.

Here is the hyperlink for the current Storm Water Pollution Prevention Plan written for our storm water permit:

<http://www.rochesterstormwater.com/docs/Permit-Plans/Rev%203.%20Final%202006%20SWPPP%2012-20-06%20to%20pca.pdf>

This cycle for the current municipal storm water permit ends May 31, 2010. MPCA will be revising the permit for the 2010 – 2015 cycle, which (when adopted) will necessitate a SWPPP revision.

The 2009 – 2014 Capital Improvement Plan budget is at the following link (click on the storm water tab). Remember that the plan for years after 2009 is subject to change with each year's adoption cycle. Due to the current financial situation, some projects (even this year's) may be deferred.

Any land resource plans for the City of Rochester would be managed by the Rochester-Olmsted Planning Department. If you haven't already done so, please send Phil Wheeler a copy of the Priority Concerns Input form and its cover letter and ask him to provide you with links to any land use/resource plans applicable to the City of Rochester. Similarly, the contact people for each of the other 7 MS4 permittees should also receive the Input form and cover letter. I will forward you my Rochester Urbanizing Area electronic distribution list in a separate e-mail, but the contacts I have (particularly for the Townships) may not be current. I believe MPCA maintains a list with current contacts, but I could not find it on their web site. You might try asking Scott Fox for this (scott.fox@pca.state.mn.us).

Barbara J. Huberty

Regulatory and Environmental Affairs Coordinator
Rochester Public Works Department
201 Fourth St. SE, Room 108
Rochester, MN 55904
Phone: 507/328-2425
Fax: 507/328-2401
e-mail: bhuberty@rochestermn.gov
web site: www.rochesterstormwater.com

Priority Concerns Input

Agency/organization [Winona SWCD](#)
Submitted by [Tim Terrill](#)

Priority Concern 1: Soil Erosion

Why is it important the plan focus on this concern (include or cite relevant data)?

I would assume this is the largest percentage of land use in Olmsted county, and definitely the best way to leverage federal money to find a solution.

What actions are needed?

Pollution Prevention practices on farmground (BMP's) to deal with erosion.

What resources may be available to accomplish the actions?

The Olmsted County SWCD.

What area(s) of the county is high priority?

This could best be answered by staff using GIS and targeting.

Priority Concern 2: Water Quality

Regarding this concern please answer the following:

Why is it important the plan focus on this concern (include or cite relevant data)?

Pesticides and Fertilizer from farms and urban areas directly affect the water that we use.

What actions are needed?

Best Management Practices for farmground (nutrient management) and urban (rain gardens) to deal with the pollution.

What resources may be available to accomplish the actions?

The SWCD and Environmental Commission to provide cost share for these BMP's.

What area(s) of the county is high priority?

Priority Concern 3: Smart Growth and Alternative Energy

Regarding this concern please answer the following:

Why is it important the plan focus on this concern (include or cite relevant data)?

Smart Growth works with the environment rather than against it and saves \$ in grading costs. Alternative Energy products can be a long term solution to save money and reduce our pollution footprint on the earth.

What actions are needed?

What resources may be available to accomplish the actions?

Incentives for landowners to retrofit and encourage this type of planning and design. A long term commitment to sustainability is a good principle to begin with.

What area(s) of the county is high priority?

Minnesota Pollution Control Agency

RE: Olmsted County Priority Concerns Local Water Management Program

The Minnesota Pollution Control Agency (MPCA) is pleased to provide priority concerns for consideration in Olmsted County's (County) Local Water Management (LWM) planning efforts. We trust these priority concerns will be helpful with developing the forthcoming Priority Concerns Scoping Document (PCSD) and LWM Plan.

1. Impaired Waters /Total Maximum Daily Loads (TMDLs) 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 groundwater while still allowing it to meet its designated uses, such as drinking water, fishing, swimming, irrigation or industrial purposes. Many of Minnesota's water resources do not currently meet their designated uses because of pollution problems from a combination of point and nonpoint sources.

Addressing impaired waters in LWM Plans is voluntary. However, the MPCA strongly encourages counties to consider how their LWM Plans address impaired waters, as identified on the "TMDL List of Impaired Waters in Minnesota" available on MPCA's Web site at:

<http://wwwpca.state.mn.us/water/tmdl/index.html#tmdl>

It is suggested that the LWM Plan:

- identify the priority the County places on addressing impaired waters, and how the County plans to participate in the development of total maximum daily load (TMDL) pollutant allocations and implementation of TMDLs for impaired waters;
- include a list of impaired waters, pollutants causing the impairments and types of impairment(s) (see table below);
- address the commitment of the County to submit any data it collects to MPCA for use in identifying impaired waters for a more comprehensive assessment of waters in the County; and
- describe actions and timing the County intends to take to reduce the pollutant(s) causing the impairment, including those actions that are part of an approved implementation plan for TMDLs.

Regional TMDL reports for mercury have received approval from the United States Environmental Protection Agency. Therefore, waters listed as impaired for a pollutant/stressor other than mercury in the table below are recommended to be addressed in the LWM Plan.

The 2008 list of impaired waters in the County are provided in the table below (attached).

The list of impaired waters will be updated in 2010.

The MPCA has initiated TMDL study work in each of the major watersheds in Olmsted County: Root River (turbidity), Whitewater River (turbidity), Zumbro River (turbidity and excess nutrients in Lake Zumbro). These studies are at various stages; the closest to completion is the turbidity TMDL for the Zumbro watershed (end of calendar year 2009), with Root River and Whitewater River projects slated for completion in June of 2011. Once TMDL studies are finalized, a TMDL implementation planning process is undertaken by a partnership of MPCA, stakeholders and local government units. An implementation plan is produced, to be used as a reference and guide to steer spending aimed at pursuing water quality improvements. The LWM Plan should integrate well with the TMDL implementation plan. The Olmsted County LWM Plan should define as a primary goal *addressing impaired waters*, and should include, when possible, language from the completed TMDL implementation plan regarding water quality goals and land management strategies.

Areas of the County that should be considered priority waters are the impaired water bodies and reaches of impaired water bodies on the Clean Water Act 303 [d] TMDL List. We believe the County should consider impaired waters as a top priority for discussion in the LWM Plan.

Environmental Data Access System The water quality section of MPCA's Environmental Data Access (EDA) System allows visitors to find and download data from surface water monitoring sites located throughout the state. Where available, conditions of lakes, rivers or streams that have been assessed can be viewed. We encourage the County to visit this site for water quality monitoring data which may be useful with LWM planning efforts: <http://www.pca.state.mn.us/dataledaWater/index.cfm>

2. Erosion Control and Stormwater Quality and Quantity Some cities and townships in the County have Stormwater Pollution Prevention Plans (SWPPP) under their Municipal Separate Storm Sewer Systems (MS4) permits while other areas do not. These permits already address the need for stormwater management. The areas without permits, including agricultural areas, are also contributors of sediment to the three watersheds in the County, and all three watersheds have impaired waters listed for turbidity. Therefore, it is important to address the unpermitted areas through other programs and education. The goals and actions of the existing city of Rochester's Stormwater Management Plan and SWPPPs in the County are strongly encouraged.

This year, the state of Minnesota tasked the Minnesota Department of Natural Resources with updating the Statewide Minimum Shoreland Conservation Standards Rule (Chapter 6120). This Rule has always included a 50 foot buffer between agricultural land uses and the ordinary high water level. Recent activity in the County has led to preliminary action on this Rule which is commended by the MPCA. Education of residents and officials in cities and townships without MS4 may lead to installation of best management practices that will reduce erosion and runoff to nearby waterways.

MPCA stormwater programs (construction, industrial and municipal) can help address these issues. Section 319 of the Clean Water Act and Minnesota Clean Water Partnership (CWP) funds can be applied to aid local efforts. With the passing of the Clean Water, Land and Legacy Amendment, these CWP funds may be more available than in the past.

High priority areas include land near impaired waters, karst features, riparian areas and shoreland.

3. Drinking Water Source/ Groundwater Protection All drinking water in the County is obtained from groundwater aquifers. The County's drinking water vulnerability is largely a function of ambient conditions found locally. The main aquifer used is the St. Peter-Prairie du Chien-Jordan located 300-700 feet down. However, some older wells use a higher aquifer (Galena) that has a higher likelihood of nitrate contamination. The Minnesota Department of Agriculture has noted in the past that routine application of pesticides and nitrogen fertilizer have been shown to impact the County's drinking water wells.

Recommended actions include continue to support mapping of groundwater-sheds so exact pathways are known. In conjunction, continue nitrate monitoring program that the County has been involved for the past few years through a grant with the Southeast MN Water Resources Board. Although this grant is ending soon, any effort to continue this monitoring network is supported.

Minnesota Department of Health has a drinking water protection program that may be of assistance.

Federal Section 319 funds from the Clean Waters Act may be available for continuation of well monitoring efforts. With the passing of the Clean Water, Land and Legacy Amendment, funding may be more available than in the past.

The entire County uses groundwater for drinking. Karst features are direct conduits to groundwater and should be managed correctly. Areas in the entire County should be considered high priority.

4. Involvement in Watershed Management Efforts

The County encompasses three separate watersheds: the Zumbro River, the Whitewater River, and the Root River. All three have waters identified as impaired for turbidity, excess nutrients, fecal coliform bacteria, or pesticides.

All watersheds have active TMDL studies at various stages and have formed stakeholder and technical committees. The opportunity is there for County employees to provide unique insight into the project areas by joining these committees. The County has already attended meetings for each watershed and is involved in the Whitewater Watershed Project, Zumbro Watershed Project, Lake Zumbro Joint Powers Board and Lake Shady Stakeholders Group, and Root River Turbidity TMDL Technical Group. An effort should be made to pair LWM goals with implementation goals of the TMDL studies which would help accomplish tasks at an accelerated rate.

Resources which may be available include State Clean Water, Land and Legacy Amendment funds as well as federal Clean Waters Act funding for impaired waters and other water protection studies.

High priority areas of the County should include waters on the 303 (d) list of Impaired Waters.

If we may be of further assistance, please contact Shaina Keseley in the Rochester Regional Office at 507-206-2622, or Dave L. Johnson in the St. Paul Office at 651-757-2470.

Thank you and we look forward to reviewing the forthcoming PCSD and LWM Plan.

Sincerely,
Rebecca J. Flood Assistant Commissioner

cc: Jeff Nielsen, Board of Water and Soil Resources Katherine Logan, MPCA Rochester Office
Shaina Keseley, MPCA Rochester Office

Whitewater River Watershed Project

County Water Plan Priorities Comments

The Whitewater River Watershed contains agricultural uplands, diverse habitat, and high-value trout streams. These resources contribute to local economies and provide recreational opportunities for thousands of visitors each year.

The Whitewater Joint Power Board has recommended that the following priorities be considered for the Olmsted and Winona County Water Plans. This set of recommendations was approved at the board meeting on September 10, 2009.

1. **Education and Outreach**
Water resource programs should emphasize building positive relationships with citizens, landowners, and farmers. The county and its partners should use a collaborative approach that emphasizes education and outreach. When addressing water resource concerns that involve agriculture, local agencies should seek to engage farmers and use their knowledge to create effective water quality programs.
2. **Stream Buffers**
Streams should be buffered with perennial vegetation to stabilize streambanks, filter runoff, and provide habitat corridors. To protect water quality and ecological function, buffers should be managed by preventing overgrazing of buffer vegetation, by planting and maintaining native vegetation, and by maintaining a sufficient buffer width.
3. **Impairments**
Addressing water quality impairments should be a priority in the water plan. In the Whitewater Watershed, these include turbidity and fecal coliform impairments. Preventing upland soil erosion should be a key component of efforts to address turbidity.
4. **Surface/groundwater interactions**

Groundwater and surface water interactions must be considered in all water resources programs. The karst topography of this region makes it especially important to consider the relationships between surface and ground water resources when addressing water quality and quantity concerns.



Appendix B: Local Public Hearings and Approvals

Olmsted County Board of Commissioners Resolution



OFFICE OF COUNTY RECORDER
Olmsted County, Minnesota



I hereby certify that this document was filed in this office
on 3/5/2013 at 2:15 PM and was duly
recorded as document number **A- 1314652**

W MARK KRUPSKI - Co Recorder, by _____ Deputy

Well Certificate: _____ Received _____ Not Required

Abstr. - yes _____ no _____

Fee: \$46.00

Adoption and Implementation After BWSR Approval

RESOLUTION 13- 07

No Land

WHEREAS, the Olmsted County Board of Commissioners has been notified by the Minnesota Board of Water and Soil Resources that the Olmsted County Comprehensive Local Water Management Plan has been approved according to Minnesota Statutes Chapter 103B.301-103B.3355:

NOW, THEREFORE BE IT RESOLVED, the Olmsted County Board hereby adopts and will begin implementation of its approved comprehensive water plan.

BE IT FURTHER RESOLVED, after the adoption of the local comprehensive water management plan, the Olmsted County Board shall amend existing water and related land resources plans and official controls as necessary to bring them into conformance with the applicable and approved comprehensive water plan.

BE IT FURTHER RESOLVED, after the adoption of the local comprehensive water management plan, Olmsted County shall notify local units of government within the County of the adoption of the plan or amendments to the plan. The local units of government are required to submit existing water and related land resources plans and official controls to the County Board for review within 90 days of notification.

BE IT FURTHER RESOLVED, the Olmsted County Board shall review the submitted plans and official controls and identify any inconsistencies between the local plans and official controls, and local comprehensive water management plan. The Olmsted County Board shall specify applicable and necessary measures to bring the local plans and official controls into conformance with the local comprehensive water management plan.

BE IT FURTHER RESOLVED, if a local unit of government disagrees with any changes recommended by the County Board to bring its plan into conformance with the County's approved comprehensive water plan, the local unit has 60 days after receiving the county's recommendations to appeal the recommendations to the Board of Water and Soil Resources.

