

City of Andover Water Resource Management Plan



Andover, Minnesota
City Project No. 03-42

Prepared by:



**WATER RESOURCE MANAGEMENT PLAN
FOR THE CITY OF ANDOVER, MINNESOTA**

**City Project 03-42
WSB Project No. 1463-04**

FINAL

March 2005

PREPARED BY

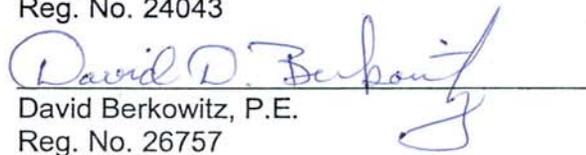
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I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.



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I. EXECUTIVE SUMMARY

This Water Resource Management Plan update for the City of Andover has been developed to meet local watershed management planning requirements of the Metropolitan Surface Water Management Act and Board of Water and Soil Resources Rules 8410. It has also been developed to be in conformance with the requirements of local Watershed District and Watershed Management Organization, Metropolitan Council requirements, and applicable State and Federal laws. This document and its referenced literature is intended to provide a comprehensive inventory of pertinent water resource related information that affects the City and management of those resources.

Section II

Section II of this plan provides an introduction and purpose. The update to the Water Resource Management Plan has been developed to provide the City of Andover with direction concerning the administration and implementation of water resource activities within the City. This plan is intended to meet the requirements for a local watershed management plan as required by the Metropolitan Surface Water Management Act and be in conformance with Board of Water and Soil Resources (BWSR) Rules Chapter 8410. This section also lists the personnel contacts involved in the assistance and implementation of this plan, including the staff from the Coon Creek Watershed District and the Lower Rum River Watershed Management Organization.

Section III

Section III of this plan provides an inventory of land and water resources within the City including a general description and summary of data related to precipitation, geology, topography, flood problem areas, existing flood insurance studies, water quality, shoreland ordinances, surface and ground water appropriations, ground water, soils, land use, public utilities services, public areas for water-based recreation and access, fish and wildlife habitat, unique features, scenic areas and pollutant source locations within the City. A number of maps were also developed as part of the Plan to assist in summarizing this information.

Section IV

Section IV of this plan outlines water resource management related goals and policies of the City. Goals and policies have been developed for the City concerning water quantity, water quality, recreation, fish and wildlife management, enhancement of public participation, information and education, public ditch system, ground water, wetlands, and erosion.

Section V

Section V of this Water Resource Management Plan provides an assessment of the existing and potential water resource related concerns within the City. These concerns were identified based on an analysis of the land and resource data collected as part of this plan preparation and through public input. This section summarizes the problems and corrective actions that were identified through this process.

Section VI

Section VI outlines implementation priorities and develops an implementation program. This section contains a prioritized listing of the studies, programs and capital improvements that have been identified as necessary to respond to the water resource needs within the City. The implementation period identified within this report for the programs, studies and capital improvements is from the year 2004 through 2014. This plan is to be used for planning purposes only. Detailed feasibility analysis has not been completed to develop this section; therefore, cost estimates are subject to change and update as more detailed information is obtained.

Section VII

Section VII discusses the financial considerations of implementing the proposed regulatory controls, programs and improvements, which have been identified in this plan and their financial impact on the City. Funding sources available for implementing the policies and corrective actions identified within this plan are identified. The plan indicates that the majority of funding for the policies and corrective actions will be from the City's Storm Water Utility, which is anticipated to generate approximately \$238,000 in 2004 with an increase of \$5,000 per year for storm water management items. Other possible funding sources for the implementation of this plan include special assessments and grant monies, which may be secured from various local, regional, County, State or Federal agencies. These other funding sources will be necessary to aggressively implement the Plan.

Section VIII

Section VIII discusses the procedures to be followed in the event this Water Resource Management Plan is amended. Once this Water Resource Management Plan is approved, no significant changes to this plan can be facilitated without the approval of the proposed revisions by the Watershed Management Organization and Watershed District within the City that are affected by the change. Significant changes to the plan shall be made known to the Mayor, City Council, City Administrator, the Metropolitan Council, the public, and the Watershed Management Organization and Watershed District within the City.

Appendices

Appendices are included in the back of the plan and summarized below. These documents are included because they provide supporting information to the main body of the plan, are useful information, and/or are required by Minnesota Rules.

- **Appendix A:** This appendix contains any water resource related agreements that the City has entered in to with adjoining municipalities, landowners, etc. **Section II** contains a summary of these agreements.
- **Appendix B:** This appendix contains copies of water quality studies completed by other organizations.
- **Appendix C:** A copy of the FEMA Flood Insurance Study is included in this appendix.
- **Appendix D:** The appendix includes the City's current code regulations associated with water management such as floodplain regulations and shoreland management.

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- **Appendix E:** A list of the Department of Natural Resources groundwater appropriations within the City is provided.
 - **Appendix F:** This appendix includes the information obtained from the Minnesota Pollution Control Agency regarding pollutant sources within the City.
 - **Appendix G:** The NPDES Phase II storm water pollution prevention program (SWPPP) application is included here.
 - **Appendix H:** This appendix contains information from the State Historic Preservation Office.
 - **Appendix I:** The Storm Water System Maintenance Plan was developed as summary of the maintenance program that the City will undertake to maintain the storm sewer system such as clean out storm ponds, sweep streets at least twice annually, and inspect the storm sewer system. This plan was developed in conformance with the City's NPDES Phase II applications.
 - **Appendix J:** The City's Parks Map is included in this appendix.
 - **Appendix K:** The City's Zoning Map is included in this appendix.
 - **Appendix L:** The information that was obtained from the Department of Natural Resources Natural Heritage database relating to rare or endangered species or significant geologic features are provide here.
 - **Appendix M:** Skimmer structure details for the City are included in this appendix.
 - **Appendix N:** A summary of the hydrologic model prepared by the CCWD is contained in this appendix
 - **Appendix O:** This appendix contains a Developer's Handout that summarizes the storm water requirements.
 - **Appendix P:** This appendix contains possible variance criteria for low floor elevations from the LRRWMO.

Additional material is referenced within this report and is available at the Water Resource Library located at Andover City Hall.

This Water Resource Management Plan will be in effect through the year 2014, at which time this plan will be updated. However, if significant changes to the plan are deemed necessary prior to that date the City may revise this plan in its entirety.

II. INTRODUCTION AND PURPOSE

A. General

This Water Resource Management Plan has been developed to serve as an update to City of Andover Water Resource Management Plan dated January 1993 and provide direction concerning the administration and implementation of water resource activities within the City. This plan is intended to meet the requirements for a local watershed management plan as required by the Metropolitan Surface Water Management Act and be in conformance with Board of Water and Soil Resources (BWSR) Rules Chapter 8410.

In addition to being in conformance with the above state law, this plan has also been developed to meet the needs, requirements, and direction outlined by the following list:

1. Coon Creek Watershed District Plan
2. Lower Rum River Watershed Management Organization Plan
3. State Laws and Rules concerning wetland management as outlined in the Wetland Conservation Act
4. State and Federal laws regarding the need to secure a National Pollutant Discharge Elimination System (NPDES) permit for storm water outfalls to designated drainage ways

This plan incorporates the approaches and direction provided in the programs and documents listed above into a comprehensive plan that can be consistently applied across the City.

B. Personnel Contacts

To implement this plan, a coordinated water resource management approach must be used. This approach utilizes the services of staff personnel within the City and surrounding communities, as well as staff personnel associated with the Coon Creek Watershed District (CCWD) and Lower Rum River Watershed Management Organization (LRRWMO) having jurisdiction over areas within the City. The CCWD and LRRWMO boundaries are shown on **Figure II-1**.

The primary implementation responsibility will lie with the appropriate staff members at the City. Assistance from the surrounding municipalities and CCWD and LRRWMO will also be expected. Outlined below is the contact information for personnel having responsibilities for overseeing or implementing various aspects of the Water Resource Management Plan.

City of Andover
City Engineer
David Berkowitz, P.E.
1685 Crosstown Blvd NW
Andover, MN 55304
(763)755-5100

Coon Creek Watershed District
Contact: Tim Kelly, Administrator
12301 Central Avenue NE, Suite 100
Blaine, MN 55434
(763) 755-0975

Lower Rum River Watershed Management Organization
Contact: Steve Jankowski, P.E., Chair
15153 Nowthen Boulevard
Ramsey, MN 55303
(763) 421-8999

C. Water Resource Related Agreements

The City has entered into water resource-related agreements that govern in part how the City must manage its water resources. These agreements include joint powers agreements between the City and Watershed Management Organizations having jurisdiction within its boundaries, agreements between the City and adjoining communities, or agreements it may have with other governmental units or private parties. Listed below is a description of the water resource related agreements which the City has entered into. A copy of these agreements or appropriate portions thereof, are included in **Appendix A**.

- Joint and cooperative agreement for the establishment of the Lower Rum River Watershed Management Organization to plan, control and provide for the development of the Lower Rum River Watershed, 1995.
- Agreement with the City and the Slyzuk's for maintaining the storm water drainage ditch within an easement on their property, 1978.

City of



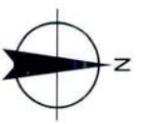
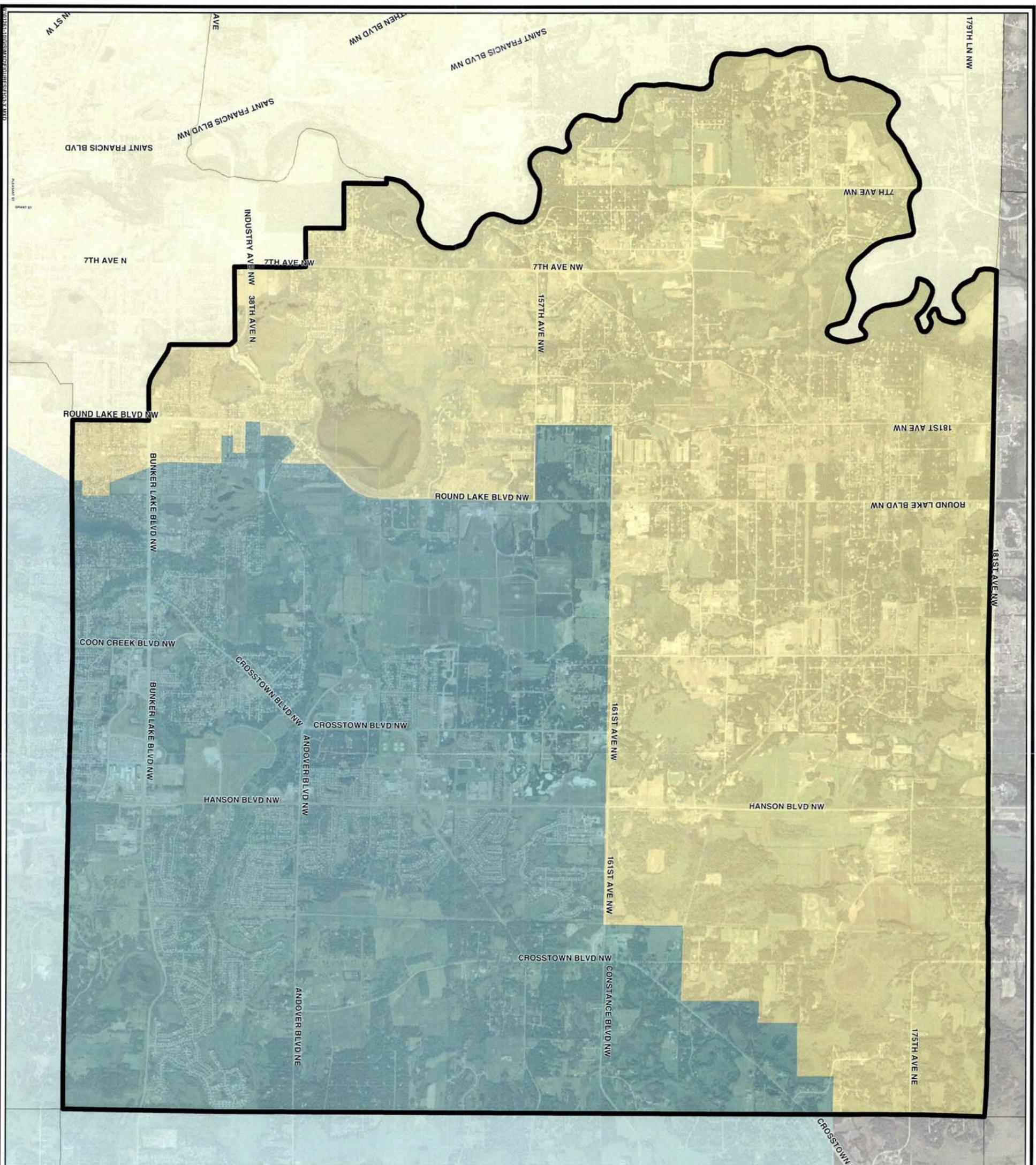
Andover

*Comprehensive Water Resource
Management Plan*

Figure II-1

**Watershed District/Management
Organization Boundaries**

Source: Coon Creek Watershed District



LEGEND

-  COON CREEK WATERSHED DISTRICT
-  LOWER RUM RIVER WMO



III. 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 ground water resource data, soils, land use, public utilities services, water-based recreation, fish and wildlife habitat, unique features, scenic areas, and pollutant sources. This section also identifies where detailed information can be obtained for many of these areas.

A. Climate and Precipitation

1. Climate

The climate within the Minneapolis/St. Paul metropolitan area is described as a humid continental climate with moderate precipitation, wide daily temperature variations, warm humid summers and cold winters. The total average annual precipitation is approximately 31 inches, of which approximately 70% occurs between April and September. The annual snowfall average is about 47 inches. Average monthly temperature, precipitation, and snowfall are shown in **Table III-1**.

2. Precipitation

A rainfall event having a 99% chance of occurrence in a 24-hour period is approximately 2.3 inches (1-year event). A rainfall event having a 1% chance of occurrence in a 24-hour period is approximately 5.9 inches (100-year event). The 100-year, 10-day runoff (snowmelt) is 7.2 inches. **Figures III-1** and **III-2** show the 1% rainfall event and the annual normal precipitation within the State of Minnesota. Additional climatological information for the area can be obtained from the U.S. Weather Bureau Technical Paper 40.

B. Geology and Topographic Information

1. Geology:

The City of Andover is located in south-central portion of Anoka County (**Figure III-3**). The City is bordered by the Rum River and the City of Ramsey (west), the City of Coon Rapids (south), the City of Ham Lake (east), the City of Oak Grove (north), and the City of Anoka (southwest). Total area within the corporate limits is approximately 36 square miles.

The geomorphology of the City is comprised of postglacial deposits formed from the retreat of the Superior Lobe of the Grantsburg Sublobe of the Lake Wisconsin glaciers. The surface of the Anoka Sandplain is mostly flat to gently rolling. 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 the southwesterly winds after the sandplain was abandoned by outwash streams. Landscape features of negative relief include lakes and marshes which formed as ice blocks that were originally buried by the outwash sand melted to create the depressions, which are now filled with water or organic soils.

According to the Bedrock Geologic Map and Bedrock Topographic Map of the Seven-County Twin Cities Metropolitan Area (Minnesota Geologic Survey, 1986), the bedrock formations within the City primarily consist of the St. Lawrence and Franconia formations with some area of Jordan sandstone, Ironton and Galesville sandstones, and Eau Claire formation to a lesser degree. The depth of bedrock varies from 600 to 800 feet above sea level.

Additional geologic information for areas within the City can be found in the Anoka County Regional Hydrogeologic Assessment (MDNR).

**TABLE III-1 AVERAGE MONTHLY TEMPERATURE, PRECIPITATION,
AND SNOWFALL DATA**

<u>Month</u>	<u>Average Temp. F°</u>	<u>Precip. inches</u>	<u>Snowfall inches</u>
January	8.9	1.13	10.4
February	17.4	0.78	11.3
March	28.7	1.81	10.2
April	45.0	2.49	2.4
May	59.0	3.64	0
June	67.3	4.33	0
July	71.7	4.21	0
August	69.6	4.32	0
September	60.5	3.11	0
October	48.6	2.47	2.0
November	32.0	2.03	3.9
December	18.0	0.91	6.9
Annual Average:	43.9	Total: 31.23	Total: 47.1

Source: Coon Creek Watershed District Plan (Forest Lake 1970-1999; UM 1999)

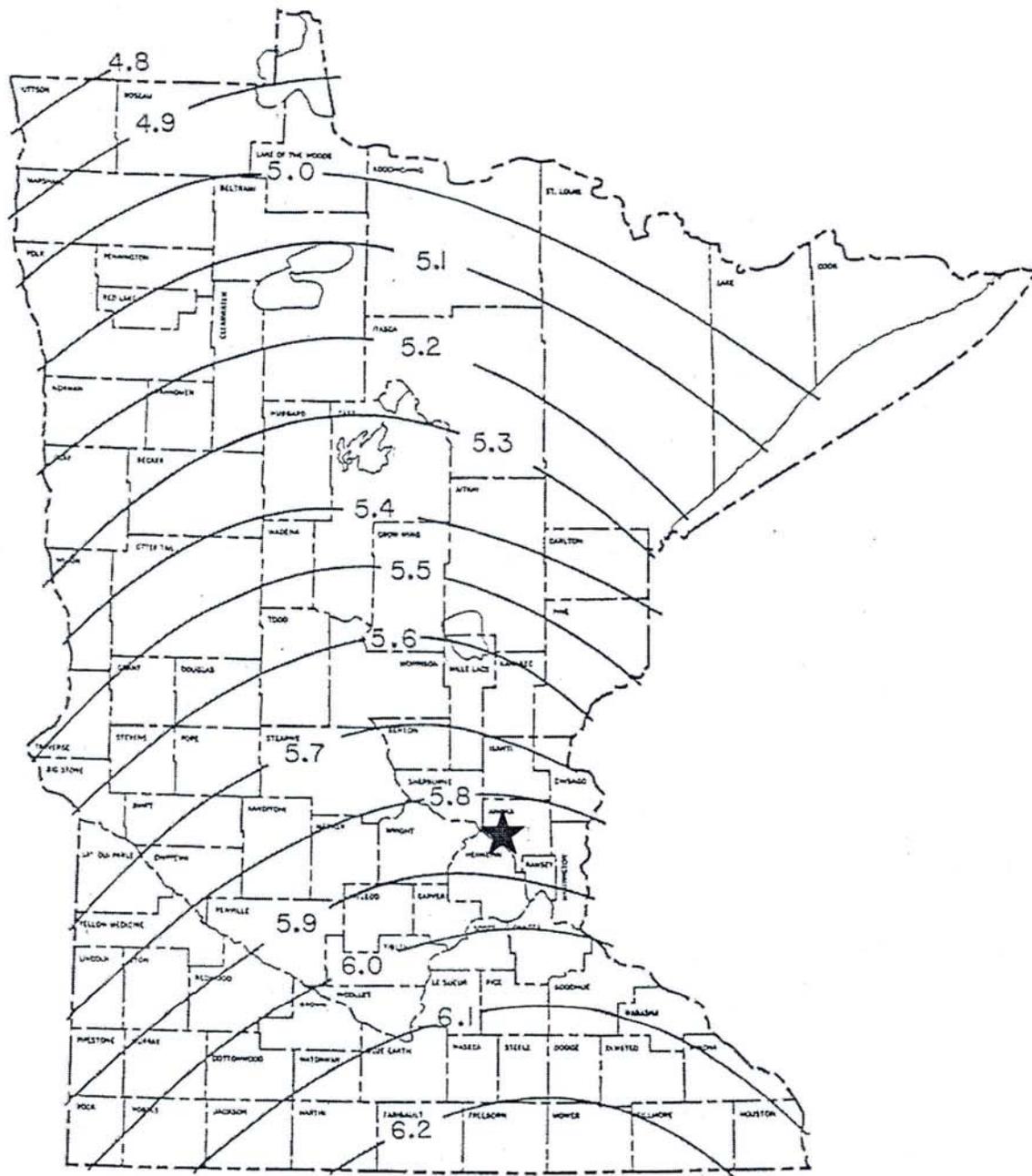


Figure III-1. 1% Chance Rainfall Event in 24-hours within the State of Minnesota.

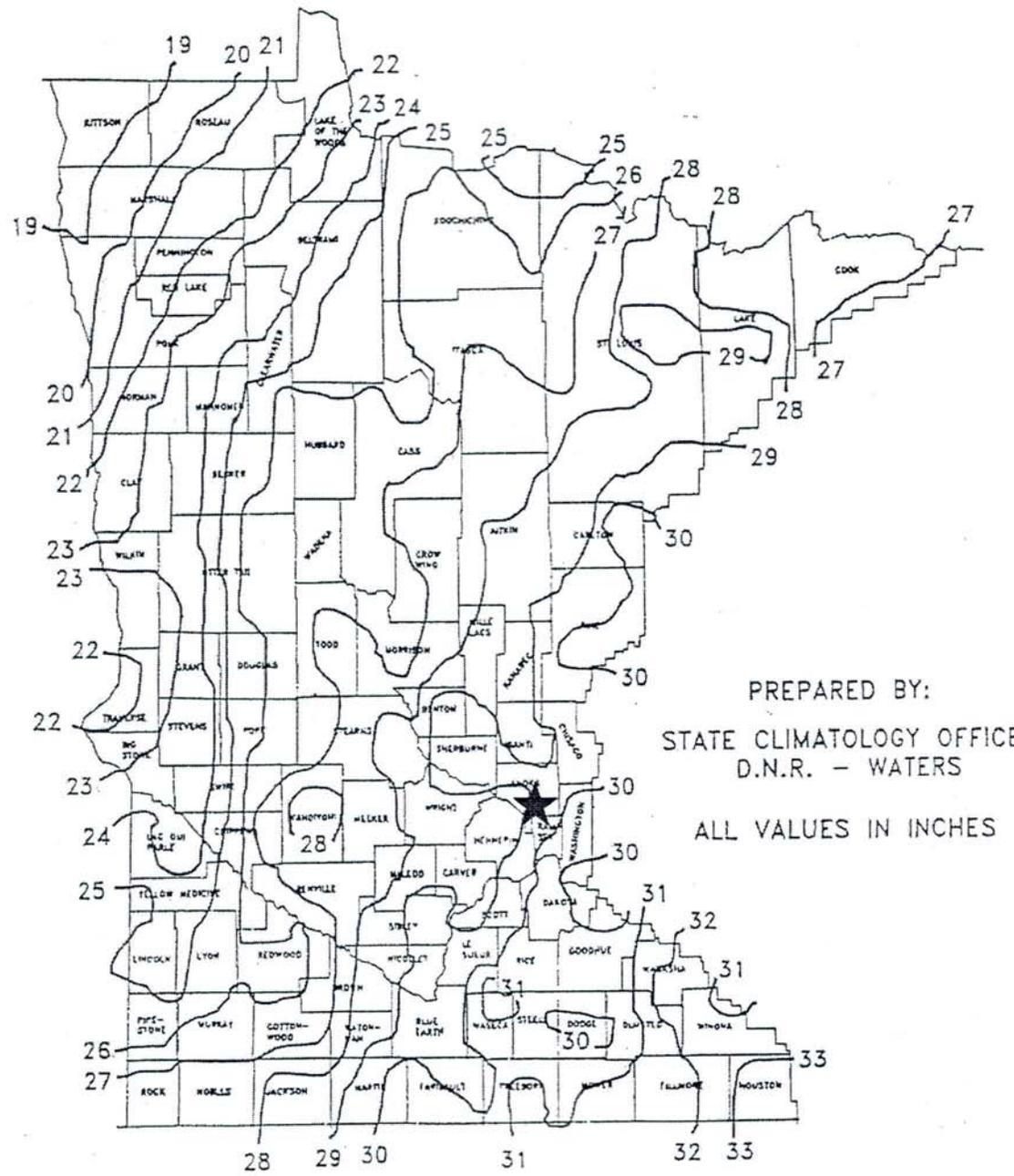


Figure III-2. Annual Normal Precipitation with the State of Minnesota.

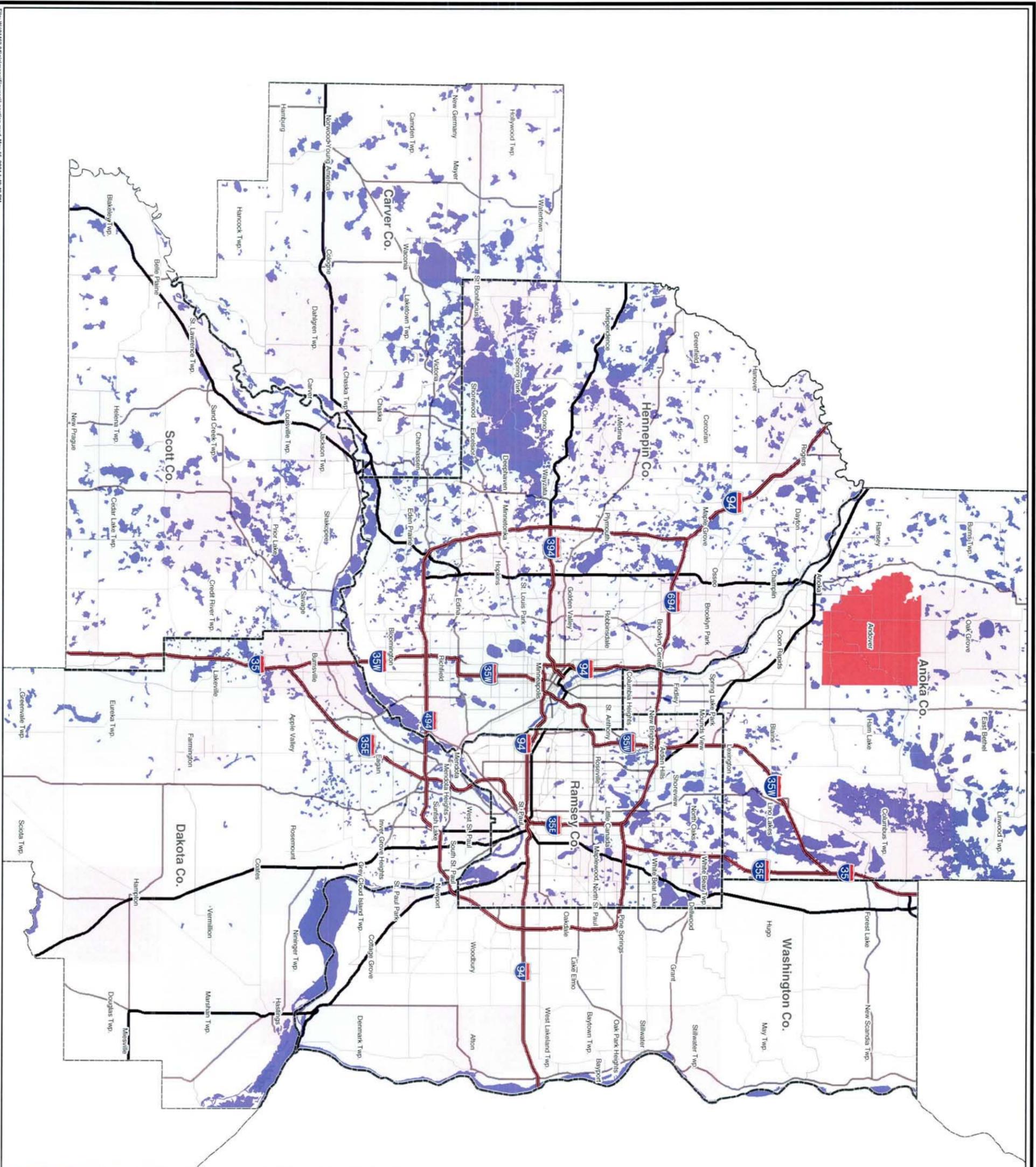
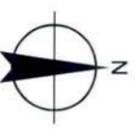
City of



Andover
Comprehensive Water Resource
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Figure III-3
Location Map

2000 Population: 26,588



2. **Topography:**

The topography of the City can be described as gently rolling. Storm water runoff from the City of Andover is generally directed to the Rum River or Coon Creek, where it is eventually discharged into the Mississippi River. The specific drainage patterns, which depict topography for areas within the City, are shown on the subwatershed delineation map on **Figure III-4**.

C. **Surface Water Resource Data**

Available surface water resource data within the City is summarized in this section. Detailed information has been included either in the appendices to this report or has been identified by reference and is available in the Water Resource Library at City Hall.

The hydrologic system of the City consists of wetlands, streams, and major water bodies as outlined below.

1. **Wetlands**

The general location of wetlands within the City are shown on **Figures III-5a and 5b**. These figures show the National Wetland Inventory and the DNR Public Waters Map, respectively. These wetlands provide habitat to many species of plants and animals. Wetlands also affect local water quality. The aquatic plants present in a healthy wetland will slow and filter water moving through the wetland, take up pollutants, and provide for additional settling time for sediment.

2. **Major Bodies of Water**

The City has four main lakes which include Bunker Lake, Crooked Lake, Round Lake, and Ward Lake (**Figure III-5b**). More information about these water bodies is included in various portions of this section.

3. **Hydrologic Modeling (Water Quantity)**

The City's hydrologic/hydraulic system consists of the Coon Creek, the Rum River, Cedar Creek, Ward Lake, Crooked Lake, County Ditches, private ditches, and other lakes, ponds, wetlands, and storm sewer pipe systems. The City is divided into 6 subwatershed areas, which are shown on **Figure III-4**.

Minnesota Statute 103B.235 requires that the local plan define the drainage areas, the volumes, rates, and paths of storm water runoff. In part to address water resource problems within the watershed, a hydrologic model for Coon Creek Watershed was completed by the CCWD in 1999. A summary of this model is contained in **Appendix N**.

Areas of the City within the LRRWMO have not experienced flooding or rate control issues. Therefore, it has been determined that there is no benefit to Andover's receiving waters to complete an overall hydrologic/hydraulic model of the City at this time. The City has, however, chosen to

develop the model in conformance with State Statutes as development occurs. The storm water management requirements for development in the City are outlined in **Section IV** of this Plan. The information that will be provided as part of development is sufficient to analyze the upstream watershed, downstream watershed, as well as providing on-site storm water management controls.

D. Flood Insurance Studies

A Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) was completed for areas within the City in 1980. This study provides the basis for floodplain management regulations and is included in **Appendix C**. The City's floodplain management regulations are included in **Appendix D**. The Flood Insurance Rate Maps (FIRMs) are available at City Hall. The current floodplain boundaries for the City of Andover are shown in **Figure III-6**.

Letter of Map Change or LOMC is a collective term for different types of map changes such as revisions (LOMR) and amendments (LOMA) to flood hazard maps submitted to FEMA. A number of Letters of Map Revision have been submitted for various areas of the City since 1980.

Additionally, a study to revise the floodplain boundaries is being completed by Wenck Associates. This area is generally north of 161st Street, west of the BNSF railroad, south of 181st Avenue NW, and east of Valley Drive NW as shown on **Figure III-6**. Once the revised boundary is approved by FEMA, **Figure III-6** will be revised as a minor amendment to the Plan.

E. Water Resource Problem Areas

Water resource problem areas were identified through information obtained from the Lower Rum River WMO, Coon Creek Watershed District, Anoka Conservation District, and the City. The following areas are identified areas that experience flooding:

- County Ditch 6
- Low lying areas adjacent to the Rum River

More detailed information about these areas is available in the Lower Rum River WMO Water Management Plan and the Coon Creek Watershed District Plan and is discussed in **Section V** of this plan.

F. Water Quality Data

1. Overview

Water quality data for the City has been obtained from the Storage and Retrieval Database (STORET). This database is utilized by participating agencies to compile water quality testing data and is almost entirely used for the storage of water quality parameters. Other Water Quality reports have been completed by Coon Creek Watershed District, Lower Rum

River WMO, the Department of Natural Resources, and Anoka Conservation District.

Figure III-7 shows the location of water quality monitoring sites. Water quality information is contained in the STORET national database which can be reviewed at <http://www.epa.gov/STORET/>. A print out of some of the water quality information within STORET is available in the Water Resource Library at City Hall.

Upper Coon Creek Watershed Water Quality Project (1997): This study was completed by the Anoka Conservation District and University of Minnesota to evaluate the relationship between groundwater and surface water in the Anoka Sandplain. The results of this study showed that there were no contaminants in excess of state or federal drinking standards. However, nitrate-nitrogen levels were detected at several non-drinking water sites. Overall, the data did not support water quality relationships between surface water and shallow groundwater in the upper portions of the Coon Creek watershed.

Anoka Conservation District (ACD) Ditch 6 Water Quality Investigation (1998-2002): ACD completed a water quality study on Ditch 6 in 2002. The study found that chloride levels were four times higher than impacted streams in the ecoregion and three times higher than the median level for Anoka County streams. The report identified two probable non-point sources for the elevated chlorine levels and recommended several actions to eliminate or reduce the chlorine sources at the point of origin. A copy of this study is available online at Anoka Conservation District's website, www.anokanaturalresources.com.

Crooked Lake 2002 Report and Ten Year Trend Analysis: The results for the 2002 Crooked Lake Water Quality study completed by the Coon Creek Watershed District, The DNR, and ACD examined the water quality parameters of Crooked Lake including: total suspended solids (TSS), total phosphorous (TP), total Kjeldahl nitrogen (TKN), copper (Cu), lead (Pb), zinc (Zn), hydrocarbons (HC), chemical oxygen demand (COD), and biological oxygen demand (BOD). Analysis of the water quality parameters for 2002 resulted in an overall B grade for the lake. The Carlson Trophic State Index analysis indicated that the lake was slightly eutrophic and swimming activities were impaired. Trend analysis of Crooked Lake from data collected by the Met Council (1993-1998) and ACD (2000-2002) indicates that the lake water quality has significantly improved over the past ten years. A copy of this report is included in **Appendix B**.

Round Lake Water Quality Information (2003): The ACD has compiled information regarding the water quality of Round Lake. This information suggests that Round Lake is one of the clearest lakes in the County. The full report is contained in **Appendix B**.

Total Maximum Daily Loads (TMDLs): The Minnesota Pollution Control Agency lists the Rum River on the Total Maximum Daily Loads List (TMDL) as a *Fish Consumption Advisory* water.

G. Floodplain Management and Shoreland Regulations

The City of Andover has developed Floodplain Management Regulations. A copy of these regulations can be found in **Appendix D** with the most up-to-date version being available on the City's web-site at <http://www.ci.andover.mn.us/>. These regulations generally prohibit uses or activities within the floodplain that include structures or fill or that obstruct flood flows or cause increased flood elevations.

The City currently has a Shoreland Management policies within the City Code which regulates development in shoreland zones. A copy of these regulations is included in **Appendix D** with updates available on the City's web-site.

H. Ground Water Appropriations

Within the City, ground water wells serve the City and private water needs. Each of these wells has a ground water appropriation permit from the DNR. Information on the DNR permit number for each well, its location, permitted volume, and number of gallons withdrawn each year is included in **Appendix E**. **Figure III-8** shows the locations of the DNR permitted ground water appropriation sites within the City.

I. Ground Water Resource Data

Ground water resource data for areas within the City are available by reviewing the contents of The Anoka Sand Plain Regional Hydrogeologic Assessment completed in 1993, containing information on water-table hydrogeology and water well data base distribution and sensitivity of the water-table system to pollution.

J. Soils Information

The City of Andover is entirely within the Anoka Sandplain; therefore soils within the area have generally higher infiltration rates and create an increased susceptibility to ground water contamination. The hydrologic soil classification map is shown in **Figure III-9**. The four soil classifications are defined as follows:

Group A - These soils have high infiltration rates even when thoroughly wetted. The infiltration rates range from 0.3 to 0.5 inches per hour. These soils consist chiefly of deep, well drained to excessively drained sands and gravel. Group A soils have a high rate of water transmission, therefore resulting in a low runoff potential.

Group B - These soils have moderate infiltration rates ranging from 0.15 to 0.30 inches per hour when thoroughly wetted. Group B soils consist of deep

moderately well to well drained soils with moderately fine to moderately coarse textures.

Group C - These soils have slow infiltration rates ranging from 0.05 to 0.15 inches per hour when thoroughly wetted. Group C have moderately fine to fine texture.

Group D - These soils have very slow infiltration rates ranging from 0 to 0.05 inches per hour when thoroughly wetted. Group D soils are typically clay soils with high swelling potential, soils with high permanent water table, soils with a clay layer at or near the surface, or shallow soils over nearly impervious material.

Roughly one-quarter of the City consists of Hubbard-Nymore association. This association is mainly a nearly level to gently sloping outwash plain that is dissected by drainage ways and pitted by large depressions. These soils contain mostly Group A soils.

The remainder of the City consists of Zimmerman-Isanti-Lino association. These soils are nearly level to undulating, excessively drained, somewhat poorly drained, and very poorly drained soils that are dominated by fine sands throughout. This association contains a mixture of Group A and B soils

Additional information on the geology and soil for the City is included in the Regional Hydrogeologic Assessment and Anoka County Soil Survey available at the Water Resource Library at City Hall.

K. Land Use and Public Utilities Services

The City of Andover land use practices include residential, commercial, industrial, and public and private open space areas. A copy of the City Zoning Map is located in **Appendix K** and updates can be viewed on the City's web-site at <http://www.ci.andover.mn.us/>. The existing and future land use map is also on the City's web-site.

About 17,000 residences and most businesses in the City are served by public water and sewer systems. The City does, however, contain approximately 3,300 Individual Sewage Treatment Systems (ISTS). These sites are not anticipated to be abandoned and converted to city services in the future.

The Minnesota Department of Health maintains a record of new wells and existing wells that change ownership beginning in the year 1990. A copy of the well data can be obtained from the Minnesota Department of Health.

M. Public Areas for Water Based Recreation and Access

There are a number of water bodies that both active recreation such as fishing and passive recreation such as walking. These recreational resources are outlined below:

Kelsey Round Lake Park: Kelsey Round Lake Park is 136 acre nature area that offers trails for hiking, biking, cross-country skiing, and environmental observation.

Crooked Lake: A fishing pier and park area are located at Crooked Lake. A public park access is available at the north end of the lake. Crooked Lake is located in both the cities of Andover and Coon Rapids.

Bunker Hills Regional Park: Bunker Hills Regional Park is a County Park located within the cities of Andover and Coon Rapids in southeastern Andover and provides a variety of passive recreational opportunities such as camping, hiking, biking, cross-country skiing, and nature observation.

Additional information regarding recreational opportunities is available from the City of Andover or Anoka County Parks and Recreation Department.

N. Fish and Wildlife Habitat

Andover provides habitat for a variety of small mammals, reptiles, birds, amphibians, and insects. Maintenance of habitat for wildlife species is important in maintaining ecological stability in Andover natural areas.

Appendix L contains information obtained from the DNR Natural Heritage database. This data indicates there is a variety of unique fish and wildlife habitat within the City, much of which is located along Coon Creek and within Bunker Hills Regional Park and the Rum River Central Regional Park.

The Anoka County Conservation District and the DNR designates the areas between the Rum River, Round Lake, and along Coon Creek to Bunker Hills Regional Park as a wildlife corridor. The importance of preserving wildlife corridors to perpetuate the survival of endangered and/or threatened species is being recognized as important as development pressures on natural lands increase with rapid growth. The Minnesota DNR has partnered with private and public sponsors to create focus areas of wildlife corridor preservation throughout the expanding Metro area. The Rum River from north Anoka County boundary south to the union of the Mississippi River is considered a focus area for wildlife corridor preservation.

O. Unique Features and Scenic Areas

Unique features and scenic areas include State designated Scientific and Natural Areas, designated scenic areas, areas containing rare and endangered species, and historic areas.

The City of Andover has several natural areas and a few water bodies. Two regional parks are located adjacent to and within the City boundary. Some of these areas contain rare and endangered species and special habitats.

Appendix L contains information from the DNR Natural Heritage Database outlining the rare and endangered species and special habitats within the City.

A portion of the Rum River Wild and Scenic area as defined by the State lies within the City boundary.

