

**Comprehensive Watershed Management Plan**

**For  
The Upper Rum River Watershed Management Organization**

**March 2007**

**Prepared by**

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## CERTIFICATION

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I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed professional engineer under the laws of the State of Minnesota.



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Todd E. Hubmer, PE

Date: March 2007

Reg. No. 24043

## TABLE OF CONTENTS

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I.	EXECUTIVE SUMMARY .....	1
II.	LAND AND WATER RESOURCE INVENTORY .....	6
III.	PROBLEMS AND CORRECTIVE ACTIONS .....	40
IV.	GOALS AND POLICIES .....	45
V.	IMPLEMENTATION PROGRAM/ PRIORITIES .....	61
VI.	IMPACT ON MEMBER COMMUNITIES .....	68
VII.	AMENDMENT PROCEDURES.....	69
VIII.	GLOSSARY .....	70

## TABLE OF CONTENTS

---

### **LIST OF FIGURES**

Figure I-1	Watershed Location Map.....	Page 5
Figure II-1	Precipitation Monitoring Stations.....	Page 6
Figure II-2	Subwatershed Map.....	Page 28
Figure II-3	County Ditch Map.....	Page 29
Figure II-4	National Wetland Inventory.....	Page 30
Figure II-5	DNR Public Waters/Wetlands.....	Page 31
Figure II-6	Water Quality Monitoring Locations.....	Page 32
Figure II-7	Surface and Groundwater Appropriations.....	Page 33
Figure II-8	Floodplain Map.....	Page 34
Figure II-9	Soils Map.....	Page 35
Figure II-10	Existing Land Use.....	Page 36
Figure II-11	Planned Land Use.....	Page 37
Figure II-12	County Biological Survey.....	Page 38
Figure II-13	Pollutant Sources.....	Page 39

### **LIST OF TABLES**

Table II-1	Precipitation Summary.....	Page 7
Table II-2	Frequency Distribution of Precipitation Events.....	Page 7
Table II-3	County Ditches within the URRWMO.....	Page 10
Table II-4	Status of Shoreland Management Ordinances.....	Page 12
Table II-5	DNR Shoreland Classifications.....	Page 14
Table II-6	Hydrologic Soil Groups.....	Page 19
Table II-7	Metropolitan County Population and Household Forecast.....	Page 20
Table II-8	Natural Communities in the URRWMO.....	Page 24
Table II-9	Rare Species in the URRWMO.....	Page 25
Table V-1	Proposed Management Programs.....	Page 63
Table V-2	Proposed Management Studies.....	Page 65
Table V-3	Proposed Capital Improvement Program.....	Page 67
Table V-4	Summary.....	Page 68

### **LIST OF APPENDICES**

Appendix A	Joint Powers Agreements
Appendix B	Memorandum of Understanding
Appendix C	Draft 2006 Results – Upper Rum River Watershed

## I. Executive Summary

The Upper Rum River Watershed Management Organization (URRWMO) has prepared this Comprehensive Watershed Management Plan in accordance with Minnesota Rules Chapter 8410 (the Metropolitan Area Local Water Management), as administered by the Minnesota Board of Water and Soil Resources. This plan is effective from 2006-2017. The plan will be updated after this 10-year period.

This plan development process was initiated by the URRWMO Board. They began by internally reviewing their own goals for the WMO. Based on this framework, the solicited background information from the member communities. Since the Board is made up of elected officials from the member communities, the Board members were liaisons between the WMO and the member communities. Monthly meetings were held to review goals, policies, and to set priorities. Two public meetings were held to obtain background information from residents and to hear their perspectives on water management issues in the area. The ACD also provided extensive background information and input into the goals and priorities for the watershed as the ACD is contracted to do much of the work of the URRWMO.

The Upper Rum River Watershed Management Organization was formed on June 18, 1991 through a Joint Powers Agreement by Burns, Bethel, East Bethel, Ham Lake, St. Francis and Oak Grove under the authority conferred to the member parties in 1992 through Minnesota Statutes Sections 103B.201 to 103B.251. The agreement was amended and bylaws adopted in 1997. The Organization's purpose is to coordinate watershed-wide efforts to efficiently manage surface and groundwater resources. Management is aimed to improve water quality, minimize flooding, enhance wildlife values, and ensure sustainability. The Joint Powers Agreement that established the Upper Rum River WMO is included in **Appendix A** of this plan.

The Upper Rum River Watershed lies wholly within the northwestern corner of Anoka County and is shown on **Figure I-1**. The watershed covers 126.5 square miles. Portions of, or all of, six governmental units are within the watershed and are listed below:

Local Government Unit	Local Units of Government Area within Watershed (Square Miles)	Percent of Watershed
Burns	34.99	27.6%
Bethel	0.98	0.8%
East Bethel	31.5	24.9%
Ham Lake	1.31	1.0%
St. Francis	23.71	18.7%
Oak Grove	34.06	27.0%

A Board of Commissioners has been established as the governing body of the Upper Rum River Watershed Management Organization (WMO). The 11 member Board of Commissioners is

comprised of appointed members from each of the member communities. Many of the appointed members are council members or town board members of the member community. One member represents the City of Bethel, two members represent the town of Burns, two members represent the City of East Bethel, one member represents the City of Ham Lake, two members represent the City of Oak Grove, and one member represents the City of St. Francis. The Upper Rum River Watershed Management Organization Administrative Contacts are as follows:

Chair  
Randy Bettinger  
5550 210th Avenue NW  
Anoka, MN 55303  
[randy.bettinger@co.anoka.mn.us](mailto:randy.bettinger@co.anoka.mn.us)  
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Vice Chair  
John Anderson  
1820 229th Avenue NW  
Bethel, MN 55005  
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The duties of the WMO, as enacted by the Board, are as follows:

- Prepare and adopt a watershed management plan meeting the requirements of Minnesota Rules Chapter 8410.
- Review and approve local water management plans as defined in Minnesota Rules Chapter 8410.
- Exercise the authority of a Watershed District or Watershed Management Organization under Minnesota Statutes Chapter 103B to regulate the development of land when:
  1. A local water management plan has not been approved and adopted.
  2. A local permit requires an amendment to or variance from the local water management plan.
  3. The Board has been authorized by the local government to require permits for land use.

As identified in the Joint Powers Agreement, the Board has the authority to hire employees, conduct studies, fund improvements, and operate and maintain improvements constructed by the Board. Procedures have been established to finance capital improvement projects in such a manner that costs can be equitably distributed to benefited members for projects of benefit to more than one member. Where only one member community is benefited, that community will be responsible for the entire cost.

Under the Minnesota Rules Chapter 8410, requirements are outlined for preparing watershed management plans within the Twin Cities Metropolitan Area. Pursuant to the requirements of the law, the plan must focus on preserving and using natural water storage and retention systems to:

- Reduce, to the greatest practical extent, the public capital expenditures necessary to control excessive volumes and rate of run-off.
- Improve water quality.
- Prevent flooding and erosion from surface flows.

- Promote ground water recharge.
- Protect and enhance fish and wildlife habitat and water recreational facilities.
- Secure the other benefits associated with the proper management of surface water.

To insure that these goals are realized, the Metropolitan Surface Water Management Act further specified the basic contents of the watershed management plan. According to the law, this plan shall:

- Describe the existing and physical environment, land use and development in the watershed as well as the environment, land use and development proposed in existing local and metropolitan comprehensive plans.
- Present information on the hydrologic system and its components, including any drainage system previously constructed under Minnesota Statutes Chapter 103E, and existing and potential problems related thereto.
- State goals and policies, including management principles, alternatives and modifications, water quality, and protection of natural characteristics.
- Set forth a management plan, including the hydrologic and water quality conditions that will be sought and the significant opportunities for improvement.
- Describe the effect of the plan on existing drainage systems.
- Describe conflicts between the watershed plan and existing plans of local government units.
- Set forth an implementation program consistent with the management plan, which includes a capital improvement program and standards and schedules for amending the comprehensive plans and official controls of local government units in the watershed to bring about conformance with this watershed plan.

This watershed management plan is divided into the following major sections:

- I. Executive Summary
- II. Land and Water Resources Inventory
- III. Problems and Corrective Actions
- IV. Goals and Policies
- V. Implementation Program/Priorities
- VI. Impact on Member Communities
- VII. Amendment Procedures
- VIII. Glossary

The Executive Summary (**Section I**) states the authority and composition of the Upper Rum River Watershed Management Organization, the purpose of the Surface Water Management Act, and the components of this watershed management plan.

The Land and Water Resources Inventory (**Section II**) includes a profile of the watershed's existing environmental conditions. This profile contains descriptions of the area's topography, soils, land use, and metropolitan systems. This section also contains the information necessary to model the hydrologic system. Information includes watershed and subwatershed boundaries, wetlands, water bodies, conveyance systems and flood plains. Surface and ground water quality, ground water recharge areas, water use and water quality guidelines are also included.

Problems and Corrective Actions (**Section III**) discusses water resource management issues and identifies the strategies developed for each issue and defines the course of action the Organization will follow to address each issue. Implementation procedures explain how the strategies will be put into effect. Potential impacts associated with each identified alternative are evaluated.

The Goals and Policies Section (**Section IV**) describes the goals and policies of the Watershed Management Organization. The goals reflect the purposes set forth in the Surface Water Management Act. Policies developed by the Upper Rum River Watershed Management Organization define the goals and provide a framework in which to address the water management issues.

The Implementation Program/Priorities (**Section V**) consists of non-structural, structural, and programmatic solutions to the problems, issues, and goals identified in **Section III** and **Section IV**.

The Impact on Member Communities (**Section VI**) discusses the conformance of local governmental water resource management plans to this watershed management plan.

The Amendment Procedures (**Section VII**) discusses a procedure to be followed should it be necessary to amend this plan. This procedure would be invoked only for major changes that would directly affect water resource management within the member communities.

**Section VIII** contains a glossary of commonly used terms.

The Plan also contains various appendices with supporting documentation.

**Figure I-1 Watershed Location Map**

## II. Land and Water Resource Inventory

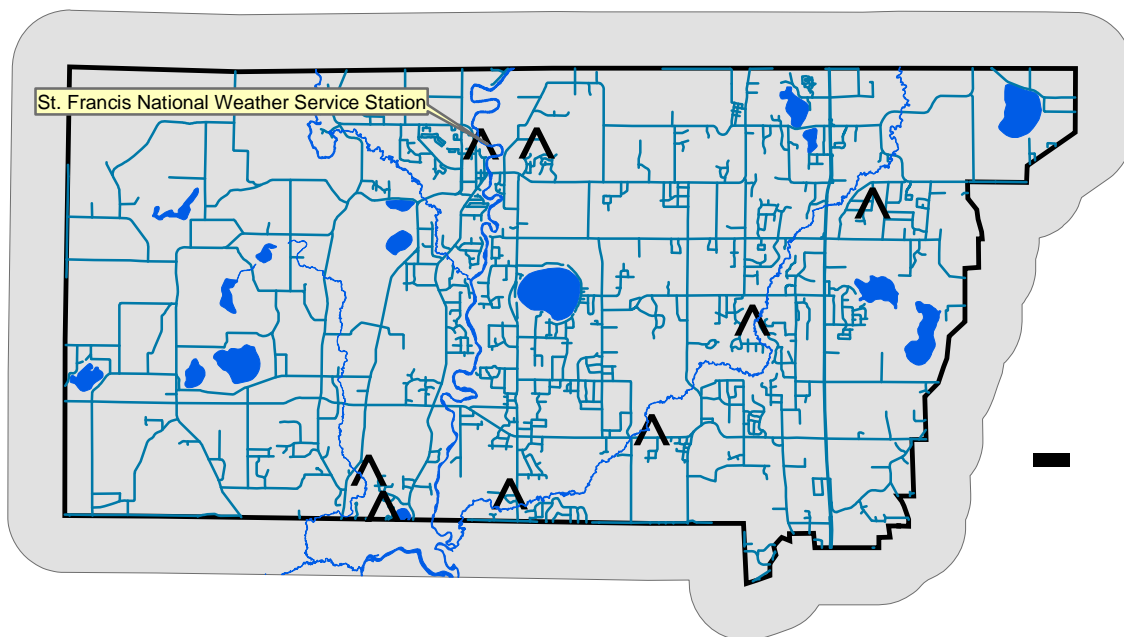
As required in Minnesota Rules Section 8410.0060, this section of the plan provides a general description and summary of the climate, geology, surficial topography, surface and groundwater resource data, soils, land use, public utility services, water based area land ownership, fish and wildlife habitat, unique features, scenic areas and possible pollutant sources. This section also identifies where detailed information can be obtained for many of these areas of concern. This information is provided to the extent necessary to provide guidance to the URRWMO in managing water resources and is not intended to be used for final design or construction within the URRWMO. This portion of the URRWMO Watershed Management Plan was developed with the assistance of the Anoka Conservation District.

### A. Climate / Precipitation

Precipitation patterns are influenced by moisture from the Gulf of Mexico. Precipitation occurs as rain, freezing rain, hail, and snow. Occasional tornados, severe thunderstorms, and hailstorms occur and are of short duration.