BE IT FURTHER RESOLVED, after receiving the recommendations of the Olmsted County Board, or a resolution of an appeal, a local unit of government has 180 days to initiate revisions to its plan or official controls. The new or revised plans and official controls must be submitted to the Olmsted County Board for review and recommendations.

Adopted 1/22, 2013

Attest: [Signature]
County Administrator

[Signature]
Chair of County Board

Public Hearing Minutes 7/24/2012 – Olmsted County Board of Commissioners

interest and to accounts for which cash is held on behalf of other entities. MOTION: Ayes 7, Nays 0	
Board and committee reports were presented.	Brd/Comm Rpts
Chairperson Brown called for a recess at 4:25 PM, until 7:00 PM on July 24, 2012.	Recess
Chairperson Brown reconvened the meeting at 7:00 PM. Commissioners Podulke, Brown, Bier, Flynn, and Perkins, were all present.	Reconvene
PUBLIC HEARING	
<p>Now being the time for a public hearing, information was presented from John Harford, Rochester-Olmsted Senior Planner, on the Olmsted County Water Management Plan Update- 2013-2023. The County Board must hold a public hearing prior to submitting the final draft of the plan to the Minnesota Board of Water and Soil Resources for review (MS 103B.315, Subd.4). After approval the plan will be submitted to the Board of Water and Soil Resources on or before August 1, 2012.</p> <p>The Chairperson opened up the meeting for Public Comment:</p> <p>Kathy King- Rochester Township, expressed her concerns that the Board needs to review the plan before formally adopting it.</p> <p>Dave Martino, Wabasha County, expressed concerns about Lake Zumbro, and the dredging, questioned benefits of all of the proposed studies.</p> <p>David Peterson, 900 18 Ave NW, Rochester, long term effects of the water plan.</p> <p>Lenny Laures, Chair, Cascade Township, applauded John and Sandi's efforts on the plan. Wants the Board to take time and review the plan fully before making a decision. Would like both the Planning & Environmental Commissions to have the opportunity to look at the final plan.</p> <p>John Johnson, Chair, TCPA, applauded John and Sandi's work on the plan. Asked the Board to take time to understand what is in the entire document before approving.</p> <p>Perkins moved; Bier seconded, to close the public hearing.</p> <p>MOTION: Ayes 5, Nays 0</p>	Public Hring: OC Water Mgmnt Plan
<p>Perkins moved; Flynn seconded, to modify the motion to close the public hearing, and continue the Public Hearing at the August 14th Board meeting after they have had a chance to further review and make a decision regarding the proposed Water Management plan.</p> <p>MOTION: Ayes 5, Nays 0</p>	
<p>Perkins moved; Flynn seconded, to adjourn at 8:30 PM until August 14, 2012.</p> <p>MOTION: Ayes 5, Nays 0</p>	Adjourn

Public Hearing Minutes 8/14/2012 – Olmsted County Board of Commissioners

Proceedings of the Olmsted County Board of Commissioners held on August 14, 2012, at 9:00 AM in the Council/Board Chambers at the Government Center.	
The Olmsted County Board of Commissioners met on the above date with the following commissioners present: Podulke, Wilson, Brown, Flynn, Bier, Perkins, and Ohly.	
Chair Person Brown called the meeting to order.	Call to Order
INFORMATIONAL	
Dr. Richard Hurt, Director of Mayo Clinic Nicotine Dependence Center presented data, and congratulated the Commissioners on their position that resulted in the smoke-free ordinance which ultimately has saved lives for citizens, not only of Olmsted County, but for Minnesota as a whole.	Update: Smoke-Free Ordinance
PUBLIC HEARING	
Now being the time to continue the public hearing which was held on July 24, 2012, information was presented by John Harford, Rochester-Olmsted Senior Planner, on the Olmsted County Water Management Plan Update - 2013-2023. Pending approval of the plan by the County Board, it will be submitted to the Board of Water and Soil Resources on August 14, 2012. The Chairperson opened up the meeting for Public Comment: Lenny Laures, Cascade Township, Chair came forward to support the revised document. No one else from the public came forward to speak. Bier moved; Perkins seconded, to close the public hearing. MOTION: Ayes 7, Nays 0	Public Hearing: OC Water Management Plan
Bier moved; Ohly seconded, to approve the revised Olmsted County Water Management Plan Update 2013-2023. MOTION: Ayes 7, Nays 0	Appr Rvsd Wtr Mgmt Plan Updt 2013-2023
CONSENT CALENDAR	
Bier moved; Perkins seconded, to approve the Consent Calendar as follows	Appr Consent Calendar
Minutes from the July 24, 2012 meeting.	Appr 07/24/2012 minutes
Personnel Status Changes as follows:	Appr Prsnl Status Chgs
<u>REGULAR APPOINTMENT</u>	
Mickel Thompson (Public Health Nurse)	08/13/2012 Public Health

Olmsted County SWCD Resolution

RESOLUTION
ADOPTING THE OLMSTED COUNTY COMPREHENSIVE LOCAL WATER
MANAGEMENT PLAN
AS THE COMPREHENSIVE PLAN FOR THE OLMSTED SOIL AND WATER
CONSERVATION DISTRICT

Supervisor Andy Hart offered the following resolution, No. 2012 and moved its adoption.

WHEREAS, the Olmsted SWCD has been an active participant in the development and all updates of the Olmsted County Comprehensive Local Water Management Plan (CLWMP); and

WHEREAS, the Olmsted County CLWMP included a map and description of the soil classifications within the conservation district; and

WHEREAS, the Olmsted County CLWMP identifies the areas within the conservation district where erosion, sedimentation, and related water quality problems are the most severe; and

WHEREAS, the Olmsted County CLWMP has been approved by the BWSR and has been determined to be in compliance with all laws and rules governing water in the State of Minnesota, and

WHEREAS, the Olmsted County CLWMP identifies high priority erosion, sedimentation, and water quality problems in accordance with BWSR rules and guidelines.

NOW THEREFORE IT IS RESOLVED:

THAT THE Olmsted SWCD adopts the Olmsted County CLWMP as its Comprehensive Plan for July 1, 2012 through June 30, 2014.

Supervisor Steve Connelly seconds the adoption of the resolution, and it was declared adopted upon the following votes:

Ayes: 5

List Names: Andy Hart

Steve Connelly

George Poch

Paul Uecker

John Keefe

Nays: 0

List Names:



Olmsted SWCD Chair



Date

OLMSTED SOIL AND WATER CONSERVATION DISTRICT SUPPLEMENTS TO THE OLMSTED COUNTY WATER PLAN

HIGH PRIORITY EROSION PROBLEMS

When state cost share applications exceed available funding, priority is based on direct evidence of ephemeral and/or gully erosion rather than "T" and soil class (the priority basis in the 1995 Olmsted SWCD Comprehensive Plan). Further priority is given to applicants following existing conservation plans and/or demonstrated willingness to apply conservation practices that reduce runoff and sedimentation and improve water quality. State Cost share assistance is available to landowners to off set the cost for practice implementation. Geographically, priority is given to watersheds identified in the Olmsted County Comprehensive Water Management Plan.

HIGH PRIORITY WATER QUALITY PROBLEMS

Olmsted SWCD identifies Cascade Creek as its highest priority, along with the Whitewater, Bear Creek Watershed and the sub-watersheds identified in the County Water Plan above, and the seven PL-566 flood control structures as priority areas for water quality. The District will work in conjunction with all interested parties to research the potential in organizing a work group to address priority conservation concerns within the Cascade Creek Watershed. The District has and will continue to solicit applications for State Cost Share and RIM Projects in these areas. Priority will also be given to applicants with existing nutrient management plans, or who have plans in preparation. The District is assisting landowners with feedlot compliance through the open lot agreements and associated water quality problems in the County. High priority affected waters are expected to be identified in this effort, and they will be targeted in State Cost Share projects. Olmsted SWCD will promote and encourage eligible landowners to participate in the Continuous Conservation Reserve Program and available conservation programs.

SPECIAL PROJECTS

Minnesota Board of Water and Soil Resources provided a grant which will be used to develop a surface water management plan for the South Zumbro Watershed. Olmsted SWCD will work with townships and Olmsted County Public Works in areas impacted. County and state agencies work in selecting and overseeing consultants hired to identify potential locations and sizes for water and sediment retention structures designed to reduce flooding and damage to the County's roads and bridges. Such structures would retain water and sediment, reducing peak flows and sediment loads to ditches and streams. The cost of such structures would be offset by the downsizing and decreasing maintenance of ditches, culverts and bridges.

The Minnesota Board of Soil and Water Resources (BWSR) has a new state cost share program component called the Native Buffer Program. This program provides landowners with the opportunity to plant a diverse native species mix of a local ecotype on their properties with the potential for future energy production from its harvest.

The Olmsted SWCD will process eligible applicants on a first come, first serve basis. Technical assistance will be given to landowners in selecting eligible seed mixes, determining eligible seed sources and cost-share assistance.

Landowners must seed a 25 species mix of local origin and sign a 15 year contract to maintain the cover. Cost share is available to landowners to cover seeding costs and there is a one-time payment based on the CRP soil rental rate x .2% x 75% x 3 years.

The program allows for several land uses such as haying, seed production, managed grazing and energy production outside the nesting season.

Olmsted Soil and Water will continue to partner with Olmsted County assisting landowners becoming compliant with the Olmsted County Shoreland Ordinance.

The District will work directly with Olmsted County Public Works in developing each year's Stormwater MS4 reporting requirement to the Minnesota Pollution Control Agency (MPCA).

Olmsted Soil and Water is a partner with the Zumbro Watershed Partnership to identify and prioritize critical areas in the Zumbro River Watershed for restoring and protecting water quality. The project will analyze Light Detection and Ranging (LiDAR) data and other Geographic Information System (GIS) data to identify and rank critical areas of soil erosion and surface runoff for the 910,337-acre watershed and develop and use an in-field assessment technique to further evaluate the top 50 source locations in the Zumbro Watershed. Outcomes of the project include determination of the top 50 critical sites. Olmsted SWCD will assist in identification of appropriate conservation practices and potential funding sources for those projects. Olmsted Soil and Water will be trained in the protocols developed so they can apply this process to the remainder of critical areas identified through the project and monitor changing conditions to update the list of priority projects as necessary.

Olmsted SWCD will work in partnership with Olmsted County Parks, Public Works, Fair Board and friends of Graham Park to find solutions for Stormwater runoff on the Olmsted County fairgrounds property. A variety of Best Management Practices will be installed including infiltration systems, rain gardens and vegetative plantings as well as other storm water control measures.

6/13/2012

**OLMSTED SOIL WATER CONSERVATION DISTRICT
COMPREHENSIVE PLAN**

				Actual 2010	Actual 2011	PROJECTED 2012	PROJECTED 2013	PROJECTED 2014	PROJECTED 2015	PROJECTED 2016
Revenue										
	Charges for Services			33,929	40,602	41,820	43,074	44,367	45,698	47,069
	Intergovernmental Rev - County			277,445	232,541	343,347	360,820	379,143	398,365	418,530
	Intergovernmental Rev - State			219,118	258,468	83,463	83,463	83,463	83,463	83,463
	Miscellaneous Rev. Interest			750	855	1,600	1,600	1,600	1,600	1,600
	Miscellaneous Rev. Other			5,278	5,585	6,353	6,526	6,704	6,888	7,078
Total Revenue				536,520	568,990	476,583	495,483	515,277	536,014	557,740
Expenditures										
	District Op. Other Services			46,700	58,347	60,096	61,900	63,756	65,667	67,639
	District Op. Personal Services			305,769	313,492	339,967	356,425	373,706	391,853	410,908
	District Op. Supplies			146	483	498	513	528	544	560
	District Project Expense			23,751	13,331	20,770	21,393	22,035	22,697	23,379
	State Project Expense			166,440	223,374	55,252	55,252	55,252	55,253	55,254
Total Expenditures				542,806	609,027	476,583	495,483	515,277	536,014	557,740
Total Revenue Less Total Expenditures				-6,286	-40,037	0	0	0	0	0

2012LongTermBudgetCompPlan.xls
Adopted 7/22/04
Revised 8/26/04

City of Rochester Resolution

207-12

D-45

RESOLUTION

WHEREAS, Olmsted County is required by Minn. Stat. ch. 103B to prepare a Comprehensive Local Water Management Plan ("Plan"); and,

WHEREAS, local priorities established in the Plan become the basis for eligibility for future grant funds administered by the Board of Water and Soil Resources ("BWSR"); and,

WHEREAS, BWSR grants typically require a match of local funds; and,

WHEREAS, BWSR also relies on submittal of a Biennial Budget Request ("BBR") worksheet by Olmsted County that outlines proposed grant project details to determine grant eligibility; and,

WHEREAS, the City must work with and through Olmsted County in order to get the City's water project priorities into the Plan and project specifics into the BBR.

NOW, THEREFORE, BE IT RESOLVED by the Common Council of the City of Rochester, Minnesota, that the Common Council of the City of Rochester approve the addition of a line item to the 2013 storm water capital improvements program budget to establish a \$200,000 fund to serve as matching funds for grant applications.

BE IT FURTHER RESOLVED that the Common Council of the City of Rochester authorize staff to work with Olmsted County staff to develop a BBR worksheet that includes potential grant-funded projects within the City.

BE IT FURTHER RESOLVED that the Common Council of the City of Rochester adopt the attached list of grant project priorities for the City of Rochester.

PASSED AND ADOPTED BY THE COMMON COUNCIL OF THE CITY OF
ROCHESTER, MINNESOTA, THIS 7th DAY OF May, 2012.

ATTEST:

Valori Langseth
DEPUTY CITY CLERK

Thomas L. Hanson
PRESIDENT OF SAID COMMON COUNCIL

APPROVED THIS 8th DAY OF May, 2012.

Richard F. Bieda
MAYOR OF SAID CITY

(Seal of the City of
Rochester, Minnesota)

Res10\Resolu.WaterPlan

Grant Project Priorities for the City of Rochester
May 2012

The following list identifies categories for potential projects that represent the City's grant-funded project priorities. For each category listed, examples of projects are presented. The categories are not listed in any sort of priority order since specific initiatives are dependent upon integrating multiple factors, such as: the type and amount of available funding sources, willing land-owners, willing agency and organization partners, and the ability to synergize storm water projects with other infrastructure projects.