The City does have a number of historical and architectural resources as identified by the Minnesota State Historical Preservation Office (**Appendix H**). These resources include the following areas:

Table III-3. Archeological and Historic Properties/Sites within the City of Andover

Site/Property Name and/or Description	Approximate Location
J.C. Clark House	Section 3, T32N, R24W
St. Patrick's Church	Section 5, T32N, R24W
Constance Historic District	Section 13, 14, T32N, R24W
Porter Kelsey House	Section 30, T32N, R24W
Elijah Sabin Rogers House	Section 29, T32N, R24W
District No. 8 School	Section 26, T32N, R24W
M.R. Eaters' House and Store	Section 25, T32N, R24W
P.M Gory House	Section 25, T32N, R24W
Adolphson Round Barn	Section 32, T32N, R24W
Constance Church	Section 14, T32N, R24W
Constance Post Office	Section 13, T32N, R24W
Constance School	Section 14, T31N, R24W
Archeological Sites	
Earthwork (mounds, fortifications, ricing pits, etc.) Cemetery	Section 20, T32N, R24W
Lithic and Artifact Scatter	Section 28, T32N, R24W
Artifact Scatter	Section 29, T32N, R24W
Pratt, Structural Ruin and Artifact Scatter	Section 23, T32N, R24W
Earthwork and Cemetery	Section 13, T32N, R24W
Rum River Terrace, Artifact Scatter	Section 13, T32N, R24W

Source : Minnesota State Historic Preservation Office

P. Pollutant Source Locations

Pollutant source location information from the MPCA Master Entity System and MPCA Leaksite list is included in **Appendix F**, as well as lists of hazardous waste generators and registered underground and aboveground storage tanks within the City of Andover.

Figure III-10 shows the approximate locations of a variety of sites that are listed with MPCA's "What's in My Neighborhood" database. The status of these sites varies from active sites to sites that have been cleaned up and closed by MPCA. Specific details of each site can be obtained from MPCA.

Q. NPDES Phase II

The Minnesota Pollution Control Agency (MPCA) implemented the National Pollutant Discharge Elimination System (NPDES) Phase II Stormwater Program in March 2003. Phase II requires municipal separate storm sewer systems (MS4's) in urban areas with populations over 10,000 and under 100,000 to obtain an NPDES permit. Permits for construction sites greater than 1 acre will also be required as part of the Phase II. The City has submitted its Stormwater Pollution Prevention Plan and Notice of Intent in conformance with the MPCA guidelines. The application that was sent to the MPCA is included in **Appendix G**.

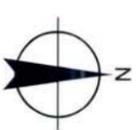
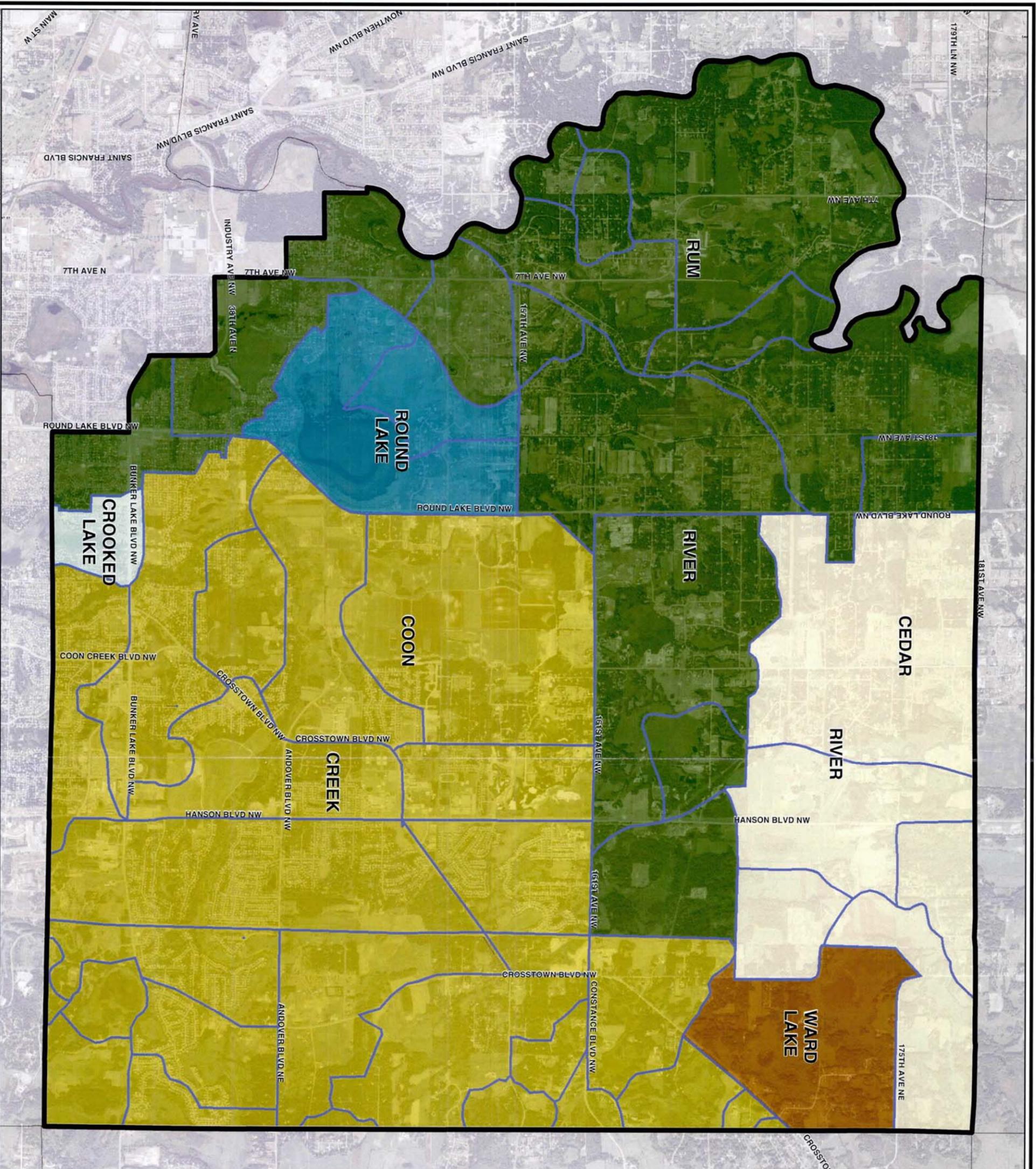


Andover
Comprehensive Water Resource
Management Plan

Figure III-4

Subwatershed Boundaries

Source: 1993 Water Resource Management Plan
Coon Creek Watershed District (March 2001)



LEGEND

-  CEDAR RIVER
-  COON CREEK
-  WARD LAKE
-  CROOKED LAKE
-  ROUND LAKE
-  RUM RIVER
-  SUB-WATERSHED BOUNDARIES



Andover
Comprehensive Water Resource
Management Plan

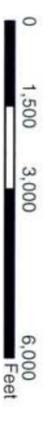
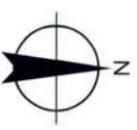
Figure III-5a

NWI Wetlands & County Ditches

Source: MNDNR, Anoka County, & CCWD

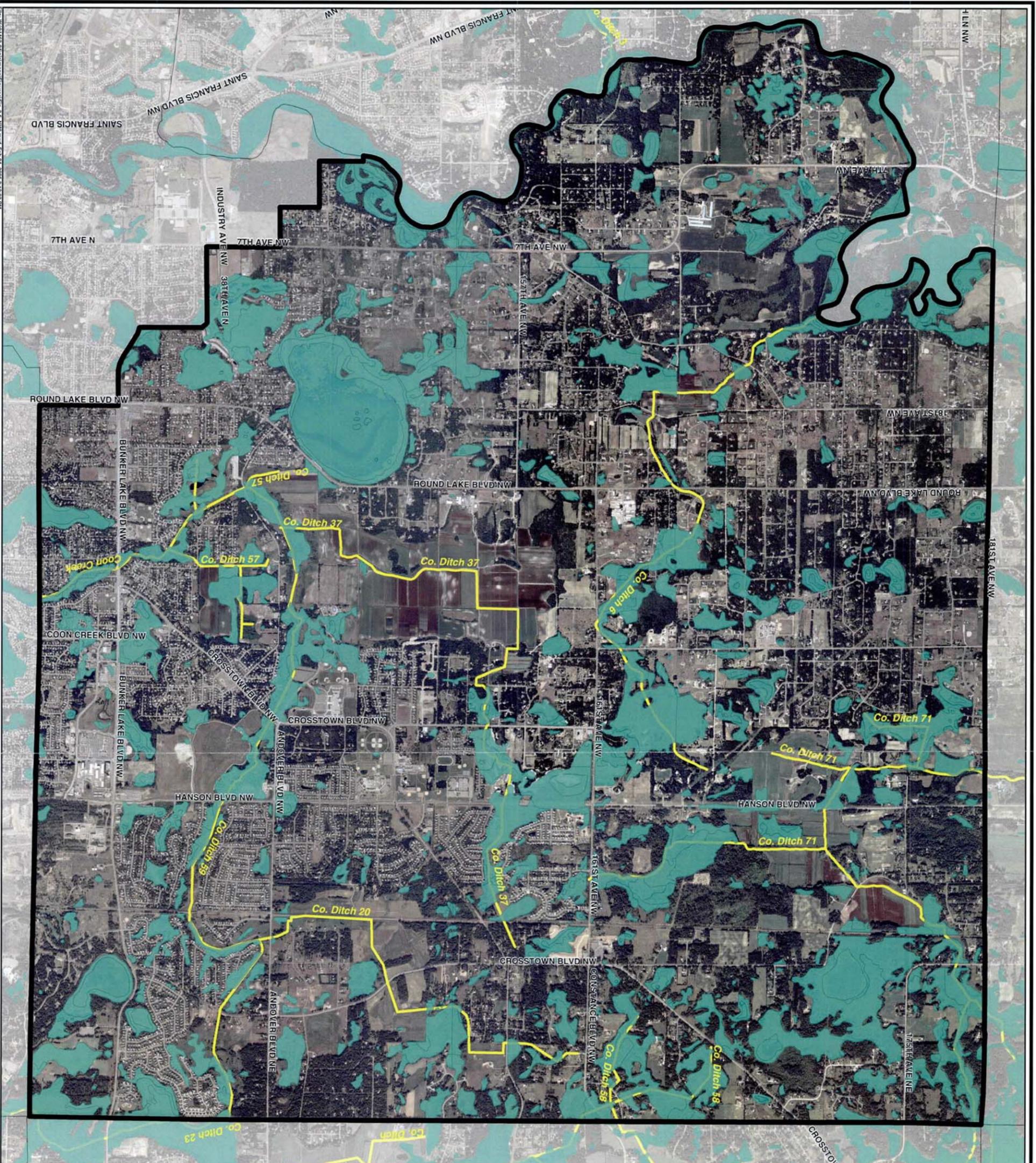
Ditch Maintenance Authority

CCWD: County Ditch 20, 37, 57, & 59
Anoka County: County Ditch 6 & 71



LEGEND

-  NWI Wetland
-  County Ditches / Public Waterways

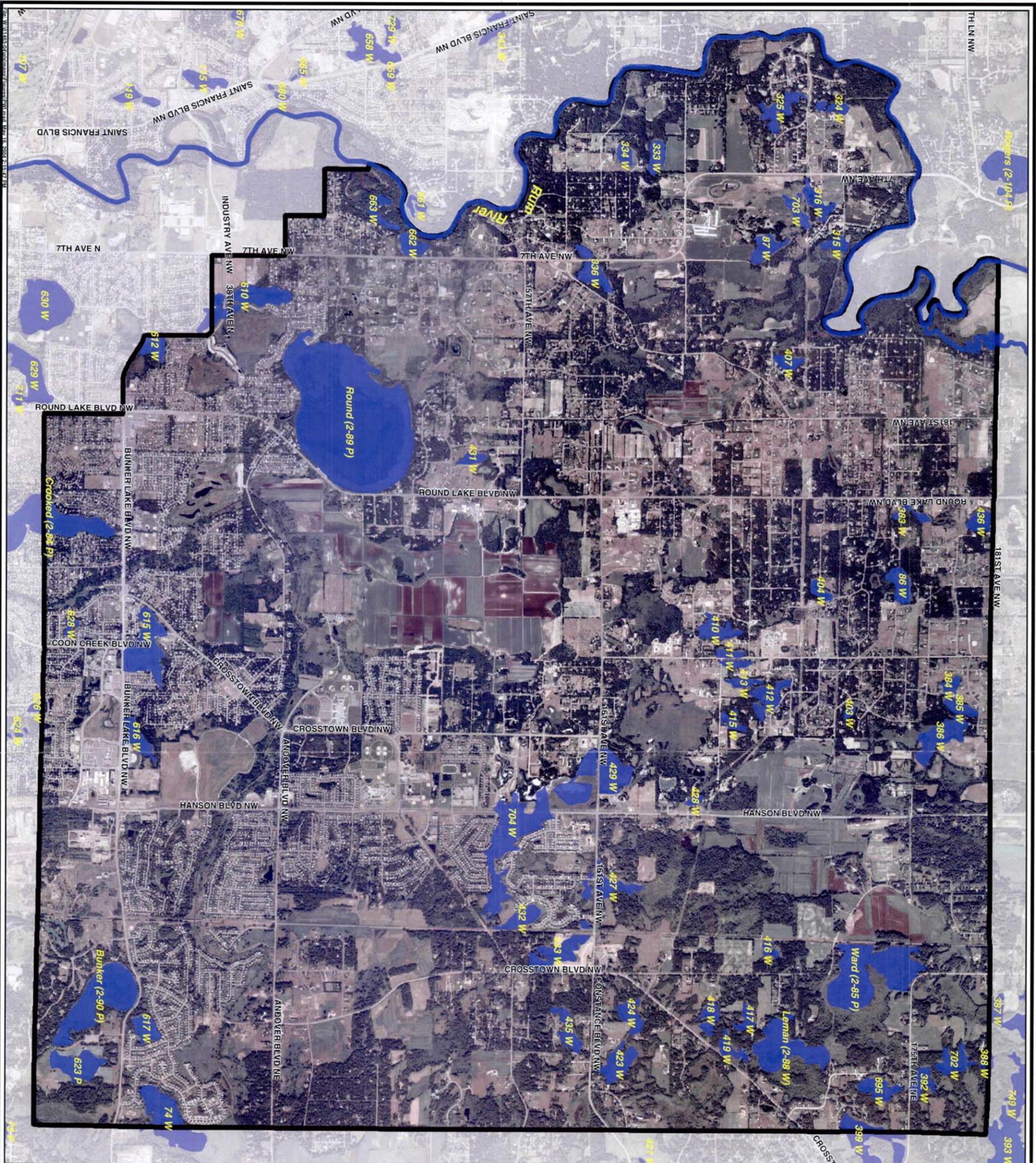




Andover
Comprehensive Water Resource
Management Plan

Figure III-5b
**DNR Public Waters
and Wetlands**

Source: MndNR



Ordinary High Water Level

Crooked Lake	84 P	862.1
Bunker Lake	90 P	885.5
Ward Lake	85 P	883.7
Round Lake	89 P	866.4
	429 W	893.9
	433 W	897.9
	432 W	897.3
	704 W	894.0
	615 W	876.5
	427 W	896.7

LEGEND

Public Water/Wetland

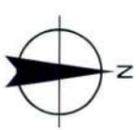
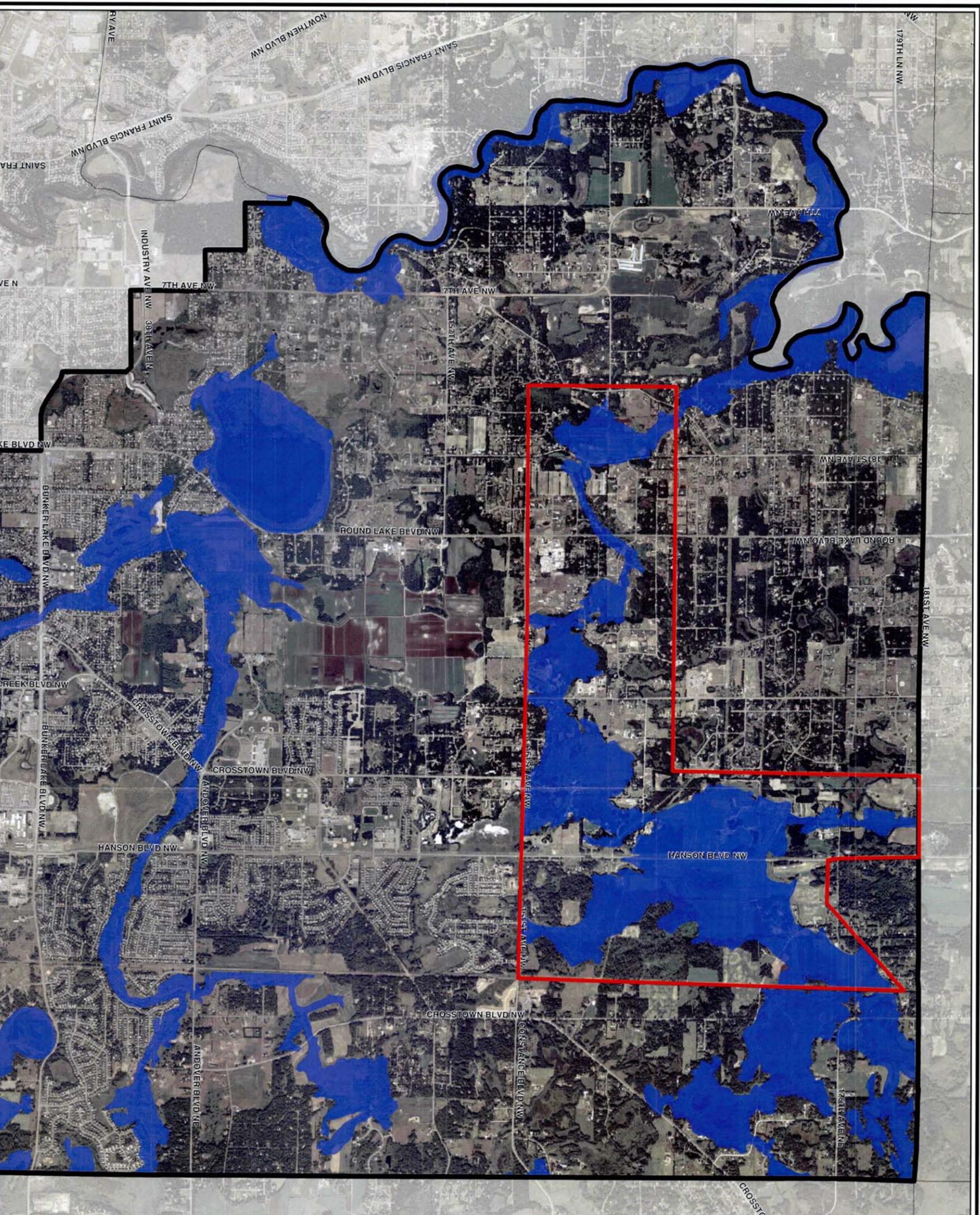
City of



Andover
Comprehensive Water Resource
Management Plan

Figure III-6
FEMA Floodplain Map

Source: FEMA



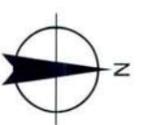
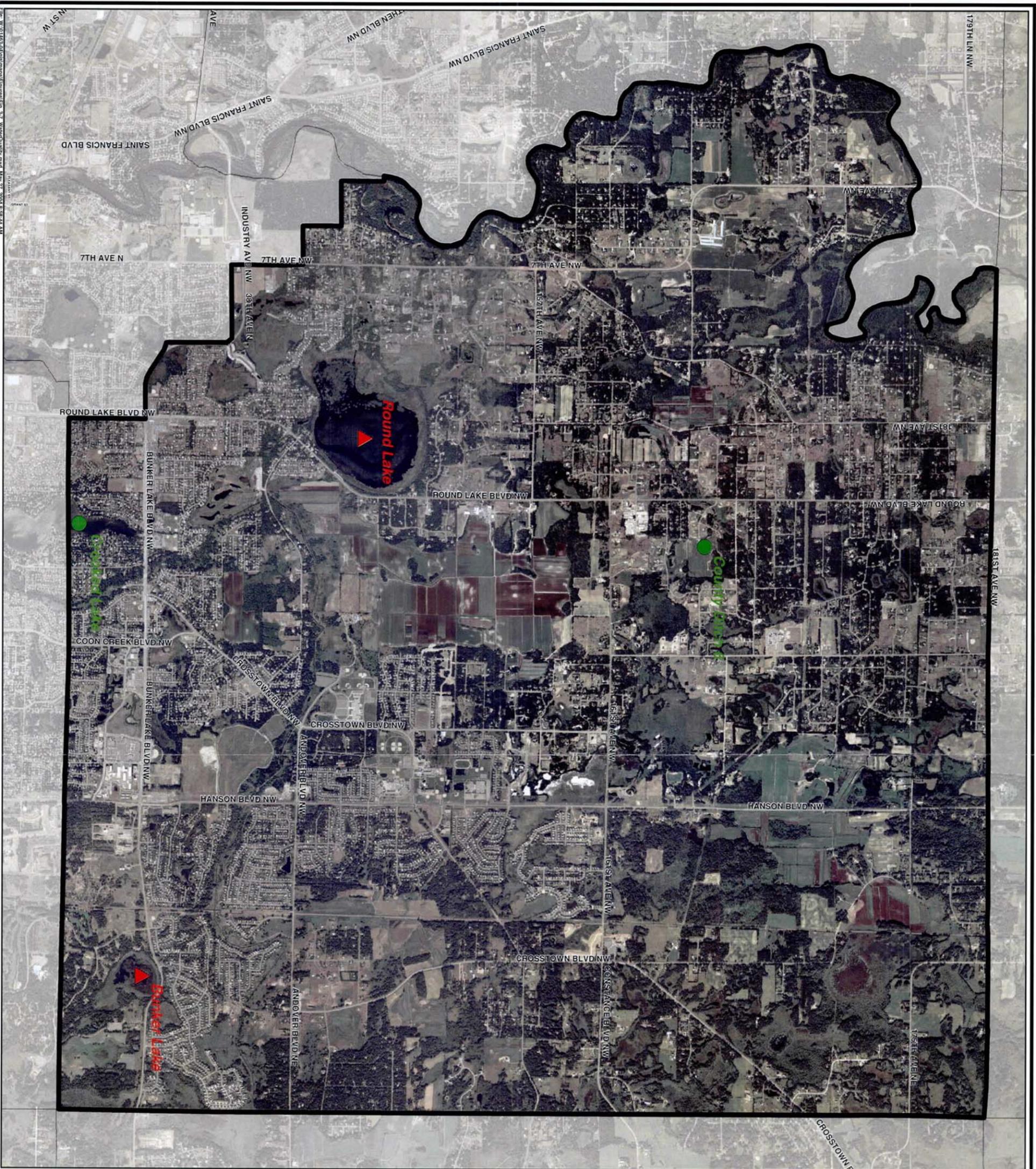
LEGEND

-  100 YR FEMA Floodplain
-  Floodplain Boundary Study Area
(Floodplain Subject to Change)



Andover
Comprehensive Water Resource
Management Plan

Figure III-7
Water Quality
Monitoring Locations
Source: Anoka Conservation District



LEGEND

- Type
- Water Quality
 - ▲ Water Quality & Elevation Monitoring

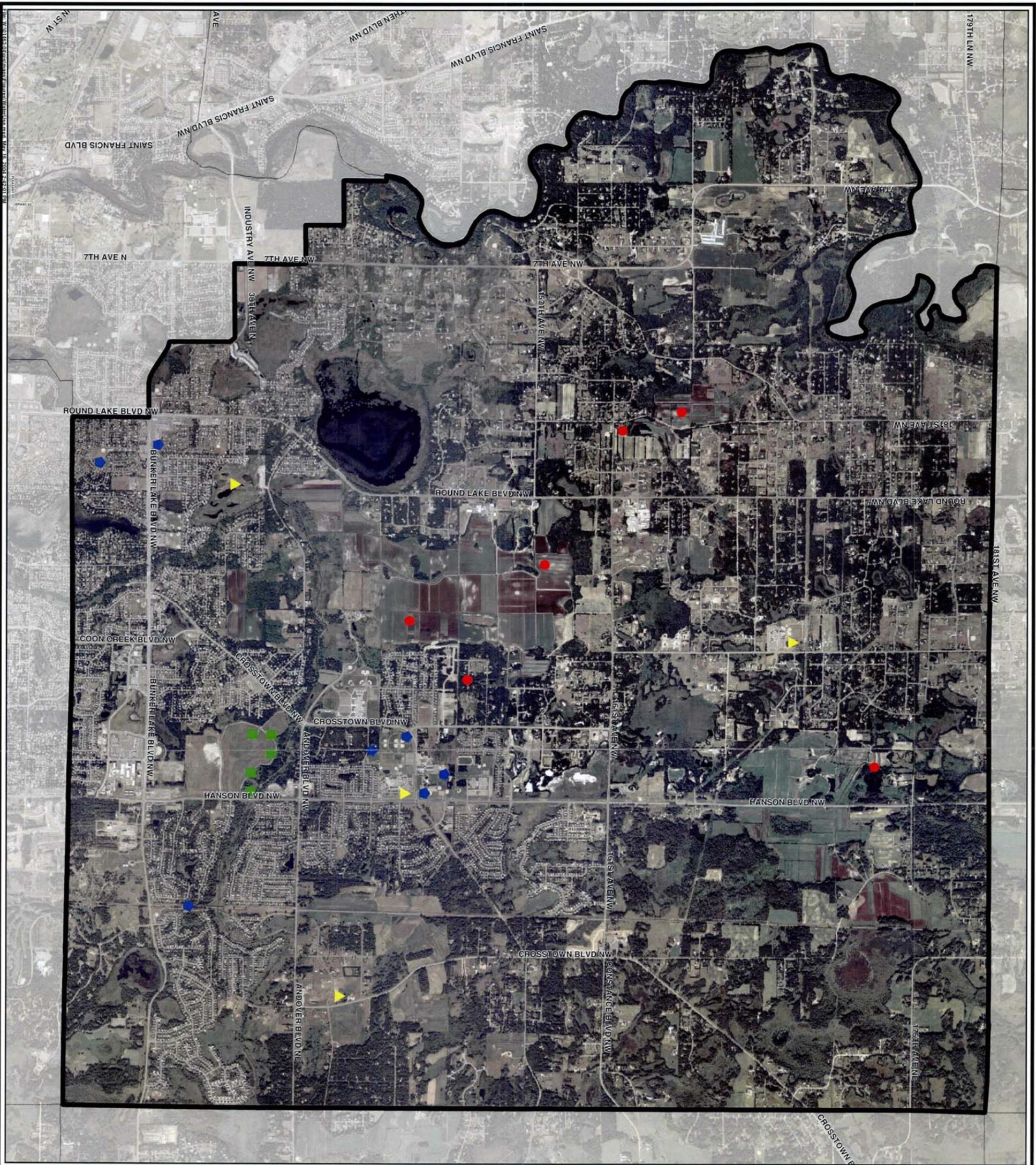


Andover
Comprehensive Water Resource
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Figure III-8

MNDNR
Ground Water
Appropriations
Location Map

Source: MNDNR (9-22-2003) & City of Andover



LEGEND

CATEGORY

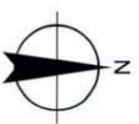
- MAJOR CROP IRRIGATION
- ▲ NON-CROP IRRIGATION
- SPECIAL CATEGORIES
- ◆ WATERWORKS



Andover Comprehensive Water Resource Management Plan

Figure III-9 Soils Map

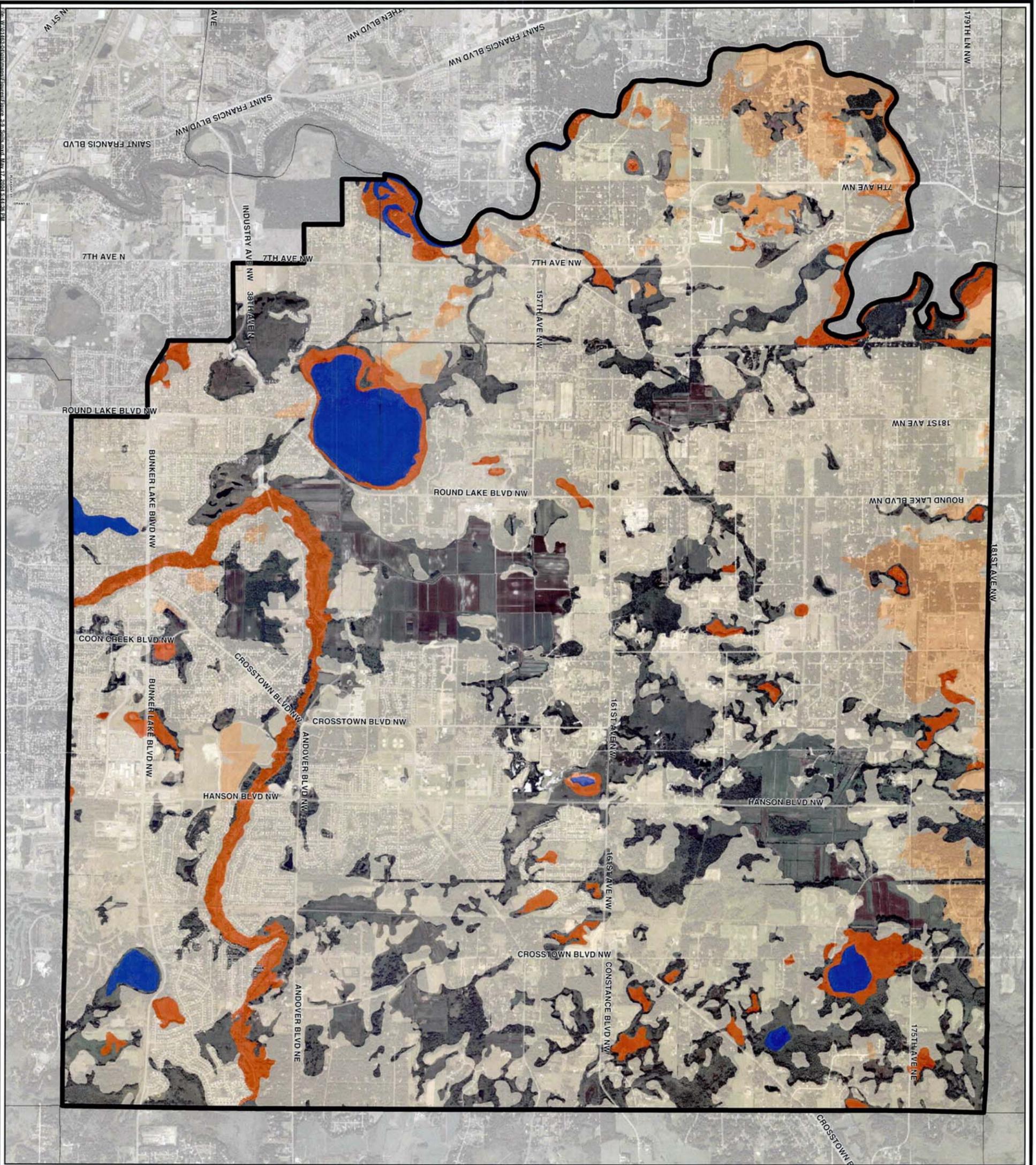
Source: Source: Anoka County Soil Survey & Geologic Atlas



LEGEND

Hydrologic Group

- A - These Soils have high infiltration rates even when thoroughly wetted. The infiltration rates range from .3 to .5 inches per hour. These soils consist chiefly of deep, well drained to excessively drained sands and gravel. These soils have a high rate of water transmission, therefore resulting in a low runoff potential.
- B - These soils have a moderate infiltration rate ranging from .15 to .3 inches per hour when thoroughly wetted. These soils consist of deep moderately well to well drained soils with moderately fine to moderately coarse textures.
- C - These soils have slow infiltration rates ranging from .05 to .15 inches per hour when thoroughly wetted.
- D - These soils have very slow infiltration rates ranging from 0 to 0.05 inches per hour when thoroughly wetted. These soils are typically clay soils with high swelling potential at or near the surface or shallow soils over nearly impervious material.
- AD, B/D, C/D, No Data
- Water Body

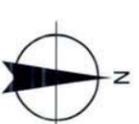


City of



Andover
Comprehensive Water Resource
Management Plan

Figure III-10
Pollutant Source
Location Map

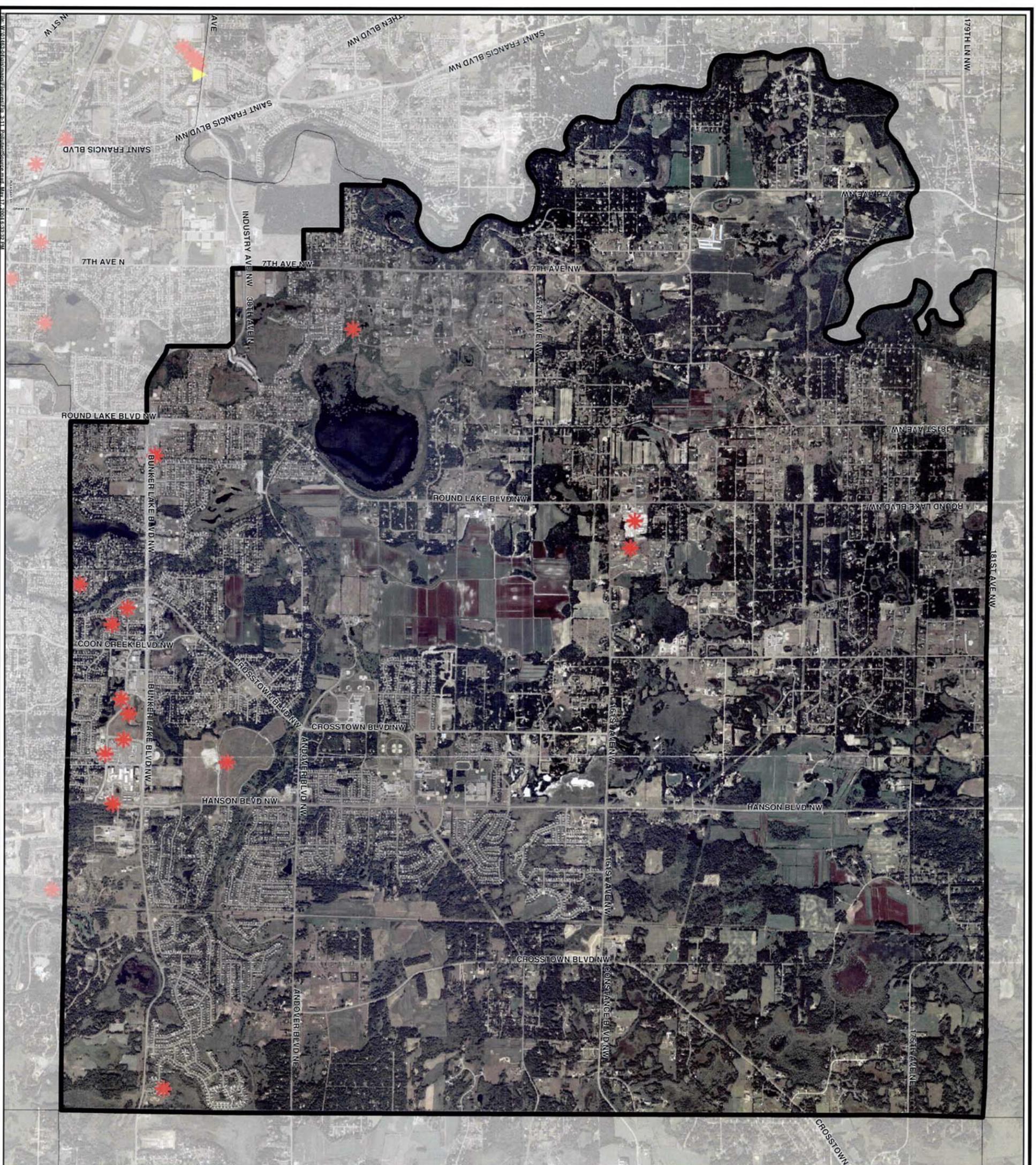


LEGEND

-  Master Entry System
-  Leaking Underground Storage Tanks

The Master Entry System List combines 14 state and federal pollutant lists and systems including Brownfield sites, National Priorities List, and others. Sites shown may have been previously cleaned up. They are shown for historical & preliminary site review purposes only. Contact the MPCA for current status.

Data Source Date: August 5, 2004



IV. ESTABLISHMENT OF GOALS AND POLICIES

The City of Andover 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, and specifically, to be in strict conformance to the policies required by the following:

- Comprehensive Plan for the Coon Creek Watershed District, Version 3.0, 2000-2010.
- Lower Rum River WMO Second Generation Watershed Plan, prepared by Short Elliott Hendrickson Inc., dated May 7, 1998.

These goals and policies have also been developed to preserve and use natural water storage and retention systems in order to:

- A. Limit public capital expenditures that are necessary to control excessive volumes and rates of runoff.
- B. Improve water quality.
- C. Prevent erosion of soil into surface water systems.
- D. Promote ground water recharge.
- E. Protect and enhance fish and wildlife habitat and water recreational facilities.
- F. Secure the other benefits associated with the proper management of surface water.

The goals and policies that the City has developed to address issues related to water quantity, quality, recreation, fish and wildlife, enhancement of public participation, information and education, public ditch system management, ground water management, and erosion are outlined below.

A. Water Quantity

Goal:

Limit public capital expenditures that are necessary to control excessive volumes and rates of runoff.

Policies:

1. Activities such as placement of structures, fill, or other activities that will increase the flood stage of the 100-year or regional event are prohibited.
(City.)
2. Any improvements within a structure must be above the regulatory, 100-year flood elevation. If the improvements are more than 50% of the current value

of the structure, the entire structure must be brought into compliance with the current floodplain regulatory requirements.

3. Stormwater leaving a site must be routed to a public drainage system. (CCWD)
4. The post-development runoff rates from the site may not exceed predevelopment rates or rates for the 1-year, 10-year, and 100-year event which would interfere with sensitive downstream uses. (CCWD, City)
5. Within Drainage Sensitive Uses Area, rate control calculations showing that the post-development 100-year peak flow rate shall not exceed predevelopment 25-year peak flow rate (by subwatershed). A Drainage Sensitive Use Area is defined as all those land uses that depend on subsurface drainage (i.e. local draining of the soil profile) for their continuation. For Non-Drainage Sensitive Uses Area, the post-development 100-year peak flow rate shall not exceed predevelopment 100-year peak flow rate.(CCWD)
6. The public ditch and drainage system must be managed and maintained at design grade. (CCWD)
7. All hydrologic studies will be based on standard hydrologic criteria and ultimate or anticipated development of the entire tributary drainage area. (LRRWMO)
8. Drainage calculations for the 1-, 10-, and 100-year critical events must be submitted and approved as part of any development applications prior to the issuance of any building or grading permit. (City)
9. The design storm events shall be defined as having the following Soil Conservation Service (SCS) Type II distributions: (City)

Event Frequency	Event Duration	Probability of Occurrence in Any Given Year	Rainfall Amount (inches)
1 – Year	24- Hour	99%	2.3
10 – Year	24- Hour	10%	4.1
100 – Year	24- Hour	1%	5.9
100 – Year	10-Day Runoff	1%	7.2 (inches of runoff)
100-year back-to-back (landlocked basin)	48-hour	NA	11.8

10. The critical 1% probability event will be defined as the event that requires the greatest storm water storage volume in a storage facility. These facilities include lakes, ponds, and their outlets. (WSB)

-
11. Major storm water facilities (i.e., ponds, pond outlet systems, and major conveyance systems) will be designed using a 100-year event. *(LRRWMO)*
 12. All minor drainage systems and local storm water collection systems analyses and design will be based on a 10-year event unless otherwise specified. *(LRRWMO)*
 13. Detention and storm water ponding facility design will include access for maintenance of the outlet structure and to the facility in general. *(LRRWMO)*
 14. Culvert crossings or storm sewer systems in County or State right-of-way may have a design frequency that differs from the 10-year. Each agency shall be contacted to determine the appropriate design frequency. *(LRRWMO)*
 15. The design of storm water facilities will consider and identify location(s) of overflow(s) that prevent property damage to adjacent properties from extreme water levels. *(LRRWMO)*
 16. The City will utilize natural ponding areas, such as wetlands and lakes, for the impoundment and treatment of surface water runoff as appropriate. *(WSB, LRRWMO, City.)*
 17. The City intends to use both designated and non-designated areas to store storm water runoff. Non-designated areas include general depressions, areas lacking easements, low points, and streets where structures and/or property is not damaged and any inundation that occurs will only be temporary in nature. *(WSB)*
 18. Available storage volume of landlocked areas shall be established by estimating the water surface elevation resulting from a 100-year, 10-Day runoff event or a back-to-back 100-year, 24-hour events, whichever is greater. *(LRRWMO, City)*
 19. Emergency overflows or outlets to drainage systems will be provided to any landlocked area if the available storm water storage capacity is inadequate to prevent flooding of residences and if the available downstream conveyance system capacity is adequate to accept additional flow. *(LRRWMO).*
 20. The City will encourage developers to infiltrate storm water runoff in areas where the risk to groundwater is minimal, the land use is compatible, and soil is conducive to infiltration. For projects that use infiltration, the following policies apply:
 - a. Pretreatment of storm water to NURP guidelines will be required prior to discharge to an infiltration basin.
 - b. The infiltration basin will be sized to infiltrate the runoff from the impervious surface area from a 0.34 inch rainfall event in 72 hours.