Precipitation is monitored at numerous sites throughout the Upper Rum River Watershed as shown in **Figure II-1**. These areas include sites that are monitored by volunteers coordinated by the Anoka Conservation District and sites managed by the Metropolitan Mosquito Control District, Minnesota Department of Natural Resources, and National Weather Service. Data from all sites is centrally housed by the Minnesota Climatology Working Group at <http://climate.umn.edu>. Summary data is provided in **Table II-1**.

**Figure II-1.** Precipitation Monitoring Stations (June 2004).



**Table II-1. Precipitation Summary for the National Weather Services St. Francis Monitoring Station (217308).**

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Ave total precip. (in)	0.75	0.89	1.41	2.11	3.41	3.84	3.65	4.25	3.24	2.09	1.40	1.00	28.04
2 years in 10 have less than*	0.47	0.28	0.96	1.03	2.02	2.78	2.47	3.14	1.49	1.01	0.75	0.37	16.77
2 years in 10 have more than*	1.50	1.25	2.56	3.80	4.75	5.65	5.82	6.14	4.78	3.75	3.46	1.38	44.84
Ave # days with 0.1 in or more *	3	2	4	5	7	7	7	7	6	4	4	2	58

\* Source: USDA NRCS

Standards for characterizing precipitation events have been developed based upon monitoring data. Precipitation events are characterized based upon the probability of a storm event with a given total precipitation to occur in any given year. Often times this is expressed as a return interval. For instance, a 50-year storm event is a rainfall event that has a 2% chance of occurrence in any given year. The criteria for characterizing storm events in east central Minnesota are in **Table II-2**.

**Table II-2. Frequency Distribution of Precipitation Events.**

Storm Duration	Recurrence Interval											
	2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
10-days	1.83	2.21	2.54	2.99	3.44	3.74	4.53	5.51	6.23	7.16	7.90	8.68
5-days	1.55	1.85	2.09	2.42	2.79	3.03	3.66	4.50	5.15	6.11	6.86	7.69
72-hrs	1.37	1.61	1.82	2.11	2.43	2.64	3.16	3.85	4.41	5.19	5.85	6.59
48-hrs	1.28	1.50	1.67	1.94	2.23	2.42	2.89	3.53	4.03	4.74	5.36	6.02
24-hrs	1.22	1.42	1.55	1.80	2.04	2.22	2.65	3.23	3.69	4.35	4.88	5.80
18-hrs	1.15	1.34	1.46	1.69	1.92	2.09	2.49	3.04	3.47	4.09	4.59	5.13
12-hrs	1.06	1.24	1.35	1.56	1.78	1.93	2.31	2.81	3.21	3.78	4.25	4.75
6-hrs	0.91	1.06	1.16	1.34	1.53	1.66	1.99	2.42	2.77	3.26	3.66	4.10
3-hrs	0.78	0.91	0.99	1.15	1.31	1.42	1.70	2.07	2.36	2.78	3.12	3.49
2-hrs	0.71	0.83	0.90	1.04	1.19	1.29	1.54	1.87	2.14	2.52	2.83	3.17
1-hr	0.57	0.67	0.73	0.84	0.96	1.04	1.25	1.52	1.73	2.04	2.29	2.57
30-min	0.45	0.52	0.57	0.66	0.75	0.82	0.98	1.20	1.37	1.61	1.81	2.02
15-min	0.33	0.38	0.42	0.49	0.55	0.60	0.72	0.87	1.00	1.17	1.32	1.47
10-min	0.26	0.30	0.33	0.38	0.43	0.47	0.56	0.68	0.77	0.91	1.02	1.15
5-min	0.15	0.17	0.19	0.22	0.25	0.27	0.32	0.39	0.44	0.52	0.59	0.66

Source: Huff, F.A. and J. Angel. 1992. Rainfall Frequency Atlas of the Midwest. Midwest Climate Center. Research Report 92-03.

## **B. Geology**

### **1. Surficial Geology**

The landscape of the Upper Rum River Watershed was shaped by several ice advances into east central Minnesota during the last glaciation, which occurred about 10,000 years ago. In the Upper Rum River Watershed a large glacial outwash deposit, called the Anoka Sandplain is the dominant geomorphic feature. It was formed largely by glacial drainage from the receding Grantsburg Sublobe of the Des Moines glacier. The Surface of the Anoka Sandplain is flat to moderately undulating. Low regions of upland represent areas of till left from previous ice movements that were not buried by the outwash sand. Other features of positive relief are patches of sand dunes formed by southwesterly winds after the outwash streams left the Sandplain. Landscape features of negative relief include numerous lakes and marshes, which formed as ice blocks, originally buried by the outwash sand that melted to create the depressions, and are now filled with water or organic soils. As a result of the above-mentioned glacial actions, glacial outwash is the predominant surficial geologic formation in the watershed, about one-third of which is covered by organic soils.

Topography in the URRWMO differs from the rest of Anoka County due to an end moraine. The glaciers deposited large mounds of gravel in what is now the western part of the City of St. Francis and northwestern Burns Township. Melt water from the retreating glaciers shaped much of what is now Anoka County, a large outwash plain dominated by gently rolling sand and shallow lakes and wetlands. The highest point of the WMO area is in the northwestern St. Francis at an elevation of 1130 feet above sea level (this is also the highest point in Anoka County). The lowest point is 860 feet above sea level in the southern edge of the WMO area where Cedar Creek meets the Rum River.

### **2. Bedrock Geology**

The surficial glacial deposits of the URRWMO overlie bedrock of Cambrian sandstones that dip gently to the southeast. The uppermost formation across most of the URRWMO is the Cambrian Franconia sandstone. The Franconia is a very fine to coarse grained, commonly silty and glauconitic sandstone with some shale and dolomite. The Franconia formation is 30 to 60 meters (100 to 200 feet) thick. In the URRWMO, it is thickest in the east and thins in the west.

In the areas where the Franconia has eroded away, narrow bands of the Ironton Galesville Formation exist as the uppermost bedrock formation. The Ironton sandstone is a white to grey, medium grained, moderately well to poorly sorted commonly silty quartzose sandstone. The Galesville sandstone is a white to grey predominantly medium grained, well sorted quartzose sandstone. The Ironton is at most 14 meters (46 feet) thick and the Galesville is as much as 30 meters (100 feet) thick. The boundary between the Ironton and Galesville is often difficult to determine.

Underlying the Iron-ton-Galesville Formation is the Eau Claire Formation. The Eau Claire Formation is the uppermost bedrock in the northwest corner of the URRWMO. The Eau Claire formation is composed of red shale, grey-green shale, fine grained quartzose sandstone and fine grained glauconitic quartzose sandstone. The shale's are generally interbedded layers within the quartzose sandstone and are less than 2.5 meters (8 feet) thick. This formation is nearly 60 meters (200 feet) thick.

## C. Surface Water Resource Data

### 1. Hydrologic System

The topography of the Upper Rum River Watershed varies from the highest elevation of approximately 1,130 feet above mean sea level in the northwestern corner to the lowest elevation of about 860 feet at the point that the Rum River leaves the watershed boundary in the south-central area. In general, the land is quite flat with gently sloping areas.

The Upper Rum River Watershed contains numerous lakes, wetlands, watercourses and ditches. The watershed contains four major DNR Public Watercourses:

- Cedar Creek
- Ford Brook
- Seelye Brook
- Rum River

Water collects in these systems and is eventually discharged to the Rum River.

The subwatershed boundaries tributary to lakes and streams within the watershed are outlined on **Figure II-2**.

The watershed also contains a number of private and public ditches. These ditches were constructed in the late 1800's and early 1900's. Minimal maintenance has been performed on these ditches since their construction. While original construction plans exist for many ditches, the "as-built" drawings do not, thus making repairs and maintenance problematic. The Anoka County Highway Department is the ditch authority for the County Ditches in the watershed. **Table II-3** lists the County Ditches and **Figure II-3** shows the location of the ditches.

**Table II-3: County Ditches within the URRWMO**

<b>Ditch No.</b>	<b>Length (miles)</b>	<b>Year Constructed</b>	<b>Location</b>
13	11.48	1891	East Bethel
14	3.97	1891	Burns
18	3.47	1893	St. Francis, Oak Grove
19	12.76	1893	St. Francis, Oak Grove
21 (71)	4.54	1893	Ham Lake, Oak Grove
27	8.65	1899	Burns
28	7.33	1898	East Bethel, Ham Lake
30	1.10	1898	St. Francis, Burns
36	2.65	1899	East Bethel
38	2.43	1900	East Bethel
42	3.83	1907	Burns
48	4.98	1908	East Bethel, Oak Grove
49	9.29	1909	Burns
50	0.64	1910	Burns
64	2.96	1920	Burns
65	2.53	1921	Burns
67	3.03	1922	East Bethel
34	1.1		Ham Lake, East Bethel

**2. Wetland Inventory**

A wetland inventory has been completed by the US Fish and Wildlife Service as published on the National Wetland Inventory (NWI). Wetlands cover more than one-quarter of the watershed. The national wetlands inventory (NWI) has identified 3,978 different wetlands within the URRWMO totaling 21,756 acres (**Figure II-4**). This inventory was conducted using aerial photos and infrared photos from 1979 to 1988. Wetlands were digitized based on these aerial photos and additional information including USGS Quadrangle maps and soil surveys in 1991. Wetlands were coded using USFWS classification scheme.

An inventory has also been completed by the Department of Natural Resources (DNR) that identifies the public waters and wetlands. The DNR Public Waters/Wetlands map is shown on **Figure II-5**.

**3. Water Quality**

Surface water quality data exists for many of the water bodies within the watershed. Several agencies have instituted programs based on particular needs. These agencies include the Anoka Conservation District, Metropolitan Council, USGS, and the Minnesota Pollution Control Agency.

**Figure II-6** shows the location of the past and current water quality monitoring in the watershed. The results of water quality monitoring are published by the ACD and can be obtained on the Anoka Conservation District website at <http://www.anokanaturalresources.com/>.

The MPCA also has water quality data for the area. The information from the MPCA can be found at their website at <http://www.pca.mn.us/data/edaWater/index.cfm>

#### **4. Impaired Waters**

There are five listed impaired waters within the URRWMO as follows:

Lake George – Oak Grove – Mercury  
Rum River – St. Francis and Oak Grove – Mercury  
Crooked Brook – East Bethel – Low oxygen  
Rogers Lake (104P) – Oak Grove, Burns, Ramsey – Nutrients

Information about these waters can be found at the MPCA’s website at <http://www/pca.mn.us>.

#### **5. Water Appropriations**

A list of all the permitted surface and groundwater appropriations has been obtained from the DNR. **Figure II-7** illustrates the locations of these appropriations. Further information about these sites can be obtained from the DNR.

#### **6. Flood Problem Areas**

The URRWMO Board has discussed flooding and determined there are **no** flood problem areas within the URRWMO at this time.

#### **7. Flood Insurance Studies/ Floodplain Management**

The Upper Rum River Watershed includes 19,731 acres of 100-year floodplain and 3,401 acres of 500-year floodplain (**Figure II-8**). These floodplains band the streams of the watershed including Seelye Brook, Ford Brook, Cedar Creek and some of the major ditches. Other large floodplain areas are part of the watershed’s major wetland complexes including those in northeastern Burns Township and those near the Sandhill Crane Natural Area. Flood Data are derived from the Flood Insurance Rate Maps (FIRMs) published by the Federal Emergency Management Agency (FEMA). The FIRM is the basis for floodplain management, mitigation, and insurance activities for the National Flood Insurance Program (NFIP). Insurance applications include enforcement of the mandatory purchase of flood insurance by property owners who are being assisted by Federal Programs or by federally supervised, regulated or insured agencies or institutions in the acquisition or improvement of land facilities located or to be located in identified areas having special flood hazards.

The National Flood Insurance Program mapped the Upper Rum River Watershed's flood boundaries as part of the Flood Insurance Studies completed in 1979 and 1980. These studies can be found at the member communities' City Halls. These studies included:

1. Anoka County FIS, July 1979, Community ID 270005(includes Columbus and Linwood Townships).
2. City of East Bethel FIS, November 1979, Community ID 270012
3. City of Ham Lake FIS, January 1980, Community ID 270674
4. City of St. Francis FIS, 1980's

Flood Insurance study maps are useful tools, but have considerable limitations. In this relatively flat watershed, the Flood Insurance Rate Maps, generated from the USGS topographic maps with 10 foot contour intervals, are not very precise. Therefore, it is not uncommon to find non-floodplain areas mapped as flood hazard areas and flood prone areas that are not included on the map.

**8. Shoreland Management**

The member communities within the URRWMO have either completed a shoreland ordinance or are in the process of completing a shoreland ordinance. Communities within the watershed are required to have an adopted shoreland ordinance. The status of the member communities' ordinances is as follows:

**Table II-4: Status of Shoreland Management Ordinances**

<b>Local Government Unit</b>	<b>Adopted Shoreland Ordinance</b>
Burns Township	Under Anoka County Ordinance
City of Bethel	No (needs to be reviewed by DNR)
City of East Bethel	Yes
City of Ham Lake	Yes
City of St. Francis	Has Rum River Scenic District and Urban Stormwater Ordinance
City of Oak Grove	Yes

There many lakes within the Upper Rum River Watershed. The Minnesota Department of Natural Resources (DNR) classifies lakes to describe their morphology, recreational usage, fisheries characteristics and priority level for sustaining or improving the quality of the resource. The classification systems are described below, and the designation for each lake is indicated in **Table II-5**. This classification system is intended to help local governments appropriately regulate development in shoreland areas adjacent to each lake. More information about specific lakes can be obtained from the Anoka Conservation District web-site at <http://www.anokanaturalresources.com/>.