1. Retrofits

Retrofit projects are those that provide new or expanded water quality treatment and/or volume control in already developed areas. This would include construction of new Best Management Practices (BMPs; such as ponds, raingardens, infiltration trenches, etc.), as well as modification of existing BMPs to add storm water management capacity. Examples of these sorts of projects could include creating an infiltration basin to manage Country Club Manor flows prior to their discharge into Cascade Lake, installing BMPs in the Central Business District or along transportation corridors, or modifying dry ponds to add water quality treatment or volume control capacity.

2. Stream and Ravine Health

These are projects along or within streams or ravines that reduce pollutant loads, such as sediment or litter and debris. Examples include sediment and debris removal or bank stabilization projects. Some specific project examples could include completing tributary-wide stream assessments to determine stabilization and sediment/debris removal needs and approaches, specifically repairing a bank failure along Quarry Hill Creek next to CR 22 and Quarry Hill Park, stabilizing the reach of Rocky Creek from TH 63 to its confluence with the Zumbro River, stabilizing the Kings Run reach from 60th Ave/55th St NW to the Harvest View ponds, stabilizing sections of other tributary streams (e.g., Cascade Creek) that are outside the limits of the Flood Control Project, or removing sediment deltas or debris accumulations.

3. Upstream Protection

To minimize impacts to receiving waters, installing flow and volume control BMPs as high in a watershed as possible is advantageous from both hydrologic and economic standpoints. This could mean, in many cases, installing BMPs upstream of future development that have multipurpose benefits, such as volume control, flood protection, wildlife habitat creation, green space development, and water quality protection and improvement. An example would be the envisioned "Pond 3" in Section 7 of Kalmar Township.

4. Green Infrastructure Demonstration Projects

"Green infrastructure" BMPs are those that utilize vegetation or other engineering techniques to more closely mimic natural hydrologic processes, such as using Silva cells for boulevard trees, pervious pavement systems on alleys or parking lots, curb cuts and biofiltration practices to manage street runoff along "Green Streets", or constructing biofiltration swales within parking lots for on-site runoff management.

5. Urban Shoreland Buffers

Shorelands within urban areas are not subject to the same shoreland regulations that apply in rural areas of the County outside of municipal limits. Some areas within the City already have adequate vegetated buffers, but others do not. Examples of projects could include application of compost and native seed above rip-rapped banks, improving vegetative shoreland cover on parklands and other City-owned properties, or developing an incentive grant program for private property owners to utilize native vegetation to stabilize their shoreland.

6. **Wetland Creation**

Beyond meeting Wetland Conservation Act requirements for wetland impacts from City projects, the City could also pursue projects that identify restorable wetlands, create or restore sites for storm water volume control, or enhance existing public wetland/fen sites.

7. **Education**

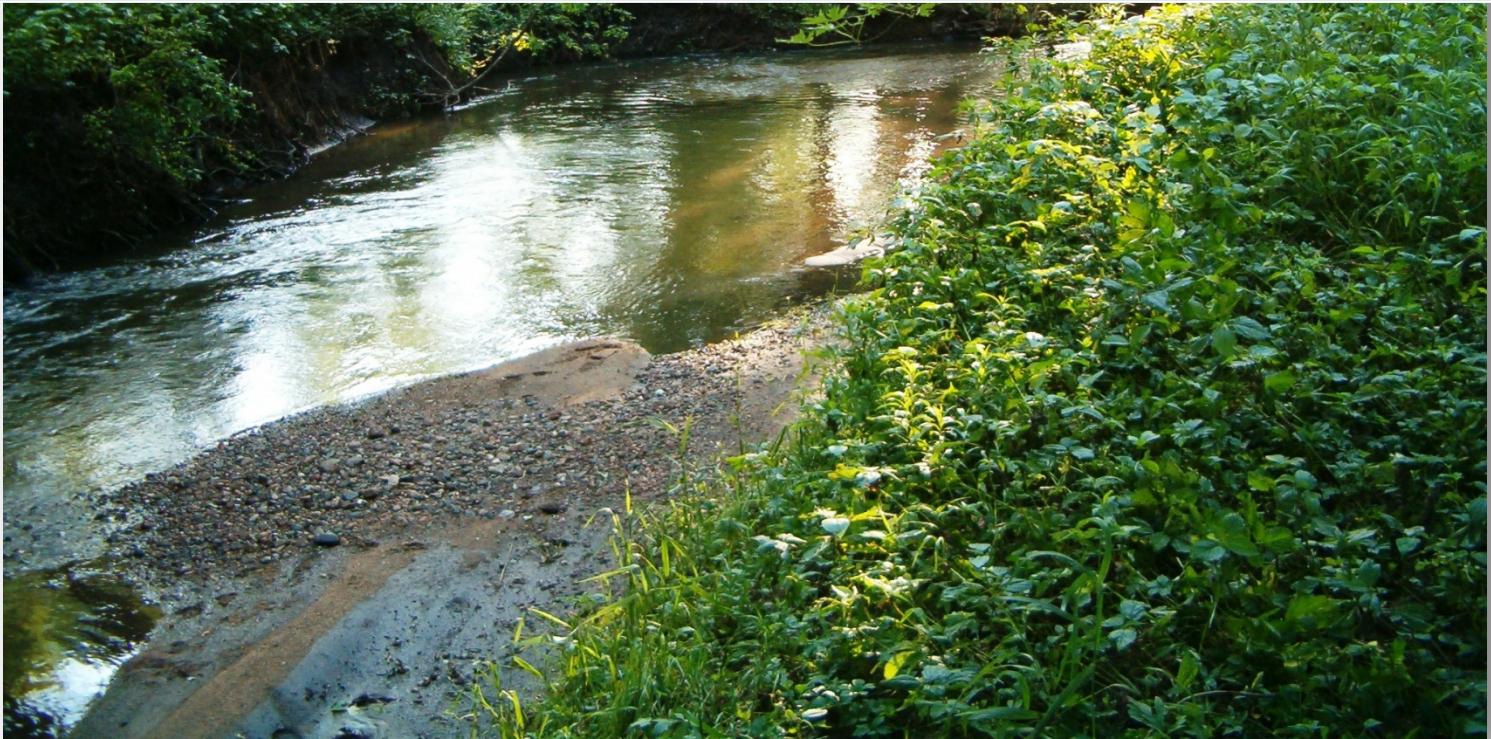
Beyond the City's permit-related education program, which is based on no or low-cost efforts, the City could pursue capital-intensive projects, such as outdoor interpretive signage about protecting water resources or implementing a City-wide survey to assess baseline awareness about local water issues, along with adopted and adoptable behaviors to improve water quality.

8. **Vegetation Improvements**

The City utilizes MnDOT specifications for selecting seed mixes on its construction projects. Their choices are not always optimal for site restoration in areas that receive concentrated storm water flows. It would be advantageous to establish specifications for standard seed mixes to be used in aquatic, emergent, upland, and boulevard environments receiving concentrated runoff. It would also be useful to establish seed mixes and lists of tree and shrub species that will tolerate expected climatic condition changes.



Appendix C: Supporting Documentation



Existing Water Resource Plans, Related Studies, & Implementation Documents

The following list of plans and programs are already in place. The list identifies the title, date executed, and the entity responsible for its implementation. The plans/programs, the priorities set forth therein, and subsequent revisions completed during the time frame of this plan are hereby incorporated by reference into this plan. The water management plan supplements and supports those plans.

Local Plans and Reports

- Bathymetric and Topographic Survey Report City of Rochester Water Reservoirs (WR-4, WR6A, SR-2), City of Rochester Public Works Department, Oct., 2007
- Chatfield Wellhead Protection Plan – Part II (2007)
- Comprehensive Land Use Plans for – Olmsted County, Cities of Byron, Chatfield, Dover, Eyota, Oronoco, Pine Island, Rochester, Stewartville.
- Emergency Water Conservation Plan (Rochester Public Utilities)
- Lake Shady Restoration Plan (City of Oronoco)
- Olmsted County All-Hazard Mitigation Plan
- Olmsted County Community Needs Assessment – 2007 (Olmsted County Health Department)
- Olmsted County Solid Waste Management Plan
- Oronoco Phase II Water Distribution Project Feasibility Report (2010)
 - Rehabilitation of the existing municipal well - Rehab work planned for completed within next year or two.
 - Sanitary Sewer Collection and Treatment of Downtown Oronoco Area – Currently initiating study of area.
- Pine Island, MN Wellhead Protection Plan – 2008
- Rochester Wastewater Plan

- Stewartville Commercial Area Drainage Study (2011)
- Stewartville Inflow and Infiltration Study (2003)
- Stewartville Surface Water Management Plan (2001)
- Stewartville Wastewater Treatment Facility Plan (2009)
- Stewartville Water Emergency and Conservation Plan (2001)
- Wellhead and Source Water Protection Plan for the City of Rochester, MN Part I(2004); Wellhead and Source Water Protection Part II: Wellhead Protection Plan City of Rochester, MN (2007)

Capital Improvement Programs

- Byron Capital Improvement Program (2011)
- Chatfield Capital Improvement Program (2011)
- Pine Island Capital Improvements Program (2011)
- Rochester Capital Improvement Program (2011)
- Stewartville Capital Improvement Program Mapping (2011)

Regional – Local Water Management Plans

- Dodge County Water Management Plan – 2006-2016
- Fillmore County Local Water Management Plan Amendment – 2006-2015
- Olmsted County Local Water Management Plan – Priority Concerns Scoping Document – 2010-2015; Dec., 2009
- Winona County Comprehensive Local Water Management Plan – March 2010-2015

Storm Water Plans

- City of Rochester Nondegredation Review (August, 2007)

- City of Rochester 2006-2010 Storm Water Pollution Prevention Program (updated Feb., 20, 2008) and annual reports. New storm water management program permits and plans as adopted by the city and MPCA.
- Rochester Storm Water Management Plan – 1997, 1999 and 2004 addenda
- Rochester, Minnesota's Storm Water Management Program Self-Assessment And Determination of Maximum Extent Practicable (June, 2006)
- Storm Water Management Plan, Northwest Drainage Area – City of Eyota, MN – 2011
- Storm Water Pollution Prevention Plans for Olmsted County, Rochester Township, Cascade Township, Haverhill Township, Marion Township, Minnesota Department of Transportation Outstate Districts, Rochester Community and Technical College (as part of the Minnesota State Colleges and Universities Plan), and the Federal Medical Center.

Watershed Based Plans and Reports and Other Regional Plans

- Agricultural Watershed Restoration Project – Logan Creek Watershed Final Report; July, 2010 – Whitewater River Joint Powers Board
- Draft Zumbro River Watershed Total Maximum Daily Loads for Turbidity Impairments; Sept., 2011 (MPCA)
- Draft Zumbro Watershed Sediment Reduction Plan (2012)
- Implementation Plan for Minnesota's Statewide Mercury Total Maximum Daily Load; Oct., 2009 (MPCA)
- Lake Zumbro Restoration Project Preliminary Engineering Status – Barr Engineering (2010)
- Lake Zumbro Sediment and Dredging Assessment (Preliminary Dredge Prisms Report – Barr Engineering) (2009)
- Lower Mississippi River Basin Fecal Coliform Implementation Plan (February, 2007)
- Mississippi River – Winona Civic Engagement Continuation and Restoration and Protection Document Development Project.
- Mississippi River – Winona Project- MPCA (MN Watershed Restoration and Protection (MWRAP) (not completed)
- Peak Flow Reduction Opportunities in the Cascade Creek Tributaries Final Report, Olmsted County, MN, November, 2008 (Project Number: 00362-06104); (Bonestroo Associates)

- Preliminary Engineering Report Lake Zumbro Restoration (Nov., 2011); Prepared for Lake Zumbro Forever, Inc., Barr Engineering
- Revised Regional Total Maximum Daily Load Evaluation of Fecal Coliform Bacteria Impairments In the Lower Mississippi River Basin in Minnesota – Final Report; January, 2006 (MPCA)
- Root River Watershed Turbidity TMDL (TMDL Study underway on Root River for turbidity – complete in 2011)
- Section 319 Nonpoint Source Pollution Prevention Program South Branch Bacteria Reduction Project 2005-2009 Final Report
- South Branch Bacteria Reduction Project – 2005-2009 Final Report (Section 319 Nonpoint Source Pollution Control Program) (2009)
- Southeast Landscape Management Plan (Minnesota Forest Resource Council Southeast Landscape Committee) (2003)
- South Zumbro Watershed Storm Water & Capital Improvement Plan, September, 2003, (Bonestroo Associates)
- Strategic Policy Framework: Southeast landscape Plan (MFRC) (2009)
- The Watershed Protection and Flood Prevention Program (PL-566 Watershed Program) for the Whitewater Watershed
- Whitewater River Watershed National Monitoring Program Project – Final Report; Dec., 2010 (MPCA)
- Whitewater Watershed Turbidity TMDL (MPCA) Ongoing study
- Zumbro River Watershed Management Plan (Zumbro River Partnership) – 2007

Tiling Data Sources

- Effects of Subsurface Drainage Tiles on Streamflow in Iowa Agricultural Watersheds: Exploratory Hydrograph Analysis; K.E. Schilling, M Helmers (2008); Hydrological Processes, 22:4497-4506. (abstract only)
- Quantifying Differential Streamflow Response of Minnesota Ecoregions to Climate Change and Implications for Management; Christian Lenhart, John Neiber; USGS; 2011
- Zumbro Watershed Management Plan Sediment Reduction Component – Draft; Spring 2012; Zumbro Watershed Partnership

Web Resources

- City of Rochester, Minnesota – Storm Water Management in Rochester, Minnesota.
<http://www.rochesterstormwater.com/welcome.asp>
- Minnesota Department of Health – Drinking Water Protection. <http://www.health.state.mn.us/divs/eh/water/>
- Minnesota Department of Health – Source Water Protection. <http://www.health.state.mn.us/divs/eh/water/swp/swa/>
- Minnesota Pollution Control Agency – Minnesota’s Impaired Waters and TMDLs.
<http://www.pca.state.mn.us/index.php/water/water-types-and-programs/minnesotas-impaired-waters-and-tmdls/minnesotas-impaired-waters-and-total-maximum-daily-loads-tmdls.html>
- Minnesota Pollution Control Agency – Stormwater Program. <http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/stormwater.html>
- Olmsted County, Minnesota, Public Works – Storm Water.
<http://www.co.olmsted.mn.us/pw/StormWater/Pages/default.aspx>
- United States Environmental Protection Agency – Impaired Waters and Total Maximum Daily Loads.
<http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/index.cfm>
- United States Environmental Protection Agency – Stormwater Phase II Final Rule: An Overview Fact Sheet 1.0.
<http://www.epa.gov/npdes/pubs/fact1-0.pdf>
- United States Environmental Protection Agency – Stormwater Phase II Final Rule: Small MS4 Stormwater Program Overview Fact Sheet 2.0. <http://www.epa.gov/npdes/pubs/fact2-0.pdf>

Other

- 1997, 2002, 2007 Census of Agriculture. County Profile of Olmsted County, Minnesota. USDA National Agricultural Statistics Service.
- 2010 Water Quality Monitoring Report – January-December 2010; Minnesota Department of Agriculture, Pesticide and Fertilizer Management (June 2011).
- 2011 Water Quality Monitoring Report – January-December 2011; Minnesota Department of Agriculture, Pesticide and Fertilizer Management (June 2012).