- c. Infiltration rates of the soil shall be calculated using the following guidelines based on the soil's hydrologic group:

Hydrologic Soil Group	Infiltration Rate
A	0.50 in/hr
B	0.25 in/hr
C	0.10 in/hr
D	0.03 in/hr

- d. Actual infiltration data for the soils on the site obtained from percolation tests conducted by a qualified engineer or soils scientist can be used instead of the rates outlined in Policy A.20.c, if available.
21. The City will not maintain private infiltration areas on private property such as individual homeowner's rain gardens. Private infiltration areas will be maintained through the Homeowners Association or landowner. (WSB)
22. The City will require that plan that includes procedures for maintenance and funding be submitted prior to approval of private infiltration basins. (WSB)
23. The City of Andover will perform maintenance measures to assure proper function of the city-owned drainage systems. (LRRWMO)
24. Anti-seepage collars shall be used on culverts and shall be installed so as to increase the creep distance or seepage line along conduit by 15 percent under public streets when there is:
- Water and ponding structures with a pool depth of 2 feet and a 2-day duration.
 - 250-acre watershed or more.
 - Design head of 10 feet or more. (LRRWMO)
25. The **lowest floor elevation** for new or redevelopment will be 3 feet above the seasonal high water mark which is identified as the mottled soils or the highest anticipated water table or the **lowest floor elevation** will be 2 feet above the designated or designed 100-year flood elevation for the area, whichever is higher unless evidence is submitted and certified by a geotechnical engineer that shall be reviewed and certified by an independent geotechnical engineer hired by the City at the expense of the developer and approved by the City Council that a separation of less than 3 feet can be achieved and is warranted. See **Appendix P** for other possible variance criteria.
26. Any new development or redevelopment within the City will maintain a **minimum building opening** of 2 feet above the designated or designed one hundred year flood elevation. Building openings shall be defined as the bottom sill of an egress window or lowest walkout elevation, whichever is lower.

27. Where the construction of a formal outlet is not practical for landlocked areas, the minimum building elevation shall be the greatest of either 2 feet above the level resulting from two concurrent 100-year, single event rainfall events or 2 feet above the 100-year, 10-day snowmelt. (LRRWMO)

28. A review and permit from the Coon Creek Watershed District or Lower Rum River Watershed Management Organization is required in conformance with the Watershed District or Watershed Management Organization standards.
(City)

B. Water Quality

Goal:

Maintain or improve the quality of water in lakes, wetlands, streams or rivers within or immediately downstream of the City.

Policies:

1. In the design and construction of new, or modifications to the existing storm water conveyance systems, pretreatment of storm water runoff to Nationwide Urban Runoff Program (NURP) recommendations must be provided prior to discharge. (WSB, CCWD)
2. The City has developed the following NURP design recommendations for the design of storm water treatment basins:
 - 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 rainfall over the entire contributing drainage area assuming full development.
 - b. A permanent pool average depth (basin volume/basin area) which shall be ≥ 3 feet, with a maximum depth of ≤ 10 feet.
 - c. An emergency overflow (emergency outlet) adequate to control the one percent frequency/critical duration rainfall event.
 - d. Basin side slopes above the normal water level should be no steeper than 4:1, and preferably flatter. A basin shelf with a minimum width of 10 feet and one foot deep below the normal water level is recommended to enhance wildlife habitat, reduce potential safety hazards, and improve access for long-term maintenance.

-
- e. To prevent short-circuiting, the distance between major inlets and the normal outlet shall be maximized.
 - f. A flood pool ("live storage") volume above the principal spillway shall be adequate so that the peak discharge rates from 1-year and 100-year, 24-hour events are no greater than pre-development basin watershed conditions.
 - g. No orifice smaller than 4" is allowed in the construction of ponds or outlets within the City.
 - g. Retardance of peak discharges for the more frequent storms can be achieved through a principal spillway design which may include a perforated vertical riser, small orifice retention outlet, or compound weir.
3. NURP ponds or pond networks must be designed with total phosphorus removal efficiency in the 65-70 percent range. Storm water treatment can be provided via a single pond, which meets the design and treatment criteria or an on-site network of interconnected ponds. If an on-site pond network is used, the overall pollutant removal efficiency for the network must meet the criteria. (LRRWMO)
 4. In areas where NURP treatment basins are not feasible to construct and a variance from the applicable Watershed Management Organization or Watershed District and City has been acquired, the MPCA NPDES requirements may be substituted. The MPCA requirements are as follows:
 - a. The basin's hydraulic volume (dead pool) shall be sufficient to capture a ½ inch of runoff from the new impervious watershed area. The basin's permanent volume must reach a minimum depth of at least 3 feet and must have no depth greater than 10 feet. Basin design should be such that scour or re-suspension of solids is minimized.
 - b. Basins shall also provide a minimum of 1800 ft³ of dead sediment storage volume below the basin's volume/impervious acre drained.
 - c. Basin outlets shall also be designed to prevent short circuiting and the discharge of floating debris and must include an energy dissipation device.
 - d. A sufficiently wide maintenance access (typically 10ft. wide) must be provided for future maintenance of the basin.
 5. In areas of redevelopment where ponding is not feasible or available, in-line storm water treatment systems will be required to treat storm water runoff. (City)
-

-
6. The City has submitted the NPDES Phase II permit application and Stormwater Pollution Prevention Program in conformance with the Minnesota Pollution Control Agency. The application and plan is included in **Appendix G**. The Storm Water Pollution Prevention Program includes the following guidelines and Minimum Control Measures (MCMs) to be implemented on an on-going basis:
 - Public Education and Outreach program
 - Public Participation
 - Illicit Discharge Detection and Elimination
 - Construction Site Stormwater Runoff Control
 - Post-Construction Stormwater Management
 - Municipal Pollution Prevention/Good Housekeeping
 7. Skimmer design on stormwater ponds shall provide for skimmers that extend a minimum of 12 inches below the normal water level and minimize the velocities of water passing under the skimmer to less than 0.5 feet per second for a 1-year, 24-hour rainfall event. A typical skimmer design is shown in **Appendix M**. *(City)*
 8. The City will continue to work cooperatively with Anoka County to implement the household hazardous waste disposal program and educate residents on the proper disposal of household hazardous waste. *(WSB)*
 9. The City will work with neighboring municipalities to require rate control and treatment prior to the discharge of storm water across municipal boundaries. *(WSB)*
 10. The City has established a 33-foot standard street width (back of curb to back to curb) for minor urban city streets, and 31-foot standard street width for minor rural city streets. This standard takes parking, safety, snow removal, and water resources issues into consideration. *(City)*
 11. Future outlets to DNR Public Waters must first pass through a sediment pond / trap prior to discharging into the water body. *(LRRWMO)*
 12. All on-site wastewater systems will be the responsibility of the owner. Biennial maintenance reporting of septic system is required by the City. If an on-site wastewater system fails, the owner will be required to upgrade, replace, or discontinue use of the system within six months from notice of noncompliance from the City. *(LRRWMO, City)*
 13. The City will sweep the streets twice a year. *(LRRWMO)*
 14. Permanent drainage, access, and maintenance easements shall be provided for all drainage facilities.

C. Recreation, Fish and Wildlife

Goal:

Protect and enhance recreational facilities and fish and wildlife habitat with special attention given to the Rum River corridor within the City.

Policies:

1. The City will cooperate with the Minnesota Department of Natural Resources, the Corps of Engineers, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, Anoka County Parks, and other appropriate agencies in promoting public enjoyment and protecting fish, wildlife, and recreational resources in the City. *(WSB)*
2. The City has established a scenic river district along the bluffland and shoreland of the Rum River in order to protect and preserve the scenic, recreational, natural, historical and scientific values of the Rum River in Andover in a manner consistent with Minnesota Statutes and the management plan for the Rum River. *(City)*
3. Activities related to recreation, parks, open space, and trails systems shall be consistent with the City's code. The City encourages participation in the "Adopt a Park" program to keep City parks litter free.
4. The City requires a 16.5 foot buffer strip during construction upon development or redevelopment for protection of wetlands and storm water ponds. For areas within the CCWD or LRRWMO, additional buffer requirements may be applicable. The developer will be required to work with the CCWD or LRRWMO to meet their buffer requirements, where applicable.

D. Enhancement of Public Participation, Information, and Education

Goal:

Educate and inform the public on pertinent water resource management issues and increase public participation in water management activities.

Policies:

1. The City will continue to implement an education program which utilizes the following medium: city newsletters, community access cable TV, individual mailings, and the city website www.ci.andover.mn.us *(City)*
2. The City will implement public education as part of the NPDES Phase II program.

E. Public Ditch Systems

Goal:

Provide a mechanism through which public ditch systems will be managed. The public ditches within the City are shown on **Figure III-5a** in **Section III**.

Policies:

1. County Ditch 20, 37, 57, 59, and Coon Creek are managed by the Coon Creek Watershed District (CCWD).
2. County Ditch 6 and 71 is managed by Anoka County.
3. A Ditch Maintenance Permit from the Coon Creek Watershed District is required for work in all designated ditches within the Watershed District. (CCWD)
4. The CCWD requires a 100-foot easement on either side of Coon Creek from the centerline for maintenance (CCWD).
5. The CCWD requires a 50-foot easement on either side from the centerline for maintenance of all designated ditches within the Coon Creek Watershed (CCWD).

F. Ground Water

Goal:

To coordinate activities and/or manage surface water runoff to the degree necessary to meet requirements for ground water protection or management as required by Anoka County, Minnesota Pollution Control Agency, the Minnesota Department of Health, and the Department of Natural Resources.

Policies:

1. Cooperate with state and regional agencies on ground water monitoring, inventorying or permitting programs.
2. The City will work towards groundwater protection through the implementation of floodplain and shoreland ordinances in conformance with State and County regulations. (County)
3. The City will encourage the development of alternative storm water management methods including vegetated swales and infiltration practices provided these methods do not contaminate ground water. (WSB)
4. The City will cooperate with the Department of Health to ensure that all unsealed or improperly abandoned wells within the City are properly sealed.

Technical requirements for the abandonment of these wells will be in conformance with the local and state regulations. *(WSB)*

5. The City will sweep the streets twice a year *(LRRWMO)* and encourages resident and business participation in the "Adopt a Street" program.
6. The City will implement its Wellhead Protection Plan.

G. Wetlands

Goals:

The City will protect wetlands in conformance with the requirements of the Wetland Conservation Act.

Policies:

1. The Lower Rum River WMO and Coon Creek Watershed District will act as the Local Government Unit (LGU) for the Wetland Conservation Act. *(City)*
2. Prior to issuance of any city grading or building permits, all development and redevelopment activities must comply with the Wetland Conservation Act. *(WSB)*
3. The City will sweep the streets twice a year *(LRRWMO)*.
4. The City requires a 16.5 foot buffer strip during construction upon development or redevelopment for protection of wetlands and storm water ponds. For areas within the CCWD or LRRWMO, additional buffer requirements may be applicable. The developer will be required to work with the CCWD or LRRWMO to meet their buffer requirements, where applicable.
5. Wetland banking opportunities will be pursued by the City in accordance with the Wetland Conservation Act. *(LRRWMO)*

H. Erosion

Goals:

To prevent soil erosion and sedimentation.

Policies:

1. The City requires the submission and approval of erosion control and grading plans prior to the issuance of any grading or building permits. *(City, WSB)*
2. The City will require any development or redevelopment to comply with the erosion control and steep slope standards **(Appendix D)**. *(City)*

-
3. The City will update its erosion and sediment control standards to be in conformance with the NPDES permit, the Watershed District's, Watershed Management Organization's, and Anoka County's requirements. The City will also develop and Erosion Control Ordinance to meet these standards. *(City)*
 4. Soil erosion shall be prevented through the installation of erosion control practices in accordance with MPCA's Best Management Practices Handbook. *(LRRWMO)*
 5. It shall be the responsibility of the developer / contractor to keep streets and property adjacent to construction areas free from sediment carried by construction traffic at site entrances and access points, and from site runoff and blowing dust. *(LRRWMO)*

I. **Rum River Scenic River District**

Goals:

1. To maintain, protect, and enhance a scenic river district along the bluffland and shoreland of the Rum River as required by the management plan for the Rum River. *(City)*

Policies:

1. Land use, area lots, and the length of bluffland and water frontage suitable for building sites will be regulated through the bluffland ordinance **(Appendix D)**.
2. Setbacks of structures and sanitary waste treatment facilities from bluff lines and shorelines to protect existing and/or natural scenic values, vegetation, soils, water quality, floodplain areas, and bedrock from disruption by manmade structures or facilities will be regulated as indicated in the shoreland and bluffland ordinances **(Appendix D)**.
3. Alterations of the natural vegetation and topography within the Rum River Scenic River District will be regulated.
4. The natural scenic values and resources of the Rum River will be conserved and protected to maintain a high standard of environmental quality.
5. The City will comply with Minnesota statutes and the management plan for the Rum River.
6. The City will work cooperatively with Federal, State, and County agencies in the development of resource management and implementation plans affecting the Rum River.
7. The City shall apply and enforce the Rum River management plan policies.

V. ASSESSMENT OF EXISTING AND POTENTIAL PROBLEMS AND CORRECTIVE ACTIONS

Outlined below is an assessment of existing and potential water resource related problems that are known at this time or that are anticipated to occur with increased development. Existing and potential problems have been identified based on an analysis of the land and water resource data collected as part of this local plan preparation.

A. Lake and stream water quality

1. The water quality of Crooked Lake associated with its turbidity and milfoil has been identified as a problem.

Corrective Action

- a. Support implementation of the goals and policies outlined by Anoka Conservation District and Coon Creek Watershed District.
 - b. Coordinate with the City of Coon Rapids to obtain water quality information regarding Crooked Lake.
2. Elevated chloride levels in County Ditch 6 have been noted as a concern by the Anoka Conservation District (ACD).

Corrective Action

- a. The ACD has completed a study with recommendations to address the elevated chloride levels in County Ditch 6. The City will work with the Anoka County Highway Department and the ACD to implement the recommendations of this study.
3. Increased development has the potential to increase pollutants to streams and lakes.

Corrective Action

- a. The City will implement the Water Resource Management Plan.
- b. The City will work with the CCWD and LRRWMO to collect data on local water resources to identify problems with water quality.

B. Flooding and storm water rate control concerns within the City

1. Inaccurate FEMA floodplain mapping has been noted for the County Ditch 6 and County Ditch 71 subwatershed north of 161st Avenue NW (CSAH 20) (see **Figure III-6**).

Corrective Action

- a. A Letter of Map Revision (LOMR) has been submitted by a private development company to address the floodplain inaccuracies. Once FEMA approves the map change, the City will update its records and **Figure III-6** as a minor amendment to this Plan.

-
- b. The City will implement the goals and policies within the Water Resource Management Plan, review development plans in conformance with these policies, and work with the LRRWMO and CCWD to address flooding concerns.
 2. Structural flooding along a portion of the Rum River has been noted by the City. The City approached the landowners, but did not receive cooperation to address the problem. No further action is proposed to address this issue.

Corrective Action

- a. If a building permit for any improvements within a structure that is below the 100-year flood elevation, the improvements must be above the regulatory flood elevation. If the improvements are more than 50% of the current value of the structure, the entire structure must be brought into compliance with the floodplain regulations.

C. Flooding or storm water rate control concerns between the City and adjoining entities

1. No concerns have been noted.

No Corrective Action Needed

D. Impacts of water quantity or quality management practices on recreational opportunities

2. The water quality of Crooked Lake associated with its turbidity and milfoil has been identified as a concern.

Corrective Action

- a. Analysis of the water quality information for Crooked Lake indicates that water quality has improved over the years and is suitable for recreation. A milfoil management program could be undertaken if the swimming beach is re-opened in Coon Rapids.
- b. Work with the City of Coon Rapids to review the water quality data.

E. Impacts of storm water quality on fish and wildlife resources

1. The potential for water quantity, water quality, and erosion problems to impact the fish and wildlife resources within the City is anticipated to increase with increased development.
2. The need for a Wetland Management Plan in the area has been identified by the LRRWMO, CCWD, and the City.

Corrective Action

- a. Implement the goals and policies within the Water Resource Management Plan.
 - b. The City will coordinate with the CCWD and LRRWMO to develop a Wetland Management Plan.
3. Direct storm water runoff to Round Lake has been identified as a concern (LRRWMO).

Corrective Action

- a. Continue to manage Round Lake as a wildlife lake.

F. Impacts of soil erosion on water quality and quantity

1. Due to the sandy nature of the City's soils, the stream banks have the potential for bank erosion.

Corrective Action

- a. Implement the goals and policies of the Water Resource Management Plan and the NPDES SWPPP.
- b. Develop an Erosion Control Ordinance.
- c. Annually address erosion problem areas as issues arise.
- d. Coordinate with the CCWD to continue to implement the CCWD bank stabilization program.

G. General impact of land use practices and in particular land development and land alteration on water quality and water quantity

1. The City will experience increased storm water runoff rates and volumes as a result of urbanization. Land development and land use practices within the City are anticipated to affect both water quality and quantity.

Corrective Action

- c. Implement the goals, policies, program, and studies outlined within this Water Resource Management Plan.
- d. Implement the NPDES Phase II SWPPP.

H. The adequacy of existing regulatory controls to manage or mitigate adverse impacts on public waters and wetlands

1. The City has existing regulatory controls in-place through various ordinances and City Code.

Corrective action

- a. The City's Code and regulations will be updated, as needed, to include current Best Management Practices and enforcement measures.
- b. The City will implement the NPDES Phase II Program.

I. The adequacy of programs to limit soil erosion and corresponding water quality degradation

1. The City has existing programs in-place to address soil erosion.

Corrective Action

- a. The City will implement the Water Resource Management Plan along with the NPDES Phase II permit and the applicable City ordinances.

J. The adequacy of programs to maintain the tangible and intrinsic values of natural storage and retention systems

1. It is the City's position that the goals and policies outlined in the Water Resource Management Plan are sufficient.

No Corrective Action Needed

K. The adequacy of programs to maintain water level control structures

1. Water level control structures are presently being inspected and reviewed on a regular basis to assure they are operating correctly and repaired as needed.

No Corrective Action Needed

L. The adequacy of capital improvement programs to correct problems relating to water quantity, water quality management, fish and wildlife habitat, public waters and wetland management, and recreational opportunities

1. The capital improvement projects outlined within this plan and the general operating procedures of the City are sufficient to address water resource related concerns. However, City funding alone may not be adequate to allow for the aggressive implementation of the Plan.

Corrective Action

- a. The City will actively seek outside grant funding and assistance to implement these programs.

M. Identification of potential problems which are anticipated to occur within the next twenty years based on growth projections and planned urbanization

1. The City anticipates that there will be increased pressure to improve the quality of water within the City and the appearance of storm water retention areas. Additional funding sources will need to be sought to address this demand.

Corrective Action

- a. The implementation of this Water Resource Management Plan will address water quantity, quality, and maintenance issues associated with storm water retention areas.
- b. The City will actively seek outside grant funding and assistance when available and practical, to improve the quality and appearance of storm water retention areas.

N. The adequacy of existing technical and background information on systems in the City that are used to manage water resources

1. The City acknowledges that additional technical and background information is required to efficiently and effectively manage water resources.
2. There is no complete hydrologic model for the areas of the City within the LRRWMO.

Corrective Action

- a. Actively seek outside grant funding and continue to implement a long-range water quantity and quality-monitoring plan for the City through coordination with the CCWD, LRRWMO and Anoka Conservation District.
- b. Continue to keep up to date with technological advances and pursue innovative technologies to manage water resources.
- c. Improve the transfer of surface water resource information to the public through the education program.
- d. The City will consult with the LRRWD, CCWD, and Anoka Conservation District to obtain updated technical data on the City's water resources.
- e. As no current problem areas exist, the City will continue to address the need for hydrologic modeling within the LRRWMO on a case-by-case basis and require developers to provide this information as development occurs in conformance with the policies outlined in this Plan.

O. Implementation of NPDES Phase II

1. The City is required to implement the NPDES Phase II requirements as administered by the MPCA.

Corrective Action

- a. The City will utilize the Water Resource Management Plan as the primary tool to implement and meet the NPDES Phase II requirements. While the City believes that it has adequate measures in-place to address the NPDES Phase II requirements, amendments to this plan may be necessary. The City will work with the regulatory agencies regarding the implementation of the federally mandated NPDES Phase II program.

VI. IMPLEMENTATION PRIORITIES/IMPLEMENTATION PROGRAM

Based on the information developed in **Sections III through V**, the City has developed a Water Resource Management Plan that reflects the needs and concerns of the City Council, City Staff, citizens, and the funding capabilities of the City. A prioritized listing of the studies, programs and capital improvements that have been identified as necessary to respond to the water resource needs within the City is outlined on the following tables. The City anticipates implementing at least to some extent the regulatory programs, studies, or improvements identified within this plan within the next 10 years.

Table VI-1 contains Storm Water Capital Improvement Projects (CIP), **Table VI-2** contains Storm Water Management Programs (SMP), and **Table VI-3** contains Storm Water Management Studies (SMS). **Table VI-4** summarizes the information from all of these tables. The costs associated with these items reflect year 2004 costs. These tables are for planning and budgeting purposes and are considered rough estimates. It is anticipated that these cost estimates will be reviewed annually and updated as needed.

This implementation plan will be coordinated and reviewed annually with the CCWD and LRRWMO.

SECTION VI

TABLE VI-1											
CAPITAL IMPROVEMENT PROJECTS											
No.	Priority	Project Description	Cost Estimate	Potential Funding Sources	Proposed Expenses for Year					2009 - 2014	Comments
					2004	2005	2006	2007	2008		
					No projects currently identified						
			\$0	TOTAL	\$0	\$0	\$0	\$0	\$0	\$0	\$0

SECTION VI

TABLE VI-2

STORMWATER MANAGEMENT PROGRAMS

Storm Water Management Programs		Proposed Expenses for Year							Comments			
No.	Priority	Project Description	Cost Estimate ^{1,2}	Potential Funding Sources	2004	2005	2006	2007		2008	2009 - 2013	
SMP-1	High				Develop and implement an Education Activity Implementation Plan (EAIP)							
		Training (Staff)	\$71,000	Storm Water Utility Funds	\$6,300	\$6,500	\$6,700	\$6,900	\$7,100	\$37,500		
		Newsletter Articles / Questionnaires / Inserts	\$38,500	Storm Water Utility Funds	\$3,000	\$3,500	\$4,000	\$4,000	\$4,000	\$20,000		
		Presentations / Outreach	\$32,000	Storm Water Utility Funds	\$2,000	\$2,500	\$3,000	\$3,500	\$3,500	\$17,500		
			\$141,500	SUB-TOTAL	\$11,300	\$12,500	\$13,700	\$14,400	\$14,600	\$75,000		

SECTION VI

TABLE VI-2

STORMWATER MANAGEMENT PROGRAMS

No.	Priority	Project Description	Cost Estimate ^{1,2}	Potential Funding Sources	Proposed Expenses for Year							Comments
					2004	2005	2006	2007	2008	2009 - 2013		
Implement the Storm Water Pollution Prevention Program (SWPPP) / Municipal Pollution Prevention / Infrastructure												
SMP-2	High											
		Street Sweeping	\$916,900	Storm Water Utility Funds	\$77,000	\$79,000	\$89,400	\$92,500	\$96,500	\$482,500		
		Inlet & Manhole Cleaning, Maintenance, Repair	\$162,800	Storm Water Utility Funds	\$14,800	\$15,000	\$15,500	\$16,000	\$16,500	\$85,000		
		Storm Sewer Repair / Replacement / Cleaning	\$309,100	Storm Water Utility Funds	\$33,000	\$33,500	\$28,600	\$29,000	\$30,000	\$155,000		
		Ditch Cleaning	\$290,250	Storm Water Utility Funds	\$25,750	\$26,500	\$27,500	\$28,500	\$29,500	\$152,500		
		Storm Water Pond Cleaning & Repair	\$114,700	Storm Water Utility Funds	\$10,300	\$10,600	\$10,900	\$11,300	\$11,600	\$60,000		
		Storm Water Lift Station Maintenance	\$36,500	Storm Water Utility Funds	\$3,100	\$3,200	\$3,300	\$3,400	\$3,500	\$20,000		
		Storm Sewer Televising	\$114,000	Storm Water Utility Funds	\$10,200	\$10,500	\$10,800	\$11,100	\$11,400	\$60,000		
		Inspections / Record Keeping / Map Development	\$483,500	Storm Water Utility Funds	\$43,800	\$45,200	\$46,500	\$48,000	\$50,000	\$250,000		
			\$2,427,750	SUB-TOTAL	\$217,950	\$223,500	\$232,500	\$239,800	\$249,000	\$1,265,000		
SMP-3	High	Implement the Storm Water Pollution Prevention Program (SWPPP) / Construction Inspections / Enforcement / Ordinance Adoption	\$39,500	Storm Water Utility Funds	\$3,500	\$3,500	\$4,000	\$4,000	\$4,500	\$20,000		

SECTION VI

TABLE VI-2
STORMWATER MANAGEMENT PROGRAMS

Storm Water Management Programs		Proposed Expenses for Year						Comments		
No.	Priority	Project Description	Cost Estimate ^{1,2}	Potential Funding Sources	2004	2005	2006		2007	2008
SMP-4	High	Coordinate with ACD and County Highway to minimize road salt application and work to reduce chloride levels in County Ditch 6.	\$11,000	Storm Water Utility Funds	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$6,000
			\$2,619,750	TOTAL	\$233,750	\$240,500	\$251,200	\$259,200	\$269,100	\$1,366,000

1) Cost estimates provided are for planning purposes only. Cost estimates are subject to change and/or updates. Inflation has been taken into account.
 2) The City's cost for these programs are subject to change based on the availability of grant money and cost-sharing.

SECTION VI

TABLE VI-3
STORMWATER MANAGEMENT STUDIES

Water Resources Studies		Proposed Expenses for Year							Comments		
No.	Priority	Project Description	Cost Estimate ^{1,2}	Potential Funding Sources	2004	2005	2006	2007		2008	2009 - 2014
SMS-1	High	Coordinate with the LRRWMO to address flooding of the Rum River	\$6,000	Storm Water Utility Funds			\$3,000	\$3,000			
SMS-2	High	Coordinate with the LRRWMO to address flooding of Cedar Creek	\$6,000	Storm Water Utility Funds				\$3,000	\$3,000		
SMS-3	High	Obtain and review hydrologic/hydraulic modeling within the City as part of the development review process	NA	Developer	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	
SMS-4	High	Coordinate with the CCWD to address flooding of Coon Creek	\$6,000	Storm Water Utility Funds					\$3,000	\$3,000	
			\$18,000	TOTAL	\$0	\$0	\$3,000	\$6,000	\$6,000	\$3,000	

1) Cost estimates provided are for planning purposes only. Cost estimates are subject to change and/or updates. Inflation has been taken into account.

2) The City's cost for these studies are subject to change based on the availability of grant money and cost-sharing.

SECTION VI

TABLE VI-4

SUMMARY

Improvements, Programs, and Studies	Totals ^{1,2}	Proposed Expenses for Year							Comments
		2004	2005	2006	2007	2008	2009 - 2014		
Totals for Capital Improvements:	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Totals for Management Programs:	\$2,619,750	\$233,750	\$240,500	\$251,200	\$259,200	\$269,100	\$1,366,000		
Totals for Management Studies:	\$18,000	\$0	\$0	\$3,000	\$6,000	\$6,000	\$3,000		
Grand Totals:	\$2,637,750	\$233,750	\$240,500	\$254,200	\$265,200	\$275,100	\$1,369,000		

1) Cost estimates provided are for planning purposes only. Detailed feasibility analyses have not been completed for these projects, programs, and studies; therefore, cost estimates are subject to change upon final design and/or updated information.

2) The City's cost for these items are subject to change based on the availability of grant money, cost-sharing, and landowner participation.

VII. FINANCIAL CONSIDERATIONS

Implementation of the proposed regulatory controls, programs and improvements that are identified in this plan will have a financial impact on the City. To establish how significant this impact will be, a review of the means and ability of the City to fund these controls, programs and improvements is necessary. Toward this end, please find outlined below a listing of various sources of revenue that the City will endeavor to implement the water resource management efforts outlined in this plan.

For 2004-2014, there are no capital improvement projects. The storm water management program costs are estimated at about **\$2,619,750**. The storm water studies are estimated to cost about **\$18,000**. Over this 11- year period, these projects, programs, and studies are estimated to cost about **\$2,637,750**.

DESCRIPTION OF FUNDING SOURCE	REVENUE GENERATED
1. Revenue generated by City's Storm Water Utility	\$238,000 annually (w/ \$5,000 per year increase)
2. Special assessments for local improvements made under the authority granted by Minnesota Statutes Chapter 429	Variable depending on activities undertaken
3. Revenue generated by Watershed Management Special Tax Districts provided for under Minnesota Statutes Chapter 473.882	Variable depending on activities undertaken
4. For projects being completed by or in cooperation with Coon Creek Watershed District and/or the Lower Rum River Watershed Management Organization project funds could be obtained from watershed district levies associated with their administrative funds, construction funds, preliminary funds, repair and maintenance funds or survey and data acquisition funds, as provided for in Minnesota Statutes Chapter 103D.905 or 103B.241.	Variable depending on activities undertaken
5. Grant monies that may be secured from various local, regional, County, State, or Federal agencies. This would include MnDOT, MPCA, Metropolitan Council, the DNR and others	Variable depending on activities undertaken
6. Other Sources: These may be other sources of funding for storm water activities such as tax increment financing, state aid, etc. The City will continue to explore additional revenue sources as they become available.	Variable depending on activities undertaken
7. Tax abatement	Variable

The General Fund will assist in the implementation of this Plan. However, the City will seek outside funding sources to assist in implementation.

VIII. AMENDMENT PROCEDURES

It is the intention of the City to have this Water Resource Management Plan reviewed and approved by the Coon Creek Watershed District and the Lower Rum River Watershed Management Organization. Once approved, no significant changes to this plan can be facilitated without the approval of the proposed revisions by the Watershed Management Organization or Watershed District within the City that are affected by the change. Significant changes to the local plan shall be made known to the following parties:

1. Mayor, City Council, City Administrator, and City Engineer
2. Affected Watershed Management Organization and Watershed District within the City
3. Metropolitan Council
4. Public within the City through a public hearing process

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. Upon receipt of approvals from the affected Watershed Management Organization and Watershed District within the City, any proposed amendments will be considered approved.

Minor changes to the Plan shall be defined as changes that do not modify the goals, policies, or commitments expressly defined in this plan by the City. Adjustment to subwatershed boundaries will be considered minor changes provided that the change will have no significant impact on the rate or quality in which storm water runoff is discharged from the City boundaries. Minor changes to this plan can be made by the staff at the City without outside review. It is the intention of the City that this Plan be updated by the year 2014 unless significant changes to the plan are deemed necessary prior to that date.

Appendix A
Water Resource Related Agreements

JOINT AND COOPERATIVE AGREEMENT FOR THE ESTABLISHMENT OF
THE LOWER RUM RIVER WATERSHED MANAGEMENT ORGANIZATION TO
PLAN, CONTROL AND PROVIDE FOR THE DEVELOPMENT OF THE LOWER
RUM RIVER WATERSHED

PREFACE

The Lower Rum River Watershed lying East of the Mississippi River is a watershed that is basically a direct tributary to the Mississippi River. It encompasses all or parts of the following cities:

Andover, Anoka, Coon Rapids, Ramsey

Minnesota Laws of 1982, Chapter 509, mandated that all watersheds within the seven county Metropolitan area must be governed by a watershed management organization and as is now codified as Minnesota Statutes 1992, Sections 103B.201 through 103B.251. The Watershed is authorized to organize under a joint powers agreement pursuant to Minnesota Statutes, Section 471.59 and Section 103B.211 or if such an organization is not created, Anoka County shall petition for the establishment of a watershed district under Minnesota Statutes, Chapter 103D. All the cities in the Lower Rum River Watershed expressed a desire in 1985 to create a joint powers group rather than a watershed and now desire to adopt an amended joint powers agreement to establish a Watershed Management Organization which will comply with the current law for management of this watershed. It is the belief of these four cities that a joint powers group will provide more efficient planning and administration of the Lower Rum River Watershed if the watershed is managed under a joint powers agreement. The goal is to leave as much control as possible with the four individual member cities.

It has been determined by the four cities involved in the watershed that they desire to proceed under a Joint Powers Agreement rather than under Chapter 103D as a watershed district. Each party to this agreement has been fully advised that the Watershed Management Organization being created shall have the powers and responsibilities set forth in the Metropolitan Surface Water Management Act, Minnesota Statutes Sections 103B.201 through 103B.251 and as amended by this Agreement. It is further understood and agreed that it is the intent of this agreement to assign to the watershed management organization, which has operated since 1985, the additional powers and duties assigned by the Minnesota legislature. The management of water resources is a rapidly changing field and new laws and regulations are being adopted and amended frequently and it should not be necessary to amend this agreement every time the legislature enacts a new law.

Each member further recognizes that this is a binding contract and failure to cooperate or to carry out a member's responsibilities will result in a breach of this contract.

JOINT AND COOPERATIVE AGREEMENT

The parties to this Agreement are governmental units of the State of Minnesota, all of which have lands which drain surface water within the Lower Rum River Watershed and all of which have power and responsibility to construct, reconstruct, extend and maintain storm water management facilities to improve water quality, to promote groundwater recharge, and to protect, promote and preserve water resources within the Watersheds. This agreement is made pursuant to the authority conferred upon the parties by Minnesota Statutes 1992, Sections 103B.201 to and including Section 103B.251 and Section 471.59.

NAME

I.

The parties hereto create and establish the Lower Rum River Watershed Management Commission.

GENERAL PURPOSE

II.

The general purpose of this agreement is to provide an organization which can investigate, study, plan and control the construction of facilities to drain or pond storm waters, to alleviate damage by flood waters; to improve the creek channels for drainage; to assist in planning for land use; to repair, improve, relocate, modify, consolidate or abandon, in whole or in part, drainage systems within the watershed area; to do whatever is necessary to assist in water conservation and the abatement of surface water and groundwater contamination and water pollution and the improvement of water quality; to promote ground water recharge; and to protect and enhance fish and wildlife habitat and water recreational facilities. In addition to the aforesated purposes, the organization hereby created shall serve as the Watershed Management Organization for the Lower Rum River Watershed and shall carry out all of the duties and responsibilities outlined in Minnesota Statutes, Section 103B.201 through 103B.251, both inclusive.

DEFINITIONS

III.

For the purposes of this Agreement, the terms used herein shall have the meanings as defined in this article.

Subdivision 1. "Commission" means the organization created by this agreement, the full name of which is "Lower Rum River Watershed Management Commission." It shall be a public agency of its members and a watershed management organization as defined in Minnesota Statutes, Section 103B.211.

Subdivision 2. "Board" means the Board of commissioners of the Commission, consisting of one commissioner or one alternate commissioner from each of the governmental units which is a party to this agreement and which shall be the governing body of the Commission.

Subdivision 3. "Council" means the governing body of a governmental unit which is a member of this Commission.

vacancies resulting from the expiration of a Commissioner or Alternate Commissioner's terms or where a vacancy exists for any reason. Publication and notice shall be in accordance with Minnesota Statutes, Section 103B.227, Subds. 1 and 2, as they now exist or as subsequently amended.

Subdivision 4. The council of each member agrees that its representative commissioner will not be removed from the Board prior to the expiration of the Commissioner's term, unless said Commissioner consents in writing or unless said council has presented the Commissioner with charges in writing and has held a public hearing after reasonable notice to the Commissioner.

A member may remove a Commissioner or an Alternate Commissioner for just cause or for violation of a Code of Ethics of the Commission or a member City, or for malfeasance, nonfeasance, or misfeasance. Said hearing shall be held by the Member City Council who appointed the Commissioner.

A Commissioner who is an elected official of a Member City who is not reelected may be removed by the appointing Member City at the Member's discretion. Any decision by a Member to remove a Commissioner may be appealed to the Board of Water and Soil Resources. A certified copy of the Council's Resolution removing said Commissioner shall be filed with the Secretary of the Board of Commissioners and shall show compliance with the terms of this section.

Subdivision 5. Each member shall within 30 days of appointment file with the Secretary of the Board of Commissioners a record of the appointment of its Commissioner and its Alternate Commissioner. The Commission shall notify the Board of Water and Soil Resources of member appointments and vacancies within 30 days after receiving notice from the member. Members shall fill all vacancies within 90 days after the vacancy occurs.

Subdivision 6. Commissioners shall serve without compensation from the Commission, but this shall not prevent a governmental unit from providing compensation for its Commissioner for serving on the board, if such compensation is authorized by such governmental unit and by law. Commission funds may be used to reimburse a Commissioner or Alternate Commissioner for expenses incurred in performing Commission business and if authorized by the Board.

Subdivision 7. At the first meeting of the Board and in February of each year thereafter, the Board shall elect from its Commissioners a Chair, a Vice Chair, a Secretary, a Treasurer, and such other officers as it deems necessary to conduct its meetings and affairs. At the organizational meeting or a soon there after as it may be reasonably done, the Commission shall adopt rules and regulations governing its meetings. Such rules and regulations may be amended from time to time at either a regular or a special meeting of the Commission provided that a ten day prior notice of the proposed amendment has been furnished to each person to whom notice of the Board meetings is required to be sent; a majority vote of all eligible votes of the then existing members of the Commission shall be sufficient to adopt any proposed amendment to such rules and regulations.

The Board shall notify each member City of the location and time of regular and special

construct or maintain dams, dikes, reservoirs and appurtenant works or other improvements necessary to implement the overall plan.

The member cities further understand and agree that the Commission in reviewing, ordering, or authorizing these projects will use the best management practices required to meet state and federal statutes and regulations. The Commission will also consider the ability of the member cities to fund the enforcement of local controls and any ordered capital improvements. The Commission shall incorporate financial review and anticipated sources of revenue as apart of the over all management plan and as a part of local water management plans.

Subdivision 10. It shall regulate, conserve and control the use of storm and surface water and groundwater within the Watershed necessary to implement the overall plan.

Subdivision 11. It shall contract for or purchase such insurance as the Board deems necessary for the protection of the Commission.

Subdivision 12. It may establish and maintain devices for acquiring and recording hydrological and water quality data within the Watershed.

Subdivision 13. It may enter upon lands, in a lawful manner, within or without the watershed to make surveys and investigations to accomplish the purposes of the Commission. The Commission shall be liable for actual damages resulting there from but every person who claims damages shall serve the Chair or Secretary of the Board of Commissioners with a Notice of Claim as required by Chapter 466.05 of the Minnesota Statutes.

Subdivision 14. It shall provide any member governmental unit with technical data or any other information of which the Commission has knowledge which will assist the governmental unit in preparing land use classifications or local water management plans within the watershed.