Natural Environment Lakes (NE)

Usually have less than 150 total acres, less than 60 acres per mile of shoreline, and less than three dwellings per mile of shoreline. They have some winterkill of fish; may have shallow, swampy shoreline; and are less than 15 feet deep. Some natural environment lakes are further specified as “A” or “B,” indicating differing structure setback requirements based on the likelihood that the shoreline would be viewed from the water(i.e., lake’s boating potential).

Recreational Development Lakes (RD)

Usually have between 60 and 225 acres of water per mile of shoreline, between 3 and 25 dwellings per mile of shoreline and are more than 15 feet deep.

General Development Lakes (GD)

Usually have more than 225 acres of water per mile of shoreline, between 3 and 25 dwellings per mile of shoreline and are more than 15 feet deep.

**Table II-5: DNR Shoreland Classifications**

<b>ID. No.</b>	<b>Name</b>	<b>Twp./ Range</b>	<b>Selection(s)</b>	<b>Local Government Unit</b>	<b>Area (acres)</b>	<b>DNR Shoreland<sup>a</sup> Classification</b>	<b>OHW<sup>b</sup></b>
02-55P	Lone Pine Lake	33/23	2,3,10,11	East Bethel	209	NE	
02-56P	Booster Pond	33/23	4	East Bethel	15	NE	
02-57P	Neds Lake	33/23	8,9,16,17	East Bethel	551	NE	
02-59P	Deer Lake	33/23	15,16,21,22	East Bethel	376	NE	
02-60P	Mud Lake	33/23	16	East Bethel	184	NE	
02-65P	Fish Lake	34/23	25,26,35,36	East Bethel	432	NE	
02-67P	Minard Lake	34/23	29,30,31	East Bethel	124	RD	
02-70P	Coopers Lake	34/23	31,32	East Bethel	58	NE	
02-91P	Lake George	33/24	9,10,15,16	Oak Grove	486	GD	902.30
02-92P	Grass Lake	33/24	10,11,14,15	Oak Grove	159	NE	908.50 <sup>c</sup>
02-96W	Hickey Lake	33/24	20,21,28	Oak Grove	73	NE	887.20
02-97P	Mud Lake	33/24	21,22,27,28	Oak Grove	175	NE	890.70
02-98P	Swan Lake	33/24	25	Oak Grove	273	NE	
02-102P	Sand Shore	34/24	25,36	Bethel	40	NE	
02-104P	Rogers Lake	32;33/24;25	6;1;31;36	Burns/Oak Grove	46	NE	
02-105P	Mud Lake	33/24;25	6;7;1,12	Burns/Oak Grove	172	NE	
02-106P	Norris Lake	33/24;25	6;1	Burns/Oak Grove	120	NE	
02-122P	Burns Lake	33/25	4,5	Burns	153	NE	
02-127P	Goose Lake	33/25	9,10,15,16	Burns	79	NE	
02-128P	Pinnaker Lake	33/25	10	Burns	34	NE	915.60
02-130P	Pickeral Lake	33/25	15,16,21,22	Burns	303	NE	
02-131W	Bear Lake	33/25	17	Burns	24	NE	99.00 <sup>d</sup>
02-133P	East Twin Lake	33/25	19	Burns	141	NE	927.10
02-135P	Bass Lake	33/25	21	Burns	92	NE	
02-136P	Benjamin Lake	33/25	25	Burns	39	NE	
02-138P	McCann Lake	33/25	26,27	Burns	107	NE	
02-225W	Unnamed wetland	33;34/24	1;36	Oak Grove/ St. Francis	24	NE	
02-64W	Unnamed wetland	34/23	20,29	East Bethel	15	NE	
02-66W	Unnamed wetland	34/23	29	East Bethel	16	NE	
02-68W	Unnamed wetland	34/23	31	East Bethel	25	NE	
02-69W	Unnamed wetland	34/23	31, 32	East Bethel	25	NE	
02-94W	Unnamed wetland	33/24	17, 20	Oak Grove	63	GD	
02-95W	Unnamed wetland	33/24	20	Oak Grove	15	NE	
02-99W	Unnamed wetland	33/24	30	Oak Grove	14	NE	
02-124W	Unnamed wetland	33/25	6	Burns	45	NE	
02-134W	Unnamed wetland	33/25	19, 20	Burns	39	NE	

<b>ID. No.</b>	<b>Name</b>	<b>Twp./ Range</b>	<b>Selection(s)</b>	<b>Local Government Unit</b>	<b>Area (acres)</b>	<b>DNR Shoreland<sup>a</sup> Classification</b>	<b>OHW<sup>b</sup></b>
02-141W	Unnamed wetland	34/25	31, 32	St. Francis	38	NE	
02-276W	Unnamed wetland	33/24	6	Oak Grove	26	NE	
02-285W	Unnamed wetland	33/25	7, 18	Oak Grove	31	NE	
02-293W	Unnamed wetland	33/24	19	Oak Grove	10	NE	
02-346W	Unnamed wetland	33/24	4	Oak Grove	12	NE	
02-348W	Unnamed wetland	33/24	3, 10	Oak Grove	31	NE	
02-352W	Unnamed wetland	33/24	1, 12	Oak Grove	73	NE	
02-356W	Unnamed wetland	33/24	9	Oak Grove	27	NE	
02-357W	Unnamed wetland	33/24	4, 9	Oak Grove	45	NE	
02-362W	Unnamed wetland	33/24	15	Oak Grove	16	NE	
02-367W	Unnamed wetland	33/24	16, 21	Oak Grove	26	NE	
02-369W	Unnamed wetland	33/24	29	Oak Grove	21	NE	
02-371W	Unnamed wetland	33/24	29, 32	Oak Grove	34	NE	
02-375W	Unnamed wetland	33/24	32	Oak Grove	130	NE	
02-376W	Unnamed wetland	33/24	25, 36	Oak Grove	12	NE	
02-387W	Unnamed wetland	33/24	36	Oak Grove	49	NE	

- a. NE=Natural Environment, RD=Recreational Development, GD=General Development
- b. The Ordinary High Water (OHW) elevation is recorded from the 1929 datum unless otherwise noted.
- c. 1912 datum
- d. Assumed datum

## **D. Ground Water Resource Data**

### **1. Surficial Aquifers**

The surficial outwash (Anoka Sand Plain) deposits located across the eastern two-thirds of the URRWMO will yield small to large quantities of water. Where the aquifer has sufficient saturated thickness, a well may yield several hundred gallons of water per minute. The grey till (surficial material) in the western third of the URRWMO will yield little water because of the low hydraulic conductivity associated with till.

However buried lenses of sand and gravel located within the till may yield sufficient water depending on thickness and extent of the layers. The red drift and ice contact deposits in the northwest corner of the URRWMO may yield sufficient quantities of water. It is difficult to predict high water yielding capacity due to the stratified zones and varying hydraulic conductivities.

The regional groundwater flow within the surficial aquifers and glacial drift is generally to the southeast, except near the Rum River and Cedar Creek where ground water tends to flow toward these surface waters. Rum River and Cedar Creek are predominately discharge areas for groundwater. Therefore, Cedar Creek and Rum River would be characterized as known groundwater and surface water connections. Areas not near the Rum River and Cedar Creek are predominately groundwater recharge areas.

### **2. Bedrock Aquifers**

The Franconia sandstone which covers all but the northwest corner of the URRWMO has moderate to high water yielding capacity. The Ironton-Galesville Formation lies to the northwest of the Franconia sandstone and is the uppermost bedrock in a band approximately 1.6 to 3.2 kilometers (1 to 2 miles) wide. The Franconia Ironton-Galesville Aquifer has moderate to high water yielding capabilities. The hydraulic conductivities are variable in these aquifers, with the highest generally in the Galesville. Wells in these aquifers may be capable of yielding several hundred gallons of water per minute.

Underlying the Franconia Ironton-Galesville formations is the Eau Claire formation. The Eau Claire formation may yield low quantities of water in certain locations, but is not generally considered an aquifer. The Eau Claire formations act as a confining layer between the Cambrian sandstones and the Cambrian Mt. Simon-Precambrian Hinckley aquifers. The Mt. Simon-Hinckley Aquifer, which underlies the entire URRWMO, dips gently to the southeast. Regional groundwater flow in the Mt. Simon-Hinckley Aquifer is to the southeast. The water in the aquifer is under artesian pressure.

### **3. Groundwater Quality**

The metropolitan area is developed over an extensive groundwater aquifer system that consists of several good sources of water separated and protected by relatively impervious confining layers. Hazardous waste sites, sanitary landfills, dump sites, feedlots, pipelines, and leaking underground or above ground storage tanks or spills and private disposal sites may contaminate groundwater resources.

Drinking water throughout the URRWMO is obtained primarily from shallow private wells. Approximately one-third of St. Francis is served by municipal well and water systems. The remaining residential and commercial properties within the URRWMO utilize private wells for potable and other water needs. The high yielding Prairie du-Chien- Jordan aquifer that is available in other Twin Cities Metropolitan areas is not available in the URRWMO. As a result residents in the URRWMO must rely on the shallow surficial drift aquifer, which is highly susceptible to contamination in most areas. The bedrock aquifers available include the Franconia-Ironton-Galesville and lower lying Mt. Simon-Hinckley aquifer.

Most ground water quality protection is in the form of Wellhead Protection Planning. The primary purpose of these plans is to identify potential sources of contamination and put a plan in place to protect groundwater supplies and areas where special measures are most needed. Ten Anoka County cities formed a Joint Powers Organization to jointly write a city-level Wellhead Protection Plan. St. Francis is not part of the Joint Powers Organization and has developed its own Wellhead Protection Plan.

The URRWMO area is also within the source water protection area for the cities of Minneapolis and St. Paul. These cities draw drinking water from the Mississippi River approximately 20 miles downstream from the URRWMO. Source water protection planning for these cities is being coordinated by the Minnesota Rural Water Association (MRWA). The URRWMO will work with the MRWA through the implementation schedule in this plan to protect and improve source water drinking supplies in areas downstream of the URRWMO.

## **E. Soils**

There are four general soil associations within the watershed as determined by the “Soil Survey of Anoka County, Minnesota” as follows:

### **1. Zimmerman-Isanti-Lino Association**

The topography of these soils is level to undulating. Zimmerman soils are excessively drained soils consisting of very dark gray to dark-brown fine sand underlain by yellowish-brown and light yellowish-brown fine sand. Isanti soils are very poorly drained black fine sandy loam underlain by gray and dark gray fine sand. These soils occur in depressions and low lying areas. Lino soils are somewhat poorly drained black, dark gray or dark grayish-brown loamy fine sand underlain by mottled brown and light brownish gray-fine sand. The high water table is at or near the surface in many of the depressions that occur throughout this association. This association dominates from the eastern border of the watershed to the Rum River.

## **2. Hubbard-Nymore Association**

The topography of these soils is gently sloping and excessively drained sandy soils throughout. Hubbard soils are black and dark grayish brown at the surface and are underlain by dark brown and yellowish brown coarse sand. Nymore soils are very dark gray and black to very dark grayish brown loamy sand underlain by dark brown loamy sand. It is an outwash plain that is dissected by drainage ways and dotted with large depressions. This association is prominent along the Rum River and between Lake George and Cedar Creek.

## **3. Heyder-Kingsley-Hayden Association**

The topography of these soils is gently undulating to steep they are often excessively drained to well drained soils formed in loamy glacial till. Heyder and Kingsley soils occur on hill crests and hillsides. Heyder soils are very dark grayish-brown fine sandy loam underlain by grayish-brown fine sandy loam. With the exception of Emmert-Kingsley association in the northwest this soil dominates the watershed from its western border to Seeyle Brook and the Rum River.

## **4. Emmert- Kingsley Association**

The topography of these soils is gently undulating to steep. They are often excessively drained to well drained soils formed in loamy and sandy glacial drift, much of the association in the watershed is gravel coarse sand. Emmert soils consist of dark gray gravelly coarse sandy loam underlain by brown to very pale brown coarse sand or gravelly coarse sand. They typically occupy irregularly-shaped knolls and hills. Kingsley soils occupy hill crests and hillsides. Kingsley soils have a surface layer of very dark gray fine sandy loam underlain by pale brown fine sandy loam. This association is only present in the northwestern corner of the watershed.

These soils can be described based on their hydrologic characteristics (**Table II-6**). The majority of soils in the Upper Rum River Watershed are Groups A and A/D. All soils listed as Group A/D are extremely wet soils and are considered D soils in the undrained condition since they are ponded or saturated and would result in discharge if additional precipitation were added. From a resource management standpoint they do not present the same concerns as Group D soils found in uplands. Most of Burns Township and western St. Francis is Group B soils with only small areas scattered in the remainder of the watershed. The watershed has Group C soils located in western St. Francis, northwestern Burns Township and two small areas in southern Burns Township.