2011 Minnesota Statutes Water Policies

103A.201 Regulatory Policy.

Subdivision 1. **Policy.** To conserve and use water resources of the state in the best interests of its people, and to promote the public health, safety, and welfare, it is the policy of the state that:

- (1) subject to existing rights, public waters are subject to the control of the state;
- (2) the state, to the extent provided by law, shall control the appropriation and use of waters of the state; and
- (3) the state shall control and supervise activity that changes or will change the course, current, or cross section of public waters, including the construction, reconstruction, repair, removal, abandonment, alteration, or the transfer of ownership of dams, reservoirs, control structures, and waterway obstructions in public waters.

Subd. 2. **Wetlands findings; public interest.** (a) Wetlands identified in the state under section [103G.005, subdivision 19](#), do not:

- (1) grant the public additional or greater right of access to the wetlands;
- (2) diminish the right of ownership or usage of the beds underlying the wetlands, except as otherwise provided by law;
- (3) affect state law forbidding trespass on private lands; and
- (4) require the commissioner to acquire access to the wetlands.

(b) The legislature finds that the wetlands of Minnesota provide public value by conserving surface waters, maintaining and improving water quality, preserving wildlife habitat, providing recreational opportunities, reducing runoff, providing for floodwater retention, reducing stream sedimentation, contributing to improved subsurface moisture, helping moderate climatic change, and enhancing the natural beauty of the landscape, and are important to comprehensive water management, and that it is in the public interest to:

- (1) achieve no net loss in the quantity, quality, and biological diversity of Minnesota's existing wetlands;
- (2) increase the quantity, quality, and biological diversity of Minnesota's wetlands by restoring or enhancing diminished or drained wetlands;

- (3) avoid direct or indirect impacts from activities that destroy or diminish the quantity, quality, and biological diversity of wetlands; and
- (4) replace wetland values where avoidance of activity is not feasible and prudent.

History: 1990 c 391 art 1 s 2; 1991 c 354 art 1 s 2

103A.202 Wetland Policy.

The legislature finds that it is in the public interest to preserve the wetlands of the state to conserve surface waters, maintain and improve water quality, preserve wildlife habitat, reduce runoff, provide for floodwater retention, reduce stream sedimentation, contribute to improved subsurface moisture, enhance the natural beauty of the landscape, and promote comprehensive and total water management planning.

History: 1990 c 391 art 1 s 3

103A.204 Groundwater Policy.

(a) The responsibility for the protection of groundwater in Minnesota is vested in a multiagency approach to management. The following is a list of agencies and the groundwater protection areas for which the agencies are primarily responsible; the list is not intended to restrict the areas of responsibility to only those specified:

- (1) Environmental Quality Board: coordination of state groundwater protection programs;
- (2) Pollution Control Agency: water quality monitoring and reporting and the development of best management practices and regulatory mechanisms for protection of groundwater from nonagricultural chemical contaminants;
- (3) Department of Agriculture: sustainable agriculture, integrated pest management, water quality monitoring, and the development of best management practices and regulatory mechanisms for protection of groundwater from agricultural chemical contaminants;
- (4) Board of Water and Soil Resources: reporting on groundwater education and outreach with local government officials, local water planning and management, and local cost share programs;
- (5) Department of Natural Resources: water quantity monitoring and regulation, sensitivity mapping, and development of a plan for the use of integrated pest management and sustainable agriculture on state-owned lands; and

(6) Department of Health: regulation of wells and borings, and the development of health risk limits under section [103H.201](#).

(b) The Environmental Quality Board shall prepare a report on policy issues related to its responsibilities listed in paragraph (a), and include these reports with the assessments in section [103A.43](#) and the "Minnesota Water Plan" in section [103B.151](#).

History: [1994 c 557 s 11](#); [2008 c 363 art 5 s 14](#)

103A.205 Conservation Policy for Water.

It is the policy of the state to promote the retention and conservation of all water precipitated from the atmosphere in the areas where it falls, as far as practicable. Except as otherwise expressly provided, all officers, departments, and other agencies of the state or political subdivisions having any authority or means for constructing, maintaining, or operating dams or other works or engaging in other projects or operations affecting precipitated water shall use the authority, as far as practicable, to effectuate the policy in this section.

History: [1990 c 391 art 1 s 5](#)

103A.206 Soil and Water Conservation Policy.

Maintaining and enhancing the quality of soil and water for the environmental and economic benefits they produce, preventing degradation, and restoring degraded soil and water resources of this state contribute greatly to the health, safety, economic well-being, and general welfare of this state and its citizens. Land occupiers have the responsibility to implement practices that conserve the soil and water resources of the state. Soil and water conservation measures implemented on private lands in this state provide benefits to the general public by reducing erosion, sedimentation, siltation, water pollution, and damages caused by floods. The soil and water conservation policy of the state is to encourage land occupiers to conserve soil, water, and the natural resources they support through the implementation of practices that:

- (1) control or prevent erosion, sedimentation, siltation, and related pollution in order to preserve natural resources;
- (2) ensure continued soil productivity;
- (3) protect water quality;
- (4) prevent impairment of dams and reservoirs;
- (5) reduce damages caused by floods;

- (6) preserve wildlife;
- (7) protect the tax base; and
- (8) protect public lands and waters.

History: 1990 c 391 art 1 s 6; 2003 c 104 s 1

103A.207 Floodplain Management Policy.

(a) It is the policy of this state to reduce flood damages through floodplain management, stressing nonstructural measures such as floodplain zoning and flood proofing, and flood warning practices.

(b) It is the policy of this state:

- (1) not to prohibit but to guide development of the floodplains consistent with legislative findings;
- (2) to provide state coordination and assistance to local governmental units in floodplain management;
- (3) to encourage local governmental units to adopt, enforce, and administer sound floodplain management ordinances; and
- (4) to provide the commissioner of natural resources with authority necessary to carry out a floodplain management program for the state and to coordinate federal, state, and local floodplain management activities in this state.

History: 1990 c 391 art 1 s 7

103A.209 Marginal, Erodible Land Retirement Policy.

It is state policy to encourage the retirement of marginal, highly erodible land, particularly land adjacent to public waters and drainage systems, from crop production and to reestablish a cover of perennial vegetation.

History: 1990 c 391 art 1 s 9

103A.212 Watershed Management Policy.

The quality of life of every Minnesotan depends on water. Minnesota's rivers, lakes, streams, wetlands, and groundwater provide a foundation for drinking water and the state's recreational, municipal, commercial, industrial, agricultural, environmental, aesthetic, and economic well-being. The legislature finds that it is in the public interest to manage groundwater and surface water resources

from the perspective of aquifers, watersheds, and river basins to achieve protection, preservation, enhancement, and restoration of the state's valuable groundwater and surface water resources.

History: 2010 c 361 art 4 s 48

2012 Draft Impaired Waters List for Olmsted County

Reach name	Reach Description ['from' - 'to']	Yr placed in impairment Inventory	Basin	River EDA link	River ID#	Lake EDA link	Lake or wetland ID# [County# + Lake#]	Affected designated use	Pollutant or stressor	TMDL Target start	TMDL Target completion	EPA Category	Hg TMDL region	Year TMDL Plan Approved	Approved TMDL EPA ID#	date of draft change	Comment
Bear Creek	Willow Cr to S Fk Zumbro R	2008	LMiss	07040004-538	07040004-538			Aquatic life	Turbidity	2007	2012	5	--				
Bear Creek	Headwaters to Willow Cr	2008	LMiss	07040004-539	07040004-539			Aquatic life	Turbidity	2007	2012	5	--				
Cascade Creek	Unnamed cr to S Fk Zumbro R	2006	LMiss	07040004-581	07040004-581			Aquatic life	Turbidity	2007	2012	5	--				
Cascade Creek	Headwaters to Unnamed cr	2006	LMiss	07040004-639	07040004-639			Aquatic life	Turbidity	2007	2012	5	--				
Logan Branch	Headwaters to T107 R11W S4, east line	2002	LMiss	07040003-536	07040003-536			Aquatic life	Turbidity	2010	2014	5	--				
Logan Branch	Unnamed cr to N Fk Whitewater R	2008	LMiss	07040003-552	07040003-552			Aquatic recreation	Fecal Coliform	2010	2014	5	--				
Root River, North Branch	Unnamed cr to Mill Cr	2008	LMiss	07040008-716	07040008-716			Aquatic life	Turbidity	2008	2012	5	--				
Root River, North Branch	Headwaters to Carey Cr	2008	LMiss	07040008-717	07040008-717			Aquatic life	Turbidity	2008	2012	5	--				
Silver Creek	Unnamed cr to Unnamed cr	2006	LMiss	07040004-552	07040004-552			Aquatic life	Turbidity	2007	2012	5	--				
Silver Creek	Unnamed cr to Silver Lk (S Fk Zumbro R)	2006	LMiss	07040004-553	07040004-553			Aquatic life	Turbidity	2007	2012	5	--				
Unnamed creek	Unnamed cr to Unnamed cr	2006	LMiss	07040004-556	07040004-556			Aquatic life	Turbidity	2007	2012	5	--				
Unnamed creek	Unnamed cr to Unnamed cr	2008	LMiss	07040004-601	07040004-601			Aquatic life	Turbidity	2007	2012	5	--				

Whitewater River, Middle Fork	T107 R11W S35, west line to N Fk Whitewater R	2010	LMiss	07040003-514	07040003-514			Drinking Water	Nitrates	2010	2014	5	--				
Whitewater River, Middle Fork	T107 R11W S35, west line to N Fk Whitewater R	2002	LMiss	07040003-514	07040003-514			Aquatic life	Turbidity	2004	2012	5	--				
Whitewater River, Middle Fork	Headwaters to T107 R11W S34, east line	2008	LMiss	07040003-515	07040003-515			Aquatic life	Turbidity	2009	2012	5	--				
Whitewater River, North Fork	Unnamed cr to M Fk Whitewater R	1996	LMiss	07040003-554	07040003-554			Aquatic life	Turbidity	2009	2012	5	--				
Willow Creek	Headwaters to Bear Cr	2006	LMiss	07040004-540	07040004-540			Aquatic life	Turbidity	2007	2012	5	--				
Zumbro River, Middle Fork	Shady Lk to Zumbro Lk	2010	LMiss	07040004-519	07040004-519			Aquatic life	Turbidity	2012	2016	5	--				
Zumbro River, Middle Fork, South Branch	Dodge Center Cr to M Fk Zumbro R	2006	LMiss	07040004-525	07040004-525			Aquatic life	Turbidity	2007	2012	5	--				
Zumbro River, South Fork	Cascade Cr to Zumbro Lk	2002	LMiss	07040004-507	07040004-507			Aquatic life	Turbidity	2007	2012	5	--				
Zumbro River, South Fork	Old Oakwood Dam to Silver Lk Dam	2010	LMiss	07040004-534	07040004-534			Aquatic life	Turbidity	2012	2012	5	--				
Zumbro River, South Fork	Salem Cr to Bear Cr	2006	LMiss	07040004-536	07040004-536			Aquatic life	Turbidity	2007	2012	5	--				
Zumbro	Lake or Reservoir	2002	LMiss		0704x	55-0004-00	55-0004-00	Aquatic recreation	Nutrient/Eutrophication Biological Indicators	2012	2016	5	--				
Mill Creek	T105 R12W S14, north line to N Br Root R	2012	LMiss	07040008-536	07040008-536			Aquatic Recreation	<i>Escherichia coli</i>	2011	2015	5	--				
Root River, North Branch	Unnamed cr to Mill Cr	2012	LMiss	07040008-716	07040008-716			Aquatic Life	Aquatic Macroinvertebrate Bioassessments	2011	2015	5	--				
Root River, North Branch	Headwaters to Carey Cr	2012	LMiss	07040008-717	07040008-717			Aquatic Life	Aquatic Macroinvertebrate Bioassessments	2011	2015	5	--				

Unnamed creek	Unnamed cr to N Br Root R	2012	LMiss	07040008-706	07040008-706			Aquatic Life	Aquatic Macroinvertebrate Bioassessments	2011	2015	5	--				
Unnamed creek	Unnamed cr to Unnamed cr	2012	LMiss	07040008-F46	07040008-F46			Aquatic Life	Aquatic Macroinvertebrate Bioassessments	2011	2015	5	--				

Comparison of BWSR BBR and County Project Types

The BWSR has instituted the Biennial Budget Request (BBR) process for grants involving water plan implementation. The competitive grant BBR encourages the completion and submittal of a spreadsheet of high priority projects that local units of government and other organizations involved in local or regional water resource management propose. The Olmsted County plan identifies project details in a set of tables that further explain the action items listed for implementation. The BWSR BBR requires identification of project/activities categories as does the water management plan. The list of categories is similar but not the same. The following table provides a comparison of the types of projects/activities that appear in this plan. (Refer to the BBR Overview and Guidance document for the definitions of BBR categories.)