Subdivision 15. It may provide legal and technical assistance in connection with litigation or other proceedings between one or more of its members and any other political subdivision, commission, Board or agency relating to the planning or construction of facilities to drain or pond storm waters or relating to water quality within the Watershed. The use of commission funds for litigation shall be only upon a favorable vote of a majority of the eligible votes of the then existing members of the Commission.

Subdivision 16. It may accumulate reserve funds for the purposes herein mentioned and may invest funds of the Commission not currently needed for its operations, in the manner and subject to the laws of Minnesota applicable to statutory cities.

Subdivision 17. It may collect monies, subject to the provisions of this agreement, from its members, Anoka County and from any other source approved by a majority of its board.

Subdivision 18. It may accept gifts, apply for and use grants or loans of money or other property from the United States, the State of Minnesota, a unit of government or other governmental unit or organization, or any person or entity for the purposes described herein; may enter into any reasonable agreement required in connection therewith; may comply with any laws or regulations applicable thereto; and may hold, use, and dispose of such money or property in

determined insufficient by the Commission, request written clarification within an additional ten (10) days.

METHOD OF PROCEEDING

VII.

Subdivision 1. The procedures to be followed by the Board in carrying out the powers and duties set forth in Article VI, Subdivisions 5, 6, 7, 8, 9, and 10, shall be as set forth in this article.

Subdivision 2. The Board has previously prepared the over all plan as required in Article VI, Subdivision 5. This plan shall be updated as required by state law. The Board shall proceed to implement said plan, and this implementation may be ordered by stages.

Subdivision 3. No project which will channel or divert additional waters to subdistrict and subtrunks which cross municipal boundaries shall be commenced by any member governmental unit prior to approval of the Board of the design of an adequate outlet or of adequate storage facilities.

Subdivision 4. All construction, reconstruction, extension or maintenance of outlets for the various subdistrict and subtrunks, including outlets, lift stations, dams, reservoirs, or other appurtenances of a surface water or storm sewer system which involve construction by or assessment against any member governmental unit or against privately or publicly owned land within the watershed shall follow the statutory procedures outlined in Chapter 429 of the Minnesota Statutes except as herein modified.

The Board shall secure from its engineers or some other competent persona report advising it in a preliminary way as to whether the proposed improvement is feasible and as to whether it shall best be made as proposed or in connection with some other improvement and the estimated cost of the improvement as recommended and the proposed allocation of costs between members.

The Commission shall have authority to separate the watershed into subtrunks or subdistricts if the capital improvement project and costs only benefit a subtrunk or subdistrict area. If the Commission determines that a capital improvement and capital cost benefits only a subtrunk or subdistrict area it may so designate that said area shall be responsible for said costs and may allocate the costs to said area or areas rather than to the entire watershed.

The Board shall then hold a public hearing on the proposed improvement after mailed notice to the clerk of each member governmental unit within the Watershed. The Commission shall not be required to mail or publish notice except by said notice to the clerk. Said notice shall be mailed not less than 45 days before the hearing, shall state the time and place of the hearing, the general nature of the improvement, the estimated total cost and the estimated cost to each member governmental unit. The Board may adjourn said hearing to obtain further information, may continue said hearing pending action of the member governmental units or may take such other action as it deems necessary to carry out the purposes of this Commission.

To order the improvement, in accordance with the powers and duties established in Article VI, Subdivisions 7, 8 and 9, a resolution setting forth the order for a capital improvement project

Arbitration shall be conducted in accordance with the Uniform Arbitration Act, Chapter 572 of the Minnesota Statutes.

Subdivision 7. Contracts for Improvements. All contracts which are to be let as a result of the board's order to construct, repair, alter, reclaim or change the course or terminus of any ditch, drain, storm sewer, watercourse, or to acquire, operate, construct or maintain dams, dikes, reservoirs or their appurtenances or to carry out any of the other provisions of the plan as authorized by Minnesota Statutes, and for which two or more member governmental units shall be responsible for the costs, shall be let in accordance with the provisions of Section 429.041 of the Minnesota Statutes. The bidding and contracting of said work shall be let by any one of the member governmental units, as ordered by the Board of Commissioners, after compliance with the statutes. All contracts and bidding procedures shall comply with all the requirements of law applicable to contracts let by a statutory city in the State of Minnesota.

The Commission shall not have the authority to contract in its own name for any improvement work for which a special assessment will be levied against any private or public property under the provisions of Chapter 429 or under the provisions of any City charter. This section shall not preclude the Commission from proceeding under Minnesota Statutes, Section 103B.251.

Subdivision 8. Contracts with Other Governmental Bodies. The Commission may exercise the powers set forth in Article VI, Subdivision 7, but said contracts for a capital improvement shall require a favorable vote of two-thirds majority of the eligible votes of the then existing members of the Commission.

Subdivision 9. Supervision. All improvement contracts awarded under the provisions of Subdivision 7 of this Article shall be supervised by the member governmental unit awarding said contract or said member governmental unit may contract or appoint any qualified staff member or members of the Commission to carry out said supervision, but each member agrees that the staff of this Commission shall be authorized to observe and review the work in progress and the members agree to cooperate with the Commission staff in accomplishing the purposes of this Commission. Representatives of the Commission shall have the right to enter upon the place or places where the improvement work is in progress for the purpose of making reasonable tests and inspections. The staff of this Commission shall report, advise and recommend to the Board on the progress of said work.

Subdivision 10. Land Acquisition. The Commission shall not have the power of eminent domain. The member governmental units agree that any and all easements or interest in land which are necessary will be negotiated or condemned in accordance with Chapter 117 of the Minnesota Statutes by the unit wherein said lands are located, and each member agrees to acquire the necessary easements or right-of-way or partial or complete interest in land upon order of the Board of Commissioners to accomplish the purposes of this agreement. All reasonable costs of said acquisition shall be considered as a cost of the improvement. If a member governmental unit

trust companies, authorized by Chapters 118 and 427 of the Minnesota Statutes to receive deposits of public moneys and to act as depositories for the Commission funds. In no event shall there be a disbursement of Commission funds without the signature of at least two Board members, one of whom shall be the Treasurer or Authorized Deputy Treasurer. The Treasurer shall be required to file with the Secretary of the Board a bond in the sum of at least \$10,000 or such higher amount as shall be determined by the Board. The Commission shall pay the premium on said bond.

Subdivision 2. Each member agrees to contribute each year to a general fund, said fund to be used for general administration purposes including, but not limited to: salaries, rent, supplies, development of an over all plan, engineering and legal expenses, insurance, and bonds, and to purchase and maintain devices to measure hydrological and water quality data. Said funds may also be used for normal maintenance of the facilities, but any extraordinary maintenance or repair expense shall be treated as an improvement cost and processed in accordance with Subdivision 5 of this Article. The annual contribution by each member shall be based fifty percent (50%) on the net tax capacity of all property within the Watershed and fifty percent (50%) on the basis of the total area of each member within the boundaries of the Watershed each year to the total area in the Lower Rum River Watershed governed by this Agreement.

Subdivision 3.

(a) An improvement fund shall be established for each improvement project instituted under Article VII, Subdivision 4. Each member agrees to contribute to said fund its proportionate share of the engineering, legal and administrative costs as determined by the Commission as the amount to be assessed against each member as a cost of the improvement. The Board shall submit in writing a statement to each member, setting forth in detail the expenses incurred by the Commission for each project. Each member further agrees to pay to or contract with the member governmental unit awarding said contract for the improvement, its proportionate share of the cost of the improvement in accordance with the determination of the Board under Article VII, Subdivision 4. The member awarding the contract shall submit in writing copies of the engineer's certificate authorizing payment during construction and the member being billed agrees to pay its proportionate share of said improvement costs within 30 days after receipt of the statement. The member awarding the contract shall advise other contributing members of the tentative time schedule of the work and the estimated times when the contributions shall be necessary.

(b) Notwithstanding the provisions of paragraph (a) of this subdivision, the Commission may by a vote of 2/3rds of all eligible votes of the then existing members of the Commission decide to proceed to fund all or any part of the cost of a capital improvement contained in the capital improvement program of the plan pursuant to the authority and subject to the provisions set forth in Minnesota Statutes, Section 103B.251. It is expressed as a goal of this Agreement that cost sharing of capital

Members' attention is drawn to Minnesota Statutes, Section 103B.245, which authorizes a Watershed Management Tax District to be created within each member City to pay the costs of planning and for the purpose of paying capital costs and/or normal and routine maintenance of facilities.

Subdivision 5. Cost Allocation. General costs of operating the Commission shall be as set forth in Article VIII, Subdivision 2. The Commission shall apportion costs of any capital improvements to the respective members based upon a negotiated agreement to be arrived at by members who have lands in the subdistrict. In the event a negotiation cannot be reached, the distribution of costs will be determined through the arbitration process described in Article VII Subd. 6.

MISCELLANEOUS PROVISIONS

IX.

Subdivision 1. The Commission shall not have the power to issue certificates, warrants or bonds.

Subdivision 2. The Commission shall not have the power of eminent domain and shall not own any interest in real property. All interests in lands shall be held in the name of the corporate member wherein said lands are located.

Subdivision 3. The Commission shall not have the power to levy a special assessment upon any privately or publicly owned land. All such assessments shall be levied by the member wherein said lands are located. It shall have the power to require any member to contribute the costs allocated or assessed according to the other provisions of this agreement.

Subdivision 4. Each member agrees that it will not directly or indirectly collect or divert any additional surface water to the Lower Rum River or the Mississippi River or their tributaries from any subdistrict or subtrunk without a permit from the Board of Commissioners. Permits may be granted by the Board for a member to proceed with the construction or reconstruction of improvements within the individual corporate members' boundaries and at its sole cost upon a finding:

- (1) that there is an adequate outlet;
- (2) that said construction is in conformance with the overall plan;
- (3) that the construction will not adversely affect other members of this agreement.

Subdivision 5. Any member who is more than 60 days in default in contributing its share to the general fund shall have the vote of its Board member suspended pending the payment of its proportionate share.

Any member who is more than 60 days in default in contributing its proportionate share of the cost of any improvement to the contracting member shall upon application of the contracting member have the vote of its Board member suspended, pending the payment of its proportionate share.

Any Board member whose vote is under suspension shall not be considered as an eligible

IN WITNESS WHEREOF, the undersigned governmental units, by action of their governing bodies, have caused this agreement to be executed in accordance with the authority of Minnesota Statutes, Sections 103B.211 and 471.59.

Approved by the City Council

CITY OF ANDOVER

September 5 1995 By J. E. McKevey
Attest Sitrus Bell

Approved by the City Council

CITY OF ANOKA

July 24 1995 By Pete R. Bely Mayor
Attest Mark Nagel

Approved by the City Council

CITY OF COON RAPIDS

August 15, 1995 By William L. Thompson
Attest Robert L. Suehle

Approved by the City Council

CITY OF RAMSEY

June 27, 1995 By [Signature]
Attest [Signature]

SUPPLEMENTAL AGREEMENT

This agreement is made to complement the easement grant executed by Kenneth L. Slyzuk and Mary A. Slyzuk, husband and wife, and the City of Andover, a municipal corporation, dated ~~March 24, 1978~~ March 24, 1978

The City of Andover agrees that it will be responsible for maintaining the storm water drainage ditch which is a part of the easement grant to the same condition that it was at the time of the execution of said grant. That said maintenance shall include the removal of fallen trees and brush which shall lie across or in said ditch.

The City Engineer shall determine the initial elevation profile of the drainage ditch. The ditch shall be cleaned and the sediment removed at such time as the ditch elevation profile exceeds the initial profile by one foot in elevation. The City Engineer shall periodically inspect and survey the ditch to determine when the ditch requires cleaning in accordance with the above standards. The City Engineer will consult with the grantors prior to performing said inspection.

The grantors agree that the control of the culvert control gate which is located under 141st Avenue shall be their responsibility, and furthermore, they agree to assume all responsibility and liability for any damage caused on their property as a result of their controlling said flow. The grantors further agree that the removal of all spoil resulting from the ditch cleaning operations shall be their responsibility.

CITY OF ANDOVER

By: Donald S. [Signature]
MayorATTEST: [Signature]Kenneth L. Slyzuk
Kenneth L. SlyzukMary A. Slyzuk
Mary A. Slyzuk



Slyzuk Ditch
City of Andover
Comprehensive Stormwater Management Plan

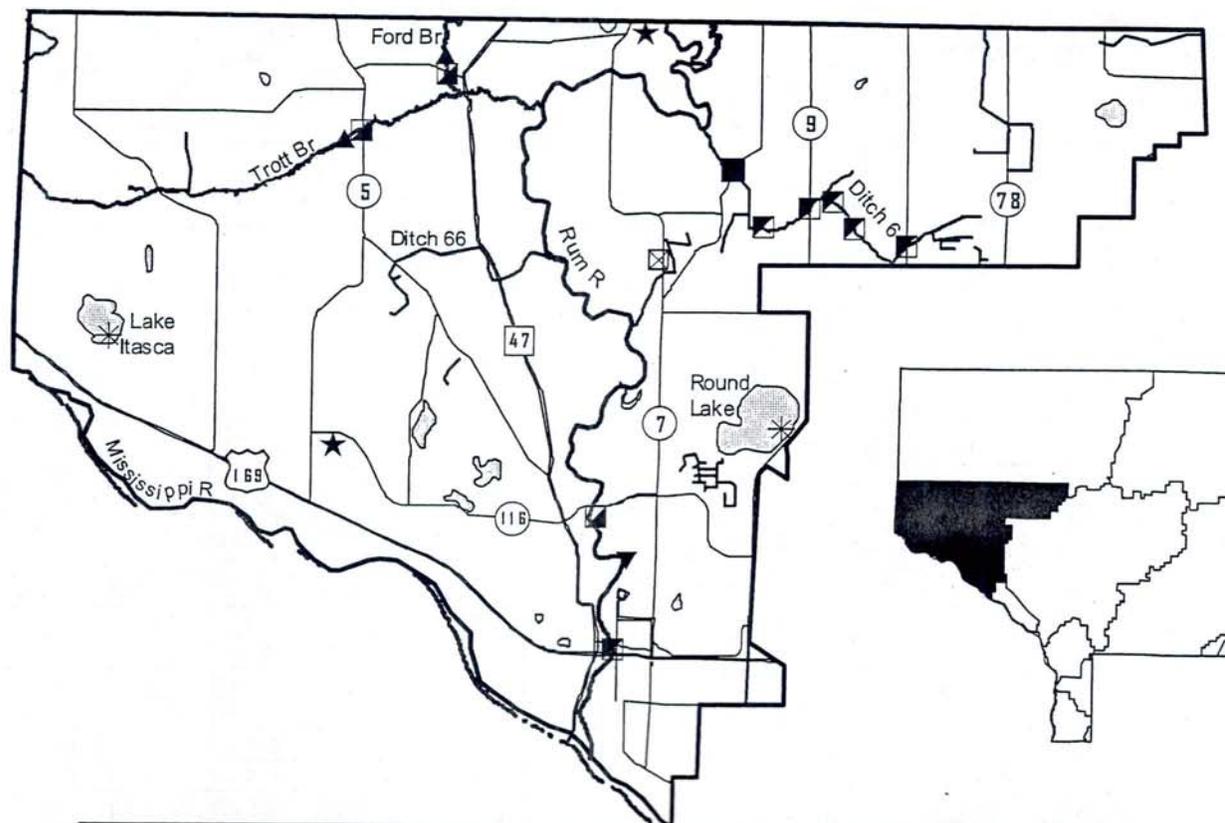


Appendix B
Water Quality Studies

CHAPTER 4: LOWER RUM RIVER WATERSHED

Monitoring	Cooperators	Page
Lake Levels	ACD, LRRWMO, volunteers	4-70
Stream Hydrology	ACD	4-71
Wetland Hydrology	ACD	4-72
Stream Water Quality – Biological	ACD, LRRWMO, Anoka HS	4-74
Special Investigation: Ditch 6	ACD, LRRWMO	4-83
Groundwater Hydrology	ACD, MNDNR	1-6
Precipitation	ACD, volunteers	1-1
Financial Summary		4-90
Recommendations		4-90

ACD = Anoka Conservation District, LRRWMO = Lower Rum River Watershed Mgmt Org,
MNDNR = Minnesota Dept. of Natural Resources



✱	Lake Levels	☒	Stream Water Quality	☒	Precipitation
▲	Stream Hydrology	▲	biological	▼	Groundwater Hydrology (Ohwells)
★	Wetland Hydrology	▣	chemical		
		■	chemical and biological		

Lake Levels

Description: Weekly water level monitoring in lakes. These data, as well as all additional historic data are available on the Minnesota DNR website using the "LakeFinder" feature (www.dnr.mn.us.state/lakefind/index.html).

Purpose: To provide understanding of lake hydrology, including the impact of climate or other water budget changes. These data are useful for regulatory, building/development, and lake hydrology manipulation decisions.

Locations: Lake Itasca, Round Lake, Rogers Lake

Results: Lake levels recovered from lower levels the preceding fall. Throughout summer 2002 water levels rose continually on Rogers Lake and Lake Itasca due to record rainfalls throughout the summer and fall. Round Lake remained about constant.

Figure 4-1: Round Lake levels '98-2002

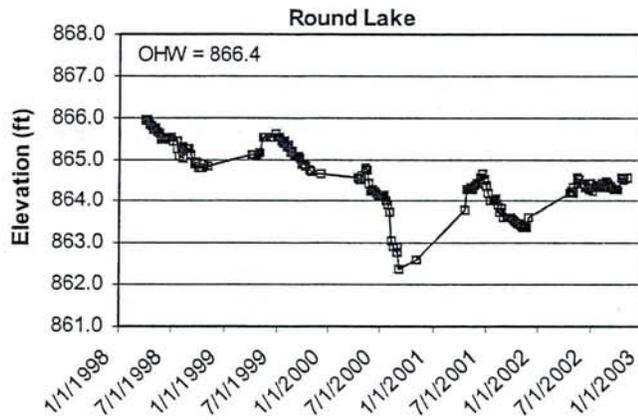


Figure 4-2: Rogers Lake levels '98-2002

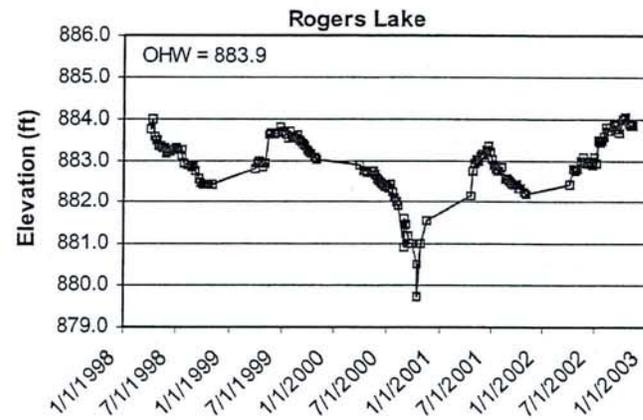
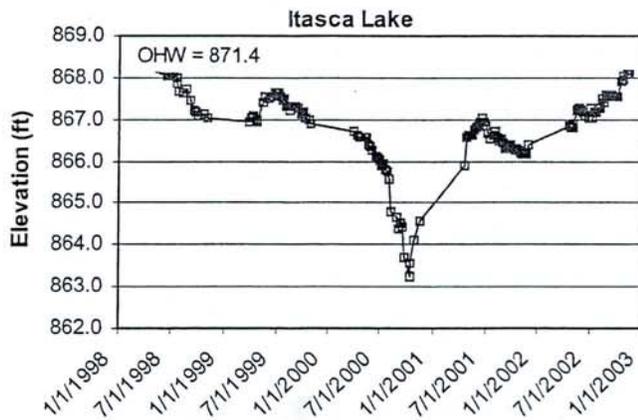


Figure 4-3: Lake Itasca levels '98-2002



Lake	Year	Average	Min	Max
Itasca	1998	867.90	867.05	868.57
	1999	867.29	866.91	867.63
	2000	865.42	863.24	866.71
	2001	866.50	865.88	867.03
	2002	867.37	866.82	868.07
Rogers	1998	883.05	882.41	884.00
	1999	883.40	882.80	883.80
	2000	881.97	879.71	882.87
	2001	882.74	882.17	883.33
	2002	883.36	882.43	884.03
Round	1998	865.35	864.79	865.93
	1999	865.22	864.65	865.61
	2000	863.89	862.37	864.79
	2001	863.94	863.39	864.65
	2002	864.39	864.19	864.57

Table 4-1: Lower Rum River Watershed lake levels summary

Stream Hydrology

Description: Continuous water level monitoring in streams.

Purpose: To provide understanding of stream hydrology, including the impact of climate, landuse or discharge changes. These data also facilitate calculation of pollutant loads and use of computer models for developing management strategies.

Locations: Ford Brook at Highway 63, Ramsey
Trott Brook at Highway 5, Ramsey

Results: Both streams responded to heavy rains throughout the summer by maintaining higher flows. Ford Brook had maximum stages within a few hundredths of a foot of 2001 maximums, but an average stage 0.61 ft higher than in 2001. Trott Brook was especially extreme, reaching stages 1.31 ft higher than in the previous year and having an average flow 0.5 ft greater than in 2001.

Figure 4-4: Ford Brook hydrograph 2002

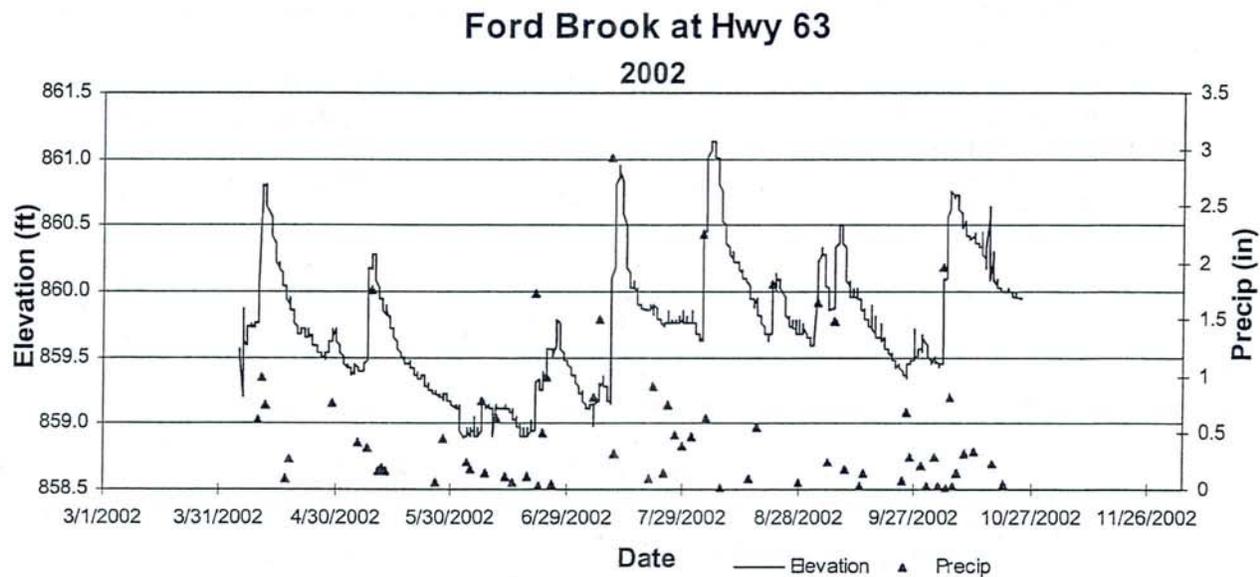
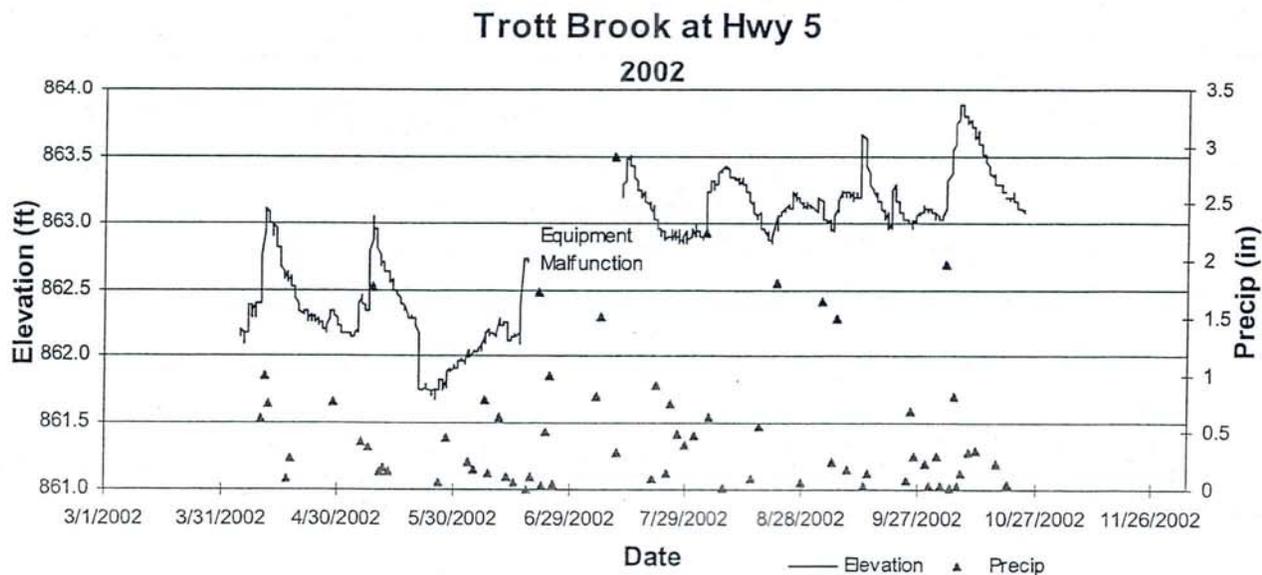


Figure 4-5: Trott Brook hydrograph 2002



Wetland Hydrology

Description: Continuous groundwater level monitoring at a wetland boundary to a depth of 40 inches. County-wide, the ACD maintains a network of 14 wetland hydrology monitoring stations.

Purpose: To provide understanding of wetland hydrology, including the impact of climate and landuse. These data aid in delineation of nearby wetlands by documenting hydrologic trends including the timing, frequency, and duration of saturation.

Locations: AEC Reference Wetland, Connexus Energy Property on Industry Ave, Ramsey
Rum River Central Reference Wetland, Rum River Central Park, Ramsey

Results: Hydrographs for 2002 were dramatically different from the previous couple of years. Typically, water levels at the AEC wetland are near the surface only in the spring, quickly dropping to >40 inches below the surface. Water levels were still low in 2002, but increased throughout the summer. The Rum River Central wetland typically begins the spring with water within 10 or less inches of the surface, and declines thereafter. In 2002 water levels were maintained within 5 inches of the surface.

These two wetlands lie in different landuse types, which probably partially accounts for much of their hydrologic differences. The AEC wetland is surrounded by residences and an industrial park. Dewatering for construction projects has occurred at this location in the last few years. Municipal groundwater wells are also in close proximity. The Rum River Central wetland, on the other hand, is located in a forested area of a park.

In the graphs below, note that well depths were 40 inches, so when a graph stabilizes at a reading of -40, water levels were at or deeper than the graphed depth.

Figure 4-6: AEC Reference Wetland hydrograph 2002

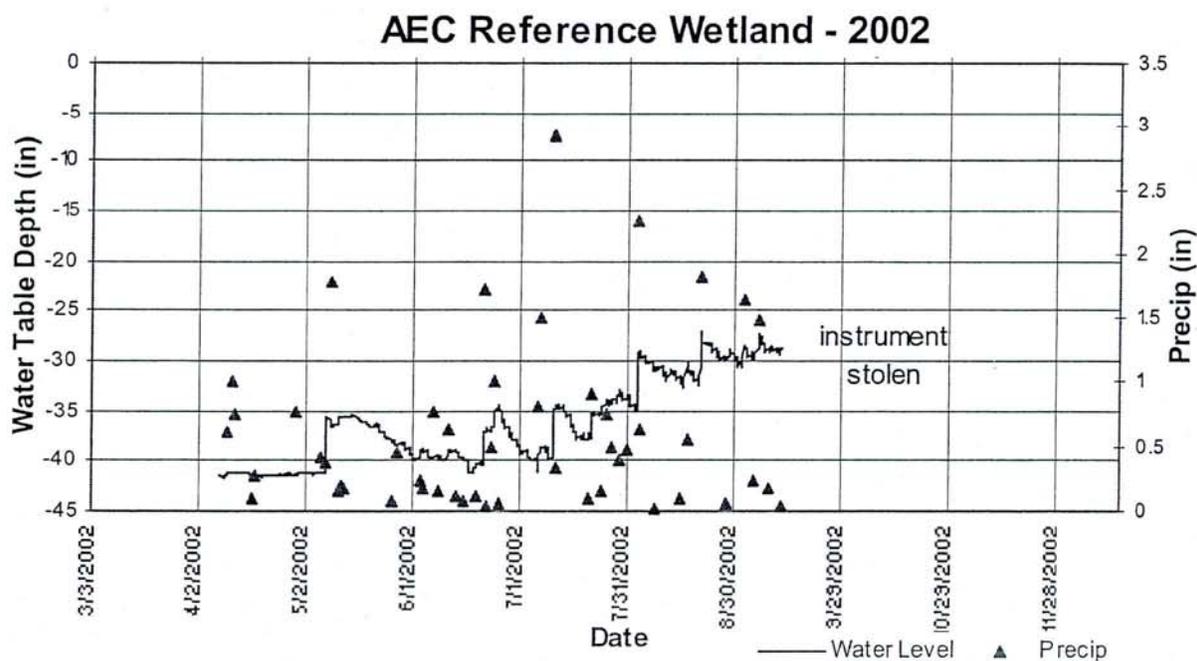
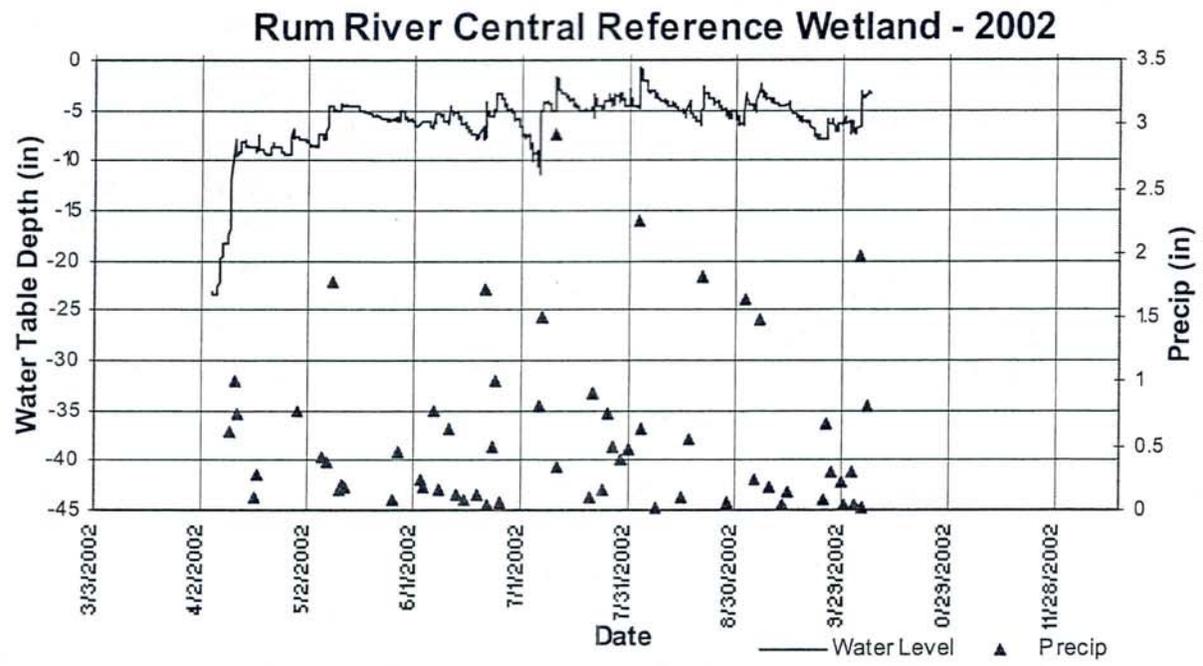


Figure 4-7: Rum River Central Reference Wetland hydrograph 2002



Stream Water Quality – Biological Monitoring

- Description:** This program combines environmental education and stream monitoring. Under the supervision of ACD staff, high school science classes collect aquatic macroinvertebrates from a stream, identify their catch to the family level, and use the resulting numbers in mathematical equations that summarize water and habitat quality. These methods are based upon the knowledge that different families of insects have different water and habitat quality requirements. The families collectively known as EPT (Ephemeroptera, or mayflies; Plecoptera, or stoneflies; and Trichoptera, or caddisflies) are pollution intolerant. Other families thrive in low quality water. Therefore, a census of stream macroinvertebrates yields information about stream health.
- Purpose:** To assess stream quality, both independently as well as by supplementing chemical data. To provide an environmental education service to the community.
- Locations:** Ditch 6 at Valley Drive, Andover
Rum River behind Anoka High School, south side of Industry Ave, Anoka
Trott Brook at Hwy 5, Ramsey
Ford Brook at Hwy 63, Ramsey
- Results:** Results for each site are detailed on the following pages.

Tips for Data Interpretation

Consider biological indices of water quality in concert rather than alone, as each gives only a partial picture of stream condition. Compare the numbers to county-wide averages. This gives some sense of what might be expected for streams in a similar landscape, but does not necessarily reflect what might be expected of a minimally impacted stream. Some key numbers to look for include:

- # Families Number of invertebrate families. Higher values indicate better quality.
- EPT Number of families of the generally pollution-intolerant orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies). Higher numbers indicate better stream quality.
- Family Biotic Index (FBI) An index that utilizes known pollution tolerances for each family. Lower numbers indicate better stream quality.

FBI	Stream Quality Evaluation
0.00-3.75	Excellent
3.76-4.25	Very Good
4.26-5.00	Good
5.01-5.75	Fair
5.76-6.50	Fairly Poor
6.51-7.25	Poor
7.26-10.00	Very Poor

- % Dominant Family High numbers indicates an uneven community; likely a poorer condition.
-

Biomonitoring

COUNTY DITCH 6

at Valley Drive, Andover

Monitored by

Anoka Conservation District staff

Number Years Monitored

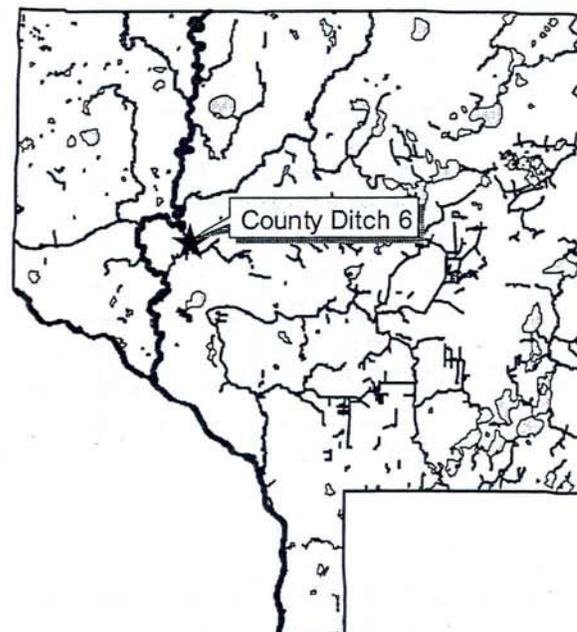
1/2

Background

County Ditch 6 originates in north-central Andover and flows west to the Rum River. It enters the Rum River near 169th Lane NW. This is a small ditch that measures about 10-15 feet wide and 1-2 feet deep at its outlet during baseflow. The stream bottom is primarily silt. Few snags or other debris overhang into the stream, except for reed canary grass which lines most of the stream banks.

Watershed landuse is about 45% built up, mostly with single family homes, and continues to develop rapidly. Most of the remainder is vacant forests, shrubland, herbaceous, or woodland. The ditch does flow through several small sod and vegetable farms.

The sampling site is near the stream's outlet at the bottom of its watershed. This sampling was conducted as part of a watershed-level investigation into the source of chronic, unusually high chloride levels in this ditch.



Results

Biological data indicated an impaired water body (Fig. 4-8, Table 4-2). The invertebrate community was not even or rich (9 families). All families found were at least moderately pollution-tolerant. 75% of all captures were Family Hydropsychidae, a caddisfly that thrives in sub-standard waters. No pollution intolerant families were found. One indice, the Family Biotic Index, did indicate above average conditions, but considered together the indices reflect a somewhat impaired condition.

Figure 4-8: Summarized biomonitoring results for Ditch 6 at Valley Drive, Andover.

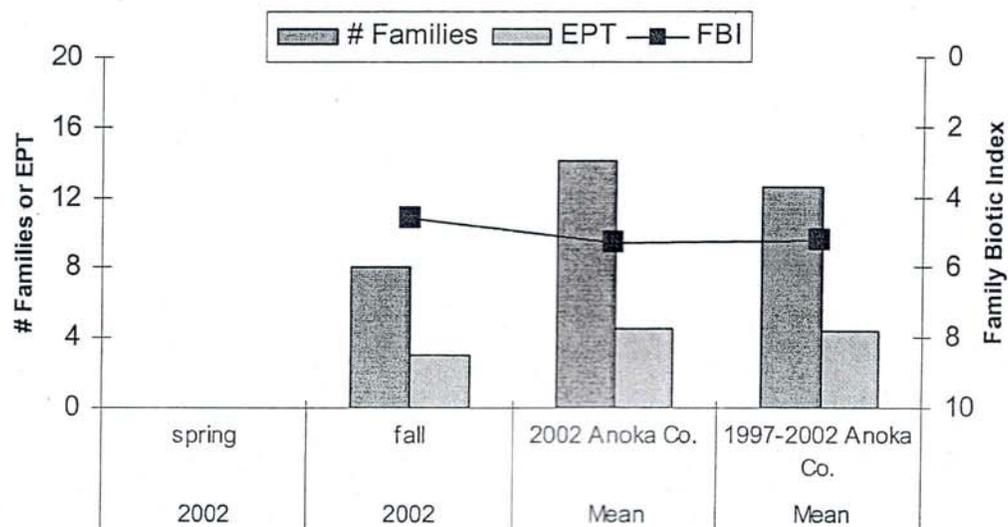


Table 4-2: Biomonitoring data for Ditch 6 at Valley Drive, Andover.

Ditch 6 @ Valley Drive

Year	2002	2002	Mean	Mean
Season	spring	fall	2002 Anoka Co.	1997-2002 Anoka Co.
FBI		4.6	5.3	5.2
# Families		8	14.1	12.5
EPT		3	4.5	4.5
Date		10/15		
sampling by		ACD		
sampling method		MH		
# individuals		129		
# replicates		1		
Dominant Family		Hydropsychidae		
% Dominant Family		75.2		
% Ephemeroptera		0		
% Trichoptera		85.3		
% Plecoptera		0		

Discussion

These biological data compliment chemical water quality data. Chloride levels in this stream are chronically high (see 2002 Anoka Conservation District investigative study). High chloride levels are known to negatively affect stream biota, though chloride levels in this ditch do not exceed US Environmental Protection Agency standards. Chloride can also be an indirect measure of other impacts associated with increasing urbanization which may impact stream biota.