**Table II-6: Hydrologic Soil Groups**

Group A	(Low runoff potential) – Soils having high infiltration rates even when thoroughly wetted, consisting chiefly of deep, well to excessively drained sands and/or gravel. These soils have a high water transmission rate and would result in a low runoff potential. Min infiltration rate: greater than 0.30 inch/hr.
Group B	Soils having moderate infiltration rates when thoroughly wetted, consisting chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate water transmission rate. Min infiltration rate: 0.15 to 0.30 inch/hr.
Group C	Soils having slow infiltration rates when thoroughly wetted, consisting chiefly of soils with a layer that impedes downward movement of water, or soils with moderately fine to fine texture and a slow infiltration rate. These soils have a slow water transmission rate. Min infiltration rate: 0.05 to 0.15 in/hr.
Group D	(High runoff potential) – Soils having very slow infiltration rates when thoroughly wetted, consisting chiefly of clay soils with a high swelling potential, soils with a high permanent water table, soils with clay pan or clay layer at or near the surface, and shallow soils over nearly impervious materials. These soils have a very slow water transmission rate. Min infiltration rate: 0 to 0.05 in/hr.

Source: *Hydrology Guide for Minnesota, U.S. Dept of Ag, Soil Conservation Service, St Paul, Minnesota*<sup>2</sup>

A detailed map showing all the soil types of Anoka County is provided by in the United States Department of Agriculture Soil Conservation Service publication entitled *Soil Survey of Anoka County, Minnesota*. This map consists of many sheets made from aerial photographs. On each map sheet soil areas are outlined and identified by symbols. A complete digital representation of the soils survey data is available and was utilized for soil characteristics maps. **Figure II-9** shows the soils within the watershed based on hydrologic soil classifications.

**F. Land Use**

Existing Land use within the watershed describes the history of the area and its future. As shown on the existing land use map (**Figure II-10**), nearly 25% of the watershed is residential development. Agriculture production is another common land use, particularly in Burns Township. Following settlement of the area, farming was a common land use with row and hay as common crops. Sod and tree farming are other forms of agriculture in the watershed, supplying the areas growing landscape needs. Parkland and public land make up 8% of the watershed with Cedar Creek Natural History Area (CCNHA) making up nearly half of the public open space. Wetlands and lowlands for the most part are unavailable for development; however, these lands are used for recreational hunting, bird watching, hiking and fire wood gathering.

There have been two major changes in land use since European settlement: the initial clearing of land for agriculture production and now the conversion of those agricultural lands and additional clearing for roads, houses, businesses and other facilities that support a growing population. As the population and individual households increase so do the stresses on the natural environment of the watershed. Since most of the current and future households within the watershed are serviced by individual sewage treatment systems and individual wells there is the potential for water impairment if local and state laws are not followed.

The development that has generally occurred within the URRWMO boundary has consisted of land use conversion from agricultural to rural residential. This land use change has resulted in a decrease of storm water runoff volume. Where areas have developed more densely, an increase in runoff volume has occurred.

Development in the past was limited by infrastructure. Development would occur along existing roads. Development is still limited to some extent by existing infrastructure; however large developments are occurring with the extension and creation of new roads. Development is also guided by local zoning ordinances. With the exceptions of parts of St. Francis, Bethel, Oak Grove and a small part of East Bethel, there are no municipal water supplies or waste water treatment facilities. St. Francis is providing water and sewer to a development in Oak Grove. The lack of water services requires the use of individual septic systems and wells, which further limits where development can occur. The planned land use within the WMO is shown in **Figure II-11**.

The Metropolitan Council produced forecasts for population, households and employment for the entire metropolitan region from 2000 to 2030 in 10 year increments. Forecasts were reviewed by cities and townships in 2002 and 2003 to make needed updates. Forecasts were developed using recent birth, death and mitigation rates and are shown in **Table II-7** for the URRWMO.

**Table II-7: Metropolitan Council Population & Household Forecast**

City or Township	Years				
	1990	2000	2010	2020	2030
<b>Population</b>					
Bethel	394	443	450	460	510
Burns	2,401	3,557	4,400	5,200	6,300
East Bethel	8,050	10,941	12,300	13,200	14,300
Ham Lake	8,924	12,710	16,100	18,100	19,500
Oak Grove	5,488	6,903	7,700	8,300	8,600
St. Francis	2,538	4,910	7,700	10,400	12,800
<b>Households</b>					
Bethel	130	149	160	180	200
Burns	754	1,123	1,500	1,900	2,300
East Bethel	2,542	3,607	4,400	5,000	5,500
Ham Lake	2,720	4,139	5,700	6,800	7,200
Oak Grove	1,638	2,200	2,700	3,000	3,220
St. Francis	760	1,638	2,800	4,000	5,000

**G. Water Based Recreation**

The watershed has available to the public a variety of water resource related recreational facilities. There are several park facilities within the watershed that provide activities such as swimming, fishing, and boating. The following parks are location at lakes and water bodies within the URRWMO:

- Neds-Mud-Deer Lake County Park (East Bethel): This park consists of 172 acres of county park intended to remain natural without trails or roads.
- Lake George Park (Oak Grove): The 265 acre park includes a boat launch, picnic areas, a swimming beach, and hiking trails.

- Rum River Central Park (Oak Grove): This park is partly within the City of Oak Grove and partly within the City of Andover. The park has trails, camping, and picnic areas. A boat launch is available within the City of Andover.
- Pickerel Lake Park (Burns Twp): A boat access is available at Pickerel Lake.
- East Twin Lake Park (Burns Twp): This park offers a swimming beach, picnic areas, trails, and a boat access.
- Rum River Canoe Access (St. Francis): A walk-in boat access is available on the Rum River in St. Francis.

## **H. Fish and Wildlife Habitat**

Many of the lakes and wetlands within the watershed provide fish and wildlife habitat for a variety of species. A description of known habitat resources in the watershed is presented below.

### **1. County Biological Survey**

Information from the DNR includes significant habitat areas as noted on the County Biological Survey as shown on **Figure II-12**. These areas contain known, high quality habitat and/or rare features. This information should be used by the member communities for land planning and development review.

### **2. Natural Areas and Wildlife Management Areas**

In addition to the areas noted as part of the County Biological Survey, a number of natural areas and wildlife management areas are within the watershed as listed below:

- Cedar Creek Natural History Area: The Cedar Creek Natural History Area (CCNHA), located in East Bethel in the northeastern portion of the URRWMO, was established in 1940 for the study and preservation of this mosaic of natural areas where the three major biomes of Minnesota merge, northern coniferous, eastern broadleaf deciduous forest and prairie/savanna to the west. CCNHA is considered a site of outstanding biodiversity by the Minnesota County Biological Survey.
- Burman Wildlife Management Area: Additional unique vegetation communities like wet meadows, hardwood swamps and dry oak forests are included in the Burman Wildlife Management Area in the City of Oak Grove and farther down the stream along Cedar Creek. Oak forests, other hardwood stands, and commercial and conservation pine groves are also common features of the landscape.
- Bethel Wildlife Management Area
- Sandhill Crane Natural Area
- Wildlife Corridors

### **3. Greenway Corridors**

Anoka County Parks and Anoka Conservation District completed resource inventories and analysis in 1999 and 2000 along Cedar Creek and in parts of East Bethel and Oak Grove, respectively. Citizens, elected officials, agencies and private consultants established goals and a basic strategy for implementing a corridor plan. These first plans have been followed up with Phase II plans completed in 2002 which included more detailed land cover inventory and a more participatory role of local governments with discussion focused on implementation measures.

In 2002 to 2003 Anoka Conservation District worked with Burns Township to complete a land cover inventory and develop a greenway plan for the community. All of these plans inventoried and evaluated the resources within the project areas. Upon analysis, a system of greenway hubs and connecting corridors was identified thus implementing the goals outlined in the greenway plans.

St. Francis and portions of Oak Grove were inventoried in 2003 and 2004 by the Anoka Conservation District. Anoka Conservation District conducted preliminary analysis within these areas and identified additional greenway hubs and corridors. The greenways identified are some of the last remaining intact or partially intact naturally vegetated wildlife corridors in the area. These areas have been selected based on the value of the natural resources and context of the resource, including habitat diversity, distance to disturbance, connectivity including stream corridors. The uplands and wetland complexes adjacent to and near these streams serve an important role not just for the flora and fauna dependent on the open spaces, but the water resources they buffer.

#### **I. Unique Features and Scenic Areas**

The watershed contains some unique features and scenic areas as described below:

##### **1. Scientific and Natural Areas**

There are no DNR Designated Scientific and Natural Areas within the watershed.

##### **2. Rare and Endangered Species**

The Upper Rum River watershed provides habitat for a significant number of Blanding's turtles (*Emydoidea blandingii*), a State Threatened Species. As part of the Rum River watershed, the URRWMO area is considered by the Nongame Wildlife Program to be potentially important for Blanding's turtles, because of verified sightings of the species and at least some remaining habitat.

In addition to Blanding's turtles, the Cedar Creek Natural History Area (NHA) and the Helen Allison Savanna Scientific and Natural Area (adjacent to the southeast boundary of Cedar Creek NHA and outside of the watershed) support many rare plants. Their combined areas contain: five state Endangered, three state Threatened, and six state Special Concern plant species. Habitat for red-shouldered hawks (*Buteo lineatus*), a Special Concern species, and Sandhill cranes (*Grus Canadensis*), a

species recently removed from Special Concern status on the state list, is also provided. The areas' natural communities form a complex of forests and wetlands that not only support a significant number of rare species, but also provide important habitat for more common native plants and animals. These two areas are high priority sites of statewide significance.

Two significant wetlands occur within the Neds-Mud-Deer Lakes County Park: Tamarack Swamp Mineotrophic Subtype #30 and Shrub Swamp#25. A state threatened plant, *Viola lanceolata* #24 occurs on the north side of Neds Lake, just north of the park/forest boundary. Sandhill cranes have been heard in the marshes south of Neds Lake. These resources are protected by their inclusion in the County Park.

A biologically sensitive area is located along that portion of Cedar Creek extending southwest from Cedar Drive (Hwy 13) to Lake George Boulevard. Eight Natural communities, including an oak savannah, hardwood, shrub, tamarack swamps, oak forests and an emergent marsh form a complex of native upland and lowland communities. A rare, but unlisted, plant, *Polygonum arifolium* #15, Blanding's turtles and Sandhill cranes have been documented in the area.

Four high quality natural communities are located west of Norris Lake and Mud Lake. They include a rich fen, shrub swamp, tamarack swamp, and cattail marsh. Blanding's turtles have been found in or near Norris Lake from 1955-1989. Three additional natural communities, including rich fen, oak forest, and an oak savannah, occur in an area of southwest Oak Grove.

A state Threatened plant (*Rotala ramosior*) has been found along three shorelines with and adjacent to John Anderson Memorial Park in East Bethel. The occurrence within the park is located on Coopers Lake. Two additional occurrences are located on Minard Lake and on a small lake southeast of Coopers Lake.

In Burns Township, a bald eagle nest (*Haliaeetus leucocephalus*) on the east side of Goose Lake has been active since 1993.

Two high quality forest communities occur on the east side of an oxbow in the Rum River, approximately one mile north of St. Francis. A high quality complex of upland forest and swamp is located north of Highway 28 in St. Francis. Two rare plants were found within the complex: *Panax quinquefolius*, a state listed Special Concern species, *Polygonum arifolium*, a rare, but unlisted species.

Two high quality wetlands occur adjacent to an intermittent stream that enters Seelye Brook. North of the complex is a Maple-Basswood Forest which supports *Panax quinquefolius*.

A natural community is a remnant of pre-settlement vegetation. Natural communities have undergone very little human disturbance since pre-settlement times. They can be generically classified into groups such as Mixed Hardwood Swamp, Dry Oak

Forest, and Alder Swamps. Like much of the larger Twin Cities Metropolitan Area, the URRWMO has only small patches of pre-settlement natural communities remaining with many occurring in the Cedar Creek Natural History Area. Since the inventory, some of the areas have been developed to residential land use.

Natural communities are functional units of the natural landscape, classified and described by considering vegetation, hydrology, landform, soils and natural disturbance regimes. The natural community types and subtypes in this report are classified primarily according to vegetation and major habitat features. Areas of natural vegetation were located by aerial photo interpretation and confirmed by field inventories conducted in 1989 through 1990. The natural community type and subtype descriptions given below describe vegetation and habitat characteristics present in the Upper Rum River Watershed. Of the 7,000 acres of natural communities within the watershed nearly 40% are located within parks, particularly CCNHA. The numbers in **Table II-8** have not been changed to reflect the conversion of some natural communities to residential housing and the roads that service them.