BBR Water Plan Categories	Olmsted County Water Plan Categories
Administration	Staffing, Grants/Administration
Community Engagement and Outreach	Civic Engagement, Education/Training/Marketing
Information and Education	Education/Training/Marketing, Civic Engagement
Inventory	Monitoring, GIS/Mapping, Research/Inventories
Land and Water Treatment	Capital Investment/Infrastructure, Implementation Program, Resource Management/BMP's
Planning and Environmental Controls	Regulation, Planning, Implementation Program, Coordination/Collaboration
Targeting	Capital Investment/Infrastructure, Education/Training/Marketing, Incentives

MPCA Fact Sheets



Minnesota
Pollution
Control
Agency

Fecal coliform and *E. coli* bacteria found in rivers and streams throughout the state originate in human, pet, livestock, and wildlife waste.

The actual numbers of people made ill in Minnesota from pathogens in surface water is not clearly understood. Most gastrointestinal illness, the most likely to be associated with surface water pathogens, goes unreported.

MPCA Offices:
Rochester:
507/285-7343
Mankato:
507/389-5977
Marshall:
507/537-7146
Willmar:
320/214-3786
Detroit Lakes:
218/847-1519
Brainerd:
218/828-2492
Duluth:
218/723-4660
Metro:
651/296-6300
Toll-Free Number:
800/657-3864

Bacteria: Sources, Types, Impact on Water Quality - A General Overview

Water Quality/Impaired Waters #3.20 • February 2008

Countless numbers of bacteria, viruses, and other microorganisms exist in the environment – land and water – and also in the bodies of humans and animals. Most are beneficial, serving as food for larger organisms, and playing critical roles in biogeochemical cycles such as organic matter decomposition, fixation of nitrogen, and digestion of food. However, about 10 percent are harmful. Known as pathogens, if ingested by humans, they can release toxins causing sickness or even death.

Symptoms of waterborne diseases may include gastrointestinal illnesses such as severe diarrhea, nausea, and possibly jaundice as well as headaches and fatigue. It is important to note, however, that these symptoms are not associated only with disease-causing organisms in drinking water. They may also be caused by a number of other factors. In addition, not all people will be affected to the same degree; young children and the elderly are usually more susceptible.

Fecal Coliform and *E. coli*

In water pollution control and water quality monitoring, specific disease-producing (pathogenic) organisms are not easily identified. Testing for them is difficult, expensive, and time-consuming. Two closely related bacteria groups have been used for decades as “indicator organisms.” Fecal coliform and *E. coli* bacteria provide an indication of the possible presence of pathogens. *E. coli* is a sub-group of fecal coliform, and is virtually always present in water along with fecal coliform. Protozoa, microorganisms such as Giardia and



Cryptosporidia, may also be present in animal waste and can be disease-causing in humans. Campers using lake or stream water for drinking or cooking must filter it to remove protozoa beforehand.

Factors Affecting Bacteria

As with many water pollutants, the behavior of fecal coliform and *E. coli* in the environment is complex. Factors affecting bacteria levels include seasonal weather, stream flow, water temperature, distance from pollution sources, livestock management practices, wildlife activity, age of fecal material, sewage overflows, and rainfall. In addition, bacteria in stream sediments can survive for extended periods and even grow. Despite the potential for growth of bacteria in stream sediments, die-off is still the dominant process.

Sources and Pathways to Water

Fecal coliform and *E. coli* bacteria found in rivers and streams throughout the state originate in human, pet, livestock, and

wq-iw3-20

Minnesota Pollution Control Agency • 520 Lafayette Rd. N., St. Paul, MN 55155-4194 • www.pca.state.mn.us
651-296-6300 • 800-657-3864 • TTY 651-282-5332 or 800-657-3864 • Available in alternative formats



wildlife waste. Amounts tend to be lower in the forested and wetland-rich areas of northern Minnesota, and higher in agricultural and more heavily populated areas.

Pathways include direct routes to surface waters (illicit septic systems connections, wastewater treatment facility discharge points, and urban stormwater systems), spills or runoff from livestock housing or manure storage facilities, runoff or movement through soil from agricultural lands that receive manure applications, runoff of wildlife dropping, and direct deposition into waterways by wildlife or grazing animals. Manure management practices including manure storage and pretreatment (e.g. composting), timing and rate of application, and application method, all have the potential to reduce bacteria contamination of surface and groundwater.

Water Quality Standards

For most water bodies in the state, standards for bacteria are designated by law to support full or partial body-contact recreational uses such as swimming, wading, boating, and fishing. Recently, Minnesota proposed changing the criteria for detecting pathogen levels from the fecal coliform to the *E. coli* standard. The U.S. Environmental Protection Agency has been encouraging states to adopt the new standard for reasons of better quality, lower cost and greater efficiency.

The current standard is for fecal coliform: A monthly average of 200 colony-forming units per 100 milliliters of water (cfu/mL), and a maximum of 2,000 cfu/100 mL not to exceed 10 percent of samples collected in a month. The proposed rule revision will replace fecal coliform with an *E. coli* standard of 126 cfu/100 mL monthly average, and 1,260 cfu/100 mL maximum. The standards apply April through October (for most waters). When they are exceeded, the water is considered impaired and not fully supporting the designated use. People using impaired waters for recreation are at risk for exposure to pathogens.

Focus on Streams, Rivers

Although bacteria water quality standards apply to all waters in Minnesota, the MPCA generally focuses its assessment work on rivers and streams rather than lakes for two reasons: 1) Bacteria levels in lakes generally tend to be lower than those seen in streams and rivers. 2) The types of bacteria sources over which the MPCA has the clearest authority are more likely to discharge directly to a stream or river than a lake. If the stream or river feeds a lake, bacteria levels are often much reduced before reaching the lake. Bacterial contamination in lakes is often associated with designated swimming beaches affected by users (e.g. children in diapers), which typically is dealt with by local health officials.

The actual numbers of people made ill from pathogens in surface water is not clearly understood. Most gastrointestinal illness, the most likely to be associated with surface water pathogens, goes unreported. Outbreaks that are documented typically are associated with designated swimming beach areas where a number of bathers become ill. According to one study, 35 percent of all gastrointestinal illness is caused by pathogen-contaminated drinking water.

Information Sources

Minnesota Department of Health:
www.health.state.mn.us/divs/eh/water/com/fs/coliform.html

“Pathogen Basics”, National Livestock and Poultry Environmental Learning Center:
<http://lpe.unl.edu/archive2.html> (Scroll to Jeanette Thurston-Enriquez, Pathogens in Animal Manure-Should We Be Concerned?-Part 1).

“A Farmer's Guide to Agriculture and Water Quality Issues” – North Carolina State University College of Agriculture and Life Sciences:
www.cals.ncsu.edu/wq/wqp/wqpollutants/pathogens/pathtfactsheets.html

Lower Mississippi River Basin Fecal Coliform Bacteria Total Maximum Daily Load Report:
www.pca.state.mn.us/water/tmdl/project-lowermiss-fecal.html

Proposed Water Quality Standards Rule Revisions:
www.pca.state.mn.us/water/standards/rulechange.html

Assessing Quality of Minnesota Surface Waters:
www.pca.state.mn.us/publications/wq-iw1-04.pdf



Minnesota
Pollution
Control
Agency

Citizen involvement, education and outreach, and pollution prevention are key components of all TMDL implementation plans.

Biological life is subjected to the cumulative effects of all activities, and represents the condition of their aquatic environment.

MPCA Offices:

Rochester:
507/285-7343

Mankato:
507/389-5977

Marshall:
507/537-1146

Willmar:
320/214-3786

Detroit Lakes:
218/847-1519

Brainerd:
218/828-2492

Duluth:
218/723-4660

Metro:
651/296-6300

Toll-Free Number:
800/657-3864

Index of Biological Integrity as a Water Quality Measure

An Overview

Water Quality/Impaired Waters 3.23 • November 2008

Biological monitoring tracks the health of plants, fish, insects, and small organisms in lakes, streams and rivers. Researchers use several measures of a biological community to create an Index of Biological Integrity (IBI). A typical IBI developed for fish will measure eight to 12 attributes related to the diversity and types of species present, including feeding, reproduction, tolerance to human disturbance, abundance, and condition. These help distinguish between natural processes and changes caused by human activities. For example, species considered tolerant of some form of pollution, such as sedimentation, could form a “tolerant” measure. Polluted or impaired waters would tend to have more of these tolerant species.

Ratings assigned to each measure are summed up in a score indicating the underlying biological integrity or “health” of a particular water body. A high IBI score indicates biological species similar to least-impacted (reference) sites of comparable size and type in the same geographic region. A low IBI score indicates the species are significantly different or degraded compared with regional reference sites. Narrative descriptions can be used to rate the integrity of a site as excellent, good, fair, poor, or very poor.

Why Perform Biological Monitoring?

To ensure the integrity of surface waters, we must understand the relationship between human activities and their effects on specific aquatic life. Pollution in surface waters comes from many sources



A mussel monitoring site on the Chippewa River

including: chemicals in wastewater treatment discharges; agricultural runoff of pesticides, nutrients, and sediment; flow changes from stream channelization, dams, and artificial drainage; and habitat changes from agricultural, urban, and residential development. Testing water quality by chemistry only can fail to detect these wider impacts.

Aquatic organisms spend all or a vast majority of their life cycles in the water. The variety of species is a reflection of the cumulative effects of all natural and human-caused influences on that waterbody, whether or not the impact is chemical, physical, or biological. Therefore, biological monitoring is often able to detect water quality impairments that other methods may miss or underestimate.

Fish

Fish are widely-used and useful for measuring water resource quality. They are

typically present even in the smallest streams and are easily sampled and identified with the proper equipment and training. The Clean Water Act mandates “fishable” waters and the public widely recognizes fish for their economic and aesthetic value. Fish are diverse and have a wide range of habitat needs. Some are sensitive to changes in water temperature, bottom composition, stream flow, or water chemistry, while others are tolerant of changes in their environment. The fish food chain ranges from plankton to other fish. The variety of fish species makes them excellent indicators of water quality.

Invertebrates

Aquatic invertebrates, also called benthic macroinvertebrates or benthos, include insect larvae, crayfish and other crustaceans, snails, clams, aquatic worms and leeches. They are found in all types of surface waters, including large rivers, small streams, lakes and wetlands. They are most commonly found living on submerged aquatic vegetation, woody debris, or rocks and cobbles, but are also found in the water column. A very diverse group, benthic macroinvertebrates, display a wide range of sizes, habitat requirements, life histories, and sensitivities to water quality impairment. Some are sensitive to changes in bottom composition; others are sensitive to changes in dissolved oxygen. Some require cold water temperatures, while others can tolerate a wide range. This makes benthic macroinvertebrates excellent indicators of human impact on aquatic systems. Researchers use hand held dip nets and artificial habitats to collect invertebrate samples.

Impairment Listing

Section 303(d) of the federal Clean Water Act requires states to identify and list impaired waters. A final determination of biological impairment is based on all available information, prior to being listed. This includes habitat quality, available water chemistry data, and biological condition of nearby upstream and downstream segments, local land use information, and other watershed data. The MPCA presents this information to a group of water quality experts who consider all of the available data when making the listing decisions.

Biological impairments differ from some traditional water quality impairments in that the impaired biotic communities are indicators of responses to pollution rather than causes. The advantage of using a response indicator in making an overall evaluation of ecosystem health is that the cumulative effects of multiple stressors

are taken into account. However, determining the primary stressors that are leading to the impairment requires an additional step. This step, often referred to as stressor identification, can provide the linkage between the impaired community and the numerical, load-based, water quality information needed for completing a Total Maximum Daily Load (TMDL).

More Information

All currently-available IBI documents:

www.pca.state.mn.us/water/biomonitoring/index.html

Aquatic life use support assessment methodology described in the MPCA’s Guidance Manual for Assessing the Quality of Minnesota Surface Waters:
<http://www.pca.state.mn.us/publications/wq-iwl-04.pdf>

Basis for using the health of the biological community for assessment is the narrative water quality standards in Minnesota Rules Chapter 7050:
<https://www.revisor.leg.state.mn.us/rules/?id=7050>

Biota TMDL Protocols and Submittal Requirements:
www.pca.state.mn.us/publications/wq-iwl-23.pdf

Biological Monitoring Streams: Fish Monitoring:
www.pca.state.mn.us/water/biomonitoring/bio-streams-fish.html

MPCA Total Maximum Daily Load Program:
www.pca.state.mn.us/water/tmdl/index.html



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Low Dissolved Oxygen in Water

Causes, Impact on Aquatic Life – An Overview

Water Quality/Impaired Waters 3.24 • February 2009

In Minnesota, the critical conditions for stream dissolved oxygen usually occur during the late summer season when water temperatures are high and stream flow rates are normally low.

MPCA Area Offices:

Rochester area:

507/285-7343

Mankato area:

507/389-5977

Marshall area:

507/537-7146

Willmar area:

320/214-3786

Detroit Lakes area:

218/847-1519

Brainerd area:

218/828-2492

Duluth area:

218/723-4660

Metro area:

651/296-6300

Toll-Free Number:

800/657-3864

Dissolved oxygen – oxygen molecules dissolved in water – is a major indicator of water quality. Like the air we breathe, the survival of aquatic life depends on a sufficient level of oxygen dissolved in water. When it drops below levels necessary for sustaining aquatic life, it becomes a significant water quality impairment, often referred to as low dissolved oxygen (DO).