Biomonitoring

RUM RIVER

behind Anoka High School, Anoka

Monitored by

Anoka High School
Anoka Conservation District staff

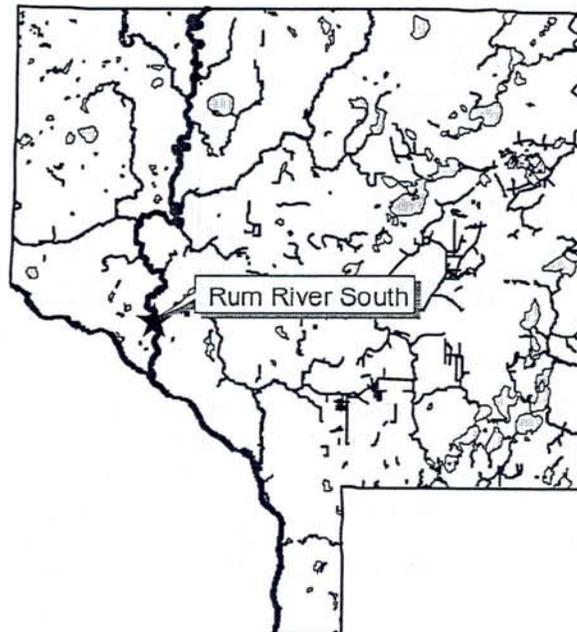
Number Years Monitored

2.5

Background

The Rum River originates from Lake Mille Lacs, and flows south through western Anoka County where it joins the Mississippi River in the City of Anoka. Other than the Mississippi, this is the largest river in the county. In Anoka County the river has both rocky ripples as well as pools and runs with sandy bottoms. The river's condition is generally regarded as excellent. Portions of the Rum in Anoka County have a "wild and scenic" designation.

The sampling site is near the Bunker Lake Boulevard bridge behind Anoka High School. Sampling is not conducted in the main channel. Rather, it occurs in a backwater area. Water is not flowing in this location and the bottom is mucky. This site is not the most representative of the river.



Results

The various indices give a mixed message about water quality, but taken together indicate an average or slightly below average condition (Fig. 4-9, Table 4-3). In spring 2002 the site was species poor (6), but many more families (19) were detected in the fall. In both cases only 2-3 families were of the pollution intolerant groups EPT. The dominant family at this site has been pollution tolerant during every sampling conducted (since 2000). The Family Biotic Index was well below the county-wide average.

Figure 4-9: Summarized biomonitoring results for Rum River at Anoka High School.

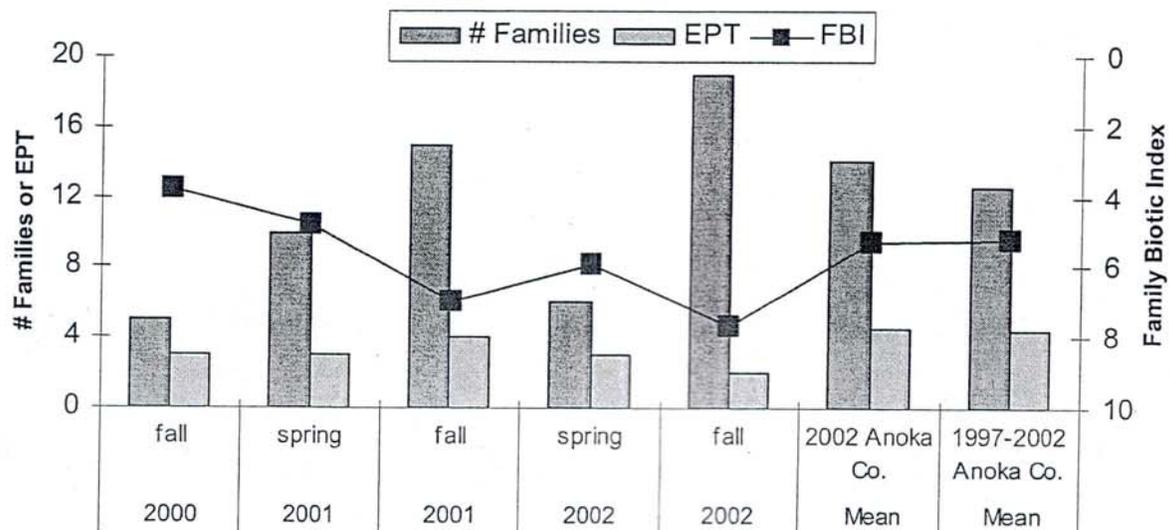


Table 4-3: Biomonitoring data for Rum River at Anoka High School.

Rum River South at Anoka HS								
Year	2000	2001	2001	2002	2002		Mean	Mean
Season	fall	spring	fall	spring	fall	2002 Anoka Co.	1997-2002 Anoka Co.	
FBI	3.76	4.80	7.00	5.90	7.70		5.3	5.2
# Families	5	10	15	6	19		14.1	12.5
EPT	3	3	4	3	2		4.5	4.5
Date	10/4	5/24	10/17	5/28	10/9			
sampling by	AHS	AHS	AHS	ACD	AHS			
sampling method	MH	MH	MH	MH	MH			
# individuals	121	100	178	179	144			
# replicates	1	1	1	1	2			
Dominant Family	heptageniidae	corixidae	hemiptera	corixidae	taltridae			
% Dominant Family	36	66	30.9	91.1	20.1			
% Ephemeroptera	66.1	7	16.9	4.5	1.4			
% Trichoptera	27.3	0	0	0	0			
% Plecoptera	6.6	4	0	0.6	0			

Discussion

Chemical monitoring data indicates a good condition, so poor or mixed biological indicators might be due to habitat condition or unrepresentative sampling site selection. The southern reaches of the Rum River where this sampling was conducted generally lacks pools, riffles, and rocky bottom found further upstream that are favored by pollution intolerant families. Also, this sampling was conducted in a backwater area that has a mucky bottom and does not receive good flow. This area is unlikely to be occupied by families which are pollution intolerant because those families generally favor rocky habitats and require high dissolved oxygen not found in stagnant areas.

Biomonitoring

TROTT BROOK

at Highway 5, Ramsey

Monitored by

Anoka Conservation District staff

Number Years Monitored

3.5

Background

Trott Brook originates in eastern Sherburne County and flows east through Anoka County in Ramsey. Near Highway 47 Ford Brook joins Trott Brook. Trott Brook enters the Rum River in northeastern Ramsey. This stream has few riffles and pools and the bottom is predominantly silt. The surrounding watershed is developing quickly but still contains large areas of undeveloped land, particularly near the stream.

The sampling site is in the road right of way and private property east of Highway 5. This site is typical of conditions found elsewhere along this stream.

Results

In 2002 this site was monitored only in the spring due to excessive water levels throughout summer and fall that made sampling unsafe. In 2002, as in the past, this site had slightly below average conditions, but was well within the range typical for Anoka county (Fig. 4-10., Table 4-4). Few pollution intolerant species were found.

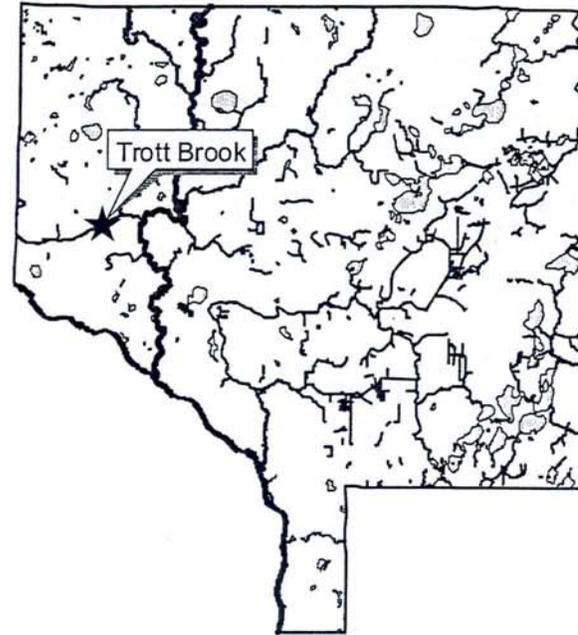


Figure 4-10: Summarized biomonitoring results for Trott Brook at Highway 5.

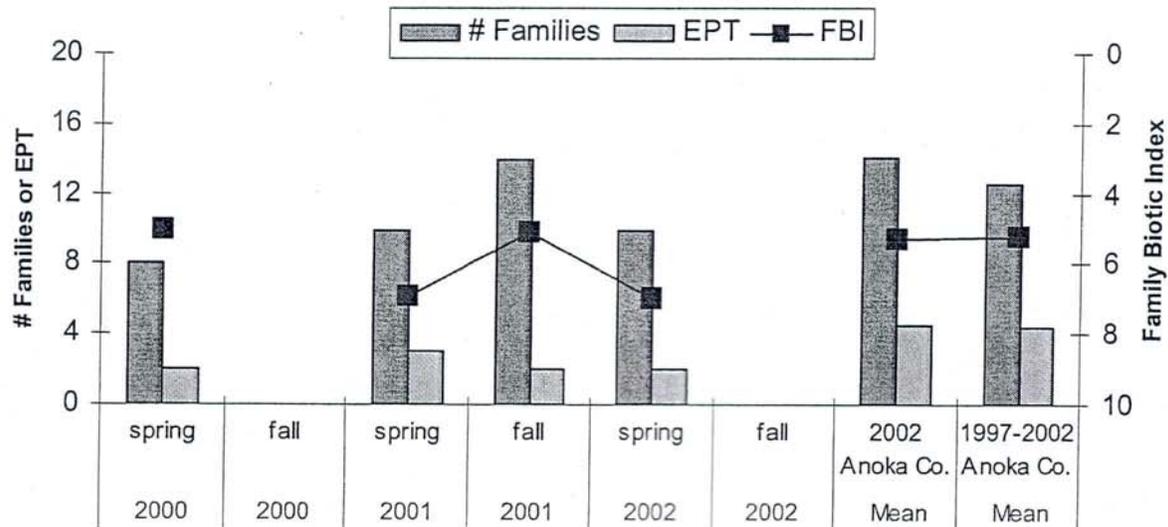


Table 4-4: Biomonitoring data for Trott Brook at Highway 5.

Trott Brook @ 5											
Year	1998	1999	1999	2000	2000	2001	2001	2002	2002	Mean	Mean
Season	fall	spring	fall	spring	fall	spring	fall	spring	fall	2002 Anoka Co.	1997-2002 Anoka Co.
FBI	4.52	7.07	5.46	5.01		6.90	5.10	7.00		5.3	5.2
# Families	15	12	21	8		10	14	10		14.1	12.5
EPT	6	5	8	2		3	2	2		4.5	4.5
Date	9/22	6/10	10/21	6/8		5/10	10/26	10/26			
sampling by	ACD	ACD	ACD	ACD		ERHS	ACD	ACD			
sampling method	kicknet	MH	MH	MH		MH	MH	MH			
# individuals	83	112	156	121		100	108	88			
# replicates	1	1	1	1		1	1	1			
Dominant Family	hydrpsychidae	taltridae	taltridae	baetidae		gastropoda/pelycapoda	leptophlebiidae	pelycapoda			
% Dominant Family	28.9	51	26	60		27/27	20.4	22.4			
% Ephemeroptera	25	17.9	25.6	61.2		9	20.4	5.7			
% Trichoptera	29.6	4.5	14.1	0		7	2.8	1.1			
% Plecoptera	0	0.9	0	0		0	0	0			

Discussion

The biological data, along with chemical monitoring that has been performed indicate a slightly impaired stream. The biota is probably slightly below average because of chemical effects and the heavily silted habitat. No trend toward improving or deteriorating conditions is apparent.

Biomonitoring

FORD BROOK

at Highway 63, Ramsey

Monitored by

Anoka Conservation District staff

Number Years Monitored

4.5

Background

Ford Brook originates in northwestern Anoka County from Ekstrom Lake. It flows southward to northern Ramsey where it joins Trott Brook and eventually enters the Rum River. This stream has some riffles and pools but is still predominantly silty-bottom. The surrounding watershed is developing quickly but still contains large areas of undeveloped land, particularly near the stream. Many residential lots in this area are 5 acres, and many of these have horses.

The sampling site is in the road right of way on the south side of Highway 63. This site has a rocky bottom with both riffles and pools. Deadfalls and overhanging bank vegetation are also common at this site.

Results

In 2002 this site was monitored only in the spring due to excessive water levels throughout summer and fall that made sampling unsafe. In 2002, as in the past, this site had slightly above average conditions for Anoka County (Fig. 4-11, Table 4-5). The dominant species was a pollution-sensitive mayfly (baetidae), and over 1/3 of all families present were EPT. Families were evenly represented in abundance.

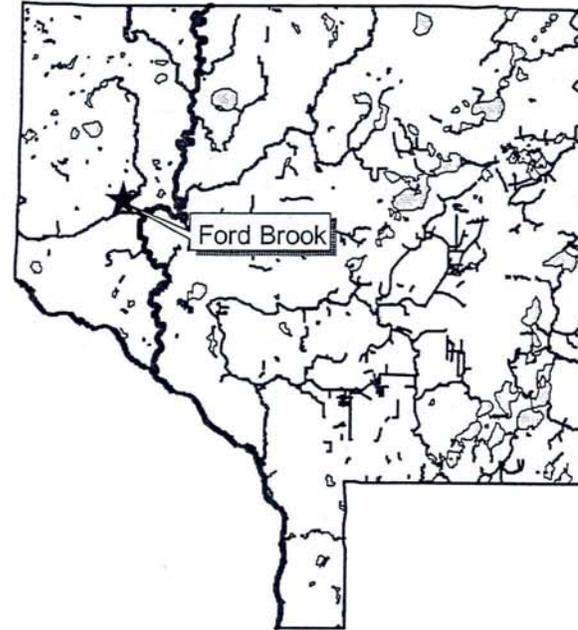


Figure 4-11: Summarized biomonitoring results for Ford Brook at Highway 63.

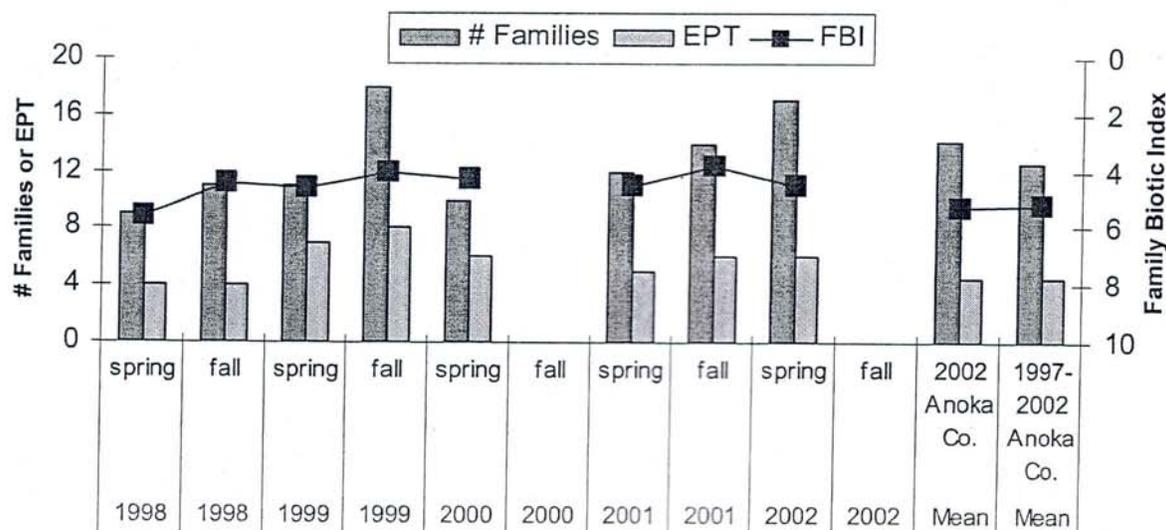


Table 4-5: Biomonitoring data for Ford Brook at Highway 63.

Ford @ 63												
Year	1998	1998	1999	1999	2000	2000	2001	2001	2002	2002	Mean	Mean
Season	spring	fall	spring	fall	spring	fall	spring	fall	spring	fall	2002 Anoka Co.	1997-2002 Anoka Co.
FBI	5.6	4.40	4.59	4.04	4.24		4.50	4.50	3.80	not sampled	5.3	5.2
# Families	9	11	11	18	10		12	12	14		14.1	12.5
EPT	4	4	7	8	5		5	5	6		4.5	4.5
Date	6-May	9/22	6/10	10/21	6/8		1/5	10/26	5/28			
sampling by	ACD	ACD	ACD	ACD	ACD		ACD	ACD	ACD			
sampling method	kicknet	kicknet	MH	MH	MH		MH	MH	MH			
# individuals	72	169	79	205	153		125	93	93			
# replicates	1	1	1	1	1		1	1	1			
Dominant Family	Nematoda	Heptageniidae	Baetidae	Hydropsychidae	Hydropsychidae		Baetidae	Gammaridae	Baetidae			
% Dominant Family	22.2	36	29	26.8	28		62.4	25.8	20.8			
% Ephemeroptera	29.2	55	60	44.4	22.9		63.2	33.3	23.7			
% Trichoptera	19.4	13	15.2	29.8	45.1		4	25.8	26.9			
% Plecoptera	0	0	7.6	2.4	10.5		2.4	0	4.3			

Discussion

No trend toward improving or deteriorating conditions is apparent.

Special Investigation: Ditch 6 Water Quality

SUMMARY

Chloride levels in Ditch 6 in Andover, Minnesota have been consistently high during past routine monitoring. The purpose of this study was to investigate the cause of high chloride levels in Ditch 6. We used a network of water monitoring stations and an inventory of the watershed to identify chloride sources. Chloride contamination can come from a variety of sources including road salts, industrial wastes, failing septic systems, and certain agricultural chemicals. We found two source areas. The first was a small sod farm, where it is suspected that potassium chloride fertilizer (potash) was excessively applied in the past or is currently. The sod farm operator did not respond to communication attempts. The second source area was the Highway 9 area, which has an increased density of roads including that highly traveled highway. It is suspected that road deicing salt application in this area is responsible. With increasing urbanization, chloride levels are expected to increase. This will lead to further impairment of stream biota, but will not likely pose a serious human health threat. Recommendations for minimizing chloride entering the environment are provided.

INTRODUCTION

Water quality monitoring conducted by the Anoka Conservation District (ACD) in 1998 found higher-than-expected chloride levels in Ditch 6, as well as two other nearby waterways, Ditches 3 and 66. While the chloride levels did not exceed US Environmental Protection Agency (EPA) water quality standards, the mean of 34 mg/l was four times greater than that of minimally impacted streams in the ecoregion (8 mg/l) and three times greater than the median for Anoka County streams (11 mg/l; summer measurements). The purpose of this study was to investigate the cause of high chloride levels in Ditch 6, Andover, Minnesota.

Chloride is often used as an indicator of water quality impairment from any of a variety of sources. The most common source of chloride is from road deicing salts. Other sources include failing septic systems, wastewater treatment effluent, animal waste, potash fertilizer (KCl), and other industrial or chemical wastes. Chloride is not naturally common in the study area (Anoka Sand Plain), but in other areas can be present from certain rock types. Chloride is persistent in the environment, not being used up or broken down by chemical or biological processes. It is very mobile and can easily reach groundwater.

Chloride can harm aquatic life, and at higher doses can be a human health concern. The EPA's Chronic Freshwater Quality Criteria is 230 mg/l (US EPA 1996). Sustained at these levels aquatic life is compromised. The US EPA's Acute Freshwater Quality Criteria is 860 mg/l. Even brief fluxes to this level will harm aquatic life. Both invertebrate and fish species richness and diversity is negatively correlated with chloride concentrations (Talmage et al. 1999; Lee 2001). The Secondary Maximum Contaminant Level is 250 mg/l (US EPA 1999). Concentrations below this level are safe for drinking water.

The chloride level for minimally impacted streams in the North Central Hardwood Forest Ecoregion where the study site is located is 8 mg/l. In the Twin Cities Metropolitan Area (TCMA) stream chloride levels range from 13-120 mg/l during late summer, but can exceed 500 mg/l during snowmelt events when road salts reach streams (Fallon and Chaplin 2001). Groundwater at the water table in the TCMA has chloride concentrations ranging from 4.3-330 mg/l (Fallon and Chaplin 2001). Chloride contamination is positively correlated with impervious surface (Fallon and Chaplin 2001). Low levels of chlorides do naturally occur.

METHODS

We investigated the source and degree of high chloride levels in Ditch 6 of Andover, Minnesota. Ditch 6 is small, having a width of about 10-15 ft and mean depth of about 2 feet during baseflow near its outlet to the Rum River. The stream length is 4.18 mi. The watershed is primarily residential or undeveloped. Several highways, including Round Lake Boulevard and Constance Boulevard cross the stream with culverts, as well as a number of other paved and unpaved roads. Regionally, this watershed is within the North Central Hardwoods Ecoregion and the Anoka Sand Plain.

To determine the source of high chlorides in Ditch 6 we used an extensive water monitoring network and a watershed inventory:

Water Monitoring Network

We selected 6 sites, all at road crossings, to monitoring chemical water quality in 2002 (Map 1). A total of eight grab samples were taken, four during baseflow and four during stormflow conditions from April to September. These were kept on ice until sent to an independent laboratory (Braun Intertec, Minneapolis, MN) within 24 hours for chloride (Cl), total phosphorus (TP), and total suspended solids (TSS) analysis. During sampling, a portable electronic meter (Horiba U-10) was used to take measurements of pH, conductivity, turbidity, dissolved oxygen (DO), temperature, and salinity.

At the Valley Drive monitoring station, the station nearest the outlet to the Rum River, we conducted biological monitoring of aquatic macroinvertebrates on October 21, 2002. We sampled with a "D" Frame net using the US EPA Multihabitat Method for low gradient streams. The invertebrates captured were identified to the family level, with QA/QC performed by the Volunteer Stream Monitoring Partnership housed at the University of Minnesota Water Resources Center. The resulting data were interpreted using taxa richness measures (# taxa, # EPT), a tolerance metric (Family Biotic Index), and population attribute metrics (% EPT, %Dominant Family).

Shallow groundwater monitoring for chlorides was conducted on one occasion in the second week of September 2002 (see Map 1 for locations). A small well was driven to a depth of 4.5-5 ft and a hand pump used to extract a sample. Analysis procedures were the same as for stream water samples. Three sites were attempted for this monitoring but only two were successful in obtaining a sample.

During groundwater sampling, a water sample was obtained from a pond near the Ditch's 164th Ave NW crossing. This sample was analyzed for chlorides.

Watershed Inventory

In concert with stream water quality monitoring, we inventoried landuse throughout the watershed to find possible chloride sources. We began by delineating the watershed, with the assistance of the City of Andover. Using 2001 aerial photographs we mapped all landcover to level four of the Minnesota Land Cover Classification System (MLCCS) using ArcView 3.1 software. This landcover was verified by ground-truthing.

Additionally, we conducted a review of past and current waste generators in the watershed. The list of hazardous waste generators was obtained from the Metro County Hazardous Waste Office at the Anoka County Government Center. A list of current and closed landfills was obtained from the Minnesota Pollution Control Agency.

RESULTS

Water Monitoring Network

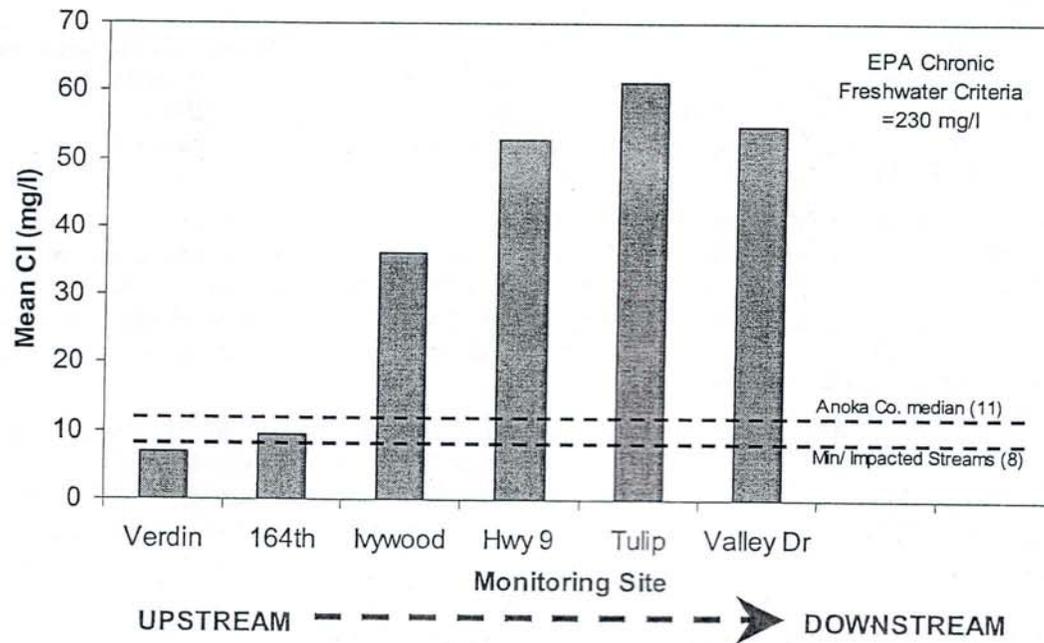
Chloride levels at the outlet of Ditch 6 to the Rum River were higher than detected during reconnaissance monitoring in 1998 (Table 4-2). The mean chloride concentration at Valley Drive was 54.88 mg/l. Chlorides during baseflow conditions were only slightly higher than during stormflow conditions, averaging 56.50 and 53.25 mg/l, respectively. Chloride did not fluctuate widely, ranging from 48-63 mg/l.

Chloride levels increased from upstream to downstream (Map 2; Fig. 4-12). At its headwaters, the Ditch 6 has chloride concentrations about equal to that of minimally impacted streams for the ecoregion (8 mg/l). The largest increases were between 164th Avenue and Ivywood Street (27 mg/l), and Ivywood Street and Highway 9 (17 mg/l). At five of the six monitoring locations the baseflow chloride concentration was higher than for stormflow (Table 4-2).

Table 4-2. Water quality results for Ditch 6, Andover Minnesota 1998-2002.

Year	Site	Type	Means										Max Cl mg/l	# samples
			pH	Conductivity mS/cm	Turbidity NTU	DO mg/l	Temp C	Salinity %	TP mg/l	TSS mg/l	Cl mg/l			
1998	Valley Dr	overall	7.63	0.47	8.00	8.56	17.28	0.01	0.07	8.00	34.75	38.00	4	
1999	no monitoring												0	
2000	169th Ln	Overall	7.40	0.47	12.69	9.05	16.14	0.01	0.07	10.38	41.00	49.00	8	
		base	7.55	0.48	2.63	7.39	15.13	0.02	0.05	5.50	42.50		4	
		storm	7.25	0.45	22.75	10.71	17.15	0.01	0.09	15.25	39.50		4	
2001	no monitoring												0	
2002	Verdin	overall	6.77	0.22	13.00	3.08	16.69	0.00	0.66	45.80	7.03	9.00	9	
		base	6.83	0.29	14.25	0.44	19.88	0.01	1.04	49.75	7.00		4	
		storm	6.72	2.53	12.00	5.20	14.14	0.00	0.29	30.00	7.05		5	
	164th	overall	7.23	0.29	7.25	4.10	17.04	0.01	0.19	80.00	9.36	13.00	8	
		base	7.18	0.26	8.00	1.60	19.13	0.01	0.20	110.00	10.75		4	
	storm	7.28	0.31	6.50	6.61	14.95	0.01	0.18	20.00	7.50		4		
	Ivywood	overall	7.71	0.46	6.50	8.45	16.55	0.02	0.07	6.00	36.14	42.00	8	
		base	7.92	0.49	7.50	6.99	18.65	0.02	0.08	6.00	40.50		4	
		storm	7.39	0.40	7.25	9.71	14.75	0.01	0.07	<5.0	30.33		4	
	Hwy 9	overall	7.78	0.52	5.22	7.61	16.74	0.02	0.07	13.25	52.88	61.00	9	
		base	7.87	0.56	4.50	6.10	19.33	0.02	0.08	9.50	57.25		4	
		storm	7.70	0.50	5.80	8.83	14.68	0.02	0.07	17.00	48.50		5	
	Tulip	overall	8.14	0.58	10.40	7.22	19.72	0.02	0.10	14.50	61.20	65.00	8	
		base	8.20	0.58	10.00	6.93	20.28	0.02	0.10	11.00	60.25		4	
		storm	8.03	0.57	11.00	7.81	18.60	0.02	0.09	25.00	65.00		4	
	Valley Dr	overall	7.87	0.62	7.25	8.86	16.39	0.02	0.08	12.25	54.88	63.00	9	
		base	8.34	0.65	3.33	8.25	18.80	0.02	0.05	6.00	56.50		4	
		storm	7.59	0.60	9.60	9.35	14.46	0.02	0.10	18.50	53.25		5	

Figure 4-12: Ditch 6 mean summertime chloride levels, 2002



Other water quality parameters monitored also showed trends from upstream to downstream (Table 4-2). Conductivity followed the same trend as chloride. pH also followed the chloride trend. Salinity was also higher downstream, but the salinity meter was not sensitive enough to detect small changes found in conductivity and chloride tests. Turbidity, total suspended solids, and total phosphorus were all many times higher at the headwaters at Verdin Street, where stagnant conditions often dominated, than farther downstream.

The two shallow groundwater samples successfully taken are not, by themselves enough to draw firm conclusions. At the upstream-most site, on the north side of 164th Ave, chloride was 5 mg/l. At the site on the east side of Round Lake Boulevard chloride was 33 mg/l.

Biological data indicated an impaired water body (Table 4-3). The invertebrate community was not even or rich (9 families). All families found were at least moderately pollution-tolerant. 75% of all captures were Family Hydropsychidae, a caddisfly which thrives in sub-standard waters. No pollution intolerant families were found. One indice, the Family Biotic Index, did indicate above average conditions, but considered together the biological data reflect an impaired condition.

Table 4-3: Biomonitoring results for Ditch 6, Andover, October 2002.

Order	Family	# Captures
Tricoptera (caddisflies)	Hydropsychidae	97
	Limnephilidae	11
	Phryganeidae	1
Odonata (dragonflies, damselflies)	Calopterygidae	1
	Coenagrionidae	1
Amphipoda (scuds)	Talitridae	12
Isopoda (aquatic sowbugs)	Asellidae	1
Hirundinea (leeches)		1
Gastropoda (snails)		4

Watershed Inventory

Map 3 shows landcover for the Ditch 6 watershed. About half (45%) of the watershed is built up, being used primarily for single family residential. This development occurred from 1940 to present (Map 4). The only industrial area is 26.5 acres in the southern part of the watershed just east of Round Lake Boulevard. Most of the remainder (43%) is vacant forests, shrubland, herbaceous, or woodland. More detailed data can be queried from the MLCCS landcover data upon request.

Two notable landscape features are a sod farm between 164th Ave and Ivywood Street and a large vegetable farm at the bottom of the watershed just upstream of Valley Drive. Water quality was monitored just up- and downstream of these sites. Chlorides increased markedly as water flowed through the sod farm (Jordan Turf Farms), but decreased as water flowed through the vegetable farm (Dehn Farms). The vegetable farm is partially certified organic, and operates on a low environmental impact philosophy. Multiple attempts were made to contact Jordan Turf Farms, but with no response.

Our review of waste generators in the watershed showed that only non-point source inputs of chlorides are likely at significant levels. Waste generators are not in close proximity to the ditch and are small. No closed landfills are within the watershed. A likely non-point source of chlorides is runoff of road deicing salts. Just west of Round Lake Boulevard (Highway 9) is a moderate density development. Drainage from these roads as well as Round Lake Boulevard is to Ditch 6, either directly or indirectly through shallow groundwater. Salt is applied to these roads by the county and city.

Our inventory of the watershed also included a soils (Map 5) and wetlands review (Map 6).

DISCUSSION

We identified two probable sources of chlorides entering Ditch 6. Both are diffuse, or non-point sources that enter the stream slowly through shallow groundwater or surface runoff. These two probable sources are:

1. the turf farm between 164th Lane and Ivywood Street and
2. road salt runoff from roads between 164th Lane and Tulip Street.

The first probable chloride source is from a sod farm owned by Jordan Turf Farms. Water was monitored just before it entered the farm and just after it exited. Mean chlorides increased from 9.36 to 36.14 mg/l (n=8). Potassium chloride (KCl), or muriate of potash, is the most likely chemical from a sod farm to affect stream or groundwater chloride levels. Potash is used as a potassium source in inexpensive turfgrass fertilizers. We suspect that KCl was, and perhaps still is, applied in excess. To date, attempts to contact the farm manager to verify this have been unsuccessful.

The second probable chloride source is road salts. Chloride levels remain low or even decline by dilution in stream segments that do not cross paved roads. The stream segments with the 2nd and 3rd highest chloride increases are adjacent to the most-traveled highway in the watershed, Round Lake Boulevard. Ditch 6 receives direct runoff from a considerable length (>1 mi) of Highway 9 because the road slopes consistently and steeply upward from the ditch from either direction. Road salts can enter the stream either directly by runoff into storm drains or indirectly by infiltration into shallow groundwater which feeds the ditch.

A large portion of chlorides entering the ditch are from the shallow groundwater that feeds the ditch, not runoff. Chlorides during baseflow and stormflow were similar and consistent throughout the summer, suggesting chloride is from the shallow groundwater which consistently feeds the ditch, rather than the more periodic stormflows. In fact, chlorides were slightly higher at baseflow than at stormflow at four sites, suggesting that stormwater was more dilute in chloride than shallow groundwater.

Accumulation of chloride in shallow groundwater and slow release to waterways is common. Chlorides are soluble in water and move through the water table easily. 45-55% of road salts enter groundwater and are eventually discharged into streams as baseflow (Bowen and Hinton 1998). Infiltration rates for chlorides from agricultural sources are probably even greater because fertilizer is not applied to an impervious surface. Once present in shallow groundwater, chloride's retention time is much longer than for water (Mason et al. 1999). Chloride will increase in soils and groundwater until it reaches a steady state with applications, while continually releasing some to streams in baseflow (Mason et al. 1999). Chloride levels in the ditch were probably also dampened by the presence of numerous ditch widenings (in-line ponds).

Other studies throughout the temperate U.S. have found similar results to those documented here for Ditch 6, particularly regarding road deicing salt (Bowen and Hinton 1998, Fallon and Chaplin 2001). Stream chlorides are positively correlated with increasing urbanization and road density. Streams and groundwater just downstream of major roadways are particularly impacted. The chloride levels found in Ditch 6 are about in the middle of the range for Twin Cities Metropolitan Area streams (13-120 mg/l; Fallon and Chaplin 2001), but exceed the median value for Anoka County streams (11 mg/l). Because chlorides are closely tied to urbanization, stream chlorides can be used as an indirect measure of many effects of urbanization that degrade streams.

At this time, stream water quality is moderately degraded in Ditch 6. Chloride levels do not exceed EPA standards for drinking water or for impairment of biota. However, it is clear from biomonitoring data that macroinvertebrates are impaired, though perhaps not due entirely to chlorides. It may also be that the primary impairment occurs during spring melt events when chlorides are typically highest from road salt runoff, which was not monitored. During those times it is quite possible that chloride levels exceed standards. Fish communities are also probably impaired due to chlorides and other factors related to increasing urbanization. Deeper water supplies, such as those used for drinking and irrigation are also at risk for chloride contamination, though this was not studied. This is especially true in areas with porous soils such as those found in the study area. Water quality is likely to worsen as the area continues to develop.

RECOMMENDATIONS

No method of pre-infiltration or runoff treatment is available for chlorides. Our recommendations focus upon minimizing salt entering the environment, and upon how and where it enters. Currently the City of Andover and Anoka County Highway Departments have commendable measures in place to minimize and control salt application. Some of these include underbody plows that scrape the surface before salt application, programmable plows which allow the driver to control dispersal rate, and use of brine solutions that work quickly and do not bounce off the road. Still, each department should review their practices with respect to other agency's practices and recommendations listed below.

Our recommendations are:

- Contact Jordan Turf Farms and request that they obtain a soil test to determine fertilization rates necessary to maximize turf development while minimizing over-application. Salt-free fertilizers should also be explored as an alternative.
- Utilize measures to minimize road salt application.
 - *Ground-Speed Sensors* - Equip road deicing trucks with ground-speed sensors that control application rates (less application at slower speeds).
 - *Zero Velocity Spreaders* - Equip road deicing trucks with zero velocity spreaders. These spreaders sense truck speed and spread salt so it lands with no velocity relative to the ground. This minimizes material bouncing off the road.
 - *Application Timing* - Apply deicers before snowfall, thereby reducing the amount of deicing material needed to melt the snow. A disadvantage of this is that if a forecasted storm does not occur deicer has been applied unnecessarily.
 - *Graduated application rates* - Adopt lower application rates for lightly traveled roads.
 - *Salt-free Areas* - Applying no salt in areas near streams and other key water bodies.
- Avoid disposing of snow from treated surfaces near water bodies.
- Sweep salt and sand from streets as soon as possible after roads are clear and dry.
- Train employees to implement the above measures.
- Consider alternative road deicers, especially a sand/salt mixture. Many chemical alternatives are much more expensive than NaCl, and have their own set of environmental concerns. We also recommend keeping abreast of innovative deicing chemicals being developed.

When considering the cost of implementing these practices, highway departments are encouraged to consider the wide benefits of these practices. The following table shows some of the seldom-considered costs of road salting (US EPA 1976). The cost of salt purchase and application is perhaps only 7% of the cost to society. Practices to reduce excess salt application yield large benefits to the community and environment.

Factor	Explanation	Cost Nationwide (1976 dollars)
Salt Purchase and Application		\$200 million
Highway Structures	Corrosion damage to bridges and other highway structures.	\$500 million
Vehicles	Corrosion damage hastening auto depreciation by 20%.	\$2,000 million
Utilities	Corrosion to buried utilities.	\$10 million
Vegetation	Damage to roadside vegetation, especially shade trees.	\$50 million
Fish and Wildlife	Degradation of habitat.	not quantified
TOTAL		>\$2.76 Billion/year

While the complete costs of using salt as a road deicer are great (see table above), the benefits are not always as certain. Salt hastens melting at temperatures down to about 12°F, but at lower temperatures makes snow shiny and more slippery. It also prolongs street wetness. Salt also permits faster driving, and accidents tend to be more serious. In snow people tend to drive slower and mainly have fender-benders. Therefore, any benefit of salt in reducing accidents is small. A benefit does exist for emergency vehicles, which are allowed to travel faster on salted roads.

While these recommendations are applicable to any municipality that applies road salts, they are especially important to those cities within the Lower Rum River Watershed and adjoining areas. The area is rapidly developing and because of increasing road densities road salt applications are increasing regardless of application procedures. Additionally, soils in this area are sandy and very permeable, making groundwater especially susceptible to contamination.

ACKNOWLEDGEMENTS

This work was funded by the Lower Rum River Watershed Management Organization.

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Financial Summary

ACD accounting is organized by program and not by customer. This allows us to track all of the labor, materials and overhead expenses for a program such as our lake water quality monitoring program. We do not, however, know specifically which expenses are attributed to monitoring which lakes. To enable reporting of expenses for monitoring conducted in a

specific watershed, we divide the total program cost by the number of sites monitored to determine an annual cost per site. We then multiply the cost per site by the number of sites monitored for a customer. The process also takes into account equipment that is purchased for monitoring a specific area.