**Table II-8: Natural Communities in the Upper Rum River Watershed**

Type	# Of Sites In URRWMO	Wetland Or Upland	Acres In URRWMO
Alder Swamp	12	W	500
Aspen Forest	1	U	2
Aspen Woodland	4	U	17
Black Ash Swamp	2	W	122
Cattail Marsh	3	W	193
Dry Oak Savanna (Central) Barrens Subtype	5	U	307
Dry Oak Savanna (Central) Sand-Gravel Subtype	6	U	66
Dry Prairie (Central) Sand-Gravel Subtype	6	U	50
Emergent Marsh	1	W	4
Floodplain Forest	5	W	60
Hardwood Swamp Forest	34	W	610
Lake Beach (Inland)	3	W	28
Lowland Hardwood Forest	1	W	72
Maple Basswood Forest	8	U	129
Mixed Emergent marsh (Forest)	19	W	713
Oak Forest (Central)	33	U	364
Oak Forest (Central) Dry Subtype	39	U	994
Oak Forest (Central) Mesic Subtype	22	U	166
Oak Woodland-Brushland (Central)	19	U	351
Poor Fen	13	W	57
Rich Fen (Transition)	15	W	318
Shrub Swamp	44	W	785
Tamarack Swamp	2	W	10
Tamarack Swamp Minerotrophic Subtype	28	W	472
Wet Meadow	35	W	544
White Pine-Hardwood Forest (North Central)	1	U	18
Willow Swamp	1	W	52
Total Natural Communities in URRWMO	362		7,004
Wetland Natural Communities in URRWMO	218		4,540
Upland Natural Communities in URRWMO	144		2,464

The information was derived from a GIS database provided by the Natural Heritage Program and the Minnesota County Biological Survey, Minnesota Department of Natural Resources.

Rare features data included in **Table II-9** was provided by the Natural Heritage and Nongame Research Program of the Division of Fish and Wildlife, Minnesota Department of Natural Resources( DNR) and were current as of October 2004. These data are not based on an exhaustive inventory of the state. The lack of data for any geographic area shall not be constructed to mean that no significant features are present. In addition, there maybe inaccuracies in the data, of which the DNR is not aware and shall not be held responsible for. Permission to use this data does not imply endorsement or approval by the DNR of any interpretations or products derived from the data.

**Table II-9: Rare Species in the Upper Rum River Watershed**

Common Name	Scientific Name	Status	# Reported in URRW
<b>Plants</b>			
American Ginseng	<i>Aristida tuberculosa</i>	SPC	2
Beach-Heather	<i>Hudsonia tomentosa</i>	SPC	1
Clinton's Bulrush	<i>Scirpus clintonii</i>	SPC	1
Cross-Leaved Milkwort	<i>Polygala cruciata</i>	END	2
Halberd-Leaved Tearthumb	<i>Polygonum arifolium var. pubescens</i>	NON	3
Lance-Leaved Violet	<i>Viola lanceolata</i>	THR	3
Least Moonwort	<i>Botrychium simplex</i>	THR	3
Long-Bearded Hawkweed	<i>Hieracium longipilum</i>	NON	2
Ram's-head Lady's Slipper	<i>Cypripedium arietinum</i>	THR	2
Rhombic-Petaled Evening Primrose	<i>Oenothera rhombipetala</i>	SPC	2
Sea-beach Needlegrass	<i>Aristida tuberculosa</i>	SPC	1
Tall Nut-rush	<i>Scleria triglomerata</i>	END	2
Tooth-cup	<i>Rotala ramosior</i>	THR	3
Twisted Yellow-eyed Grass	<i>Xyris torta</i>	END	1
Virginia Bartonian	<i>Bartonia virginica</i>	END	2
Walter's Barnyard Grass	<i>Echinochoa walteri</i>	NON	1
Water Willow	<i>Decodon verticillatus</i>	SPC	1
White Wild Indigo	<i>Baptisia alba</i>	SPC	1
<b>Birds</b>			
Bald Eagle	<i>Haliaeetus leucocephalus</i>	SPC	2
Red-Shouldered Hawk	<i>Buteo lineatus</i>	SPC	3
Sandhill Crane	<i>Grus Canadensis</i>	NON	8
Hooded Warbler	<i>Wilsonia citrine</i>	SPC	1
<b>Reptiles</b>			
Blanding's Turtle	<i>Emydoidea blandingii</i>	THR	42
<b>Butterflies</b>			
Karner Blue	<i>Lycaeides melissa samuelis</i>	END	1
Leonard's Skipper	<i>Hesperia leonardus leonardus</i>	SPC	2
Regal Fritillary	<i>Speyeria idalia</i>	SPC	1

Common Name	Scientific Name	Status	# Reported in URRW
<b>Insects</b>			
A Species of Jumping Spider	<i>Paradamoetas fontana</i>	SPC	1
	<i>Metaphidippus arizonensis</i>	SPC	1
	<i>Tutelina formicaria</i>	SPC	1
<b>Mollusk</b>			
Black Sandshell Mussel	<i>Ligumia recta</i>	SPC	1
Creek Heelsplitter Mussel	<i>Lasmigona compressa</i>	SPC	1

SPC = Special Concern, THR = Threatened, END = Endangered, NON = Not Listed But Rare

### 3. Recreational and Scenic Riverways

The Rum River is a state designated Scenic and Recreational River way, flowing south from Lake Mille Lacs 145 miles to its confluence with the Mississippi River in the City of Anoka. The river was added to Minnesota's Wild and Scenic Rivers Program in 1978. This covers the stretch from Mille Lacs, Sherburne, Isanti, and Anoka Counties.

Classifications of wild rivers are those which exist in a free-flowing state with excellent water quality and with adjacent lands that are essentially primitive. Wild rivers should not be parallel to conspicuous and well-traveled roads or railroads. Classification of scenic rivers are those that exist in a free-flowing state with adjacent lands that are largely undeveloped (i.e., adjacent lands still present an overall natural character, but in places may have been developed for agricultural, residential or other land uses).

Classifications of recreational rivers are those that may have undergone some impoundment or diversion in the past and that may have adjacent lands which are considerably developed, but that are still capable of being managed so as to further the purposes of this act. This means that bordering lands may have already been developed for a full range of agricultural or other land uses, and may also be readily accessible by pre-existing roads or railroads.

Wildlife and fish can be found along or in the Rum River. White-tailed deer, gray and fox squirrels, cottontail rabbits, snowshoe hares, beavers, minks, muskrats, raccoons, loons, great blue herons, songbirds, and waterfowls nesting are a few of the animals found along the Rum River. Smallmouth Bass, Northern Pike, and Walleyes can be found in the Rum River. Smallmouth Bass are popular among the anglers along the river. Northern Pike are common near the headwaters. Walleyes are common in the river from Princeton to Anoka. The Rum River Watershed contains extensive backwater marshes, sandy upland plains, farmland and bottom lands covered with maple, elm and other hardwoods. The remains of a once vast pine forest can be seen, near the river's lowest reaches, through the red and white pine trees.

## **J. Pollutant Sources**

A search of the Minnesota Pollution Control Agency's database was completed for above and under ground storage tanks, sanitary landfills, dumps, and hazardous waste sites. The information obtained from the MPCA is included in **Figure II-13**. This figure shows the approximate location of the sites. Many of these sites may have been cleaned up or in the process of being cleaned up. The MPCA should be contacted for specific and current details.

Figure II-2 Subwatershed Map

Figure II-3 County Ditch Map

Figure II-4 National Wetland Inventory Map

Figure II-5 DNR Public Waters/Wetlands Map

Figure II-6 Water Quality Monitoring Locations

Figure II-7 Surface and Groundwater Appropriations

Figure II-8 Floodplain Map

Figure II-9 Soils Map

Figure II-10 Existing Land Use

Figure II-11 Planned Land Use

Figure II-12 County Biological Survey

Figure II-13 Pollutant Sources

### III. Problems and Corrective Actions

Outlined below is an assessment of existing and potential water resource-related problems that are known at this time. These problems have been identified based on an analysis of the land and water resource data collected as part of this watershed management plan preparation and through the member city’s input. A description of any existing or potential problem within the topic area has been listed and corrective actions have been incorporated into an implementation plan.

<b>A. Lake and stream water quality problems</b>		
	<b>Identified Problem, Issue, or Concern</b>	<b>Corrective Action</b>
1	WMO desires to implement a water quality monitoring plan to track water quality trends and evaluate effectiveness of policies and land use practices. The URRWMO currently has a monitoring plan approved for 2007.	The URRWMO will develop with the assistance of the Anoka Conservation District (ACD) a water quality monitoring program to track trends in water quality over time within the watershed. This plan will include a list of lakes and streams to be monitored, the frequency of monitoring, and the parameters and pollutants to be monitored. This monitoring plan will be developed by 2008 and will be effective through 2012. The WMO will review and alter, if necessary, the monitoring plan annually.
2	The following water bodies have been listed as impaired by the MPCA: <ul style="list-style-type: none"> <li>● Lake George – Oak Grove – Mercury</li> <li>● Rum River – St. Francis and Oak Grove – Mercury</li> <li>● Crooked Brook – East Bethel – Low oxygen</li> <li>● Rogers Lake (104P) – Oak Grove, Burns, Ramsey - Nutrients</li> </ul>	Member communities shall be responsible for working with the MPCA to develop a Total Maximum Daily Load (TMDL) for the impaired waters to which their community drains.  The URRWMO will work with member communities and ACD to develop water quality goals for high public use water bodies. These water bodies include Lake George (Oak Grove), the Rum River (Oak Grove, St. Francis), and East Twin Lake (Burns Township). Water quality goals will be developed in 2008.

<b>B. Flooding and storm water rate control concerns within the watershed</b>		
	<b>Identified Problem, Issue, or Concern</b>	<b>Corrective Action</b>
1	Lack of consistent guidelines or minimum runoff control requirements for new development and redevelopment	The URRWMO has developed water quality and rate control policies as part of this Plan and has included implementation items to address volume control for new development and redevelopment.

<b>C. Impacts of water quantity or quality management practices on recreational opportunities</b>		
	<b>Identified Problem, Issue, or Concern</b>	<b>Corrective Action</b>
1	Invasive species limit the recreational opportunities in some lakes such as Lake George in Oak Grove.	<p>The URRWMO will request assistance from the Anoka Conservation District, the Department of Natural Resources, lake associations, Lake George Conservation Club, and other agencies to develop an invasive species monitoring program.</p> <p>The URRWMO will develop a public education program about the problems of invasive aquatic species and how to control the spread of these organisms.</p> <p>The URRMWO will work with member communities, as requested, to develop aquatic vegetation management plans for lakes.</p>

<b>D. Impacts of storm water quality on fish and wildlife resources</b>		
	<b>Identified Problem, Issue, or Concern</b>	<b>Corrective Action</b>
1	The design of storm water ponds could be improved to enhance fish and wildlife benefits.	Member communities shall implement the design standards outlined in this Plan for ponds to include habitat considerations through the plan review and platting process.

<b>E. Impacts of erosion and sedimentation on water resources</b>		
	<b>Identified Problem, Issue, or Concern</b>	<b>Corrective Action</b>
1	Erosion along the banks of the Rum River contributes to sediment load within the Rum River system.	The URRWMO will undertake a field study to determine the location and extent of erosion along the Rum River and use the study to determine next steps to address this issue.
2	It is unknown if the member communities are addressing the illicit discharge component of the NPDES Phase II permit.	Member communities shall undertake illicit discharge detection and elimination activities per the NPDES Phase II rules and include results in their annual report to the URRWMO.

<b>F. Impact of land use practices and development on water resource issues</b>		
	<b>Identified Problem, Issue, or Concern</b>	<b>Corrective Action</b>
1	Sanitary sewer is anticipated to be installed along the TH65 corridor through East Bethel. This will result in development pressure in this area.	The URRWMO shall require East Bethel to develop a wetland management plan along the TH65 corridor to address water quality, wetland and habitat impacts of the proposed new development areas.
2	For this planning period, the URRWMO anticipates that the most significant change in land use within the WMO will be from row crop agriculture to rural residential. This land use conversion will result in reductions of runoff volumes, sediment and pollutant loading when compared to agricultural land uses.	The URRWMO recognizes that land use change from row crop agriculture to rural residential improves water quality and reduces runoff volumes. The URRWMO will develop volume control standards for higher density development that may cause an increase in runoff volume and pollutant loads. The standards will be developed with the assistance of the member communities in 2008.

<b>G. Adequacy of existing regulations to address adverse impacts on water resources</b>		
	<b>Identified Problem, Issue, or Concern</b>	<b>Corrective Action</b>
1	Member communities need guidelines for wetland buffer standards	The URRWMO will develop, with the assistance of member communities, guidelines for buffer standards. URRWMO buffer standards will be developed in 2008.
2	The maintenance of water control structures has been noted as a concern.	The URRWMO requires local government units to inspect and maintain all water level control structures at least once every five years.
3	Review of the member communities' regulatory programs for conformance with the URRWMO requirements is needed	The URRWMO will undertake a review of the member communities' regulatory programs. This review will be done as part of the local water resource plan review for conformance with URRWMO policies, and through an annual report to the URRWMO from member communities. This will be completed in 2009.

<b>H. Identification of potential problems which are anticipated to occur in the next 20 years based on growth projections and planned urbanization</b>		
	<b>Identified Problem, Issue, or Concern</b>	<b>Corrective Action</b>
1	The continued use and maintenance of ISTS systems may impact the quality of groundwater.	Require member communities to implement and enforce a policy that ISTS must be installed in conformance with State and County regulations.
2	The uncertainty of the existing ground water supplies to meet future demands has been noted as a concern.	The URRWMO will work with ACD, Anoka County, Mn/DNR, and other agencies to develop a plan to track ground water levels, trends, and water quality.