Unlike air, which is normally about 21 percent oxygen, water contains only a tiny fraction of a percentage of dissolved oxygen. In water it usually is expressed in milligrams per liter (mg/L), parts per million (ppm), or percent of saturation. At sealevel, typical DO concentrations in 100-percent saturated fresh water will range from 7.56 mg/L (or 7.56 parts oxygen in 1,000,000 parts water) at 30 degrees Celsius to 14.62 mg/L at zero degrees Celsius.

The amount of dissolved oxygen that a given volume of water can hold is a function of atmospheric pressure, water temperature, and the amount of other substances dissolved in the water. At sea level, fresh water can absorb more oxygen per volume than water at mountainous elevations because of the higher atmospheric pressure near sealevel. Cool water can hold more oxygen than warm water, with variations ranging from seasonal to time of day or night. Water with high concentrations of dissolved minerals such as salt will have a lower DO concentration than fresh water at the same temperature.



Testing for dissolved oxygen in a flooded farm field with spoiling sugar beets.

Causes of Low Dissolved Oxygen

Low dissolved oxygen (DO) primarily results from excessive algae growth caused by phosphorus. Nitrogen is another nutrient that can contribute to algae growth. As the algae die and decompose, the process consumes dissolved oxygen. This can result in insufficient amounts of dissolved oxygen available for fish and other aquatic life. Die-off and decomposition of submerged plants also contributes to low dissolved oxygen. The process of decomposition is called Carbonaceous Biochemical Oxygen Demand (CBOD).

Sources of phosphorus include discharges from municipal and private wastewater treatment, cropland and urban storm water runoff, and natural decay of vegetation. Direct discharge of pollutants from point source and nonpoint sources into a river segment add to its CBOD loadings, creating an oxygen demand that may

wq-iw3-24

depress DO below acceptable concentrations. Nutrient levels can in certain rivers occasionally cause sufficient eutrophication to generate CBOD loads from decaying algae. This may not occur locally, but instead farther downstream in pools where the current slows and algae collect.

Ground Water

Ground water, a primary source of river flow during dry weather and base flow conditions, is naturally low in DO. During winter months when ice cover inhibits aeration from the air, ground water inflows will contribute to occurrences of low DO in a river. During summer, the cooler ground water inflow may at first lower the DO concentration, but it also tends to reduce the river temperature which improves the ability of the water to hold oxygen.

Temperature

Water temperature is important because it not only establishes the maximum oxygen-holding capacity of water, but also has direct influence on rates of biochemical reactions and transformation processes occurring within the water column and in the sediment bed. Warmer temperatures decrease oxygen solubility in water while at the same time increasing metabolic rates that affect BOD decay, sediment oxygen demand, nitrification, photosynthesis, and respiration. In Minnesota, the critical conditions for stream DO usually occur during the late summer season when water temperatures are high and stream flow rates are normally low.

For example, an impaired trout water on the North Shore of Lake Superior will have contributing factors much different from an impaired headwater creek in southern Minnesota. The northern trout stream may suffer from watershed disturbances due to urbanization and the loss of riparian vegetation that once provided shade to cool the stream. The southern creek may be impacted by agricultural nonpoint loadings as well as hydrological changes from artificial drainage in the watershed.

Stream Flow, Geography

The natural setting, stream morphology, and flow regime also play large roles in the re-aeration and oxygen capacity of a stream. For example, a stream reach directly downstream from a wetland may reflect the naturally low DO concentrations found in wetlands. A shallow, high gradient turbulent stream has better inherent re-aeration potential than does a low gradient,

sluggish stream with deep pools. Under conditions of low stream flow, a normally well-aerated stream with alternating riffles and pools may be reduced to mostly stagnant pools having low oxygen levels. Therefore, any analysis of DO impairment must recognize and acknowledge these types of physical constraints that are imposed by the natural characteristics of a watershed on its river system.

Water Classifications

Surface waters are classified according to their best use and the need for water quality protection (Mn Rules 7050.0140). Lakes and most streams are in Class 2, suitable for aquatic recreation, including bathing. Class 2A sets a standard of 7-milligrams-per-liter level of dissolved oxygen to support a healthy community of cold water fish such as trout. Class 2B sets a 5-milligrams-per-liter standard of dissolved oxygen, for cool or warm water fish.

Hypoxia in Gulf of Mexico

Also known as hypoxia, low dissolved oxygen occurs in a large area of northern Gulf of Mexico. Extending from the mouth of the Mississippi



River along the Louisiana coast, a zone of less than 2 ppm of DO covers an area about the size of New Jersey for much of the year, where aquatic life can't survive. The condition is primarily caused by excessive nutrients, primarily nitrogen and phosphorus. There are many sources, but the largest is agriculture in the Upper Mississippi and Ohio River Basins. Nutrients from these basins fuel algae growth followed by oxygen-depleting bacterial action.

More Information

General information about the TMDL program:

Jeff Risberg, jeff.risberg@pca.state.mn.us,
651-757-2670, 800-657-3864.

MPCA Total Maximum Daily Load Web page:

<http://www.pca.state.mn.us/water/tmdl/index.html>

Dissolved Oxygen TMDL protocol:

<http://www.pca.state.mn.us/publications/wq-iwl-09.pdf>
(1.83 MB)



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All lakes need protection from the pollution that robs them of oxygen and aquatic life. We can't do anything about nutrients from natural sources and the sun's warmth, but we can work to prevent excessive nutrients and sediments from human activity from getting into lakes and waterways.

MPCA Area Offices:

Rochester area:
507/285-7343
Mankato area:
507/389-5977
Marshall area:
507/537-7146
Willmar area:
320/214-3786
Detroit Lakes area:
218/847-1519
Brainerd area:
218/828-2492
Duluth area:
218/723-4660
Metro area:
651/296-6300
Toll-Free Number:
800/657-3864

Nutrients: Phosphorus, Nitrogen Sources, Impact on Water Quality - A General Overview

Water Quality/Impaired Waters #3.22 • May 2008

In the 1997 Clean Water Action Plan the U.S. Environmental Protection Agency identified nutrients as a significant national problem contributing to water pollution. States reported that more than half of all lakes were affected.

Just as applying fertilizer to gardens and farm fields helps crops grow, nutrients entering lakes and rivers feed the growth of algae, bacteria, and other tiny organisms. Water bodies require some nutrients to be healthy, but too much can be harmful. When lakes receive an overabundance of nutrients, they can become polluted by excessive amounts of algae. Die-off and decomposition of algae blooms can reduce dissolved oxygen and suffocate fish and other aquatic life. Some forms of algae (blue-green) may produce toxins that can be harmful if ingested by humans and animals.

Phosphorus and Nitrogen

Phosphorus (P) and nitrogen (N) are the primary nutrients that in excessive amounts pollute our lakes, streams, and wetlands. Nitrogen is essential to the production of plant and animal tissue. It is used primarily by plants and animals to synthesize protein. Nitrogen enters the ecosystem in several chemical forms and also occurs in other dissolved or particulate forms, such as tissues of living and dead organisms.

Nitrate, a compound containing nitrogen, can exist in the atmosphere or as a dissolved gas in water, and at elevated levels can have harmful effects on humans and animals. Nitrates in water can cause severe illness in infants and domestic animals. Common sources of excess nitrate reaching lakes and streams include septic



Photo: Grace Lake, Beltrami County SWCD

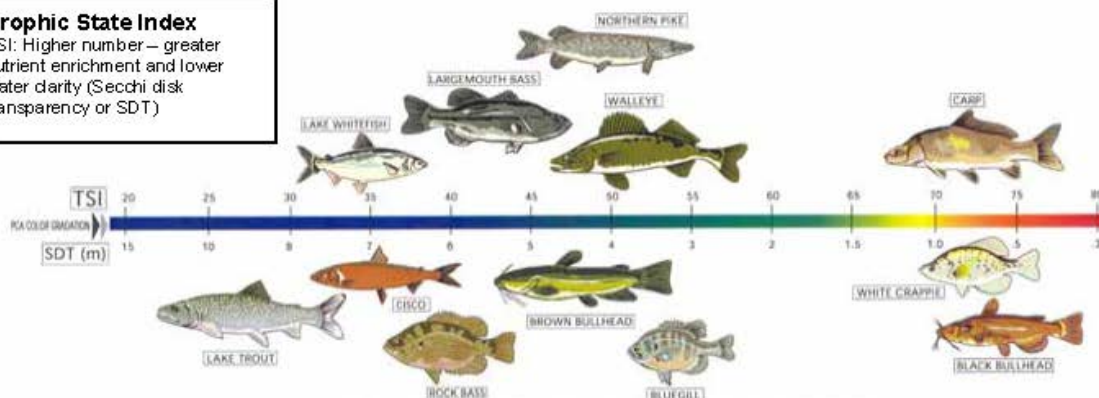
systems, animal feed lots, agricultural fertilizers, manure, industrial waste waters, sanitary landfills, and garbage dumps.

Phosphorus Fuels Algae Growth

Phosphorus is a vital nutrient for converting sunlight into usable energy, and essential to cellular growth and reproduction. It is one of the 20 most abundant elements in the solar system, and the 11th most abundant in the earth's crust. Under natural conditions phosphorus is typically scarce in water. In the late 1960s scientists discovered phosphorus contributed by human activity to be a major cause of excessive algae growth and degraded lake water quality. Phosphorus occurs in dissolved organic and inorganic forms or attached to sediment particles. Phosphates, the inorganic form, are preferred for plant growth, but other forms can be used when phosphates are unavailable. Phosphorus builds up in the sediments of a lake. When it remains in the sediments it is generally not available for use by algae; however, various chemical and biological processes can allow sediment phosphorus to be released back into the water. For example,

Trophic State Index

TSI: Higher number – greater nutrient enrichment and lower water clarity (Secchi disk transparency or SDT)



bottom-feeding rough fish such as carp can stir up bottom sediments, releasing phosphorus back into the water.

Impact on Water Quality

Poor water quality in lakes can have many unpleasant consequences. Rough fish – such as carp and bullhead – populations increase at the expense of game fish populations. Severe nuisance algal blooms yield unpleasant odor and appearance that reduce the aesthetic appeal of lakes. This may result in declines in fishing and swimming and hurt tourism.

As algae die and decompose, the process consumes oxygen. Submerged plants without sunlight die, decompose and consume more oxygen. Without enough dissolved oxygen in the water, fish and other organisms suffer and die because they can't "breathe." This can occur locally or much farther downstream leading to degraded estuaries, lakes and reservoirs. For example, fish and other aquatic life can no longer survive in the so-called "dead zone" in the Gulf of Mexico.

Nutrient Sources and Pathways

The geology and land use within a lake's watershed determine the amount of nutrients that enter the lake via surface water runoff. Eutrophication is the slow aging process during which a lake, estuary, or bay evolves into a bog or marsh and eventually disappears. Some of the nutrients come from natural processes, such as decomposition of plant and animal material. During the later stages of eutrophication the water body is choked by abundant plant life due to higher levels of nutrients

such as nitrogen and phosphorus. Human activities can accelerate the process with urban construction, sewage discharges, agricultural practices, and residential development.

Measuring Impact of Nutrients

Not all lakes are affected to the same degree. The green yuck permeates shallow lakes in the south more so than deeper, cooler northern lakes. The MPCA uses ecoregion-based total phosphorus guidelines in conjunction with Carlson's Trophic State Index (see chart) to classify lakes in their level of quality for swimming and fishing. TSI is a numeric index of lake trophic status on a scale of 1 to 100, the higher the number indicating greater nutrient enrichment. Lake nutrient standards that vary according to ecoregion and lake type have recently been developed. These water quality standards will provide a basis for determining the impairment status of Minnesota's lakes and will be useful for protecting the quality of good lakes as well. The MPCA also is developing nutrient standards for rivers.



Citizen volunteers use Secchi disks to collect data on water clarity.

Information Sources

Water Quality Standards:
www.pca.state.mn.us/water/standards/index.html
MPCA Lake Programs:
www.pca.state.mn.us/water/lake.html
Volunteer Surface Water Monitoring:
www.pca.state.mn.us/water/volunteer-monitoring.html
Secchi disk transparency slide show:
www.pca.state.mn.us/water/secchi-slideshow.html



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Regional Division

Because phosphorus changes form, most scientists measure total phosphorus rather than any single form to determine the amount of nutrient that can feed the growth of aquatic plants such as algae.

MPCA Area Offices

Brainerd:
218/828-2492
Detroit Lakes:
218/847-1519
Duluth:
218/723-4660
Mankato:
507/389-5977
Marshall:
507/537-7146
Rochester:
507/285-7343
St. Paul:
651/296-6300
800/657-3864
Willmar:
320/214-3786

Phosphorus: Sources, Forms, Impact on Water Quality

- A General Overview

Water Quality #Impaired Waters #3.12 • July 2007

Phosphorus is an essential nutrient for plants, animals and humans. It is one of the 20 most abundant elements in the solar system, and the 11th most abundant in the earth's crust. Under natural conditions phosphorus (P) is typically scarce in water. Human activities, however, have resulted in excessive loading of phosphorus into many freshwater systems. This can cause water pollution by promoting excessive algae growth, particularly in lakes. Lakes that appear relatively clear in spring can resemble green soup in late summer due to algae blooms fueled by phosphorus. Water quality can be further impaired when bacteria consume dead algae and use up dissolved oxygen, suffocating fish and other aquatic life.



atmospheric deposition and stream bank erosion. Phosphorus loading contributed by runoff from pastures and croplands is largest source of nonpoint phosphorus on a statewide basis. Other nonpoint sources include urban runoff, non-agricultural rural runoff and seepage from individual sewage treatment systems.

In some water bodies, the concentration of phosphorus is low enough to limit the growth of algae and/or aquatic plants. In this case, scientists say phosphorus is the **limiting nutrient**. For example, in water bodies having total phosphorus concentrations less than 10 parts per billion (1 ppb – equal to one drop in a railroad tank car), waters will be nutrient-poor and will not support large quantities of algae and aquatic plants. At the other extreme, total phosphorus levels of 100 or more ppb categorize lakes as highly eutrophic, with high nutrient and algae levels.