Lower Rum River Watershed	Wetland Levels	Lake Levels	Groundwater Observation Wells	Stream Levels	Stream Biomonitoring	Ditch 6 Investigation	Website	Total
Revenues								
Lower Rum River WMO	\$0	\$550	\$0	\$0	\$1,300	\$4,479	\$0	\$6,329
County General Allocation	\$0	\$330	\$0	\$0	\$0	\$0	\$3,766	\$4,096
County Ag Preserves	\$589	\$0	\$0	\$0	\$110	\$0	\$800	\$1,500
Service Fees	\$0	\$0	\$118	\$0	\$0	\$0	\$0	\$118
Interest	\$0	\$4	\$1	\$13	\$0	\$37	\$20	\$74
BWSR General Services	\$0	\$1	\$0	\$217	\$0	\$1,551	\$251	\$2,020
BWSR Local Water Planning	\$0	\$34	\$87	\$562	\$12	\$4,915	\$121	\$5,730
City of Fridley	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Non-Profit/Lake Assoc.	\$0	\$0	\$0	\$0	\$3	\$0	\$0	\$3
TOTAL	\$589	\$918	\$206	\$792	\$1,425	\$10,981	\$4,959	\$19,870
Expenses-								
Capital Outlay/Equip	\$41	\$63	\$10	\$242	\$91	\$1,180	\$347	\$1,974
Personnel Salaries/Benefits	\$446	\$660	\$147	\$459	\$1,127	\$6,975	\$4,179	\$13,993
Office Supplies/Maintenance	\$19	\$29	\$6	\$21	\$44	\$2,123	\$121	\$2,363
Employee Training	\$6	\$9	\$2	\$6	\$14	\$61	\$46	\$145
Vehicle/Mileage	\$24	\$88	\$23	\$13	\$31	\$125	\$0	\$304
Rent	\$26	\$39	\$10	\$27	\$58	\$321	\$167	\$648
Monthly Bills	\$10	\$15	\$3	\$10	\$23	\$151	\$71	\$283
Fees and Dues	\$5	\$7	\$2	\$6	\$8	\$0	\$9	\$37
Promotion/Marketing	\$5	\$7	\$2	\$5	\$9	\$46	\$18	\$92
Program Supplies	\$7	\$0	\$0	\$3	\$21	\$0	\$0	\$31
TOTAL	\$589	\$918	\$206	\$792	\$1,425	\$10,981	\$4,959	\$19,870
BALANCE	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

Recommendations

- Encourage city, county, and state public works departments to implement measures to minimize road deicing salt applications. Investigations of Ditches 6 and 66 and routine monitoring have shown that road salts are one of the largest and most widespread sources of stream impairment in this watershed.
- Continue lake level monitoring, especially on Round Lake where residents have expressed concerns with levels. Other nearby lakes should be monitored for comparison.
- Develop rating curves for all stream hydrology monitoring sites.
- Continue periodic stream water quality monitoring. Trott Brook should be a priority, as it has not been monitored since 1998.
- Continue periodic monitoring of Ditch 6 and 66 to detect changes in chloride concentration.
- Recruit small groups of volunteers or high school students to conduct biomonitoring at Ford Brook at County Road 63 and Trott Brook at County State Aid Highway 5.

**ANOKA
NATURAL
RESOURCES**

[Home](#) > [Lower Rum River Watershed](#) > [Stream Water Quality Monit](#)



LAKES

STREAMS

GROUNDWATER

WHAT IS A
WATERSHED

WATERSHEDS IN
ANOKA COUNTY

UPPER RUM RIVER
WATERSHED

LOWER RUM RIVER
WATERSHED

COON CREEK
WATERSHED

RICE CREEK
WATERSHED

SUNRISE RIVER
WATERSHED

SIX CITIES
WATERSHED

VADNAIS LAKE
WATERSHED

LOWER RUM RIVER WATERSHED DITCH 6 WATER QUALITY INVESTIGATION

INTRODUCTION

Water quality monitoring conducted by the Anoka Conservation District (ACD) revealed higher-than-expected chloride levels in Ditch 6, as well as two other near Ditches 3 and 66. While the chloride levels did not exceed US Environmental Protection Agency (EPA) water quality standards, the mean of 34 mg/l was four times that of minimally impacted streams in the ecoregion (8 mg/l) and three times that of the median for Anoka County streams (11 mg/l; summer measurements). The purpose of this study was to investigate the cause of high chloride levels in Ditch 6, and

Chloride is often used as an indicator of water quality impairment from various sources. The most common source of chloride is from road deicing salts. Other sources include failing septic systems, wastewater treatment effluent, animal waste (KCl), and other industrial or chemical wastes. Chloride is not naturally abundant in the area (Anoka Sand Plain), but in other areas can be present from certain geological sources. Chloride is persistent in the environment, not being used up or broken down by chemical processes. It is very mobile and can easily reach groundwater.

Chloride can harm aquatic life, and at higher doses can be a human health concern. The US EPA's Chronic Freshwater Quality Criteria is 230 mg/l (US EPA 1996). Sustained chloride levels above this level compromise aquatic life. The US EPA's Acute Freshwater Quality Criteria is 500 mg/l. Even brief fluxes to this level will harm aquatic life. Both invertebrate species richness and diversity is negatively correlated with chloride concentration (Lee 1999; Lee 2001). The Secondary Maximum Contaminant Level is 250 mg/l. Concentrations below this level are safe for drinking water.

The chloride level for minimally impacted streams in the North Central Hardwood Ecoregion where the study site is located is 8 mg/l. In the Twin Cities Metropolitan Area (TCMA) stream chloride levels range from 13-120 mg/l during late summer months and up to 500 mg/l during snowmelt events when road salts reach streams (Fallon and Chaplin 2001). Groundwater at the water table in the TCMA has chloride concentrations of 10-100 mg/l (Fallon and Chaplin 2001). Chloride contamination is positively correlated with impervious surface (Fallon and Chaplin 2001). Low levels of chlorides do not

METHODS

We investigated the source and degree of high chloride levels in Ditch 6 Minnesota. Ditch 6 is small, having a width of about 10-15 ft and mean depth during baseflow near its outlet to the Rum River. The stream length is 4.1 miles and is primarily residential or undeveloped. Several highways, including Rountree and Constance Boulevard cross the stream with culverts, as well as a number of unpaved roads. Regionally, this watershed is within the North Central Ecoregion and the Anoka Sand Plain.

To determine the source of high chlorides in Ditch 6 we used an extensive monitoring network and a watershed inventory:

Water Monitoring Network

We selected 6 sites, all at road crossings, to monitor chemical water quality. A total of eight grab samples were taken, four during baseflow and four during storm conditions from April to September. These were kept on ice until sent to a laboratory (Braun Intertec, Minneapolis, MN) within 24 hours for chloride, phosphorus (TP), and total suspended solids (TSS) analysis. During sampling an electronic meter (Horiba U-10) was used to take measurements of pH, conductivity, dissolved oxygen (DO), temperature, and salinity.

At the Valley Drive monitoring station, the station nearest the outlet to the Rum River, we conducted biological monitoring of aquatic macroinvertebrates on October 1, 2002. Samples were collected with a "D" Frame net using the US EPA Multihabitat Method for streams. The invertebrates captured were identified to the family level, with the assistance of the Volunteer Stream Monitoring Partnership housed at the University of Minnesota Resources Center. The resulting data were interpreted using taxa richness (# EPT), a tolerance metric (Family Biotic Index), and population attribute (Dominant Family).

Shallow groundwater monitoring for chlorides was conducted on one occasion during the week of September 2002 (see Map 1 for locations). A small well was drilled to a depth of 5 ft and a hand pump used to extract a sample. Analysis procedures were similar to those used for stream water samples. Three sites were attempted for this monitoring but only one was successful in obtaining a sample.

During groundwater sampling, a water sample was obtained from a pond located at the 164th Ave NW crossing. This sample was analyzed for chlorides.

Watershed Inventory

In concert with stream water quality monitoring, we inventoried land use throughout the watershed to find possible chloride sources. We began by delineating the watershed boundary with the assistance of the City of Andover. Using 2001 aerial photographs we mapped the land cover at the level four of the Minnesota Land Cover Classification System (MLCCS) using ArcView software. This landcover was verified by ground-truthing.

Additionally, we conducted a review of past and current waste generators in the watershed. The list of hazardous waste generators was obtained from the Metro Council of Governments Waste Office at the Anoka County Government Center. A list of current agricultural operations was obtained from the Minnesota Pollution Control Agency.

RESULTS

Water Monitoring Network

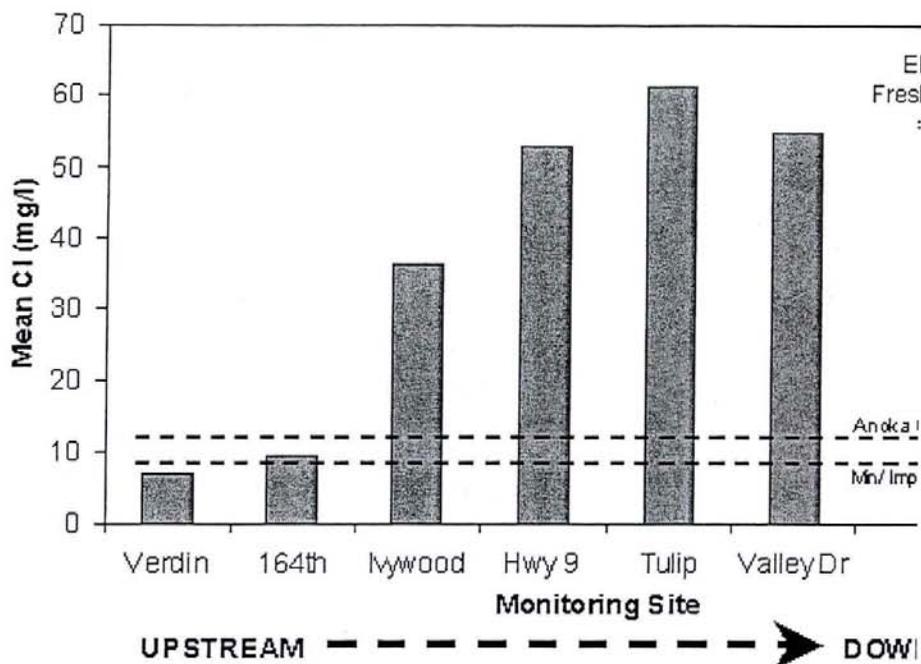
Chloride levels at the outlet of Ditch 6 to the Rum River were higher than reconnaissance monitoring in 1998 (Table 4-2). The mean chloride concentration was 54.88 mg/l. Chlorides during baseflow conditions were only slightly higher during stormflow conditions, averaging 56.50 and 53.25 mg/l, respectively. Chlorides fluctuate widely, ranging from 48-63 mg/l.

Chloride levels increased from upstream to downstream (Map 2; Fig. 4-1). At the headwaters, the Ditch 6 has chloride concentrations about equal to that of streams for the ecoregion (8 mg/l). The largest increases were between Ivywood Street (27 mg/l), and Ivywood Street and Highway 9 (17 mg/l). At monitoring locations the baseflow chloride concentration was higher than during stormflow (Table 4-2).

Table 4-2. Water quality results for Ditch 6, Andover Minnesota 1998-2002

Year	Site	Type	Means							
			pH	Conductivity mS/cm	Turbidity NTU	DO mg/l	Temp C	Salinity %	TP mg/l	TS mg/l
1998	Valley Dr	overall	7.63	0.47	8.00	8.56	17.28	0.01	0.07	
1999	no monitoring									
2000	169th Ln	Overall	7.40	0.47	12.89	9.05	16.14	0.01	0.07	1
		base	7.55	0.48	2.83	7.39	15.13	0.02	0.05	
		storm	7.25	0.46	22.75	10.71	17.15	0.01	0.09	1
2001	no monitoring									
2002	Verdin	overall	6.77	0.22	13.00	3.08	16.69	0.00	0.66	4
		base	6.83	0.29	14.25	0.44	19.88	0.01	1.04	4
		storm	6.72	2.53	12.00	5.20	14.14	0.00	0.29	3
	164th	overall	7.23	0.29	7.25	4.10	17.04	0.01	0.19	8
		base	7.18	0.26	8.00	1.80	19.13	0.01	0.20	11
		storm	7.28	0.31	6.50	6.61	14.95	0.01	0.18	2
	Ivywood	overall	7.71	0.46	6.50	9.45	16.55	0.02	0.07	
		base	7.92	0.49	7.50	6.99	18.65	0.02	0.08	
		storm	7.39	0.40	7.25	9.71	14.75	0.01	0.07	<5.0
	Highway 9	overall	7.78	0.52	5.22	7.61	16.74	0.02	0.07	1
		base	7.87	0.58	4.50	6.10	19.33	0.02	0.08	
		storm	7.70	0.50	5.80	8.83	14.68	0.02	0.07	1
	Tulp	overall	8.14	0.58	10.40	7.22	19.72	0.02	0.10	1
		base	8.20	0.58	10.00	6.93	20.28	0.02	0.10	1
		storm	8.03	0.57	11.00	7.81	18.60	0.02	0.09	2
	Valley Dr	overall	7.87	0.62	7.25	8.86	16.39	0.02	0.08	1
		base	8.34	0.65	3.33	8.25	18.80	0.02	0.05	
		storm	7.59	0.60	9.60	9.35	14.46	0.02	0.10	1

Figure 4-12: Ditch 6 mean summertime chloride levels, 2002



Other water quality parameters monitored also showed trends from upstream (Table 4-2). Conductivity followed the same trend as chloride. pH also followed the same trend. Salinity was also higher downstream, but the salinity meter was not sensitive enough to detect small changes found in conductivity and chloride tests. Turbidity, total suspended solids, and total phosphorus were all many times higher at the headwater where stagnant conditions often dominated, than farther downstream.

The two shallow groundwater samples successfully taken are not, by themselves, sufficient to draw firm conclusions. At the upstream-most site, on the north side of 164th Street, chloride was 5 mg/l. At the site on the east side of Round Lake Boulevard chloride was 54 mg/l.

Biological data indicated an impaired water body (Table 4-3). The invertebrate community was not even or rich (9 families). All families found were at least moderately represented. Of all captures were Family Hydropsychidae, a caddisfly which thrives in unpolluted conditions. No pollution intolerant families were found. One index, the Family Biotic Index, was above average conditions, but considered together the biological data reflect an impaired condition.

Table 4-3: Biomonitoring results for Ditch 6, Andover, October 2002.

Order	Family	# Captures
Trichoptera (caddisflies)	Hydropsychidae	97
	Limnephilidae	11
	Phryganeidae	1
Odonata (dragonflies, damselflies)	Calopterygidae	1
	Coenagrionidae	1

Amphipoda (scuds)	Talitridae	12
Isopoda (aquatic sowbugs)	Asellidae	1
Hirundinea (leeches)		1
Gastropoda (snails)		3

Watershed Inventory

Map 3 shows landcover for the Ditch 6 watershed. About half (45%) of the watershed is residential, being used primarily for single family residential. This development is present (Map 4). The only industrial area is 26.5 acres in the southern part of the watershed just east of Round Lake Boulevard. Most of the remainder (43%) is vacant, agricultural, herbaceous, or woodland. More detailed data can be queried from the Map 3 upon request.

Two notable landscape features are a sod farm between 164th Ave and 170th Ave and a large vegetable farm at the bottom of the watershed just upstream of Valley Road. Chloride quality was monitored just up- and downstream of these sites. Chlorides increased as water flowed through the sod farm (Jordan Turf Farms), but decrease as water flows through the vegetable farm (Dehn Farms). The vegetable farm is partially irrigated and operates on a low environmental impact philosophy. Multiple attempts to contact Jordan Turf Farms, but with no response.

Our review of waste generators in the watershed showed that only non-point sources of chlorides are likely at significant levels. Waste generators are not in close proximity to Ditch 6 and are small. No closed landfills are within the watershed. A likely source of chlorides is runoff of road deicing salts. Just west of Round Lake Boulevard is moderate density development. Drainage from these roads as well as Round Lake Boulevard is to Ditch 6, either directly or indirectly through shallow groundwater. Salt is applied to roads by the county and city.

Our inventory of the watershed also included a soils (Map 5) and wetlands inventory.

DISCUSSION

We identified two probable sources of chlorides entering Ditch 6. Both are non-point sources that enter the stream slowly through shallow groundwater (Map 3). These two probable sources are:

1. the turf farm between 164th Lane and Ivywood Street and
2. road salt runoff from roads between 164th Lane and Tulip Street.

The first probable chloride source is from a sod farm owned by Jordan Turf Farms. It was monitored just before it entered the farm and just after it exited. Mean chloride levels ranged from 9.36 to 36.14 mg/l (n=8). Potassium chloride (KCl), or muriate of potash, is the most likely chemical from a sod farm to affect stream or groundwater chloride levels. It is used as a potassium source in inexpensive turfgrass fertilizers. We suspect that it is perhaps still being applied in excess. To date, attempts to contact the farm have been unsuccessful.

The second probable chloride source is road salts. Chloride levels remain

by dilution in stream segments that do not cross paved roads. The stream's 2nd and 3rd highest chloride increases are adjacent to the most-traveled watershed, Round Lake Boulevard. Ditch 6 receives direct runoff from a (>1 mi) of Highway 9 because the road slopes consistently and steeply up from either direction. Road salts can enter the stream either directly by drains or indirectly by infiltration into shallow groundwater which feeds the

A large portion of chlorides entering the ditch are from the shallow groundwater, not runoff. Chlorides during baseflow and stormflow were similar throughout the summer, suggesting chloride is from the shallow groundwater consistently feeds the ditch, rather than the more periodic stormflows. It is slightly higher at baseflow than at stormflow at four sites, suggesting that it is more dilute in chloride than shallow groundwater.

Accumulation of chloride in shallow groundwater and slow release to water. Chlorides are soluble in water and move through the water table easily. They enter groundwater and are eventually discharged into streams as baseflow (Mason and Hinton 1998). Infiltration rates for chlorides from agricultural sources are greater because fertilizer is not applied to an impervious surface. Once in groundwater, chloride's retention time is much longer than for water (Mason and Hinton 1998). Chloride will increase in soils and groundwater until it reaches a steady state between applications, while continually releasing some to streams in baseflow (Mason and Hinton 1998). Chloride levels in the ditch were probably also dampened by the presence of in-line ponds.

Other studies throughout the temperate U.S. have found similar results to those here for Ditch 6, particularly regarding road deicing salt (Bowen and Hinton and Chaplin 2001). Stream chlorides are positively correlated with increasing road density. Streams and groundwater just downstream of major roadways are impacted. The chloride levels found in Ditch 6 are about in the middle of the Minneapolis Metropolitan Area streams (13-120 mg/l; Fallon and Chaplin 2001) and the median value for Anoka County streams (11 mg/l). Because chlorides are associated with urbanization, stream chlorides can be used as an indirect measure of the degree of urbanization that degrades streams.

At this time, stream water quality is moderately degraded in Ditch 6. Chlorides exceed EPA standards for drinking water or for impairment of biota. However, biomonitoring data that macroinvertebrates are impaired, though perhaps not directly by chlorides. It may also be that the primary impairment occurs during spring runoff when chlorides are typically highest from road salt runoff, which was not monitored. At other times it is quite possible that chloride levels exceed standards. Fish communities are probably impaired due to chlorides and other factors related to increasing urbanization. Deeper water supplies, such as those used for drinking and irrigation are not impacted by chloride contamination, though this was not studied. This is especially true for porous soils such as those found in the study area. Water quality is likely to improve as the area continues to develop.

RECOMMENDATIONS

No method of pre-infiltration or runoff treatment is available for chlorides. The recommendations focus upon minimizing salt entering the environment, and

where it enters. Currently the City of Andover and Anoka County Highway Department have commendable measures in place to minimize and control salt application. These measures include underbody plows that scrape the surface before salt application, which allow the driver to control dispersal rate, and use of brine solutions that do not bounce off the road. Still, each department should review their practices with respect to other agency's practices and recommendations listed below.

Our recommendations are:

- Contact Jordan Turf Farms and request that they obtain a soil test to determine the fertilization rates necessary to maximize turf development while minimizing salt application. Salt-free fertilizers should also be explored as an alternative.
- Utilize measures to minimize road salt application.
 - Ground-Speed Sensors - Equip road deicing trucks with sensors that control application rates (less application at slower speeds).
 - Zero Velocity Spreaders - Equip road deicing trucks with zero velocity spreaders. These spreaders sense truck speed and spread salt so it lands at a low velocity relative to the ground. This minimizes material bouncing off the road.
 - Application Timing - Apply deicers before snowfall, thereby reducing the amount of deicing material needed to melt the snow. A disadvantage is that if a forecasted storm does not occur, the deicer has been applied unnecessarily.
 - Graduated application rates - Adopt lower application rates for residential streets and roads.
 - Salt-free Areas - Applying no salt in areas near streams and water bodies.
- Avoid disposing of snow from treated surfaces near water bodies.
- Sweep salt and sand from streets as soon as possible after roads are treated.
- Train employees to implement the above measures.
- Consider alternative road deicers, especially a sand/salt mixture. Many alternatives are much more expensive than NaCl, and have their own environmental concerns. We also recommend keeping abreast of new deicing chemicals being developed.

When considering the cost of implementing these practices, highway departments are encouraged to consider the wide benefits of these practices. The following table shows the seldom-considered costs of road salting (US EPA 1976). The cost of salt application is perhaps only 7% of the cost to society. Practices to reduce salt application yield large benefits to the community and environment.

Factor	Explanation
Salt Purchase and Application	
Highway Structures	Corrosion damage to bridges and other highway structures.
Vehicles	Corrosion damage hastening auto depreciation by 20%.

Utilities	Corrosion to buried utilities.
Vegetation	Damage to roadside vegetation, especially shade trees.
Fish and Wildlife	Degradation of habitat.
TOTAL	.

While the complete costs of using salt as a road deicer are great (see table) benefits are not always as certain. Salt hastens melting at temperatures but at lower temperatures makes snow shiny and more slippery. It also produces wetness. Salt also permits faster driving, and accidents tend to be more frequent; people tend to drive slower and mainly have fender-benders. Therefore, reducing accidents is small. A benefit does exist for emergency vehicles, which can travel faster on salted roads.

While these recommendations are applicable to any municipality that applies salt, they are especially important to those cities within the Lower Rum River Watershed areas. The area is rapidly developing and because of increasing road deicer applications are increasing regardless of application procedures. Additionally, the soils are sandy and very permeable, making groundwater especially susceptible to salt contamination.

ACKNOWLEDGEMENTS

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For more detailed information, contact [Jamie Schurbon](#) or see full report.

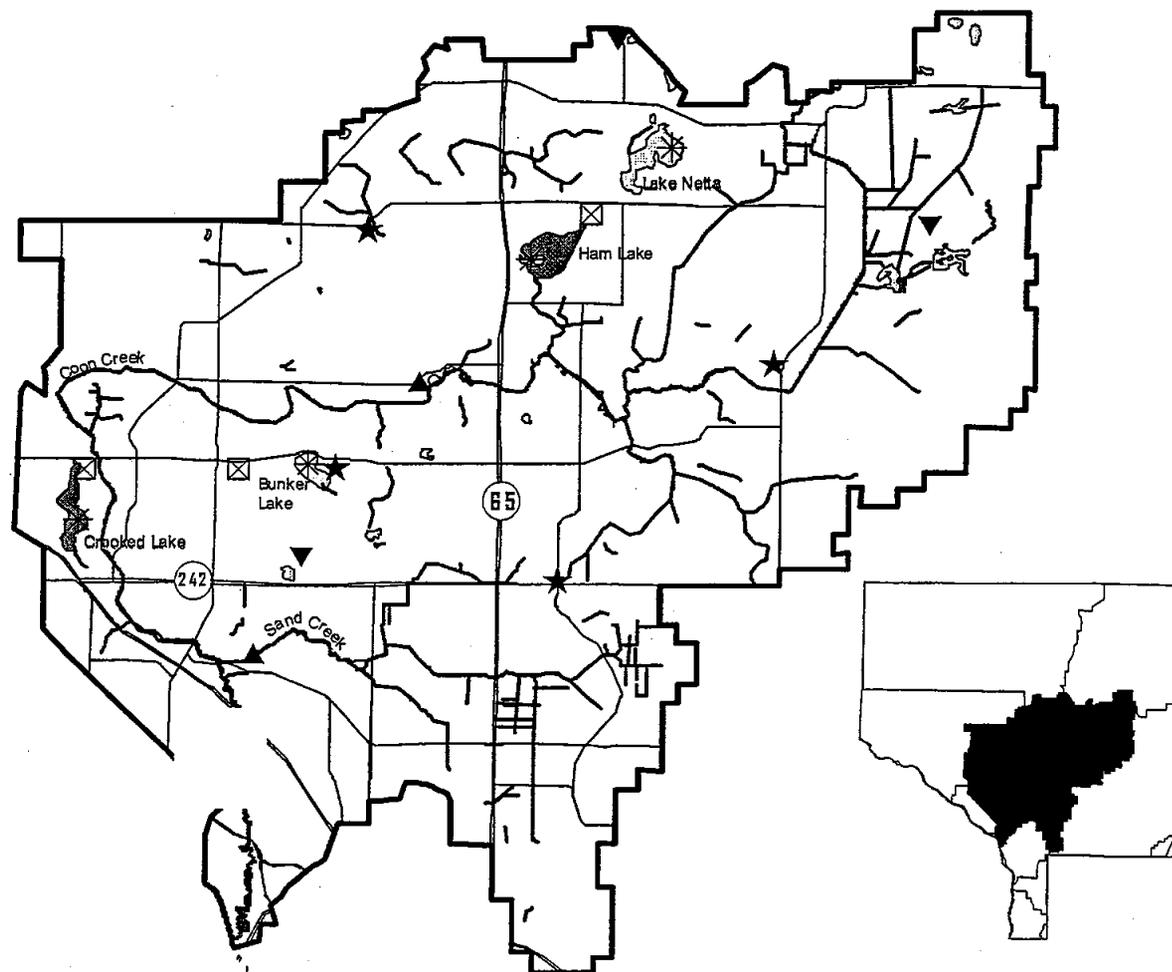
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CHAPTER 6: COON CREEK WATERSHED

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ACD = Anoka Conservation District, CCWD = Coon Creek Watershed District, MNDNR = Minnesota Dept. of Natural Resources



* Lake Levels	★ Wetland Hydrology	⊠ Precipitation
▲ Stream Hydrology	● Lake Water Quality	▼ Groundwater Hydrology (Obwells)

Lake Levels

Description: Weekly water level monitoring in lakes. These data, as well as all additional historic data are available on the Minnesota DNR website using the "LakeFinder" feature (www.dnr.mn.us.state/lakefind/index.html).

Purpose: To provide understanding of lake hydrology, including the impact of climate or other water budget changes. These data are useful for regulatory, building/development, and lake hydrology manipulation decisions.

Locations: Bunker Lake, Ham Lake, Lake Netta, Crooked Lake

Results: Lake levels recovered from lower levels the preceding fall. Throughout summer 2002 water levels rose continually on all four of these lakes due to record rainfalls throughout the summer and fall.

Figure 6-1: Bunker Lake Levels 1998-2002

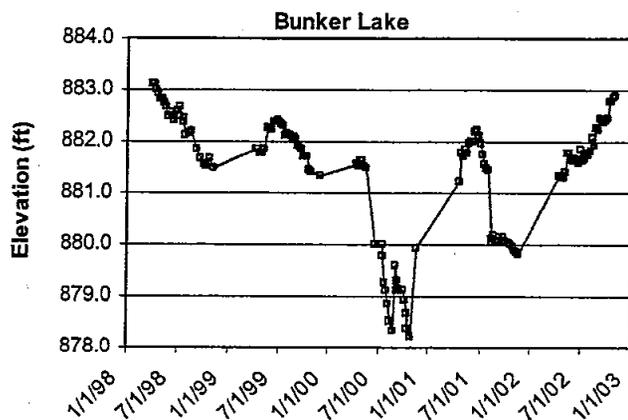


Figure 6-2: Ham Lake Levels 1998-2002

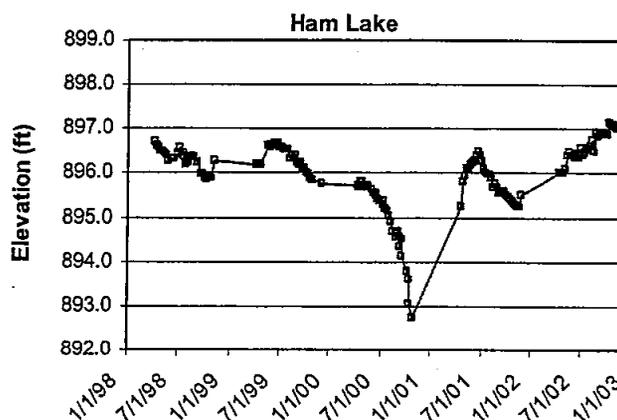


Figure 6-3: Netta Lake Levels 1998-2002

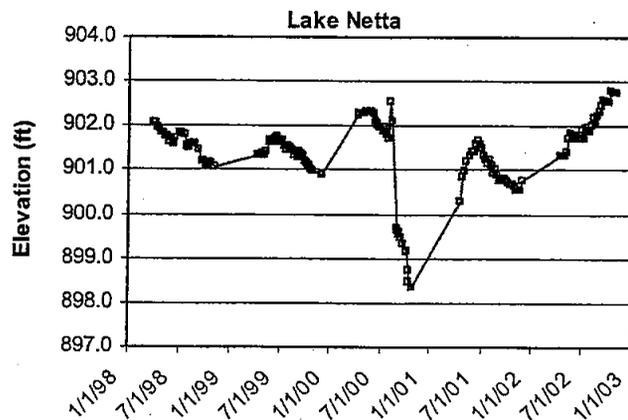


Figure 6-4: Crooked Lake Levels 1998-2002

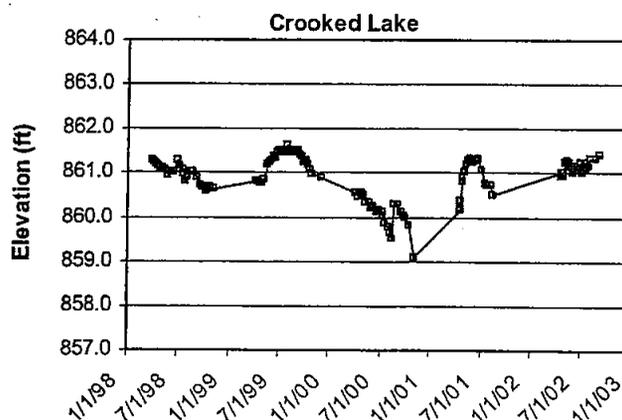


Table 6-1: Coon Creek watershed lake levels summary

Lake	Year	Average	Min	Max
Bunker	1998	882.38	881.48	883.10
	1999	881.99	881.32	882.42
	2000	879.73	878.23	881.63
	2001	880.96	879.81	882.24
	2002	881.98	881.30	882.89
Crooked	1998	860.96	860.60	861.28
	1999	861.25	860.75	861.61
	2000	860.13	859.07	860.56
	2001	860.93	860.15	861.32
	2002	861.15	860.94	861.40
Ham	1998	896.31	895.85	896.69
	1999	896.33	895.75	896.67
	2000	894.94	892.73	895.79
	2001	895.77	895.24	896.48
	2002	896.62	896.01	897.15
Netta	1998	901.59	901.06	902.04
	1999	901.41	900.88	901.74
	2000	901.11	898.35	902.54
	2001	900.99	900.29	901.66
	2002	902.05	901.31	902.78

Stream Hydrology

- Description:** Continuous water level monitoring in streams.
- Purpose:** To provide understanding of stream hydrology, including the impact of climate, landuse or discharge changes. These data also facilitate calculation of pollutant loads and use of computer models for developing management strategies.
- Locations:** Ditch 58 at Andover Blvd (Highway 16), Ham Lake
Sand Creek at Xeon Street, Coon Rapids
- Results:** Average flows were 1 foot higher in 2002 than in 2001 for Ditch 58 and 0.5 feet higher in Sand Creek. Both streams responded to multiple rainfall events of greater than 1 inch with stage fluctuations of more than 1.5 feet.

Figure 6-5: Sand Creek at Xeon Street hydrograph 2002

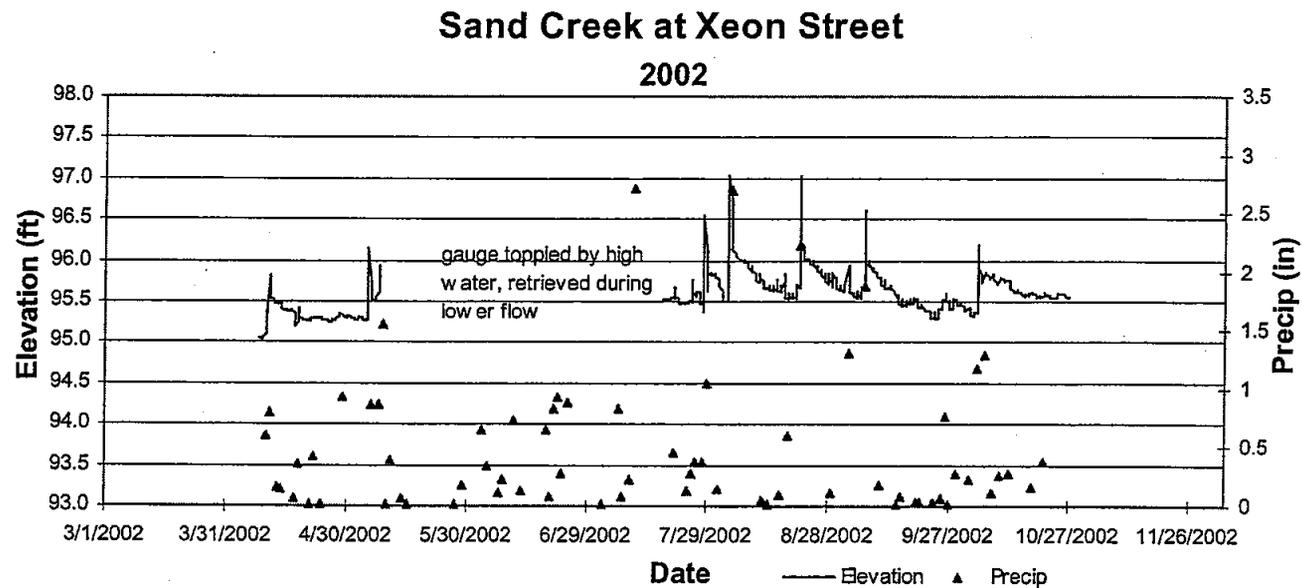
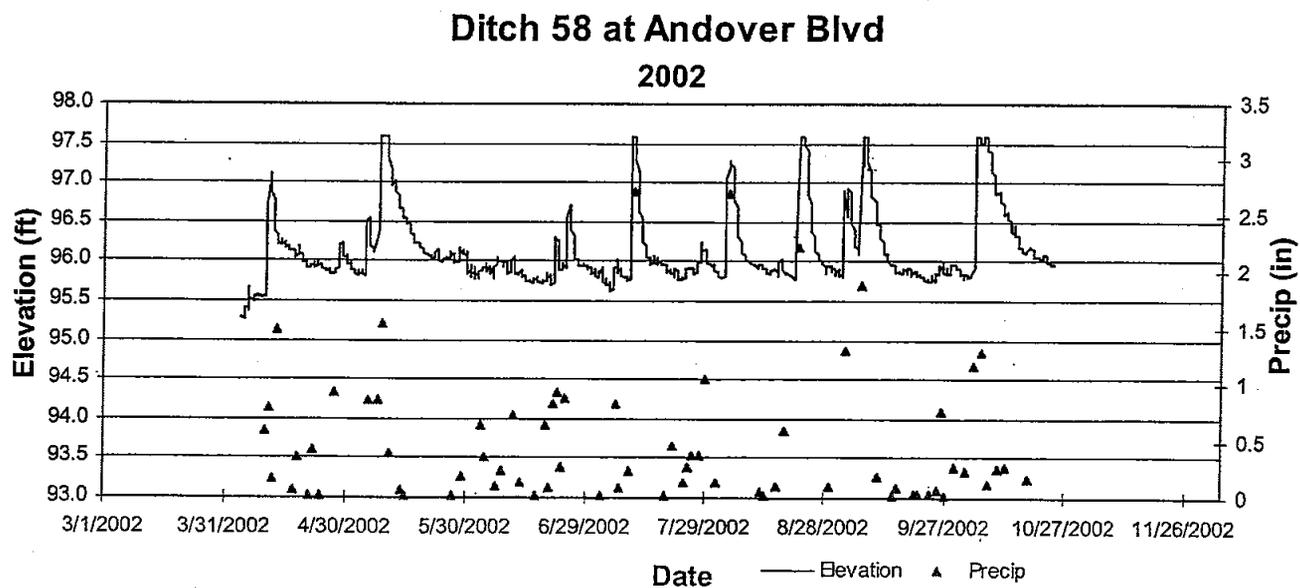


Figure 6-6: Ditch 58 at Andover Blvd hydrograph 2002

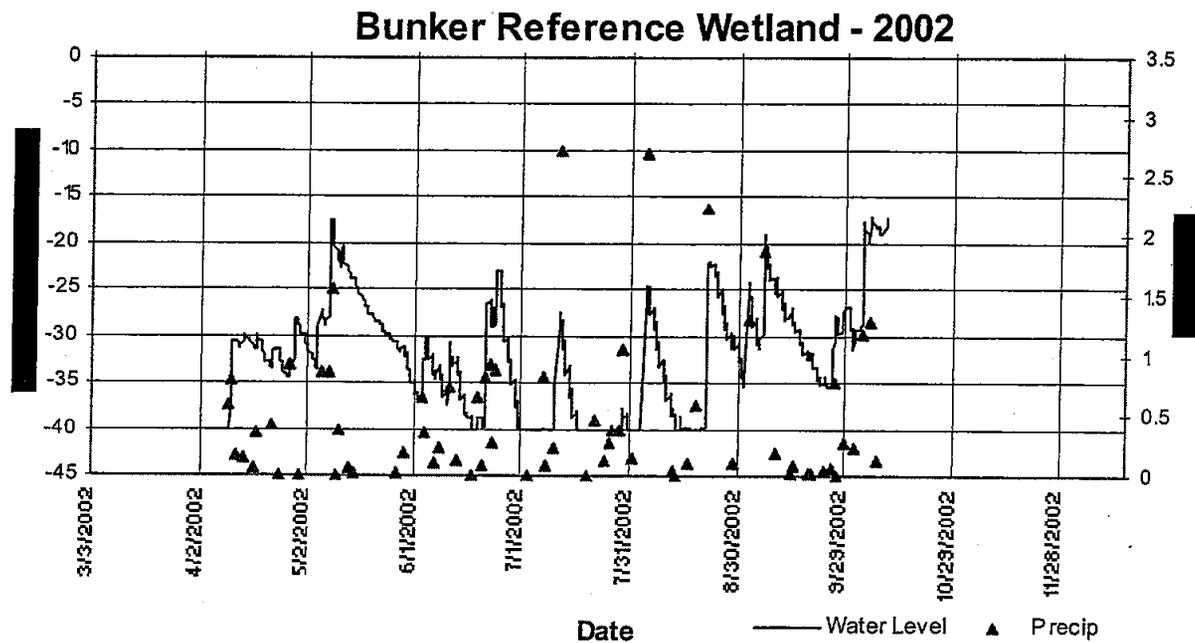


Wetland Hydrology

- Description:** Continuous groundwater level monitoring at a wetland boundary, to a depth of 40 inches. County-wide, the ACD maintains a network of 14 wetland hydrology monitoring stations.
- Purpose:** To provide understanding of wetland hydrology, including the impact of climate and landuse. These data aid in delineation of nearby wetlands by documenting hydrologic trends including the timing, frequency, and duration of saturation.
- Locations:** Bunker Reference Wetland, Bunker Hills Regional Park, Andover
- Results:** This site has gotten progressively dryer over the years, presumably due in-part to dewatering for several development projects that have taken place nearby. In 2000, the water table was >40 inches below the surface throughout the growing season. In 2001 the water level was within 16 inches of the surface in the spring, but dropped to >40 inches from the surface by July. In 2002 the water table remained within 40 inches of the surface most of the summer, but was flashy, retreating to >40 inches during periods of a week or two without major rainfalls. Previous years' data are available from the ACD.

In the graphs below, note that well depths were 40 inches, so when a graph stabilizes at a reading of -40, water levels were at or deeper than the graphed depth.