<b>I. Availability and adequacy of existing technical information to manage water resources</b>		
	<b>Identified Problem, Issue, or Concern</b>	<b>Corrective Action</b>
1	Additional groundwater and surface water monitoring and studies should be undertaken to track long term trends on water quality and quantity	<p>The URRWMO will continue the surface water monitoring program with the Anoka Conservation District and other private and governmental agencies.</p> <p>The URRMWO will work with ACD, Anoka County, MDNR, MDH, and other agencies to complete a groundwater capacity study to determine if the population can be supported by private wells. The URRWMO recognizes the need to work with agencies outside of the URRWMO as this issue transcends the URRWMO boundaries.</p>
2	The boundary between the URRWMO and CCWD in Ham Lake needs to be updated to more accurately reflect the hydrologic boundary	The URRWMO will work with CCWD and BWSR to review the jurisdictional boundary in Ham Lake and make the necessary adjustments.
3	There is limited hydrologic/hydraulic information available for the watershed.	The URRWMO requires that member communities develop a hydrologic/hydraulic model as part of the development of their local surface water management plans. These models must provide: subwatershed boundaries, indicate direction of flow, predict 100-year peak flows, and show location of discharge points at municipal boundaries.
4	The URRWMO has limited funding	The URRWMO will actively pursue grant opportunities. The URRWMO will add a budget item to meet the URRWMO obligation for matching funds that may occur as part of future grants.

#### IV. Goals and Policies

The Upper Rum River Watershed Management Organization (URRWMO) has developed a number of goals and policies that conform to the overall purpose that is specified in Minnesota Statutes Section 103B.201. These goals and policies have been developed to complement county, regional, or state goals and policies. The goals of the URRWMO are as follows:

1. Protect, preserve, and use natural surface and groundwater storage and retention systems.
2. Minimize public capital expenditures needed to correct flooding and water quality problems.
3. Identify and plan for means to effectively protect and improve surface and groundwater quality.
4. Establish more uniform local policies and official controls for surface and groundwater management.
5. Prevent erosion of soil into surface water systems.
6. Promote groundwater recharge.
7. Protect and enhance fish and wildlife habitat and water recreational facilities.
8. Secure the other benefits associated with the proper management of surface and ground water.

The URRWMO Watershed Management Plan targets four main audiences. Based on these audiences, the URRWMO has developed four strategies to meet the goals of this Plan and the requirements of Minnesota Statute 103B.201. The target audiences and strategies are as follows:

<b>AUDIENCE</b>	<b>STRATEGY</b>
Public – Residents and Business Owners	Education, Regulation
City Staff and City Council	Cooperation, Education, Regulation, Operation
Developers	Education, Regulation
Review Agencies	Cooperation

Based on the target audience and the strategy, the URRWMO has developed a number of policies, which are outlined on the following pages.

**A. COOPERATION**

This Plan is in conformance with but does not restate all other agency rules that are applicable to water quality and natural resource protection. Rules, policies, and guidelines associated with the following organizations also apply to government and development related activities within the URRWMO:

- Minnesota Department of Health [www.health.state.mn.us](http://www.health.state.mn.us)
- Minnesota Pollution Control Agency [www.pca.state.mn.us](http://www.pca.state.mn.us)
- Board of Water and Soil Resources [www.bwsr.state.mn.us](http://www.bwsr.state.mn.us) and the Wetland Conservation Act [www.bwsr.state.mn.us/wetlands/wca/index.html](http://www.bwsr.state.mn.us/wetlands/wca/index.html)
- Minnesota Department of Natural Resources [www.dnr.state.mn.us](http://www.dnr.state.mn.us)
- US Army Corps of Engineers [www.mvp.usace.army.mil](http://www.mvp.usace.army.mil)
- Minnesota Department of Agriculture [www.mda.state.mn.us](http://www.mda.state.mn.us)
- Metropolitan Council [www.metrocouncil.org](http://www.metrocouncil.org)
- Anoka Conservation District [www.anokanaturalresources.com](http://www.anokanaturalresources.com)

These other agency rules, policies, and guidelines are not restated in this Plan, but are applicable to projects, programs, and planning within the URRWMO. The Minnesota Stormwater Manual, which is a document intended to be frequently updated, is incorporated by referenced into this Plan and can be found at [www.pca.state.mn.us/water/stormwater/stormwater-manual.html](http://www.pca.state.mn.us/water/stormwater/stormwater-manual.html).

The primary focus of the URRWMO will be on water resource management issues that transcend municipal boundaries. The member communities are required by this Plan and Minnesota Rules to develop and implement a local surface water management plan. The member communities have two years from the date that the Board of Water and Soil Resource’s approves the URRWMO Plan to adopt a local plan that is in conformance with the requirements of the URRWMO plan. If the member communities fail to adopt an approved plan within the specified timeframe or fail to implement the plan’s requirements, the URRWMO will take over the responsibility of implementing the requirements of the Plan.

**B. EDUCATION**

The policies developed in this strategy are designed to foster responsible water quality management practices by educating residents, business owners, member communities, and developers.

<b>STRATEGY: EDUCATION</b>			<b>RESPONSIBILITY FOR IMPLEMENTATION</b>		
<b>Policy No.</b>	<b>Policy</b>	<b>Target Audience</b>	<b>URRWMO</b>	<b>ACD (by Contract)</b>	<b>Member Community</b>
1	Distribute educational material aimed at fostering responsible water quality management practices. Topics are anticipated to include: <ul style="list-style-type: none"> <li>• Wetland buffers</li> <li>• Water quality monitoring</li> <li>• Groundwater quality and protection</li> <li>• Controlling invasive species</li> <li>• Water conservation and the water cycle</li> <li>• Proper hazardous waste disposal</li> <li>• Yard waste management</li> <li>• Agricultural BMP's</li> <li>• Pet waste disposal</li> <li>• Activities of the URRWMO</li> </ul>	Residents, business owners, Community Staff, City Council, Developers	Prepare and distribute annual newsletter	Possible source of educational material and assistance	Include education in local plans and provide annual report to URRWMO on tasks completed in previous year.
2	The URRWMO will maintain or expand their website for water resource management information; include sample articles for local communities. This could be coordinated with the ACD's web-site.	Residents, Community Staff, City Council, Businesses, Developers	X	Host and promote the URRWMO website and possible source of water resource information.	
3	Create and make available Guidelines for Development	Developers, Community Staff and Council			X
4	Solicit volunteers for water quality monitoring	Residents	X	X	X
5	Require member communities to develop a public education program as part of local plan development. Possible educational programs include newsletters, door hangers, catch basin stenciling, cable television, etc.	Residents, Business Owners			X

**C. REGULATION**

The URRWMO has established the following regulations to manage water resources. These regulations affect the public, developers, member community staff and Councils within the URRWMO. The policies developed in this strategy outline specific elements that are required to be implemented through a program at the local level. The URRWMO will review the implementation of this program with the member communities in June of each year to determine compliance.

<i>Policy No.</i>	<i>Policy</i>	<i>Target Audience</i>	<i>Responsibility for Implementation</i>		
			<i>URRWMO</i>	<i>ACD (by Contract)</i>	<i>Member Community</i>
1	In cases where surface water impacts or the source of impacts transcend municipal boundaries, or the community is found to not be in compliance with this plan, the URRWMO shall review such problems and provide direction to member communities for resolution.	Member communities	X		X
2	Future discharge rates from new development and redevelopment will, at a minimum, not exceed the existing discharge rates for the 2-, 10-, and 100-year events. For formally identified “special waters” as defined in the NPDES general stormwater permit for construction activities, the permanent stormwater management system must be designed such that the pre and post project runoff rate and volume from the 1 and 2 year 24 hour precipitation events remains the same. NPDES permit also requires that volume of water from a site can be released at no more than 5.66 cfs per acre of surface area of the pond.	Member communities, Developers			X
3	The design of all major storm water storage facilities shall attempt to accommodate a critical duration event with a 1% chance of occurrence.	Developers, Member communities			X
4	New storm sewer systems shall be designed to accommodate discharge rates with a 10% chance of occurrence. The 10% storm event is defined as having an SCS Type II	Developers, Member communities			X

<i>Policy No.</i>	<i>Policy</i>	<i>Target Audience</i>	<i>Responsibility for Implementation</i>		
			<i>URRWMO</i>	<i>ACD (by Contract)</i>	<i>Member Community</i>
	distribution with 4.1" of rainfall over a 24-hour period.				
5	The WMO will require member communities to obtain and approve drainage calculations for the 2-, 10-, and 100-year events prior to issuance of any grading permits.	Developers, Member communities			X
6	The URRWMO requires infiltration of treated storm water whenever a development or redevelopment project increases storm water volume runoff, provided that past and existing land use practices do not have a significant potential to contaminate the storm water runoff and the soil characteristics are suitable for infiltration. The URRWMO will work with member communities to develop infiltration guidelines. These guidelines will be developed by 2008.	Developers, Member communities	X	Possibly provide technical guidance on infiltration policies.	X
7	Treatment of storm water to NURP guidelines is required prior to storm water discharge to a lake, stream, or wetland and prior to discharge from the site as part of development. The NURP guidelines for the design of storm water treatment basins are as follows:  a. A permanent pool ("dead storage") volume below the principal spillway (normal outlet) which shall be greater than or equal to the runoff from a 2.5-inch storm over the entire contributing drainage area assuming full development. In no case should the dead storage be less than 1800 cubic feet of storage below the outlet pipe for each acre that drains to the basin.	Developers, Member communities			X

<i>Policy No.</i>	<i>Policy</i>	<i>Target Audience</i>	<i>Responsibility for Implementation</i>		
			<i>URRWMO</i>	<i>ACD (by Contract)</i>	<i>Member Community</i>
	<p>b. A permanent pool average depth (basin volume/basin area) which shall be <math>\geq 3</math> feet, with a maximum depth of <math>\leq 10</math> feet.</p> <p>c. An emergency spillway (emergency outlet) adequate to control the one percent frequency/critical duration rainfall event.</p> <p>d. Basin side slopes above the normal water level shall be no steeper than 4:1, and preferably flatter. A basin shelf with a minimum width of 10 feet and 1 foot deep below the normal water level is recommended to enhance wildlife habitat, reduce potential safety hazards, and improve access for long-term maintenance.</p> <p>e. To prevent short-circuiting, the distance between major inlets and the normal outlet shall be maximized.</p> <p>f. A flood pool ("live storage") volume above the principal spillway shall be adequate so that the peak discharge rates from the 99% (1-year), 10% (10-year), and 1% (100-year) chance critical duration storms are no greater than pre-development watershed conditions.</p> <p>g. Reduction of peak discharges for the more frequent storms can be achieved through a principal spillway design that may include a perforated vertical riser, small orifice retention outlet, or compound weir.</p>				

<i>Policy No.</i>	<i>Policy</i>	<i>Target Audience</i>	<i>Responsibility for Implementation</i>		
			<i>URRWMO</i>	<i>ACD (by Contract)</i>	<i>Member Community</i>
8	Newly constructed storm water management ponds that are constructed as part of private development shall be placed in drainage and utility easements dedicated to the member community.	Member communities, Developers			X
9	The URRWMO encourages storm water pond design to include habitat enhancement and aesthetic features of the pond. This includes providing upland buffers around the ponds, seeding the area with native vegetation, and designing the slopes flatter than 4:1.	Member communities, Developers			X
10	The URRWMO requires skimmers, submerged outlets, or other devices in the construction of new pond outlets and the addition of skimmers to existing systems whenever feasible and practical. The designs shall provide for skimmers that extend a minimum of 4 inches below the water surface and minimize the velocities of water passing under the skimmer to less than 0.5 feet per second for rainfall events having a 99% frequency.	Developers, Member communities			X
11	The URRWMO defers the responsibility of working with the MPCA to develop Total Maximum Daily Load (TMDL) studies on the listed impaired waters in the watershed to the member communities who drain to impaired waters.	Member communities			X
12	The URRWMO shall develop water quality goals for high public use water bodies. These water bodies include Lake George (Oak Grove), East Twin Lake (Burns Township), and Rum River (Oak Grove, St. Francis). Water quality goals will be developed with the assistance of member communities in 2008.	Member communities	X	Possibly provide technical information on water quality goals.	X

<i>Policy No.</i>	<i>Policy</i>	<i>Target Audience</i>	<i>Responsibility for Implementation</i>		
			<i>URRWMO</i>	<i>ACD (by Contract)</i>	<i>Member Community</i>
13	A wetland management plan is required to be developed by the member communities as part of their local water resource management plan. The URRWMO will work with member communities through a public process which will define the minimum requirements of the wetland management plan. This will be completed in 2008.	Member communities	X	Provide sample requirements for wetland management plans.	X
14	The URRWMO will require member communities to develop and implement wetland buffer standards. The URRWMO will work with member communities through a public process which will define the minimum requirements of the wetland buffers. This will be completed in 2008.	Developers, Member communities	X	Provide technical assistance to develop wetland buffer widths and standards.	X
15	The URRWMO will not undertake the Local Government Unit (LGU) role for implementation of Wetland Conservation Act (WCA) Rules. This responsibility will remain with the member communities or Mn/DOT.	Member communities, Mn/DOT			X (or Mn/DOT)
16	The URRWMO will encourage member communities to develop spill prevention, control, and counter measure plans that are consistent with state and/or federal regulations such as Minnesota Statutes 115E and the Federal Oil Pollution Act 33USCA Sec. 2701-2761.	Member communities			X
17	The URRWMO requires that the design, installation and inspection of individual sewage treatment systems shall be in conformance with standards set forth in Anoka County Ordinance No. 80-11 for Burns Township and in compliance with Minnesota Rules Chapter 7080 for the cities of Bethel, East Bethel, Ham Lake, Oak Grove and St. Francis.	Member communities, developers, residents			X