Sources of Phosphorus

Under normal water flows, roughly two-thirds of the total phosphorus load to lakes and rivers comes from nonpoint sources such as runoff from pasture and croplands,

Approximately 30 percent of the phosphorus load to Minnesota waters comes from point sources such as municipal and industrial wastewater treatment facilities. The magnitude of various sources of phosphorus varies greatly throughout the state due to the diverse nature of Minnesota's watersheds. ([“Detailed Assessment of Phosphorus Sources to Minnesota Watersheds,” MPCA, February 2004](#)).

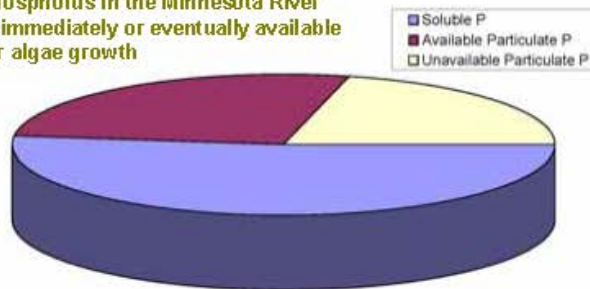
Forms of Phosphorus

Phosphorus in water exists in two main forms: dissolved (soluble) and particulate (attached to or a component of particulate matter). *Ortho phosphorus* is the primary dissolved form of phosphorus and is

wq-lw3-12

Minnesota Pollution Control Agency • 520 Lafayette Rd. N., St. Paul, MN 55155-4194 • www.pca.state.mn.us
651-296-6300 • 800-657-3864 • TTY 651-282-5332 or 800-657-3864 • Available in alternative formats

More than three-fourths of total phosphorus in the Minnesota River is immediately or eventually available for algae growth



Source: William F. James, Eau Galle Aquatic Ecology Laboratory

readily available to algae and aquatic plants. Most of the phosphorus discharged by wastewater treatment facilities is in the dissolved form.

Particulate phosphorus can change from one form to another (called *cycling*) in response to a variety of environmental conditions. A portion of particulate phosphorus is contained in organic matter such as algae, plant and animal tissue, waste solids, or other organic matter. Microbial decomposition of organic compounds can convert organic particulate P to dissolved P. Some of the P in soil mineral particles can also be converted to dissolved P both in the water column and during chemical and physical changes in bottom sediment. Only the most tightly bound forms of particulate phosphorus such as aluminum-bound phosphorus are not generally available for algal growth.

Because phosphorus changes form, most scientists measure *total phosphorus* rather than any single form to determine the amount of nutrient that can feed the growth of aquatic plants such as algae.

Minnesota River Basin-Lake Pepin

Three major river basins empty into Lake Pepin in southeastern Minnesota – St. Croix, Upper Mississippi, and the Minnesota. Lake Pepin is listed as an impaired water due to sediment and eutrophication (excessive nutrients and algae). The Minnesota River contributes a majority of the sediment. In a highly turbid water body such as the Minnesota River, much of the phosphorus load is attached to eroded soil particles, especially at higher flows. Much of the particulate phosphorus in the Minnesota River converts to the soluble that can become available to algae. This occurs in several ways: chemical and physical change (diagenesis) of sediment in the river or lake bed, interaction with dissolved chemicals in the water, and decay of organic P releasing dissolved phosphorus from soil particles. Models being used in the

Lake Pepin and Minnesota River [Total Maximum Daily Load projects](#) keep track of both particulate and dissolved forms of phosphorus.

MPCA Phosphorus Strategy

Controlling phosphorus is an important part of protecting Minnesota's water resources. In 1996 MPCA developed a comprehensive phosphorus strategy. The strategy was adopted in March of 2000. Information is available on the Web at:

www.pca.state.mn.us/water/phosphorus.html.

In February 2004, the MPCA submitted a report to the legislature entitled a "Detailed Assessment of Phosphorus Sources to Minnesota Watersheds" (cited on previous page). The report evaluates sources of phosphorus to Minnesota's surface waters and to municipal wastewater

www.pca.state.mn.us/hot/legislature/reports/phosphorus-report.html.

Phosphorus Management Plans (PMP) will be recommended or required in many new or reissued **National Pollutant Discharge Elimination System** permits. PMPs are a tool being used to determine if public wastewater treatment facilities and industrial wastewater dischargers contribute substantial loads of total phosphorus that could be reduced through pollution prevention or improved wastewater treatment methods.

Minnesota River Basin Phosphorus Permit

In December 2005 the MPCA issued a general NPDES permit limiting the amount of phosphorus discharged at 156 municipal and industrial discharges in the Minnesota River Basin from the outlet of the Lac Qui Parle reservoir to the city of Shakopee. The Phase I goal is an aggregate 35% staged reduction in phosphorus discharged to the basin by 2010. Phase II (2010-15) sets a goal of the 1 mg/L phosphorus limit on all facilities discharging more than 1,800 pounds of phosphorus per year and to guarantee that there is no net increase in the amount of phosphorus discharged to the basin. More information is available on the Web at

www.pca.state.mn.us/water/basins/mnriver/mnriver-phosphoruspermit.html.

For More Information

Contact Dennis Wasley, 651-296-8660.
dennis.wasley@pca.state.mn.us.



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Soil erosion on crop land has been a focus of soil and water conservation programs for many years. Urban stormwater runoff is also recognized as an important contributor of sediment, whether from construction sites, runoff from impervious surfaces, or other sources.

MPCA Area Offices:

Rochester area:
507/285-7343
Mankato area:
507/389-5977
Marshall area:
507/537-7146
Willmar area:
320/214-3786
Detroit Lakes area:
218/847-1519
Brainerd area:
218/828-2492
Duluth area:
218/723-4860
Metro area:
651/296-6300
Toll-Free Number:
800/657-3864

Turbidity: Description, Impact on Water Quality, Sources, Measures

- A General Overview

Water Quality/Impaired Waters #3.21 • March 2008

Many Total Maximum Daily Load projects in Minnesota address turbidity. Turbidity in water is a measurement of how cloudy or murky it is. In your espresso or latte' you want high turbidity. In your lake or stream, probably not. In either case, the substances resulting in high turbidity may not be intrinsically harmful, but their effects can be. Too much caffeine in the evening can affect sleep. Too much algae or sediment in lakes and streams can make them unsuitable for recreation and aquatic life.

What Is Turbidity?

Turbidity is caused by particles suspended or dissolved in water that scatter light making the water appear cloudy or murky. Particulate matter can include sediment - especially clay and silt, fine organic and inorganic matter, soluble colored organic compounds, algae, and other microscopic organisms. In the Minnesota River, sediment is the primary contributor to turbidity. In a shallow lake in August, it may be algae. In a northern Minnesota lake it may be tannin released by the breakdown of organic material.

Impact of Turbidity

High turbidity can significantly reduce the aesthetic quality of lakes and streams, having a harmful impact on recreation and tourism. It can increase the cost of water treatment for drinking and food processing. It can harm fish and other aquatic life by reducing food supplies, degrading spawning beds, and affecting gill function.



A report of the European Inland Fisheries Advisory Commission lists five ways that fine particles can have a harmful impact on freshwater fish:

- acting directly on fish, killing them or reducing their growth rate, resistance to disease, etc.;
- preventing successful development of fish eggs and larvae;
- modifying natural movements and migrations;
- reducing the amount of food available; and
- affecting the efficiency of methods for catching fish.

Turbidity Sources

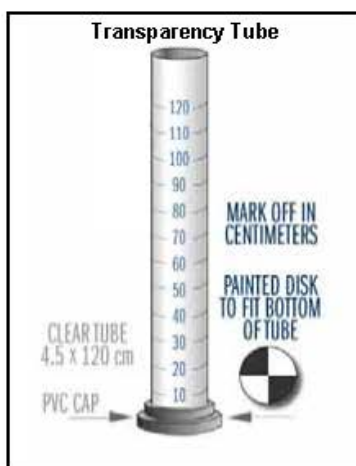
Sediment often tops the list of substances or pollutants causing turbidity. However, any watershed has multiple sources of the pollutants or physical features that can affect water clarity. These can be divided into natural or background, and human-induced sources. Natural sources can include erosion from upland, riparian, stream bank, and stream channel areas;

however, this is difficult to measure due to agriculture and development activity. Human activities can accelerate erosion. Tannic acids often associated with peat and bog areas cause water to be colored resulting in turbidity. Algae that grow with nourishment from nutrients entering the stream through leaf decomposition or other naturally occurring decomposition processes can also be a source of turbidity. Stream channel movement can also release sediment.

Phosphorus from various sources can cause algae growth resulting in increased turbidities. Phosphorus sources may include wastewater treatment facilities, nutrient runoff from crop land and other sources; and bottom sediment. Organic matter from sewage discharges, especially during treatment plant bypasses, can contribute to turbidity. Soil erosion on crop land has been a focus of soil and water conservation programs for many years. Urban stormwater runoff is also recognized as an important contributor of sediment, from construction sites, impervious surfaces, or other sources.

Measuring Turbidity

Turbidity is measured using specialized optical equipment in a laboratory or in the field. A light is directed through a water sample, and the amount of light scattered is measured. The unit of measurement is called a Nephelometric Turbidity Unit (NTU), which comes in several variations. The greater the scattering of light, the higher the turbidity. Low turbidity values indicate high water clarity; high values indicate low water clarity.



Measuring water transparency and Total Suspended Solids (TSS) also can be used to predict turbidity values. Secchi disks in lakes and transparency tubes in streams provide a simple and low-cost method for measuring water clarity. These are widely-used in citizen lake and stream monitoring

programs. Laboratory analysis is necessary for measuring TSS in milligrams per liter.



Turbidity is affected by several factors in water: presence of dissolved and suspended solids, size and shape of particles and composition of the particles. Water quality measurements that can help in the characterization of turbidity include total suspended solids, volatile suspended solids, total dissolved

solids, suspended sediment concentration, chlorophyll α , and particle size analysis. Other factors such as flow, sediment source and composition, algal species and sediment transport characteristics can also provide important information in characterizing the turbidity present in water.

Turbidity Water Quality Standard

Minnesota's water quality standards include a turbidity number as a measure of whether a water body meets its designated uses:

<u>Classes (and descriptions)</u>	<u>Turbidity (NTU)</u>
1B (drinking water)	10
2A (cold water fishery, all recreation)	10
2B (cool/warm water fishery, all recreation)	25
2C (indigenous fish, most recreation)	25

The relationship of TSS and transparency to turbidity across many streams indicates that 25 NTU is approximately equal to 58 mg/L for TSS and 20 centimeters of visibility through a T-tube. However, the relationship between turbidity and TSS can vary greatly in individual streams or even locations within a stream.

More Information

Protocol for Turbidity TMDL Development:
www.pca.state.mn.us/publications/wq-iw1-07.pdf

Minnesota River Basin Data Center:
<http://mrbdc.mnsu.edu/mnbasin/wq/turbidity.html>

Water on the Web:
<http://waterontheweb.org/under/waterquality/>

Minnesota River Turbidity TMDL Project:
www.pca.state.mn.us/water/tmdl/project-mnriver-turbidity.html

Water Grants Administered by Olmsted County's Member Organizations in 2012

Organization	Amount
SE MN Water Resources Board	\$ 1,980,139
Zumbro Watershed Partnership	\$ 515,809
Root River Watershed	\$ 1,679,422
Whitewater Watershed JPB (requested)	\$ 487,356
Total	\$ 4,662,726

SE MN Water Resources Board (10 County)

Grant	Funding Source	Amount
Volunteer Nitrate Monitoring Network - Continuation	MPCA Clean Water Partnership	\$143,600
Feedlot IV - small <300 AU feedlot fixes	MPCA/EPA Section 319	\$300,000
Feedlot V - small feedlot fixes plus engineering	MPCA/ EPASection 319	\$800,000
Feedlot V BWSR Match	BWSR Clean Water Fund	\$250,000
Wastewater V - 319 - unsewered community assistance	MPCA/ EPASection 319	\$95,149
Wastewater V - BWSR - unsewered community assistance	BWSR Clean Water Fund	\$221,790
Septic Software database for Counties	BWSR Clean Water Fund	\$169,600
Total		\$1,980,139

Zumbro Watershed Partnership (6 County)

Grant	Funding Source	Amount
Environmental and Natural Resource Trust Fund 2011-2013: Prioritizing Critical Restoration Sites in the Zumbro River Watershed	LCCMR	\$ 150,000
Clean Water Fund - Cost-share to help Oronoco residents seal unused wells	BWSR	\$ 114,449
General Operating Support	McKnight Foundation	\$ 100,000
Contract - Development of the Zumbro turbidity TMDL implementation plan, comprehensive watershed management plan and slow the flow civic engagement strategies	MPCA	\$ 60,000
Surface Water Assessment Grant - Monitoring of 13 stream sites in the Zumbro during 2012 and 2013	MPCA	\$ 76,360
UM SE Regional Sustainable Development Partnership - Pilot to select and design a recreational learning site in the Zumbro	UMN	\$ 15,000
Total		\$ 515,809

Root River Watershed (5 County)

Grant	Funding Source	Amount
Turbidity TMDL Grant (2008-2011)	MPCA	\$ 300,000
Comprehensive Strategy	MPCA	\$ 368,606
Field to Stream Partnership	MDA	\$ 237,750
Root River Landscape Plan	DNR	\$ 21,500
Root River Grazing Specialist	BWSR Clean Water Funds	\$ 126,316
Nutrient Management Specialist (all five RR counties)	BWSR Clean Water Funds	\$ 183,600
Root River MRBI Technical Assistance Grant	BWSR	\$ 25,000
Root River MRBI Technical Assistance Grant	NRCS (50%) and The Nature Conservancy (50%)	\$ 400,000
Root River Cover Crop Grant	TNC	\$ 10,000
Root River Outreach and Runoff Retention Grant	TNC	\$ 6,650
Total		\$ 1,679,422

Whitewater Watershed JPB (3 County)

Grant	Funding Source	Amount
Clean Water Partnership Bacteria Reduction	MPCA	\$ 214,028
ARRA Farmer-led Grant (Completed & Closed)	MPCA	\$ 115,000
Mississippi River - Winona Comprehensive Strategy	MPCA	\$ 158,328
Total		\$ 487,356

BWSR - Minnesota Board of Water and Soil Resources

MPCA - Minnesota Pollution Control Agency

LCCMR - Legislative and Citizen Commission on Minnesota Resources

NRCS - US Natural Resources Conservation Service

TNC - The Nature Conservancy

EPA - US Environmental Protection Agency



Appendix D: State Review Agency Comments





Minnesota Pollution Control Agency

520 Lafayette Road North | St. Paul, Minnesota 55155-4194 | 651-296-6300

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September 26, 2012

Mr. Jeff Nielsen, Regional Supervisor (South)
Board of Water and Soil Resources
261 Highway 15 South
New Ulm, MN 56073

RE: Olmsted County Local Water Management Plan

Dear Mr. Nielsen:

The Minnesota Pollution Control Agency (MPCA) has reviewed the final draft of the Local Water Management (LWM) Plan for Olmsted County (County). The following is submitted for consideration by the Board of Water and Soil Resources (BWSR) on this LWM Plan:

- The LWM Plan does not violate any statutory or rule requirements administered by the MPCA.
- The MPCA recommends BWSR approve the entire plan as submitted.
- The MPCA would like to offer the following comments for consideration by BWSR when reviewing and acting on this LWM Plan.