Figure 6-7: Bunker Reference Wetland hydrograph 2002



Lake Water Quality

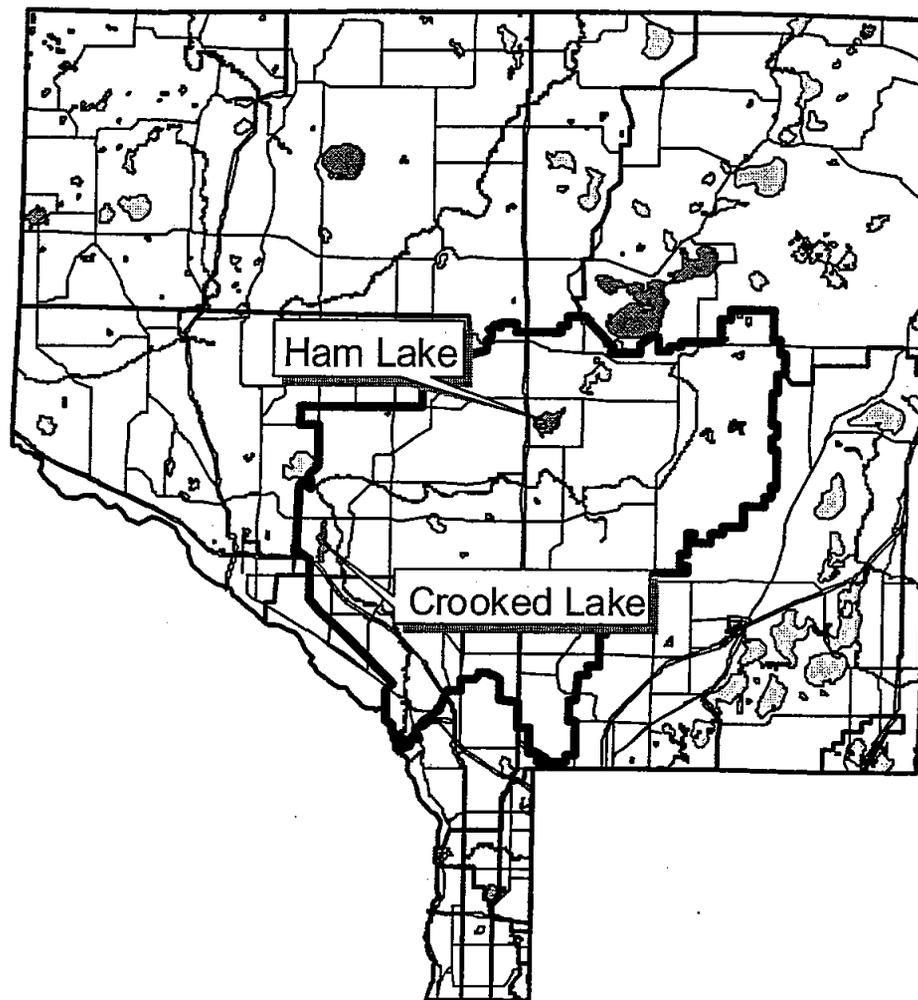
Description: May through September twice-monthly monitoring of the following parameters: total phosphorus, chlorophyll-a, secchi transparency, dissolved oxygen, turbidity, temperature, conductivity, pH, and salinity.

Purpose: To detect water quality trends and diagnose the cause of changes.

Locations: Crooked Lake

Ham Lake

Results: Detailed data for each lake are provided on the following pages, including summaries of historical conditions and trend analysis. Previous years' data are available from the ACD. Refer to Chapter 1 for additional information on interpreting the data and on lake dynamics.



Crooked Lake

CITIES OF ANDOVER AND COON RAPIDS, LAKE ID # 02-0084

Background

Crooked Lake is located in west-central Anoka County, lying half in Andover and half in Coon Rapids. It has a surface area of 117.5 acres with a maximum depth of 26 feet (7.9 m). Public access is from two locations, at a boat launch off Bunker Lake Boulevard and at a City of Coon Rapids Park on the east side of the lake where a fishing pier is located. The lake is used extensively by recreational boaters and fishers. Most of the lake is surrounded by tightly-packed single family homes. The watershed is urban/developed.

In 1990 Eurasian Watermilfoil was discovered in the lake, followed by a whole-lake treatment with fluridone in 1992 that eradicated nearly all aquatic vegetation. Eurasian Watermilfoil was discovered again in 1996. In 2002 the DNR implemented a low dose of fluridone, which has eliminated or nearly eliminated the milfoil, while having a lesser impact on other vegetation.

2002 Results

In 2002 Crooked Lake had above-average water quality for this region of the state (NCHF Ecoregion), receiving an overall B grade; the same as in the previous four years. The lake is slightly eutrophic. 2002 did show an improvement in transparency, not seen in the past, to its greatest summer average depth on record. Despite these improvements, by ACD's subjective observations of algae levels were "high" and the lake was swimming impaired but suitable for boating. Some of the swimming impairment is attributed to nuisance levels of filamentous algae and curly leaf pondweed until mid-June, which is not reflected in the lake grade or other measurements. Also, late summer algae blooms of free-floating algae were observed. Raw 2002 data can be found in Table 6-2 below and are summarized in figures on the following page.

Trend Analysis

Ten years of water quality data have been collected by the Metropolitan Council (between 1983 and 1998) and the Anoka Conservation District (2000 to 2002). Water quality has significantly increased from 1983 to 2002 (repeated measures MANOVA with response variables TP, Cl-a, and Secchi depth, $F_{2,7}=14.18$, $p=0.0035$). Improvements occurred between the 1989 and 1994 monitoring. No significant increases are detectable before or after that time, though increases in transparency in 2002 are encouraging.

Discussion

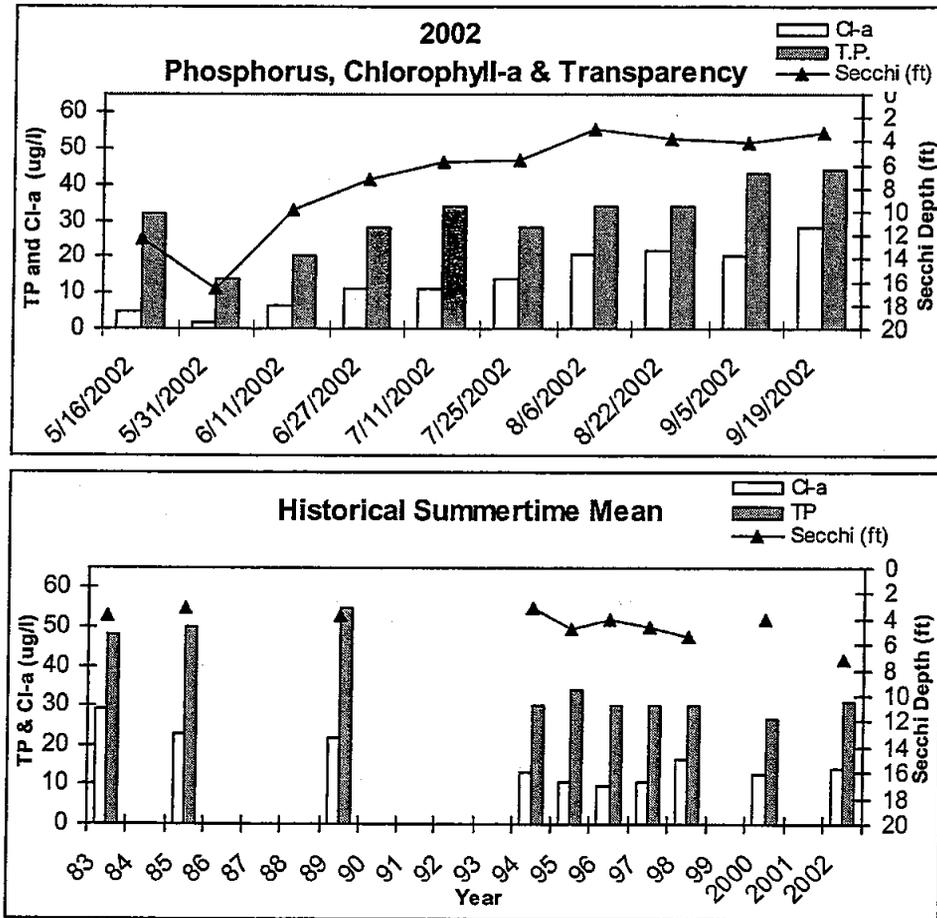
Current threats to lake water quality are urban runoff, excessive numbers of waterfowl, and nuisance growth of filamentous algae and invasive exotic aquatic plants. High-powered boats and jet skis are used extensively on this small lake, and probably impact water quality by suspending sediments. The Minnesota DNR's experimental fluridone treatments for Eurasian Watermilfoil do not seem to have had a negative impact on water quality. Measures that could be considered to protect and improve water quality include priority street sweeping for roads that drain to the lake and working with lakeshore homeowners to reduce erosion, runoff, and waterfowl.

Table 6-2: 2002 Crooked Lake Water Quality Data

Crooked Lake		5/16/2002	5/31/2002	6/11/2002	6/27/2002	7/11/2002	7/25/2002	8/6/2002	8/22/2002	9/5/2002	9/19/2002	Average	Min	Max
2002 Water Quality Data		Results	Results	Results	Results	Results	Results	Results	Results	Results	Results			
Units	R.L.*													
pH	0.1	8.35	8.77	8.85	9.17	8.59	8.73	8.93	8.84	9.05	9.12	8.84	8.35	9.17
Conductivity	mS/cm	0.01	0.433	0.433	0.433	0.422	0.422	0.411	0.418	0.419	0.417	0.423	0.411	0.433
Turbidity	NTU	1	1	1	4	7	7	13	7	7	8	6	1	13
D.O.	mg/l	0.01	12.08	9.87	9.75	8.35	6.35	6.68	6.80	6.51	7.41	5.96	7.78	5.96
Temp.	°C	0.1	14.0	22.4	22.7	26.3	26.5	25.3	24.4	22.3	24.5	22.4	23.13	14.00
Temp.	°F	0.1	57.2	72.3	72.9	79.3	79.7	77.5	75.9	73.0	76.1	72.3	74	57
Salinity	%	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cl-a	ug/l	0.5	5.0	1.7	6.3	11.0	11.0	14.0	21.0	22.0	20.0	28.0	14.0	1.7
T.P.	mg/l	0.01	0.032	0.014	0.020	0.028	0.034	0.028	0.034	0.034	0.043	0.044	0.031	0.014
T.P.	ug/l	10	32.0	14.0	20.0	28.0	34.0	28.0	34.0	34.0	43.0	44.0	31.1	14.0
Secchi	ft	0.1	12.3	16.6	9.8	7.2	5.8	5.5	2.9	3.8	4.1	3.2	7.1	2.9
Secchi	m	0.1	3.8	5.1	3.0	2.2	1.8	1.7	0.9	1.2	1.3	1.0	2.2	0.9
Field Observations														
Physical			1.5	2.0	3.0	2.0	3.0	4.0	4.0	3.5	3.5	4.5	3.1	1.5
Recreational			1.5	3.0	3.5	2.0	2.5	4.0	4.0	3.5	3.5	4.0	3.2	1.5
Eutrophic State Index														
TSIP			54	42	47	52	55	52	55	55	58	59	53	42
TSIC			46	36	49	54	54	57	61	61	60	63	54	36
TSIS			41	37	44	49	52	53	62	58	57	60	51	37
Mean TSI			47	38	47	52	54	54	59	58	58	61	53	38

*reporting limit

Figure 6-8: Crooked Lake water quality results



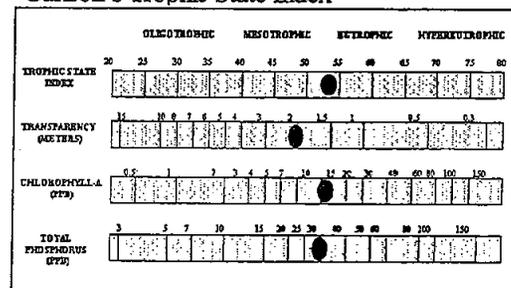
Crooked Lake Historic Summertime Mean Values

Agency	MC	ACD	ACD								
Year	83	85	89	94	95	96	97	98	2000	2002	
TP	48.00	50.00	55.00	30.00	34.00	30.00	30.00	30.00	26.70	31.1	
Cl-a	29.20	22.70	21.69	12.97	10.73	9.77	10.58	16.65	12.53	14.0	
Secchi (m)	1.1	1.0	1.0	1.4	1.5	1.3	1.4	1.6	1.2	2.2	
Secchi (ft)	3.7	3.1	3.8	3.2	4.8	4.1	4.6	5.4	4.0	7.1	
TSIP	60	61	62	53	55	53	53	53	52	53	
TSIC	64	61	61	56	54	53	54	58	56	54	
TSIS	58	61	60	56	55	57	55	53	57	51	
TSI	61	61	61	55	55	54	54	55	55	53	

Crooked Lake Water Quality Report Card

Year	83	85	89	94	95	96	97	98	2000	2002
TP	C	C	C	B	C	B	B	B	B	B
Cl-a	C	C	C	B	B	A	B	B	B	B
Secchi	D	D	D	C	C	C	C	C	C	C
Overall	C	C	C	B	C	B	B	B	B	B

Carlson's Trophic State Index



Ham Lake

CITY OF HAM LAKE, LAKE ID # 02-0053

Background

Ham Lake has a surface area of 193 acres with a maximum depth of 22 feet (6.7 m). Public access is from Ham Lake County Park on the south side of the lake, which includes a boat landing. The lake is used extensively by recreational boaters and fishers. Ham Lake has an aeration system to prevent winter fish kills. The lake is surrounded by single-family homes of moderate density and vacant/forested land. The watershed is a mixture of residential, commercial and vacant land.

2002 Results

In 2002 Ham Lake had above-average water quality for this region of the state (NCHF Ecoregion), receiving an overall B grade. The lake is slightly eutrophic. 2002 was an improvement over the previous year with respect to total phosphorus, but not necessarily chlorophyll-a, and secchi depth. These differences from last year are within the amount of variation expected, and the lake is considered to be in good condition. ACD staff's subjective observations of the lake's physical characteristics and recreational suitability were that while some algae was present, there were minimal problems and conditions were excellent for swimming and boating. Only during a algae bloom in September was swimming slightly impaired. A factor of some concern was the infestation by Curly Leaf Pondweed, which dies back by mid-June. Raw 2002 data can be found in Table 6-3 below and are summarized in figures on the following page.

Trend Analysis

Nine years of water quality data have been collected by the Minnesota Pollution Control Agency (between 1984 and 1997) and the Anoka Conservation District (1998 to 2002). Lake water quality has fluctuated between "A" to "C" water quality grades, but there is no significant long-term trend (repeated measures MANOVA with response variables TP, Cl-a, and Secchi depth, $F_{2,6}=0.19$, $p=0.83$).

Discussion

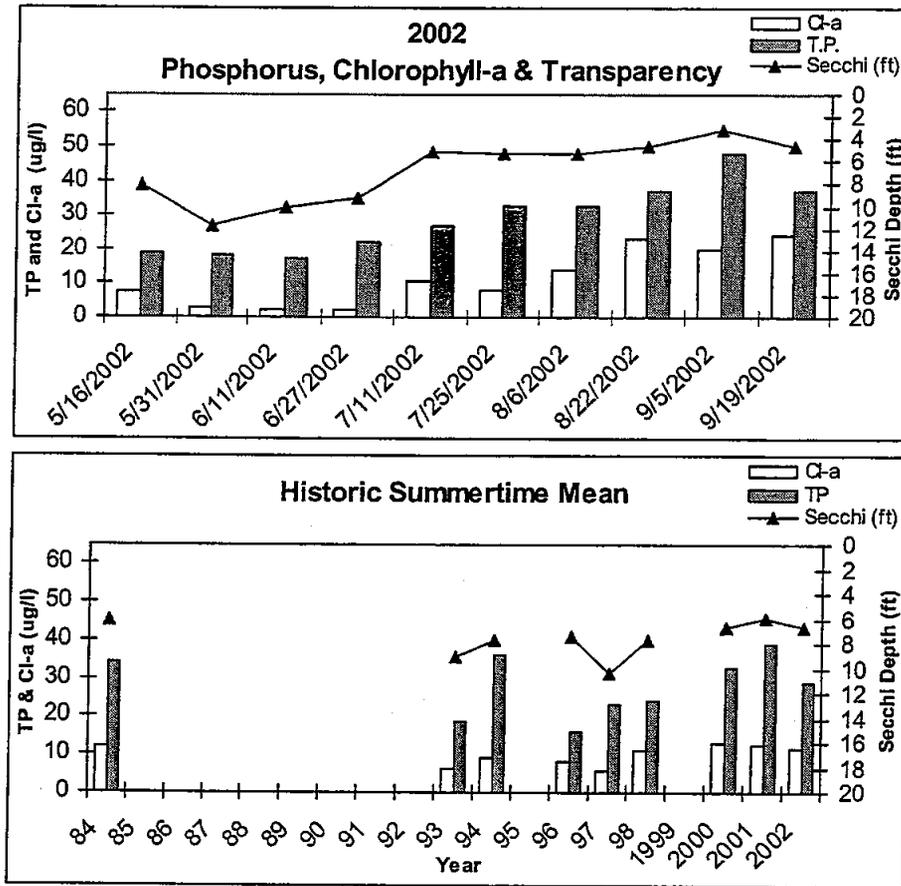
Current threats to lake water quality include runoff from residential areas, a curly leaf pondweed, and perhaps sediment disturbance by high-powered boats and jet-skis. The City of Ham Lake is working on measures to reduce pollution from failing septic systems. To address curly leaf pondweed problems, low-dose whole-lake treatments with the herbicide Aquathol-K might be effective, though probably cost-prohibitive. In addition to these water quality issues, some local anglers feel that fishing on this lake has declined since the establishment of the County Park and associated boat ramp, due to an increase in users.

Table 6-3: 2002 Ham Lake Water Quality Data

Ham Lake		2002 Water Quality Data													
	Units	R.L.*	5/16/2002	5/31/2002	6/11/2002	6/27/2002	7/11/2002	7/25/2002	8/6/2002	8/22/2002	9/5/2002	9/19/2002	Average	Min	Max
			Results	Results	Results	Results	Results	Results	Results	Results	Results	Results			
pH		0.1	8.42	9.27	8.89	8.58	8.47	8.13	8.05	8.39	7.83	7.29	8.33	7.29	9.27
Conductivity	mS/cm	0.01	0.299	0.263	0.243	0.268	0.278	0.285	0.285	0.295	0.303	0.279	0.243	0.303	
Turbidity	NTU	1	2	1	0	3	6	5	6	6	5	6	4	0	6
D.O.	mg/l	0.01	12.93	10.83	9.39	7.93	5.13	4.38	5.04	6.11	5.68	5.53	7.06	4.38	12.93
Temp.	°C	0.1	13.2	21.7	22.0	25.1	24.2	23.9	23.3	21.9	23.0	21.5	21.98	13.20	25.10
Temp.	°F	0.1	55.8	71.1	71.6	77.2	75.6	75.0	73.9	71.4	73.4	70.7	72	56	77
Salinity	%	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01
Cl-a	ug/l	0.5	7.7	2.8	2.3	2.3	11.0	8.0	14.0	23.0	20.0	24.0	11.5	2.3	24.0
T.P.	mg/l	0.01	0.019	0.018	0.017	0.022	0.027	0.033	0.033	0.037	0.048	0.037	0.029	0.017	0.048
T.P.	ug/l	10	19.0	18.0	17.0	22.0	27.0	33.0	33.0	37.0	48.0	37.0	29.1	17.0	48.0
Secchi	ft	0.1	8.1	11.7	10.1	9.3	5.1	5.3	5.3	4.7	3.2	4.6	6.7	3.2	11.7
Secchi	m	0.1	2.5	3.6	3.1	2.8	1.6	1.6	1.6	1.4	1.0	1.4	2.1	1.0	3.6
Field Observations															
Physical			1.5	1.5	1.5	2.0	1.5	2.0	2.0	2.0	2.5	3.0	2.0	1.5	3.0
Recreational			1.5	3.5	1.5	2.0	2.0	2.0	2.0	2.0	2.5	3.0	2.2	1.5	3.5
Trophic State Index															
TSIP			47	46	45	49	52	55	55	56	60	56	52	45	60
TSIC			51	41	39	39	54	51	57	61	60	62	51	39	62
TSIS			47	42	44	45	54	53	53	55	60	55	51	42	60
Mean TSI			48	43	43	44	53	53	55	57	60	58	51	43	60

*reporting limit

Figure 6-9: Ham Lake water quality results



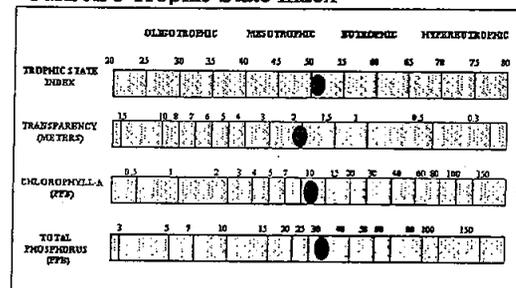
Ham Lake Summertime Historic Mean

Agency	MC	MC	MC	MPCA	MC	ACD	ACD	ACD	ACD
Year	84	93	94	96	97	98	2000	2001	2002
TP	34.0	19.0	36.0	16.0	23.0	24.0	32.6	39.1	29.1
Cl-a	11.8	6.2	9.1	8.3	5.9	11.3	13.1	12.7	11.5
Secchi (m)	1.84	2.76	2.35	2.27	3.14	2.35	2.04	1.81	2.1
Secchi (ft)	6.0	9.1	7.7	7.4	10.3	7.7	6.7	5.9	6.7
TSIP	55	47	56	44	49	50	53	56	52
TSIC	55	49	52	51	48	54	53	54	51
TSIS	51	45	48	48	43	48	51	52	51
TSI	54	47	52	48	47	51	52	54	51

Ham Lake Water Quality Report Card

Year	84	93	94	96	97	98	2000	2001	2002
TP	C	A	C	A	A	B	C	C	B
Cl-a	B	A	A	A	A	B	B	B	B
Secchi	C	B	B	B	A	B	C	C	C
Overall	C	A	B	A	A	B	C	C	B

Carlson's Trophic State Index



Financial Summary

ACD accounting is organized by program and not by customer. This allows us to track all of the labor, materials and overhead expenses for a program such as our lake water quality monitoring program. We do not, however, know specifically which expenses are attributed to monitoring which lakes. To enable reporting of expenses for monitoring conducted in a specific watershed, we divide the total program cost by the number of sites monitored to determine an annual cost per site. We then multiply the cost per site by the number of sites monitored for a customer.

The process also takes into account equipment that is purchased for monitoring in a specific area.

The balance left for wetland and stream level monitoring is to be used for necessary, periodic equipment purchases. By retaining this small amount each year we can make equipment purchases as needed without putting the large financial burden entirely upon any one year's budget.

Coon Creek Watershed	Wetland Levels	Lake Levels	Groundwater Observation Wells	Stream Levels	Lake Water Quality	Stream Biomonitoring	Website	Total
Revenues								
Coon Creek Watershed District	\$500	\$730	\$0	\$1,000	\$1,600	\$0	\$0	\$3,830
County General Allocation	\$0	\$535	\$0	\$0	\$0	\$0	\$2,260	\$2,794
County Ag Preserves	\$0	\$0	\$0	\$0	\$1,175	\$1,256	\$480	\$2,911
Service Fees	\$0	\$0	\$236	\$0	\$0	\$0	\$0	\$236
Interest	\$0	\$6	\$2	\$0	\$0	\$0	\$12	\$20
BWSR General Services	\$0	\$1	\$0	\$0	\$203	\$0	\$151	\$355
BWSR Local Water Planning	\$0	\$54	\$173	\$0	\$264	\$134	\$73	\$698
City of Fridley	\$0	\$0	\$0	\$0	\$310	\$0	\$0	\$310
Non-Profit/Lake Assoc.	\$0	\$0	\$0	\$0	\$0	\$36	\$0	\$36
TOTAL	\$500	\$1,326	\$411	\$1,000	\$3,552	\$1,425	\$2,975	\$11,190
Expenses-								
Capital Outlay/Equip	\$20	\$92	\$20	\$242	\$390	\$91	\$208	\$1,064
Personnel Salaries/Benefits	\$223	\$953	\$295	\$459	\$2,026	\$1,127	\$2,507	\$7,590
Office Supplies/Maintenance	\$10	\$42	\$11	\$21	\$705	\$44	\$73	\$906
Employee Training	\$3	\$13	\$5	\$6	\$31	\$14	\$28	\$99
Vehicle/Mileage	\$12	\$128	\$46	\$13	\$141	\$31	\$0	\$371
Rent	\$13	\$57	\$19	\$27	\$143	\$58	\$100	\$418
Monthly Bills	\$5	\$22	\$7	\$10	\$51	\$23	\$42	\$160
Fees and Dues	\$2	\$10	\$5	\$6	\$35	\$8	\$6	\$72
Promotion/Marketing	\$2	\$10	\$4	\$5	\$29	\$9	\$11	\$70
Program Supplies	\$4	\$0	\$0	\$3	\$2	\$21	\$0	\$29
TOTAL	\$295	\$1,326	\$411	\$792	\$3,552	\$1,425	\$2,975	\$10,777
BALANCE	\$205	\$0	\$0	\$208	\$0	\$0	\$0	\$413

Recommendations

- Emphasize water quality monitoring on Crooked Lake to help evaluate MNDNR experimental Eurasian Watermilfoil control efforts.
- Work with the Cities of Coon Rapids and Andover to ensure priority street sweeping for streets draining to Crooked Lake.
- Pursue the use of low-dose whole-lake treatments of Aquathol-K to control curly leaf pondweed at Ham Lake.
- Pursue treatments to improve Ham Lake water clarity, such as Alum.
- Work with the City of Ham Lake in the design of individual sewage treatment system ordinances and inventories, particularly in shoreland areas.
- Provide educational opportunities for shoreland property owners on septic system care and low impact lawn care practices.
- Initiate a routine stream water quality monitoring program.
- Engage a high school class to assist with biological monitoring of water quality on Sand and Coon Creeks. This site was monitored by Coon Rapids High School until 2002.

Round Lake

City of Andover, Lake ID # 03-0089

Background

Round Lake is located in west-central Anoka County. It has a surface area of 220 acres and a maximum depth of 19 feet, though the majority of the lake is less than 4 feet in depth. The lake is surrounded by a cattail fringe, and has submergent aquatic vegetation growing throughout, including carpets of the marophyte-like algae Chara (aka muskgrass, stonewort, and sand grass). This lake has a small watershed, with a watershed to surface area ratio of less than 10:1. The primary public access is from Round Lake Boulevard on the southeast side of the lake.

2003 Results

In 2003 Round Lake had excellent water quality compared to other lakes in this region (NCHF Ecoregion), receiving an overall A letter grade. This was consistent with very good conditions in each of the other three years monitored. The lake is mesotrophic. Water quality did not deteriorate in late summer due to algae, as happens on many other lakes, with chlorophyll-a remaining below 4 ug/l. Total phosphorus ranged from 14 to 25 ug/l. Secchi depths were at or greater than 10 feet throughout the summer. Dissolved oxygen was consistently well within the range needed by fish and other aquatic life.

Trend Analysis

Four years of water quality monitoring have been conducted by the Anoka Conservation District (1998-2000 and 2003). This is not enough data for a powerful statistical test of trend analysis. It is clear from superficial examination of the data that water quality is not deteriorating, and is either being maintained or is improving.

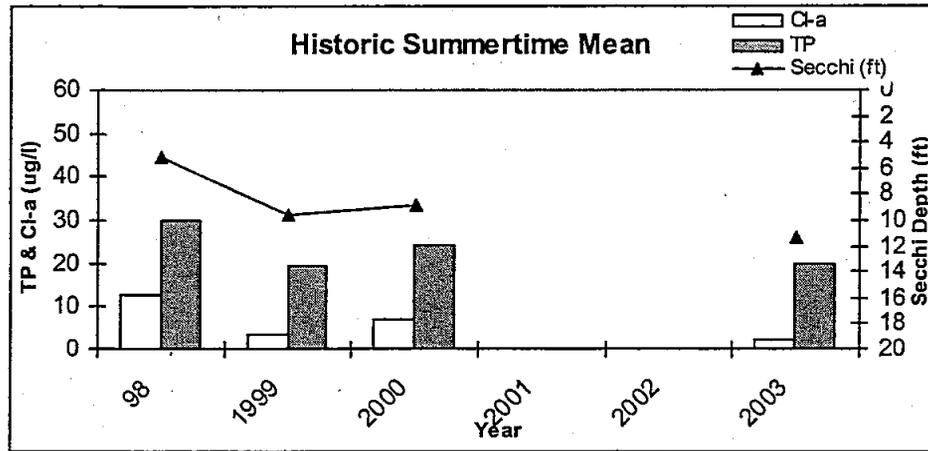
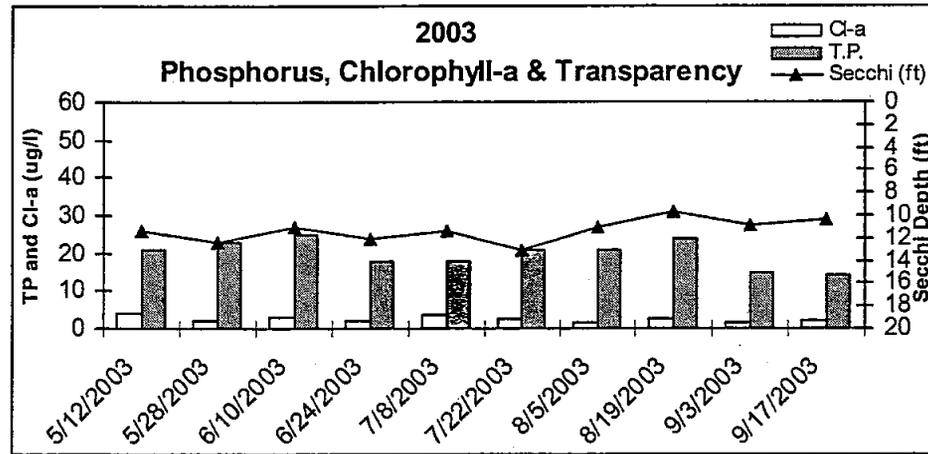
Discussion

Round Lake is one of the four clearest lakes in Anoka County. Shallow lakes like Round seldom have such a clear water condition. The two primary factors causing this are 1. the small watershed with relatively few surface water or storm water inputs and 2. the abundant macrophytes (large, aquatic plants). While nutrient inputs are probably few, the plants in the lake consume nutrients that are present, preventing algae blooms. Chara is common in this lake and forms carpets that stabilize bottom sediments. Macrophytes also foster zooplankton (microscopic animals that eat algae) communities by providing refuges from fish predators.

Table 4-3: 2003 Round Lake Water Quality Data

Round Lake		2003 Water Quality Data														Average	Min	Max
	Units	R.L.*	5/12/2003	5/28/2003	6/10/2003	6/24/2003	7/8/2003	7/22/2003	8/5/2003	8/19/2003	9/3/2003	9/17/2003						
			Results	Results	Results	Results	Results	Results	Results	Results	Results	Results						
pH		0.1	8.62	9.12	8.96	9.05	9.11	8.85	9.00	9.10	8.95	8.64	8.94	8.62	9.12			
Conductivity	mS/cm	0.01	0.279	0.236	0.233	0.235	0.217	0.238	0.239	0.246	0.257	0.468	0.265	0.217	0.468			
Turbidity	NTU	1	0	1	1	0	1	0	0	0	0	2	1	0	2			
D.O.	mg/l	0.01	N/A	see notes	9.90	8.10	8.15	8.90	8.05	7.93	8.44	7.46	8.37	7.46	9.90			
Temp.	°C	0.1	11.8	21.2	20.2	24.2	25.7	24.1	24.3	27.8	22.0	20.9	22.22	11.80	27.80			
Temp.	°F	0.1	53.2	70.2	68.4	75.6	78.3	75.4	75.7	82.0	71.6	69.6	72	53	82			
Salinity	%	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01			
Cl-a	ug/l	0.5	4.0	1.8	2.8	1.9	3.4	2.3	1.7	2.3	1.7	2.2	2.4	1.7	4.0			
T.P.	mg/l	0.01	0.021	0.023	0.025	0.018	0.018	0.021	0.021	0.024	0.015	0.014	0.020	0.014	0.025			
T.P.	ug/l	10	21.0	23.0	25.0	18.0	18.0	21.0	21.0	24.0	15.0	14.0	20.0	14.0	25.0			
T.S.S.	mg/l	5																
V.S.S.	mg/l	5																
Secchi	ft	0.1	11.4	12.3	11.1	12.0	11.4	13.0	11.0	9.7	10.9	10.0	11.3	9.7	13.0			
Secchi	m	0.1	3.5	3.8	3.4	3.7	3.5	4.0	3.4	3.0	3.3	3.1	3.4	3.0	4.0			
Field Observations																		
Physical			1.0	1.0	1.5	1.5	1.5	1.5	1.0	1.0	1.0	2.0	1.3	1.0	2.0			
Recreational			1.0	1.0	1.5	1.5	1.5	1.5	1.0	1.0	1.5	2.5	1.4	1.0	2.5			
Trophic State Index																		
TSIP			48	49	51	46	46	48	48	50	43	42	47	42	51			
TSIC			44	36	41	37	43	39	36	39	36	38	39	36	44			
TSIS			42	41	42	41	42	40	43	44	43	44	42	40	44			
Mean TSI			45	42	45	41	44	42	42	44	41	41	43	41	45			

Figure 4-12: Round Lake Water Quality Results



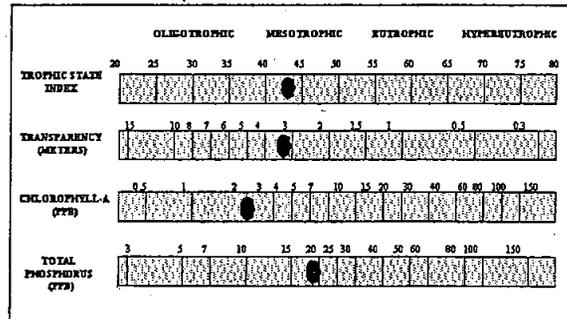
Round Lake Summertime Historic Means

Agency	ACD	ACD	ACD	ACD
Year	98	99	2000	2003
TP	29.8	19.6	24.1	20.0
Cl-a	12.80	3.74	6.86	2.40
Secchi (m)	1.4	2.9	2.7	3.4
Secchi (ft)	5.2	9.5	8.8	11.3
TSIP	53	47	50	47
TSIC	56	44	48	39
TSIS	55	45	46	42
TSI	55	45	48	43

Round Lake Water Quality Report Card

Year	98	99	2000	2003
TP	B	A	B	A
Cl-a	B	A	A	A
Secchi	C	B	B	A
Overall	B	A	B	A

Carlson's Trophic State Index

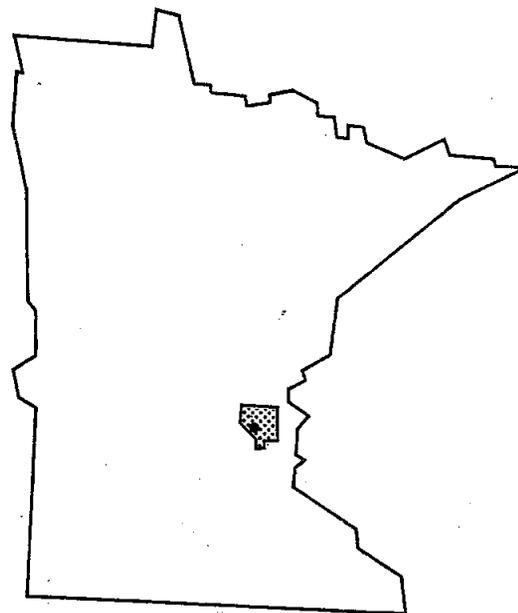


Appendix C
FEMA Flood Insurance Study for the City of Andover

FLOOD INSURANCE STUDY



CITY OF ANDOVER,
MINNESOTA
ANOKA COUNTY



MARCH 1980

FEDERAL EMERGENCY MANAGEMENT AGENCY
FEDERAL INSURANCE ADMINISTRATION

COMMUNITY NUMBER - 270689

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EXHIBITS

Exhibit 1 - Flood Profiles

Rum River

Panel 01P

Coon Creek

Panel 02P

Cedar Creek

Panel 03P

Exhibit 2 - Flood Boundary and Floodway Map Index

Flood Boundary and Floodway Map

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index

Flood Insurance Rate Map

FLOOD INSURANCE STUDY

1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the City of Andover, Anoka County, Minnesota, and to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert Andover to the regular program of flood insurance by the Federal Insurance Administration. Further use of the information will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

1.2 Coordination

The flood problems of Andover were reviewed at a meeting held in October 1974, with county officials and representatives from the Federal Insurance Administration, the Minnesota Department of Natural Resources (State Coordinating Agency), and the U.S. Geological Survey in attendance. Areas chosen for study by detailed and approximate methods were discussed at the meeting.

Flood frequency estimates for the 100-year flood for the Rum River, Cedar Creek and Coon Creek were coordinated with the U.S. Army Corps of Engineers and the U.S. Soil Conservation Service to eliminate the possibility of future conflicts.

During the course of the study, additional meetings with appropriate city officials were held in an effort to keep community officials informed as to the progress of the study and to answer questions.

The City of Andover, the U.S. Army Corps of Engineers, and the Minnesota Department of Natural Resources were contacted during the study to provide information.

The results of this study were reviewed at a final community coordination meeting held on November 20, 1979. Attending the meeting were representatives of the Federal Insurance Administration, the study contractor, Minnesota Department of Resources, and the city. This study incorporates all appropriate comments, and all problems have been resolved.

1.3 Authority and Acknowledgments

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Geological Survey, Water Resources Division, St. Paul, Minnesota, for the Federal Insurance Administration, under Inter-Agency Agreement No. IAA-H-9-77, Project Order No. 2, Amendment No. 1. This work, which was completed in June 1977, covered all significant flooding sources affecting the City of Andover, Minnesota.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Andover, Anoka County, Minnesota. The area of study is shown on the Vicinity Map (Figure 1).

Areas subject to flooding by the Rum River, Cedar and Coon Creeks, and Crooked Lake were studied in detail. Two smaller, unnamed streams, flowing in undeveloped parts of the city, were studied by approximate methods.

Flooding caused by surface runoff in the remaining parts of the city, previously done by approximate methods, is shown in this study.

Those areas studied by detailed methods were chosen with consideration given to all proposed construction and forecasted development through 1982.

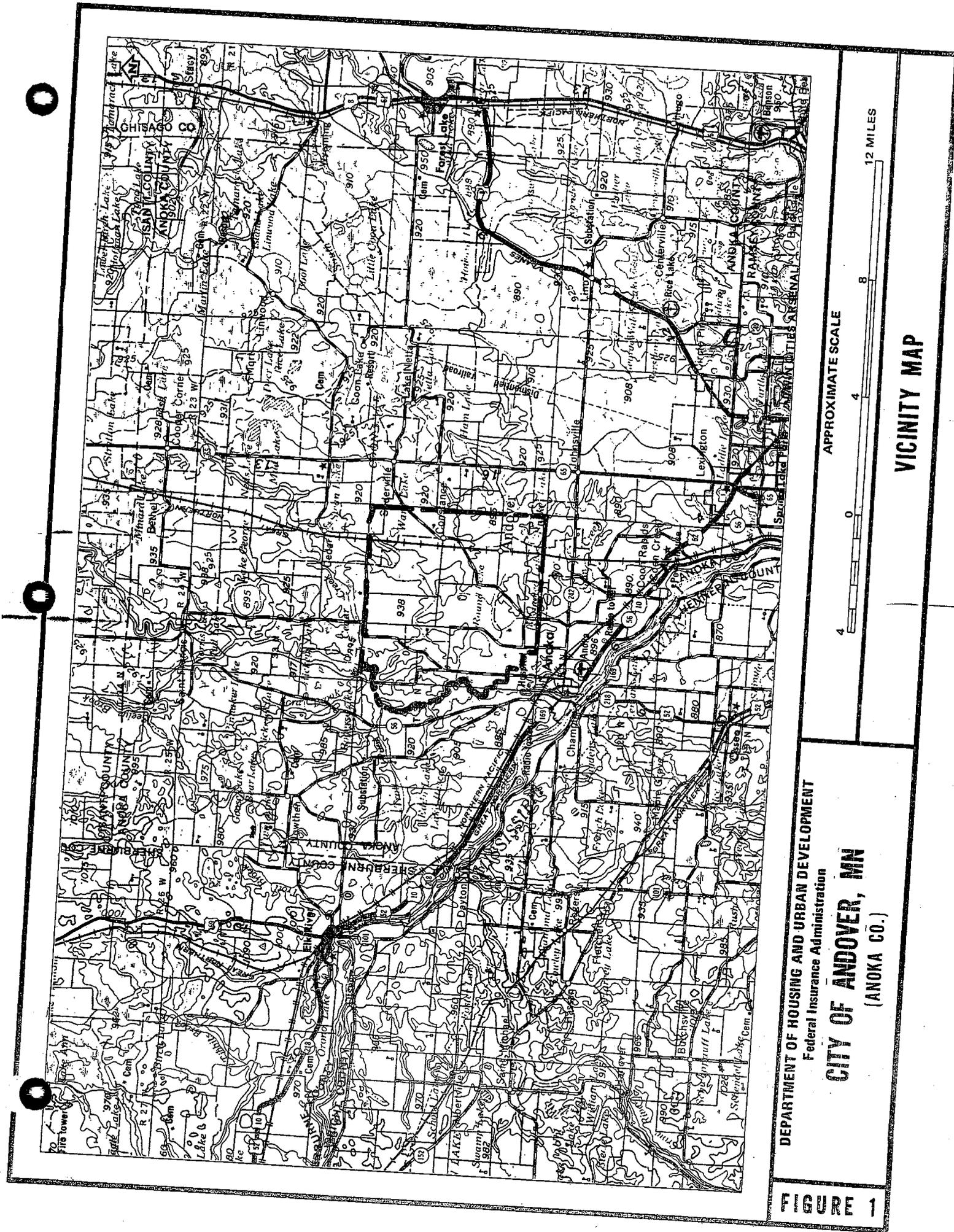
2.2 Community Description

The City of Andover lies in the west-central portion of Anoka County, approximately 16 miles north of the Minneapolis metropolitan area, in east-central Minnesota. The city is bordered by Ramsey to the west, Coon Rapids and Anoka to the south, Ham Lake to the east, and unincorporated county land to the north.