Policy No.	Policy	Target Audience	Responsibility for Implementation		
			URRWMO	ACD (by Contract)	Member Community
18	The URRWMO shall require, in conformance with the MPCA NPDES rules, the submission and implementation of erosion and sediment control plans to the member community for the prevention of erosion and sedimentation from land disturbance activities of <u>one acre</u> or more in size. These plans shall conform to the general criteria set outlined in the Minnesota Pollution Control Agency "Protecting Water Quality in Urban Areas", Erosion Control Ordinance, and the NPDES Construction Site permit. <a href="http://www.pca.state.mn.us/publications/wq-strm2-51.doc">http://www.pca.state.mn.us/publications/wq-strm2-51.doc</a>	Member communities, developers			X
19	The URRWMO requires member communities to enforce all erosion and sedimentation control plans for all new developments and redevelopments one acre and larger in size.	Developers, member communities			X
20	The URRWMO requires member communities to adopt an erosion and sediment control ordinance. The ordinance should require measures similar to those of the MPCA Best Management Practices (BMPs). A model erosion and sediment control ordinance available on the MPCA's website at <a href="http://www.pca.state.mn.us/publications/wq-strm2-16b.pdf">www.pca.state.mn.us/publications/wq-strm2-16b.pdf</a>	Member communities			X
21	The URRWMO requires member communities and involved agencies to manage the land use within the 100-year flood level as designated by the National Flood Insurance Program Flood Insurance Rate Maps (FIRM).	Member communities			X
22	If FIRM maps for a member community are not available or are inaccurate, the	Member communities,			X

<i>Policy No.</i>	<i>Policy</i>	<i>Target Audience</i>	<i>Responsibility for Implementation</i>		
			<i>URRWMO</i>	<i>ACD (by Contract)</i>	<i>Member Community</i>
	URRWMO shall require the regional (100-year) flood elevations for the area to be established by the member community or the proposer of land use alterations.	developers			
23	The URRWMO shall prohibit encroachment into floodways	Member communities, developers			X
24	The lowest floor elevation of all development, including basements, shall be required to be at least 1 foot above the 100-year high water level or regional flood level for the adjacent water or wetland.	Member communities, developers			X
25	The cities of Bethel, East Bethel, Ham Lake, Oak Grove and St. Francis shall adopt, as a minimum, a floodplain ordinance that conforms to Minnesota Rules, Chapter 6120.5000. Anoka County Floodplain Management Ordinance 90-2, 91-2 shall apply to Burns Township.	Member communities, developers			X
26	All member communities within the URRWMO shall adopt a shoreland ordinance in compliance with Minnesota Rules, Chapter 6120.2500 through 6120.3900. Burns Township Shoreland areas will continue to be administered by Anoka County. This process should be completed in cooperation with the DNR.	Member communities, developers			X
27	The Rum River throughout the URRWMO is classified as a scenic and recreational river in accordance with Minnesota Statutes, Chapter 103F.301-103F.345, therefore member community land use ordinances are subject to Minnesota Rules, Chapter 6105.1400 through 6105.1480.	Member communities, developers			X
28	Wetland excavation for the enhancement of wildlife habitat will only be allowed if the	Member communities,		X	X

			<i>Responsibility for Implementation</i>		
<i>Policy No.</i>	<i>Policy</i>	<i>Target Audience</i>	<i>URRWMO</i>	<i>ACD (by Contract)</i>	<i>Member Community</i>
	project proposer applies for a permit through the member community and the excavation is in conformance with the Wetland Conservation Act as well as guidance from the Board of Water and Soil Resources, Department of Natural Resources, and US Army Corps of Engineers.	public, developers			

#### D. OPERATION

The operation strategy is targeted primarily at member communities with some areas targeted at the public and/or another agency. These policies are aimed at operation and maintenance activities associated with water resource management within the URRWMO.

<i>No.</i>	<i>Policy</i>	<i>Target Audience</i>	<i>Responsibility for Implementation</i>		
			<i>URRWMO</i>	<i>ACD</i>	<i>Member Community</i>
1	Each member community is responsible for developing, adopting, and implementing a local water resource management plan in conformance with Minnesota Rules 8410 and the URRWMO Plan.	Member communities			X
2	The URRWMO requires sweeping of urban section streets with curb and gutter once annually in all areas, and twice annually in priority areas. Priority areas shall be areas that drain directly to high public use water bodies and/or high quality wetlands without pretreatment of storm water runoff. Roadside ditches in rural areas will constitute treatment.	Member communities			X
3	The URRWMO will require that member communities inspect storm water treatment basins at least every 5 years and sump catch basins/manholes every year. Maintenance shall be conducted as necessary. Maintenance activities undertaken by member communities shall be included in the annual report to the URRWMO.	Member communities			X
4	Landlocked depressions that presently do not have a defined outlet and do not typically overflow may be allowed a positive outlet to protect adjacent properties. This outlet must be in conformance with an approved	Member communities			X

<i>No.</i>	<i>Policy</i>	<i>Target Audience</i>	<i>Responsibility for Implementation</i>		
			<i>URRWMO</i>	<i>ACD</i>	<i>Member Community</i>
	Local Plan, demonstrate that downstream properties are not adversely affected by the flows, and be in conformance with current wetland regulations.				
5	If an outlet is not available or provided for a landlocked basin, the area shall be modeled to accommodate a back-to-back 100-year, 24-hour rainfall event; and the 100-year, 10-day runoff event. The highest water elevation in the basin shall be the 100-year high-water level.	Member communities			X
6	Regional detention areas will be identified by member communities in their Local Water Management Plans.	Member communities			X
7	The Anoka Conservation District shall act as a depository and coordinator for the collection of water quality data to assure consistency and comparability of data.	Review agencies, Member communities, public		X	
8	The URRWMO will conduct water quantity and quality studies to understand baseline conditions and to periodically update the original database in order to set criteria and appropriately review the compliance of member communities with the existing plan criteria. Where problems are identified, the URRWMO will require member communities to conduct studies to understand the problem and to develop corrective management strategies.	Review agencies, Member communities, public	X	X	X

<i>No.</i>	<i>Policy</i>	<i>Target Audience</i>	<i>Responsibility for Implementation</i>		
			<i>URRWMO</i>	<i>ACD</i>	<i>Member Community</i>
9	The URRWMO requires that member communities eliminate illegal connections to each community's storm water conveyance system.	Member communities, public			X
10	The URRWMO will actively participate in discussions about upstream projects, outside of the URRWMO, that may affect water quality or flooding in the URRWMO.	Review agencies, member communities	X		
11	The URRWMO shall review local water management plans and evaluate their consistency with the Watershed Plan. All local water management plans shall be consistent with the URRWMO Watershed Management Plan. Member communities shall have two years from the date of the Board of Water and Soil Resource's approval of this Plan to adopt their local water management plans.	Review, agencies, Member communities	X		X
12	The URRWMO shall provide an annual review of the Watershed Management Plan and its implementation to ensure it reflects the current goals of the cities, Township, county, soil and water conservation district and is consistent with legislation. This will include reviewing past activities from the implementation plan and budgeting for upcoming activities.	Review agencies, Member communities	X	Participate in annual review.	X
13	Member communities shall prepare and submit an annual status report to the URRWMO by June 1 of each year reviewing the status of their local plans, the	Member communities	X		X

<i>No.</i>	<i>Policy</i>	<i>Target Audience</i>	<i>Responsibility for Implementation</i>		
			<i>URRWMO</i>	<i>ACD</i>	<i>Member Community</i>
	status of the implementation of their plans, and a review of the implementation of the policies that are outlined in the URRWMO plan. This will be similar to the MS4 reports that some member communities are required to submit to the MPCA. The URRWMO will create a template for this report in 2007.				
14	The URRWMO will actively seek partners to strive to be the lead agency on sustainability and contamination of groundwater supplies within the WMO and will seek partners to enhance the scope of any study. When such information becomes available, including information on the location of ground water recharge areas, the WMO will take into consideration these areas for the purpose of maintaining their recharge capabilities and protection of groundwater quality.	Member communities, Review agencies	X	Coordinate information gathering efforts.	X
15	The URRWMO will support member communities, lake associations, and their programs for controlling invasive species (i.e., Purple Loosestrife, Milfoil, Curly Leaf, Pond Weed, etc.).	Public, member communities, review agencies	X		X
16	Each community will be responsible to perform maintenance measures to assure proper function of public drainage system, with the exception of County ditches.	Member communities			X

<i>No.</i>	<i>Policy</i>	<i>Target Audience</i>	<i>Responsibility for Implementation</i>		
			<i>URRWMO</i>	<i>ACD</i>	<i>Member Community</i>
17	The responsibility for inspection maintenance or repairs on County Ditches shall be coordinated by the Anoka County Highway Department.	Member communities, review agencies			Anoka County Highway Department
18	Each member community may establish a fee structure charged to developers for constructing capital improvements (i.e. trunk conveyance systems).	Member communities, developers			X
19	The URRWMO shall establish an equitable cost allocation formula when project implementation affects more than one member community. The cost allocation, taxes or assessments shall be collected in conformance with the Joint Powers Agreement.	Member communities	X		X
20	The URRWMO shall encourage donations, grants, and in kind contributions of public and private organizations for plan implementation.	Review agencies	X		

## V. Implementation Program/ Priorities

Based on the information developed in **Sections II through IV**, the URRWMO has developed a water resource program that reflects the needs and concerns of the WMO. A prioritized listing of studies, programs, and capital improvements that have been identified as necessary to respond to all of the water resource needs within the WMO is outlined on the following tables. The implementation of this plan will be through the WMO, the member communities, Anoka Conservation District, or a joint effort between the WMO and other state, local or federal agencies.

The URRWMO's schedule for implementing studies, improvements and programs is provided on the following tables. It is the URRWMO's intent to complete these activities on schedule. However, should funding not be available from local communities or grants cannot be secured, the schedule can be modified to address financial concerns. The URRWMO will annually review this implementation plan. This Plan is in effect until 2017.

In order to define the URRWMO's priorities and focus limited resources, the URRWMO has identified that any programs, policies, or capital improvements that can be undertaken to address the following concerns, will be the top priority for the URRWMO:

1. The URRWMO will convince a Technical Advisory Committee which is anticipated to consist of member community staff, elected officials, and state and local review agency representatives in 2007 and 2008 to develop the following:
  - a. Water quality goals for URRWMO waters
  - b. Requirements for the development of Wetland Management Plans
  - c. Runoff volume and/or infiltration requirements
  - d. Wetland buffer standards

These standards will be completed with local input by the end of 2008, which will allow local communities to incorporate into their 2009 local water management plans.

2. Continue to implement the water quality monitoring studies with assistance from the Anoka Conservation District, as well as other agencies.
3. Encourage and advocate programs, studies, and or improvements that are aimed at protecting the quality and quantity of groundwater resources.
4. Provide support to member communities, and other public and private entities, to improve habitat, protect water quality, and control invasive species.
5. Review the local member community implementation and regulatory program described above, including review of updated required ordinances, in June of each year to determine compliance.

TABLE V-1

## PROPOSED MANAGEMENT PROGRAMS

Priority	Plan Reference Location	Project Description	Cost Estimate <sup>a</sup>	Funding Sources	2007	2008	2009	2010	2011	2012-2017	Comments
High	III.A.1	Maintain water quality database to track trends in water quality within the WMO	Cost is included in monitoring program.	ACD to provide service							The URRWMO will work with ACD to maintain the water quality database
High	III.A.1 III.I.1 IV.D.8	Develop and implement water quality monitoring program for lakes, streams, and rivers	\$40,000	WMO, ACD	Plan for 2008-2012 to be approved 4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$24,000	Cost will be variable depending on ACD recommendations. ACD and citizens to complete monitoring
High	III.C.1 IV.B.1	Develop and implement public education program.	\$11,000	WMO	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$6,000	Includes web-site, newsletter articles, etc.
High	IV.B.2	Maintain and update URRWMO web-site	\$6,000	WMO		\$1,500	\$500	\$500	\$500	\$3,000	
High	IV.D.13	Review member communities' annual reports for compliance with the Watershed Management Plan	\$15,000	WMO		\$1,500	\$1,500	\$1,500	\$1,500	\$9,000	
High	IV.D.12	Annually review the URRWMO Watershed Management Plan and implementation plan	\$0	NA							To be completed by WMO Board
High	IV.A	Prepare Annual WMO report to the Board of Water and Soil Resources	\$5,000	WMO	\$500	\$500	\$500	\$500	\$500	\$2,500	

TABLE V-1

## PROPOSED MANAGEMENT PROGRAMS

Priority	Plan Reference Location	Project Description	Cost Estimate <sup>a</sup>	Funding Sources	2007	2008	2009	2010	2011	2012-2017	Comments
High	III.I.4	Budget for URRWMO cost share participation on future grant opportunities	\$10,000	WMO	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$5,000	
Medium	III.C.1 IV.D.15	The WMO to request assistance from ACD and DNR to develop and implement an aquatic invasive species monitoring program for Eurasian milfoil, curly leaf pond weed, purple loosestrife, etc.	\$0	Member community	To be implemented by member communities						
Medium	III.H.2	Develop and implement plan to track groundwater levels, trends, and water quality	\$16,000	WMO; other agencies; grants				\$2,000	\$2,000	\$12,000	To be implemented after results of Groundwater Study are completed
<b>TOTAL:</b>			\$103,000		\$2,500	\$9,500	\$8,500	\$10,500	\$10,500	\$61,500	

a. Estimated cost only. Actual costs may vary greatly from estimates provided here.