The County's LWM Plan is a very detailed and thorough document that addresses the concerns MPCA shares in this area. Reference is made multiple times to the benefit of regional cooperation being the key to the success of the goals laid out in the LWM Plan. The County staff is connected to the region through various work groups and, therefore, is already showing commitment to this ideal. Also, the acknowledgement that watershed-based Total Maximum Daily Load (TMDL) studies are an improvement over the previous TMDL structure is encouraging.

Comments on changes that should be made:

Page 15. "A turbidity TMDL study has been approved for the Zumbro River and an implementation plan is expected to be complete in 2013."

The Implementation Plan was approved in September, 2012.

Below is an encouraging statement that follows the previous comment about working relationships in this area. To have the link between TMDLs/Implementation Plans and LWM Plans called out is encouraging.

Page 16. "As they are approved by the MPCA, the priorities identified in TMDL Implementation Plans will be considered to be consistent with the priorities of the Olmsted County Local Water Management Plan."

Mr. Jeff Nielsen
Page 2
September 26, 2012

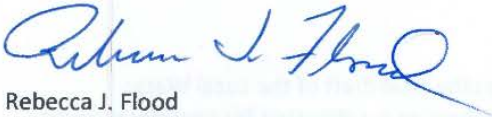
Environmental Data Access System

The water quality section of MPCA's Environmental Data Access System allows visitors to find and download data from surface water monitoring sites located throughout the state. Where available, conditions of lakes, rivers or streams that have been assessed can be viewed.

We encourage the County to visit this site for water quality monitoring data which may be useful with future water management efforts: www.pca.state.mn.us/data/edaWater/index.cfm

If we may be of further assistance, please contact Shaina Keseley in the MPCA's Rochester Regional office at 507-206-2622 or Dave L. Johnson in the St. Paul office at 651-757-2470.

Sincerely,



Rebecca J. Flood
Assistant Commissioner

RJF/DLJ:kb:bt

cc: Terry Lee, Olmsted County
Shaina Keseley, MPCA-Rochester Office

Final Draft
Olmsted County Local Water Management Plan Update

Agency/organization Minnesota Department of Health
Submitted by (name): Pat Bailey, MDH Planner SWP Unit_ (phone) 507/206-2741
(email) pat.bailey@state.mn.us

Submission deadline: October 1, 2012

1. The Minnesota Department of Health has reviewed the final draft of the water management plan for Olmsted County. The following is submitted for the Board's consideration regarding the priority concerns selected:

- ☒ The plan does not violate any statutory or rule requirements administered by our agency.
- ☐ The plan violates M.S. _____ administered by our agency. *Explanation of statute violation:* _____
- ☐ The plan violates M.R. _____ administered by our agency. *Explanation of rule violation:* _____

2. The Minnesota Department of Health recommends the board:

- ☒ Approve the entire plan as submitted
- ☐ Disapprove the entire plan as submitted
- ☐ Disapprove parts of the plan as cited: _____

3. The Minnesota Department of Health would like to offer the following comments for the board's consideration when reviewing and acting on this local water plan update:

The Minnesota Department of Health believes source water protection for public and private consumption is an important component of local water resource management. We commend Olmsted County for recognizing the value of protecting and preserving groundwater quality and quantity, specifically the action items that support the implementation of wellhead protection plans.

Final Draft
Local Water Management Plan Update

Agency/organization **MN DNR Central Region**

Submitted by Michele Hanson 651-259-5785

Michele.hanson@state.mn.us

Submission deadline: 10-1-12

1. The MN DNR has reviewed the final draft of the water management plan for Olmsted county. The following is submitted for the Board's consideration regarding the priority concerns selected:

- ☒ The plan does not violate any statutory or rule requirements administered by our agency.
- ☐ The plan violates M.S. _____ administered by our agency. *Explanation of statute violation:* _____
- ☐ The plan violates M.R. _____ administered by our agency. *Explanation of rule violation:* _____

2. The (choose agency) recommends the board:

- ☐ Approve the entire plan as submitted
- ☐ Disapprove the entire plan as submitted
- ☐ Disapprove parts of the plan as cited: _____

3. The (choose agency) would like to offer the following comments for the board's consideration when reviewing and acting on this local water plan update:

Final Draft
Olmsted County Local Water Management Plan Update

Agency/organization Minnesota Department of Agriculture (MDA)

Submitted by (name): Robert Sip (phone) 651-319-1832 (email) rob.sip@state.mn.us

Submission deadline: October 1, 2012

1. The MDA has reviewed the final draft of the water management plan for Olmsted County. The following is submitted for the Board's consideration regarding the priority concerns selected:

- ☒ The plan does not violate any statutory or rule requirements administered by our agency.
- ☐ The plan violates M.S. _____ administered by our agency. *Explanation of statute violation:* _____
- ☐ The plan violates M.R. _____ administered by our agency. *Explanation of rule violation:* _____

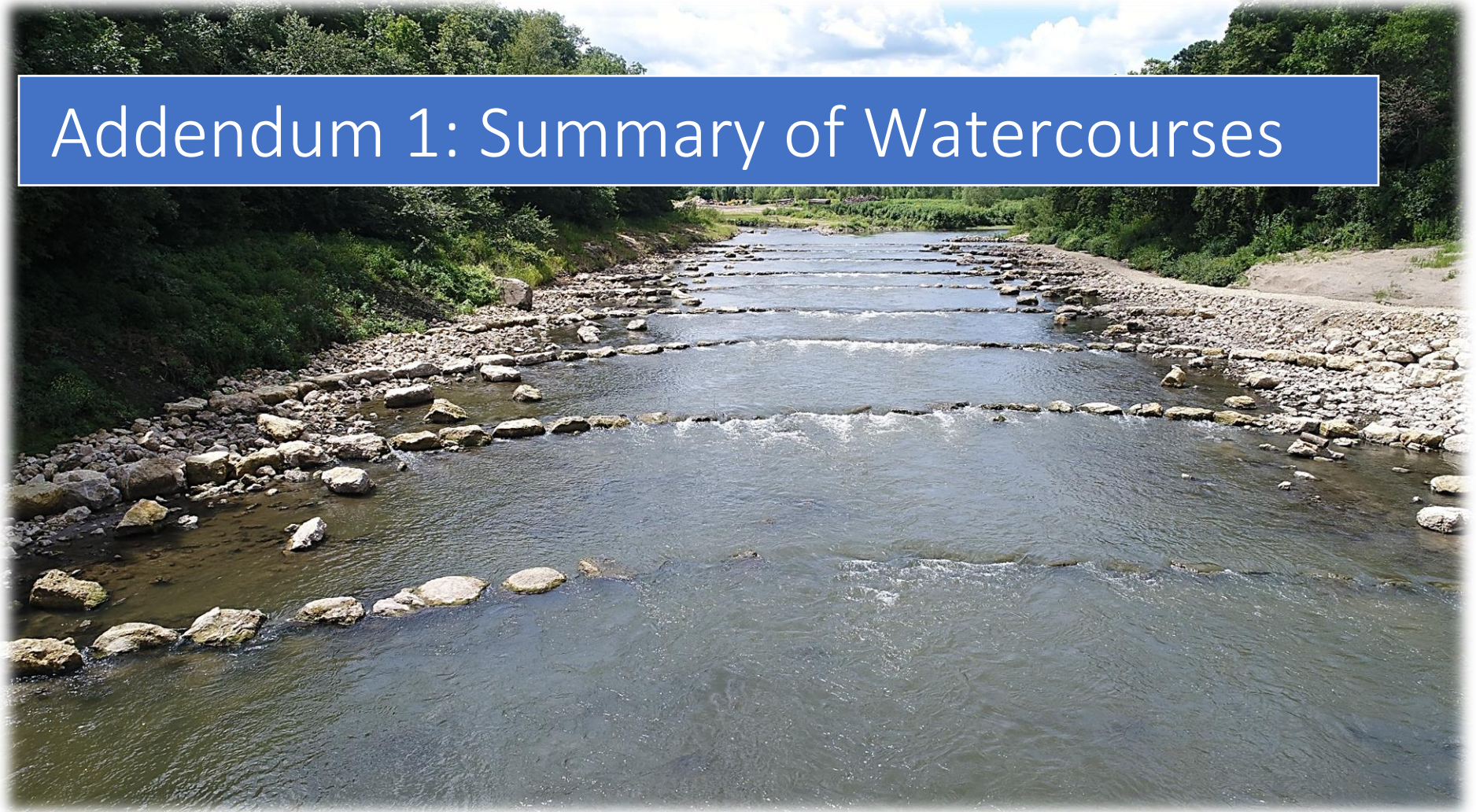
2. The MDA recommends the board:

- ☒ Approve the entire plan as submitted
- ☐ Disapprove the entire plan as submitted
- ☐ Disapprove parts of the plan as cited: _____

3. The MDA would like to offer the following comments for the board's consideration when reviewing and acting on this local water plan update:

No additional comments.

Addendum 1: Summary of Watercourses



“Other Watercourses” Description for Olmsted County

The summary of “other watercourses” for Olmsted County is descriptive in format (per BWSR Buffer Program Policy #6, August 25, 2016).

The description of watercourses to be included in the summary of “other watercourses” for Olmsted County is defined as; All watercourses deemed eligible for the adjacent land to be voluntarily enrolled into a buffer, filter strip or other comparable upland best management practice under the current eligibility criteria for state and federal programs, but excluding those watercourses depicted on the DNR Buffer Protection Map.

A list of watercourses included in this descriptive inventory:

- Are Perennial streams, or Seasonal streams depicted on the Olmsted County Soil Survey maps,
- Originate or pass through sensitive landscape features where land use may impact surface or groundwater quality, i.e. Decorah Edge areas, Well Head Protection Areas
- Have Been Identified by County or SWCD staff during onsite visits

Olmsted Soil and Water Conservation District

Adopting a Summary of Watercourses for inclusion in Local Water Management Plan

Supervisor ~~Claron Krogness~~ offered the following resolution, No. ~~01-2017~~ and

Supervisor Andy Hart moved its adoption.

Whereas; Minnesota statutes 103F.48 requires SWCDs in consultation with local water management authorities, to develop, adopt, and submit to each local water management authority within its boundary a summary of watercourses for inclusion in the local water management plan.

Whereas; The Board of Water and Soil Resources has adopted Buffer Law implementation Policy #6 Local Water Resources Riparian Protection ("Other Watercourses") which identifies steps SWCDs are required to take in developing said inventory.

Whereas; Olmsted SWCD has met with local water management authorities within its jurisdiction on Jan 11th 2017, May 1, 2017 and May 16, 2017.

Whereas; Olmsted SWCD and the water management authorities within its jurisdiction discussed watershed data, water quality data and land use information as a criteria in development of this list.

Whereas; Olmsted SWCD has assessed the water quality benefits that buffers and alternative practices could provide and determined that current State and Federal programs have eligibility criteria for watercourses where water quality would benefit from the installation of a buffer, filter strip or comparable upland best management practice.

Whereas; The Olmsted SWCD determined that the rationale for inclusion of "other watercourses" is to be inclusive of all watercourses where water quality would benefit from the voluntary installation of a buffer, filter strip or comparable upland best management practice.

Whereas; producing a map of all the watercourses meeting the eligibility criteria would be time consuming and may not be inclusive of all watercourses where water quality would benefit from the installation of a buffer, filter strip or comparable upland best management practice.

Therefore, be it resolved that; the summary of "other watercourses" for Olmsted County shall be descriptive in format instead of in map format (per BWSR Buffer Program Policy #6, August 25, 2016).

Be it further resolved that; the description of watercourses to be included in the summary of "other watercourses" shall be; All watercourses deemed eligible for the adjacent land to be voluntarily enrolled into a buffer, filter strip or other comparable upland best management practice under the current eligibility criteria for state and federal programs, but excluding those watercourses depicted on the DNR Buffer Protection Map.

A list of watercourses included in this descriptive inventory:

- Are Perennial streams, or Seasonal streams depicted on the Olmsted County Soil Survey maps,
- Originate or pass through sensitive landscape features where land use may impact surface or groundwater quality, ie. Decorah Edge areas, Well Head Protection Areas
- Have Been Identified by County or SWCD staff during onsite visits

Supervisor John Keefe seconds the adoption of the resolution, and it was declared adopted upon

Ayes: 3

Nays: 0

List Names: Claron Krogness

List names:

The following votes:

Andy Hart
John Keefe

Claron M Krogness

Olmsted SWCD Chair

June 22, 2017
Date