TABLE V-2

PROPOSED MANAGEMENT STUDIES

Priority	Plan Reference Location	Project Description	Cost Estimate <sup>a</sup>	Funding Sources	2007	2008	2009	2010	2011	2012-2017	Comments
High	III.I.2	Review jurisdictional boundary between Coon Creek Watershed District and URRWMO in Ham Lake.	\$1,000	WMO		\$1,000					
High	III.G.3 IV.D.11	Review member community surface water management plans and City policies for compliance with URRWMO Plan.	\$10,000	WMO		\$5,000	\$5,000				
High	III.G.1 IV.C.14	The URRWMO will develop wetland buffer standards and classification system. These standards will be prepared with assistance and input from member communities.	\$2,000	WMO		\$1,000	\$1,000				
High	III.F.1	Review East Bethel's wetland management plan along TH65 corridor	\$5,000	WMO; East Bethel			\$5,000				
High	III.B.1 III.F.2 IV.C.6	The URRWMO will develop infiltration and volume reduction standards. The standards will be developed with assistance and input from member communities.	\$2,500	WMO		\$1,500	\$1,000				
High	IV.D.13	Develop member community Annual Report template and review reports annually	\$1,000	WMO	\$1,000						May be similar to MS4 NPDES Report
High	III.I.1	Complete Groundwater Capacity Study to determine the population that can be supported by private wells	\$30,000	WMO; grants				\$30,000			

TABLE V-2

PROPOSED MANAGEMENT STUDIES

Priority	Plan Reference Location	Project Description	Cost Estimate <sup>a</sup>	Funding Sources	2007	2008	2009	2010	2011	2012-2017	Comments
Medium	III.C.1	Assist upon request of member communities to develop aquatic vegetation management plans		WMO; member community	This task to be completed upon request of the member community						
Medium	III.E.1	Complete field review/study of Rum River for erosion and other problems	\$10,000	WMO; other agencies; grants				\$5,000	\$5,000		
	III.C.12	The URRWMO will develop water quality goals for high public use water bodies. These goals will be developed with assistance and input provided by the member communities.	\$1,500	WMO; Member community		\$1,500					Includes Lake George (Oak Grove), East Twin Lake (Burns Twp), and Rum River (Oak Grove, St. Francis)
	III.C.11	Coordinate with MPCA to develop TMDL studies on the listed impaired waters within the WMO	NA	Member community	This task has been deferred to the member communities						
<b>TOTAL:</b>			\$61,500		\$1,000	\$10,000	\$12,000	\$35,000	\$5,000	\$0	

a. Estimated cost only. Actual costs may vary greatly from estimates provided here.

**TABLE V-3**

**PROPOSED CAPITAL IMPROVEMENT PLAN**

Priority	Project Description	Cost Estimate	Potential Funding Sources	2007	2008	2009	2010	2011	2012 - 2017	Comments
<p>As part of the URRWMO planning process, no capital improvement projects for the URRWMO have been identified. Member communities are anticipated to have capital improvement projects. The URRWMO will participate in the member communities' CIP via grant acquisition or technical assistance, if requested by the member communities.</p>										
<b>TOTAL</b>		TBD		TBD	TBD	TBD	TBD	TBD	TBD	

TABLE V-4								
SUMMARY								
		Proposed Expenses for Year						
Tables	Cost Estimate <sup>a</sup>	2007	2008	2009	2010	2011	2012 - 2017	Comments
Table V-1: Management Programs	\$103,000	\$2,500	\$9,500	\$8,500	\$10,500	\$10,500	\$61,500	
Table V-2: Management Studies	\$61,500	\$1,000	\$10,000	\$12,000	\$35,000	\$5,000	\$0	
Table V-3: Capital Improvements Plan	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
<b>Grand Total:</b>	<b>\$164,500</b>	<b>\$3,500</b>	<b>\$19,500</b>	<b>\$20,500</b>	<b>\$45,500</b>	<b>\$15,500</b>	<b>\$61,500</b>	

a. Estimated cost only. Actual costs may vary greatly from estimates provided here.

## VI. Impact on Member Communities

As required by Minnesota Rules, Part 8410.0110, this section outlines the impact implementation of this watershed management plan will have on local governmental units, regulatory program, other water resource-related programs, studies, and capital improvements. A discussion of the financial impact of implementing this watershed management plan on local units of government is also included in this section.

### A. Regulatory Programs

The implementation of the Upper Rum River Management Plan (URRWMO) requires the adoption of several regulatory programs by the member communities. The regulatory programs, which the URRWMO will require from member communities are listed in detail in the Plan in **Section IV**.

### B. Water Resources Related Programs and Studies

**Table V-1 and V-2** outline anticipated water resource-related programs and studies which the URRWMO will implement between 2007 and the year 2017. Shown below are the anticipated funding sources for the implementation of these programs.

Member Community	Contribution to URRWMO based on JPA (percent) *	Programs and Studies					
		2007 *	2008 *	2009 *	2010 *	2011 *	2012-2017 *
Burns Township	23.66%	\$828	\$4,614	\$4,850	\$10,765	\$3,667	\$14,551
Bethel	1.08%	\$38	\$211	\$221	\$491	\$167	\$664
East Bethel	24.21%	\$847	\$4,237	\$4,116	\$10,652	\$3,389	\$13,437
Ham Lake	0.99%	\$35	\$193	\$203	\$450	\$153	\$609
St. Francis	20.37%	\$713	\$3,972	\$4,176	\$9,268	\$3,157	\$12,528
Oak Grove	29.69%	\$1,039	\$5,790	\$6,086	\$13,509	\$4,602	\$18,259

\* Estimated contribution only. Actual contributions will vary greatly based on project and program costs.

### C. Capital Improvement Plan

**Table V-3** indicates that through the URRWMO planning process, no capital improvement projects have been identified to be implemented by the URRWMO. The local communities will likely have projects that the URRWMO will provide financial or technical assistance for, if requested by the member community.

## **VII. Amendment Procedures**

It is the intention of the Upper Rum River Watershed Management Organization (URRWMO) to have this water management plan reviewed and approved by the Board of Water and Soil Resources (BWSR). Once approved, no major amendments to this plan pursuant to 103B.231 can be facilitated without the approval of the proposed revisions by the BWSR. In addition to the BWSR, any proposed major amendments to the plan shall be made known to the following parties:

1. The Member Communities
2. The Metropolitan Council
3. URRWMO Board
4. Minnesota Board of Water and Soil Resources and all review agencies as set forth in Minnesota Rules, Chapter 8410.
5. A public meeting must be held to explain the amendments and legal notice of this public meeting must be published twice at least seven (7) days and 14 days prior to the date of the public meeting.

Following notification of the above parties, they shall have 60 days to comment on the proposed revisions. Failure to respond within 60 days constitutes approval.

Minor changes to the plan shall be defined as recodification of the plan, revision of a procedure meant to streamline administration of the plan, clarification of the intent of a policy, the inclusion of additional data not requiring interpretation, or any other action that will not adversely affect the member communities or diminish the URRWMO's ability to achieve the plan goals or implementation program. Adjustments to subwatershed boundaries will be considered minor changes, provided that the change will not have significant impact in the rate or quality in which storm water runoff is discharged from the WMO boundaries. Minor changes to this plan can be made by the URRWMO Board with the above-noted public notification process.

This plan will be in effect through May 2017 unless significant changes to the plan are deemed necessary prior to that date.

## VIII. Glossary

**County Ditch:** County Ditch means an open channel to conduct the flow of water. (Minnesota Statutes, Section 103E.005, subd 8). County ditch includes only those ditches which are part of the public drainage system as identified in the Anoka County Public Ditch Inventory dated January 1992.

**Critical Storm:** Critical Storm means that rainfall event whose distribution and duration results in a runoff volume generating the highest water level establishing the appropriate level of protection and will not adversely affect the capacity or natural characteristics of downstream waters and wetlands.

**Ditch Repair:** Ditch repair means to restore all or part of a drainage system, as nearly as practicable, to the same condition as when originally constructed and subsequently improved.

- Resloping of ditches, leveling and reseeding of waste banks, if necessary, to prevent further deterioration;
- Realignment of original construction, if necessary, and to restore the effectiveness of the system or prevent the drainage of a wetland;
- Routine operations that may be required to remove obstructions and maintain the efficiency of the drainage system;
- Restoration or enhancement of wetlands; and
- Wetland replacement under Minnesota Statutes 103G.222

**Lateral Ditch:** Lateral ditch means any open channel or storm sewer drainage construction by branch or extension, or a system of branches and extensions, or a drain that connects or provides an outlet to property with an established drainage system (Minnesota Statutes, section 103E.005, subdivision 15). Lateral includes only those facilities which are connected to the Anoka County Public Ditch Inventory dated January 1992. Laterals are not shown on the Water Resources and Wetlands Map.

**Level of Protection:** The amount of secondary storm water runoff capacity required to avoid flood damage and provide for public safety.

**Level of Service:** The amount of primary storm water runoff capacity required to avoid unusual hardship or significant interference with normal public activities (transportation, sanitary or utilities).

**Management Strategy:** The specific physical, legal or administrative actions recommended or implemented based upon the established criteria and will achieve the policies and goals.

**Nonpoint Source Pollution:** Pollution from any source other than any discernable, confined and discrete conveyances, including but not limited to surface runoff from agricultural, Silvicultural, mining, construction, subsurface disposal and urban activities.

**Normal Level:** For basins, that water elevation maintained by a natural or man-made outlet.

**100-Year Storms:** Rainstorms of varying duration ( e.g., 2,-6, 24-hour or 10-day) and intensities (inches per hour) expected to occur with a 1% frequency probability in any given year.

**1% Storm Event:** The 1% storm event is defined as having a Soil Conservation Service (SCS) Type II distribution with 5.9” of rainfall in a 24-hour period or 7.2” of runoff over 10 days.

**On site Detention:** A method of temporarily storing storm water runoff at a development site in the form of wet or dry basins. While the primary objective is water control, significant reduction in outflow conveyor overloading is accomplished for high intensity, short duration storm events. This method is employed on developments when the regional detention basin approach is not available, usually due to site location of either facility.

**Ordinary High Water (OHW) Level:** That elevation delineating the highest water level which has been maintained for a sufficient period of time to leave evidence upon the landscape. Generally, it is the point where natural vegetation changes from predominantly aquatic to terrestrial.

**Policies:** The plans or course of action to be followed by the URRWMO in achieving Goals.

**Post-Disturbance Condition:** The state of a site following crop or development establishment in which source and/ or structural control measures have been implemented resulting in erosion and sedimentation control achieving soil loss limits.

**Public Ditch:** A Public Ditch is those designated as a numbered County or Public Ditch.

**Primary Capacity:** The volume and/ or rate of storm water runoff defined as that level of service provided by a lateral ditch or county ditch system.

**Regional Detention Basin:** A natural pond or wetland area, often modified by man, in which a minimum and permanent water level is maintained. During periods of storm water runoff of various durations, the basin receives additional water, stores it temporarily, and releases it at a controlled rate(s). In addition to runoff flow equalization in reducing existing flooding problems, the basin serves pollutants from existing as well as planned development.

**Secondary Capacity:** The volume and/or rate of storm water runoff in excess of the primary capacity and defined as that level of protection provided by a lateral ditch of county ditch system.

**Shoreland Area:** Land located within 1,000 feet from the ordinary high water level of a lake, pond or flowage. Also the land located 300 feet from a river or stream, or the landward extent of a flood plain designated by ordinance on a river or stream, whichever is greater.

**Source Control:** The application of erosion techniques including but not limited to: mulching, seeding, sodding and greenbelts.

**Storm Water Runoff:** The flow on the surface of the ground, resulting from precipitation in the form of rainfall or snowmelt.

**Structural Control:** The application of construction erosion techniques including but not limited to sediment basins, silt fences, debris dams, dikes, terracing, riprap and diversions.

**Universal Soil Loss Equation:** A method developed by the Agricultural Research Service, USDA, and used by Soil and Water Conservation Districts to estimate the average annual soil erosion based on rainfall, soil erodibility, slope of the land, length of slope, vegetative cover, and erosion control practices.

**Worst-case Soil Loss Condition:** The state of a site which is denuded and rough grade contours could create the greatest potential soil loss( e.g., a site in which all of the vegetative cover is removed , the existing or interim grades are unstablized and could result in significant soil loss).