Andover was incorporated in 1975 from area that was largely the Township of Grow. The Township of Ramsey was directly to the west and the Rum River flowed generally to the south, meandering back and forth from Grow into Ramsey. When the Cities of Andover and Ramsey were incorporated, the area of the two townships east of the Rum River was included in the City of Andover and those areas west of the Rum River were included in the City of Ramsey; the Rum River became the border between them.

The Metropolitan Council of the Twin Cities Area has estimated that the population of the present area of Andover was 3904 in 1970 and 8295 in 1976.

Andover consists mainly of agricultural and undeveloped land, but with an increasing emphasis on residential development.



DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF ANDOVER, MN
(ANOKA CO.)

FIGURE 1

APPROXIMATE SCALE



VICINITY MAP

The topography of Andover is flat to gently rolling, with elevations ranging from 850 to 930 feet. Newer developing areas, consisting largely of residential housing, are generally on upland areas away from the flood plains of the streams. The flood plain consists basically of agricultural and undeveloped land.

The average annual precipitation is 26 inches (Reference 1).

The Rum River drains approximately 1580 square miles of farmland to the north of Andover and forms the western corporate limits. Coon Creek, which flows through the southeastern part of the city, is a small stream draining approximately 68 square miles at the southern corporate limits. Its channel, which once meandered through the peat marshes, has been improved as a judicial ditch for much of its length through Andover. Cedar Creek, draining an area of 85 square miles, empties into the Rum River after flowing only a short distance into Andover from the north. The entire flood plain of Cedar Creek in Andover is in backwater from the Rum River. Crooked Lake, part of which is outside the corporate limits, lies in the southwestern corner of the city. Several additional small streams drain the numerous areas of flat peat marsh that occur throughout the city.

2.3 Principal Flood Problems

Low-lying areas of Andover, adjacent to the Rum River, Coon Creek, and Cedar Creek are subject to flooding caused most often by snowmelt in combination with spring rains. The most notable floods on the Rum River occurred in 1965, 1969, and, most recently, 1972 (Reference 2). The 1965 and 1969 floods were of the same magnitude, with flows of 10,100 cubic feet per second (cfs) recorded at the U.S. Geological Survey gage near St. Francis. The 1972 flood peak was 9540 cfs. Return period estimates are 25 years for the 1965 and 1969 floods and 18 years for the 1972 flood. Periodic flooding also occurs along several smaller streams and in low-lying areas where surface runoff collects.

Little flood damage, other than to agricultural land, has occurred in the past, as most of the flood-prone lands are undeveloped. With the recent expansion in residential building that has occurred in Andover, the principal problem is to keep the undeveloped flood-prone areas from being developed.

2.4 Flood Protection Measures

There are no permanent flood protection structures in Andover and none are proposed at this time.

The principal means of flood protection in Andover are the provisions of the National Flood Insurance Act of 1968, as amended, and the Minnesota State Flood Plain Management Regulations (Reference 3). Enforcement of these acts and regulations will preclude development in flood plains in Andover.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual occurrence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each stream studied in detail in the community.

Data for flow-frequency analysis on the Rum River were obtained from the gaging station records collected by the U.S. Geological Survey for the station near St. Francis (Reference 2). The flow-frequency relationships were based on the log-Pearson Type III method (Reference 4) using 41 years of record. A graphical interpretation of the upper end of the frequency curve was made to provide a better fit to the data points. Flow distribution through the study area for the various frequency floods was derived from a discharge-drainage area relationship.

For Coon Creek and Cedar Creek, a regional analysis based on multiple regression techniques was utilized for the flow-frequency analysis (Reference 5). To determine the 10-year frequency flood (index flood), a regression equation that uses drainage area, main channel slope, and storage as variables was developed from crest-stage data obtained by the U.S. Geological Survey at 27 gaging stations surrounding the Andover area. Because the available flood records for small streams are of short duration, the index flood (with appropriate ratios to adjust to the remaining frequency estimates required) was considered the most reliable. Flood-frequency analyses of the 27 station records were made in accordance with standard procedures, as recommended by the U.S. Water Resources Council, using a log-Pearson calculation with a regional value of -0.20 for the skewness of the logarithms (Reference 4). Regionalized median ratios of the 10-year frequency flood to the 50-, 100-, and 500-year floods, also deter-

mined from the data for the 27 crest-stage stations, were then used to complete the flow-frequency estimates. Flood frequency values obtained from the regional regression equation and applied ratios reflect natural basin conditions (essentially undeveloped) as they still exist in Andover.

Peak discharge-drainage area relationships for Rum River, Coon Creek, and Cedar Creek are shown in Table 1.

Table 1. Summary of Discharges

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (Cubic Feet per Second)			
		10-Year	50-Year	100-Year	500-Year
Rum River					
At Southern Corporate Limits	1,580 ¹	9,080	13,300	15,300	19,800
Above Confluence With Trott Brook	1,450	8,640	12,700	14,600	18,800
Above Confluence With Cedar Creek	1,360	8,300	12,200	14,000	18,100
Coon Creek					
At Southern Corporate Limits	69.9 ²	441	794	970	1,460
At Cross Section O	58.9	369	664	812	1,220
Cedar Creek					
At Mouth	84.8	529	952	1,160	1,750

¹Drainage area at mouth; discharges apply upstream to Trott Brook.

²Drainage area above Crooked Lake Tributary in Coon Rapids; discharges apply through cross section N.

Crooked Lake was previously studied in detail for the Flood Insurance Study for the City of Coon Rapids (Reference 6). An elevation-frequency relationship for the lake was determined from rainfall-frequency data and runoff coefficients supplied in U.S. Weather Bureau Technical Paper No. 40 (Reference 7). The findings were then compared with the Coon Rapids study to ensure compatibility. The elevation-frequency data are shown in Table 2.

Table 2. Summary of Elevations

Flooding Source and Location	Elevation (Feet)			
	10-Year	50-Year	100-Year	500-Year
Crooked Lake At Andover	862.6	863.0	863.2	863.7

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding sources in the community were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each flooding source studied in the community.

Water-surface elevations of floods of the selected recurrence intervals were computed through use of the U.S. Army Corps of Engineers HEC-2 step-backwater computer program (Reference 8).

Cross sections for the backwater analysis of the overbank sections were obtained by photogrammetric compilation; the underwater parts were field surveyed. New aerial photographs (Reference 9) were used for the photogrammetric compilation so that cross section data would represent current conditions. All bridges and culverts were surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway is computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 2).

Roughness coefficients (Manning's "n") for the streams were estimated by field inspection at each cross section. For the Rum River, roughness coefficients were adjusted so that computed profiles would match the defined profiles of the 1965 and 1975 floods when using the corresponding peak discharges. The ranges of "n" values that were used for each stream are shown below.

Stream Name	Manning's "n" Values	
	Channel	Overbanks
Rum River	0.036-0.091	0.066-0.178
Coon Creek	0.026-0.045	0.060-0.150
Cedar Creek	0.072	0.100-0.160

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals. Starting water-surface elevations for Rum River were taken from the Flood Insurance Study for the City of Anoka at Andover's corporate limits (Reference 10). For Coon Creek, starting water-surface elevations were taken from the Coon Rapids Flood Insurance Study (Reference 6). For Cedar Creek, the elevations were begun at the elevation for the confluence with the Rum River. These elevations were then checked with those elevations determined for the Anoka County Flood Insurance Study (Reference 11) to insure consistency.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations, as shown on the profiles, are thus considered valid only if hydraulic structures, in general, remain unobstructed.

For areas studied by approximate methods, estimated elevations were determined using engineering judgment together with field inspection, aerial photographs (Reference 12), and topographic maps (Reference 13).

For additional areas studied by approximate methods, estimated elevations were determined by Gannett, Fleming, Corddry and Carpenter, Inc. during the preparation of the Flood Hazard Boundary Maps for Andover, Minnesota (Reference 14).

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in the study are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

A prime purpose of the National Flood Insurance Program is to encourage State and local governments to adopt sound flood plain management programs. Each Flood Insurance Study, therefore, includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the Federal Insurance Administration as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were determined photogrammetrically, using aerial photographs at a scale of 1:9600, enlarged to a scale of 1:6000 (Reference 9).

In cases where the 100- and 500-year flood boundaries are close together, only the 100-year flood boundary has been shown. Flood boundaries for the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 2).

For each area studied by approximate methods, the 100-year flood boundaries were delineated using topographic maps at a scale of 1:1200 with a contour interval of 2 feet (Reference 15).

Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to limitations of the map scale, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity and increases flood heights, thus increasing flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment in order that the 100-year flood be carried without substantial increases in flood heights. As minimum standards, the Federal Insurance Administration limits such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. In Minnesota, flood plain regulations (Minn. Reg. NR 85) adopted in accordance with the authority granted in Minnesota Statutes 1969, Section 104.04 limit the increases in flood heights to 0.5 foot; this is the maximum limiting value used in this study. Under this concept, a community such as Andover, which exercises control on only one side of the Rum River, should generally be restricted to a maximum increase of 0.25 foot along that stream. The remaining 0.25 foot is reserved for the community on the opposite side of the river.

City officials have designated a floodway for the streams studied in detail for all areas under their jurisdiction. Also, the floodway designated by the City of Ramsey for the west side of the Rum River opposite Andover was available for incorporation into the floodway computations. The designated floodways along the Rum River in each city were tested to see that they did not individually create more than half the total allowable increase in the 100-year flood profile elevation. Designated floodways for both sides of the river were then incorporated into the computer model and calculations were made.

For Coon Creek, the designated floodway was incorporated in the digital model and the calculated maximum increase in elevation from the water-surface profile for the 100-year flood did not exceed 0.5 foot. On Cedar Creek, the designated floodway is the flood boundary resulting from the 100-year flood elevation on the Rum River. In this short segment, the flood plain of Cedar Creek is entirely in backwater from the Rum River and the 0.3-foot surcharge developed by the Rum River floodway below the mouth of Cedar Creek was used to determine the floodway data. Because the creek is all backwater, it was decided that the floodway for the creek would be combined with that for Rum River.

The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 3).

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway boundaries were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the floodway and 100-year flood boundaries are close together, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 0.5 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

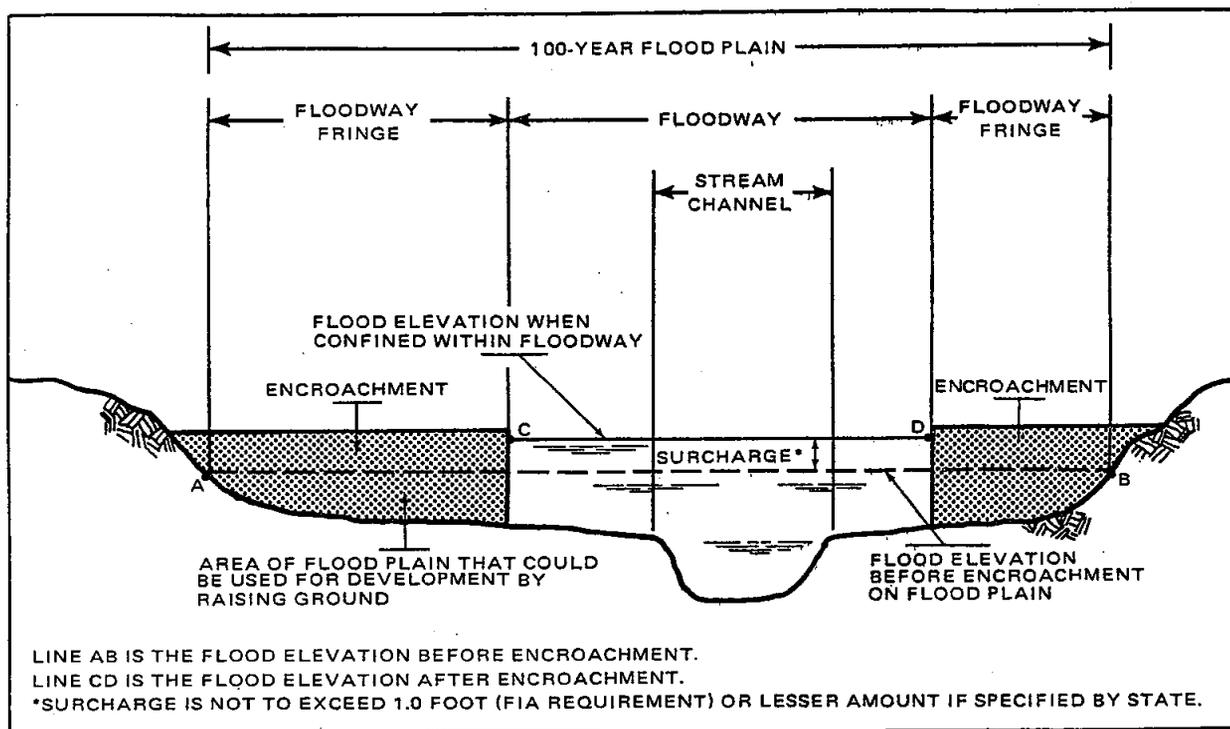


Figure 2. Floodway Schematic

Because the concept of a floodway is not applicable to areas inundated by floodwaters from lakes, a floodway has not been computed for Crooked Lake.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE ¹	WIDTH ² (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET PER SECOND)	WITH FLOODWAY	WITHOUT FLOODWAY (FEET NGVD)	DIFFERENCE
Rum River							
A	5.16	1,240/480	11,500	1.3	855.0	854.5	0.5
B	5.73	320/170	3,520	4.3	855.4	855.0	0.4
C	6.10	410/115	3,320	4.6	856.1	855.8	0.3
D	6.46	230/145	3,080	5.0	857.1	856.9	0.2
E	6.72	640/150	6,440	2.4	858.0	857.8	0.2
F	6.93	240/150	3,280	4.7	858.2	858.0	0.2
G	7.16	780/120	5,720	2.7	858.9	858.7	0.2
H	7.37	790/725	5,040	3.0	859.4	859.2	0.2
I	7.73	310/130	4,370	3.5	860.2	860.1	0.1
J	8.08	440/330	4,830	3.2	860.7	860.6	0.1
K	8.45	1,020/910	4,840	3.2	861.3	861.2	0.1
L	8.80	265/155	3,640	4.2	861.8	861.7	0.1
M	9.19	770/650	6,150	2.5	862.5	862.4	0.1
N	9.36	815/700	6,080	2.4	862.7	862.6	0.1
O	9.77	1,470/420	17,800	0.8	863.0	862.9	0.1
P	10.00	670/460	8,670	1.7	863.1	863.0	0.1
Q	10.17	1,175/380	6,520	2.2	863.1	863.1	0.0
R	10.21	1,350/310	7,440	2.0	863.4	863.1	0.3
S	10.43	1,680/575	13,200	1.1	863.7	863.3	0.4
T	10.74	750/130	7,760	0.9	863.9	863.5	0.4
U	11.08	1,020/360	11,900	0.6	864.1	863.7	0.4
V	11.62	2,200/205	23,400	0.3	864.2	863.8	0.4
W	12.06	1,060/900	12,700	0.5	864.2	863.9	0.3
X	12.42	2,540/ 1,000	24,300	0.6	864.6	864.3	0.3

¹Miles Above Mouth

²Width/Width Within Corporate Limits

TABLE 3

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF ANDOVER, MN
(ANOKA CO.)

FLOODWAY DATA

RUM RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE ¹	WIDTH ² (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WITH FLOODWAY	WITHOUT FLOODWAY (FEET NGVD)	DIFFERENCE
Rum River (cont'd)	12.97	3,310 ₃	32,300	0.5	864.7	864.4	0.3
Y		1,190					
Z	13.48	3,890 ₃	29,900	0.8	864.8	864.5	0.3
		2,810					

¹ Miles Above Mouth ² width/width Within Corporate Limits ³ Includes Width of Cedar Creek

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF ANDOVER, MN
(ANOKA CO.)

FLOODWAY DATA

RUM RIVER

TABLE 3

FLOODING SOURCE		FLOODWAY			BASE FLOOD SURFACE ELEVATION		
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WITH FLOODWAY	WITHOUT FLOODWAY (FEET NGVD)	DIFFERENCE
Coon Creek							
A	9.16	175	557	1.7	863.1	862.6	0.5
B	9.28	155	438	2.2	863.3	862.9	0.4
C	9.47	182	364	2.7	864.1	863.6	0.5
D	9.59	90	345	2.8	864.6	864.1	0.5
E	9.62	230	373	2.6	864.8	864.3	0.5
F	9.76	330	790	1.2	865.2	864.8	0.4
G	9.89	510	1,290	0.8	865.5	865.2	0.3
H	10.05	255	754	1.3	865.8	865.5	0.3
I	10.22	970	2,230	0.4	866.0	865.6	0.4
J	10.39	1,760	2,660	0.4	866.0	865.7	0.3
K	10.58	250	384	2.5	866.1	866.0	0.1
L	10.61	340	841	1.2	866.4	866.1	0.3
M	10.79	1,330	4,950	0.2	867.3	867.0	0.3
N	10.94	2,030	5,570	0.2	867.7	867.4	0.3
O	11.12	1,550 ²	1,590	0.5	868.0	867.8	0.2
P	11.33	470	732	1.1	868.3	868.2	0.1
Q	11.49	550	438	1.9	868.8	868.6	0.2
R	11.72	530	807	1.0	869.6	869.4	0.2
S	11.86	345	501	1.6	870.0	869.8	0.2
T	11.96	390	582	1.4	870.4	870.2	0.2
U	12.07	350	265	3.1	870.8	870.6	0.2
V	12.18	280	309	2.6	871.3	871.2	0.1
W	12.23	285	236	3.4	871.6	871.6	0.0
X	12.28	225	227	3.6	871.9	871.9	0.0
Y	12.44	540	354	2.3	872.5	872.4	0.1

¹Miles Above Mouth ²Width Does Not Include Islands

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF ANDOVER, MN
(ANOKA CO.)

FLOODWAY DATA

COON CREEK

TABLE 3

FLOODING SOURCE		FLOODWAY			BASE FLOOD SURFACE ELEVATION		
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WITH FLOODWAY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	DIFFERENCE
Coon Creek (continued)							
Z	12.64	190 ²	263	3.1	873.0	873.0	0.0
AA	12.82	590	228	3.6	873.4	873.4	0.0
AB	13.04	90 ²	304	2.7	874.0	874.0	0.0
AC	13.24	340	312	2.6	874.4	874.4	0.0
AD	13.44	520	401	2.0	874.8	874.8	0.0
AE	13.61	190	312	2.6	875.1	875.1	0.0
AF	13.64	75	302	2.7	875.3	875.3	0.0
AG	13.80	50	287	2.8	875.5	875.5	0.0
AH	13.97	50	241	3.4	875.9	875.9	0.0
AI	14.13	490	420	1.9	876.3	876.3	0.0
AJ	14.28	50 ²	277	2.9	876.7	876.7	0.0
AK	14.42	350 ²	223	3.6	877.0	877.0	0.0
AL	14.57	150	253	3.2	877.3	877.3	0.0
AM	14.72	100 ²	253	3.2	877.6	877.6	0.0
AN	14.76	160 ²	341	2.4	877.8	877.8	0.0
AO	14.93	755	235	3.5	878.2	878.2	0.0
AP	15.12	620	373	2.2	878.8	878.8	0.0
AQ	15.28	220	258	3.1	879.2	879.2	0.0
AR	15.38	80	302	2.7	879.4	879.4	0.0

¹Miles Above Mouth ²Width Does Not Include Islands

TABLE 3

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF ANDOVER, MN
(ANOKA CO.)

FLOODWAY DATA

COON CREEK

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the Federal Insurance Administration has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail affecting the City of Andover.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses or water bodies having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach:

<u>Average Difference Between 10- and 100-year Floods</u>	<u>Variation</u>
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot

Four reaches meeting the above criteria were required for the flooding sources of Andover. These included one each on the Rum River and Crooked Lake, and two on Coon Creek. The locations of the riverine reaches are shown on the Flood Profiles (Exhibit 1).

5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is the Federal Insurance Administration device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHF are used to set actuarial insurance premium rate tables based on FHF's from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective Flood Hazard Factors, the entire incorporated area of the City of Andover was divided into zones, each having a specific flood potential or hazard.

Each zone was assigned one of the following flood insurance zone designations:

Zone A: Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or Flood Hazard Factors determined.

Zones A1, A3, A5, and A7: Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to Flood Hazard Factors.

Zone B: Areas between the Special Flood Hazard Areas and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; also areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.

Zone C: Areas of minimal flooding.

The flood elevation differences, Flood Hazard Factors, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community are summarized in Table 4.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the City of Andover is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the Federal Insurance Administration.

FLOODING SOURCE	PANEL ¹	ELEVATION DIFFERENCE ² BETWEEN 1% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION ³ (FEET NGVD)
		10%	2%	0.2%			
		(10-YEAR)	(50-YEAR)	(500-YEAR)			
Rum River Reach 1	0005,0010 0015	-3.7	-1.0	2.1	035	A7	Varies - See Map
Coon Creek Reach 1	0015	-1.6	-0.4	0.9	015	A3	Varies - See Map
Coon Creek Reach 2	0015	-2.5	-0.7	1.1	025	A5	Varies - See Map
Crooked Lake Reach 1	0015	-0.6	-0.2	0.5	005	A1	863

¹Flood Insurance Rate Map Panel

²Weighted Average

³Rounded to Nearest Foot

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF ANDOVER, MN
(ANOKA CO.)

FLOOD INSURANCE ZONE DATA

RUM RIVER-COON CREEK-CROOKED LAKE

6.0 OTHER STUDIES

The U.S. Geological Survey has prepared Flood Insurance Studies for the Cities of Anoka and Coon Rapids (References 10 and 6, respectively), which border Andover on the south, and for the City of Ramsey (Reference 16), which borders Andover along the Rum River on the west, and for the unincorporated areas of Anoka County ~~(Reference 11), which border Andover on~~ the north. Data presented in this report are continuous at the borders with adjoining communities and the county and are, therefore, entirely compatible. This study is also compatible with the Federal Insurance Administration's Flood Hazard Boundary Map (Reference 14).

This study is authoritative for the purposes of the National Flood Insurance Program; data presented herein either supersede or are compatible with all previous determinations.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the Insurance and Mitigation Division, Federal Emergency Management Agency, 1 North Dearborn Street, Chicago, Illinois 60602.

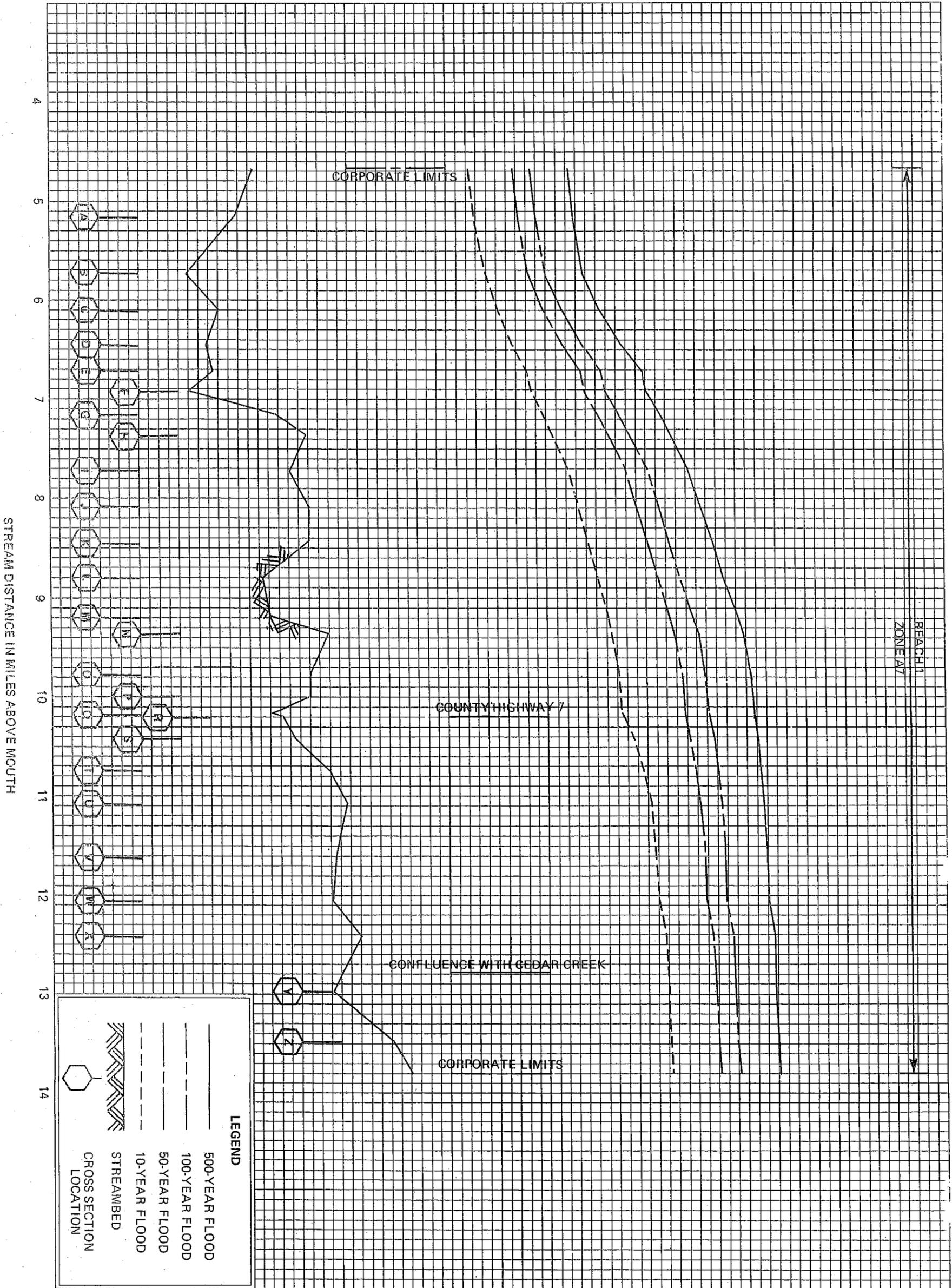
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ELEVATION (FEET NGVD)

835 840 845 850 855 860 865 870



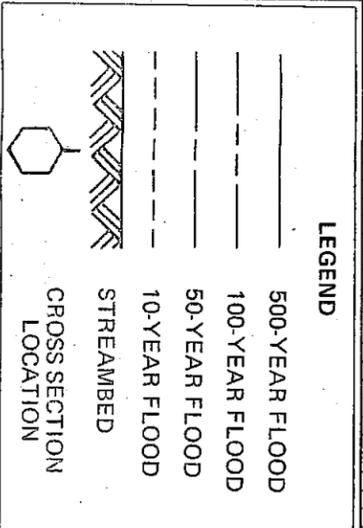
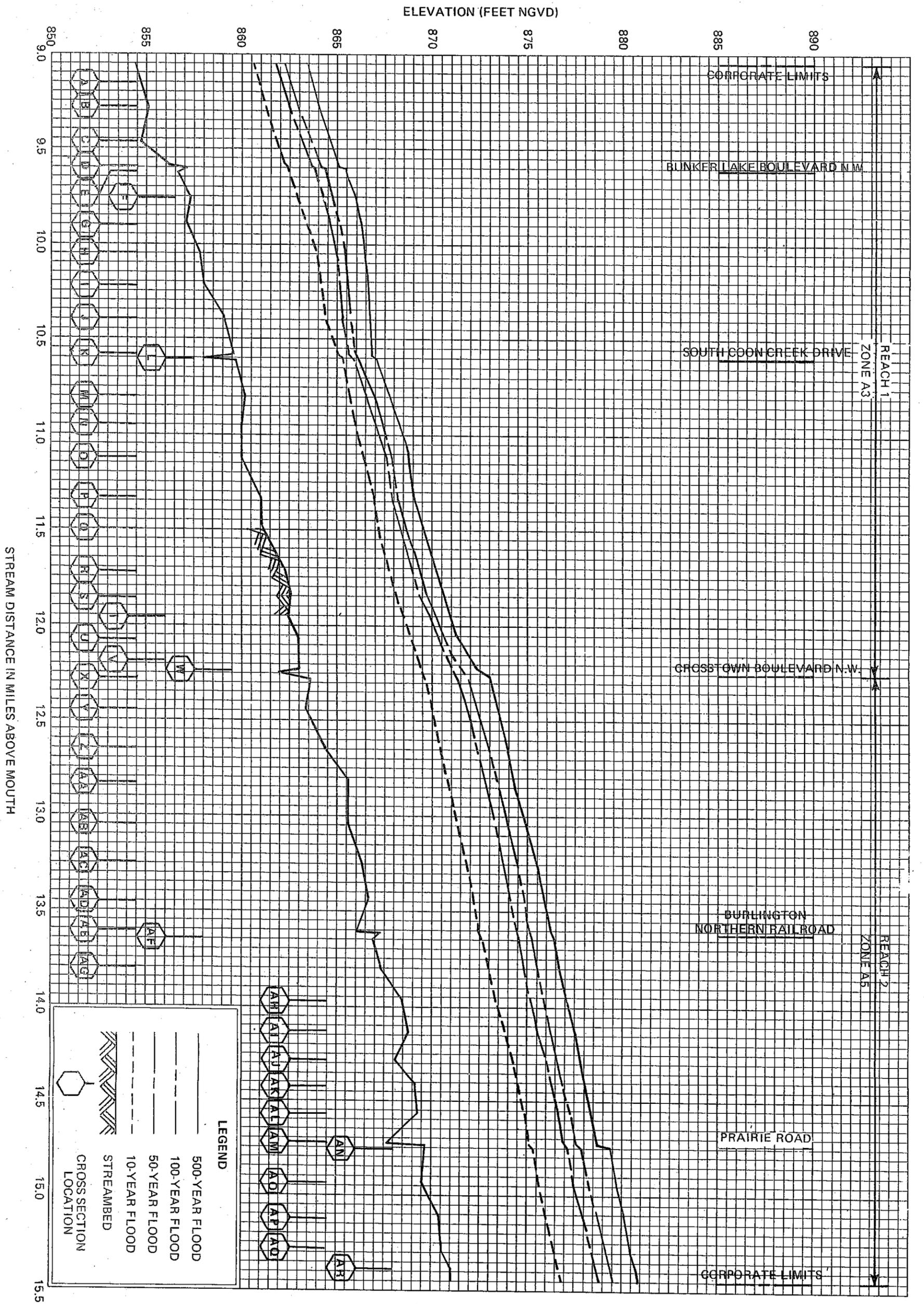
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF ANDOVER, MN
(ANOKA CO.)

FLOOD PROFILES

RUM RIVER

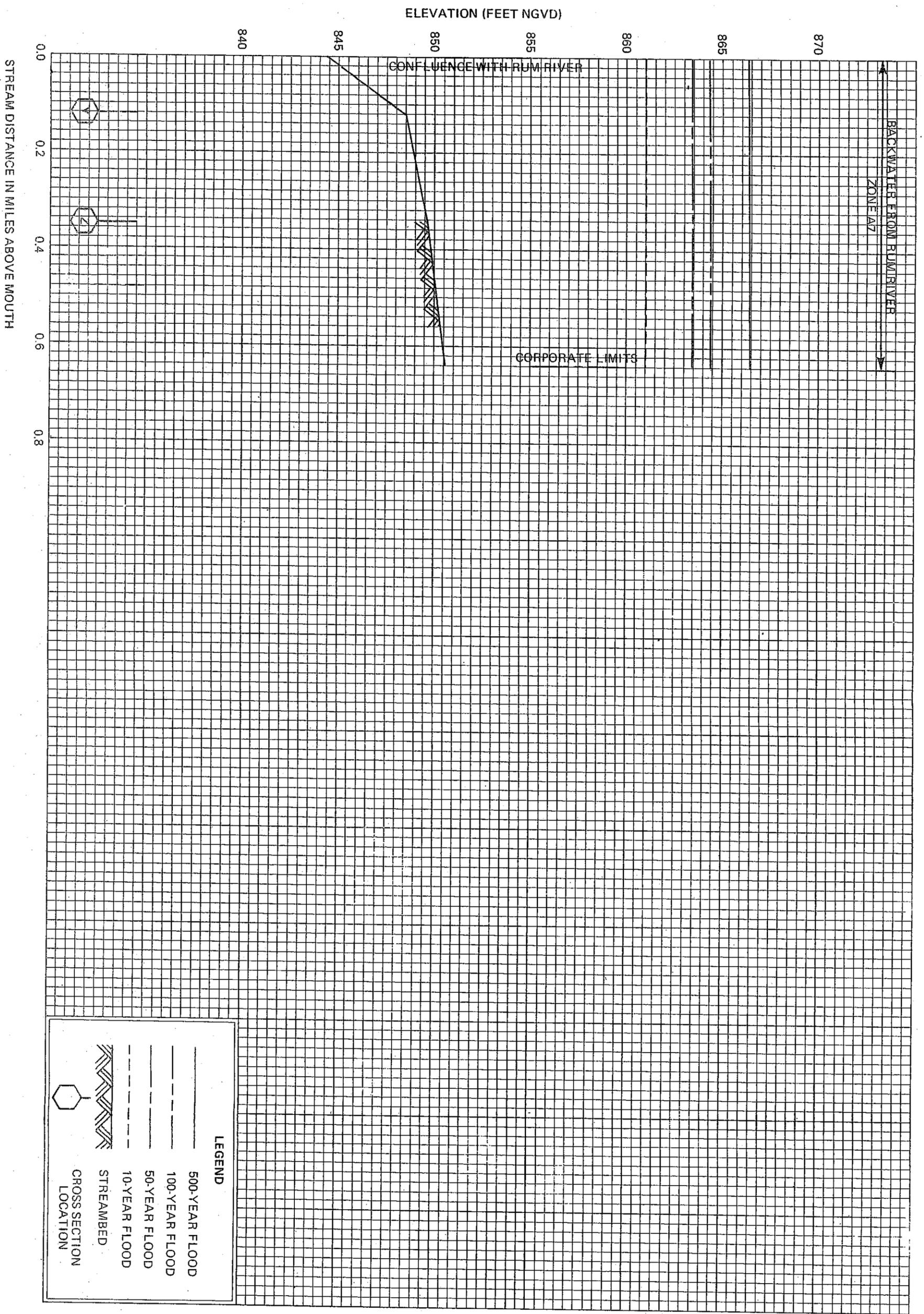
01P



DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
 Federal Insurance Administration
CITY OF ANDOVER, MN
 (ANOKA CO.)

FLOOD PROFILES
COON CREEK

02P



LEGEND

- 500-YEAR FLOOD
- - - 100-YEAR FLOOD
- - - 50-YEAR FLOOD
- - - 10-YEAR FLOOD
- ▨ STREAMBED
- CROSS SECTION LOCATION

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
 Federal Insurance Administration
CITY OF ANDOVER, MN
 (ANOKA CO.)

FLOOD PROFILES
CEDAR CREEK

**Appendix D
City Ordinances**

CHAPTER 1 FLOOD CONTROL REGULATIONS

14-1-1: STATUTORY AUTHORIZATION:

The legislature of the state has, in Minnesota statutes chapters 103F and 462, delegated the responsibility to local governmental units to adopt regulations designed to minimize flood losses. Therefore, the city council does ordain the provisions of this chapter. (Ord. 107, 2-21-1995)

14-1-2: FINDINGS OF FACT:

- A. The flood hazard areas of the city are subject to periodic inundation which results in potential loss of life, loss of property, health and safety hazards, disruption of commerce and government services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare.
- B. This chapter is based upon a reasonable method of analyzing flood hazards which is consistent with the standards established by the Minnesota department of natural resources. (Ord. 107, 2-21-1995)

14-1-3: PURPOSE:

It is the purpose of this chapter to promote the public health, safety, and general welfare and to minimize those losses described in subsection 14-1-2A of this chapter by provisions contained herein. (Ord. 107, 2-21-1995)

14-1-4: DEFINITIONS:

Unless specifically defined in this section, words or phrases used in this chapter shall be interpreted so as to give them the same meanings as they have in common usage and so as to give this chapter its most reasonable application.

ACCESSORY USE OR STRUCTURE: A use or structure on the same lot with, and of a nature customarily incidental and subordinate to, the principal use or structure.

BASEMENT: Any area of a structure, including crawlspaces, having its floor or base subgrade (below ground level) on all four (4) sides, regardless of the depth of the excavation, below ground level.

CONDITIONAL: A specific type of structure or land use listed in the official control that may be allowed but only after an in depth review procedure and with appropriate conditions or restrictions as provided in the official zoning controls or building codes and upon a finding that: a) certain conditions as detailed in the zoning ordinance exist; and b) the structure and/or land use conforms to the comprehensive plan and is compatible with the existing neighborhood.

EQUAL DEGREE OF ENCROACHMENT: A method of determining the location of floodway

boundaries so that floodplain lands on both sides of a stream are capable of conveying a proportionate share of flood flows.

FLOOD: A temporary increase in the flow or stage of a stream or in the stage of a lake that results in the inundation of normally dry areas.

FLOOD FREQUENCY: The frequency for which it is expected that a specific flood stage or discharge may be equaled or exceeded.

FLOOD FRINGE: That portion of the floodplain outside of the floodway. "Flood fringe" is synonymous with the term "floodway fringe" used in the flood insurance study for the city of Andover.

FLOODPLAIN: The beds proper and the areas adjoining a wetland, lake or watercourse which have been or hereafter may be covered by the regional flood.

FLOODPROOFING: A combination of structural provisions, changes, or adjustments to properties and structures subject to flooding, primarily for the reduction or elimination of flood damages.

FLOODWAY: The bed of a wetland or lake and the channel of the watercourse and those portions of the adjoining floodplain which are reasonably required to carry and discharge the regional flood.

OBSTRUCTION: Any dam, wall, wharf, embankment, levee, dike, pile, abutment, projection, excavation, channel modification, culvert, building, wire, fence, stockpile, refuse, fill, structure, or matter in, along, across, or projecting into any channel, watercourse, or regulatory floodplain which may impede, retard, or change the direction of the flow of water, either in itself or by catching or collecting debris carried by such water.

PRINCIPAL USE OR STRUCTURE: All uses or structures that are not accessory uses or structures.

REACH: An hydraulic engineering term to describe a longitudinal segment of a stream or river influenced by a natural or manmade obstruction. In an urban area, the segment of a stream or river between two (2) consecutive bridge crossings would most typically constitute a "reach".

REGIONAL FLOOD: A flood which is representative of large floods known to have occurred generally in Minnesota and reasonably characteristic of what can be expected to occur on an average frequency in the magnitude of the 100-year recurrence interval. "Regional flood" is synonymous with the term "base flood" used in the flood insurance study.

REGULATORY FLOOD PROTECTION ELEVATION: An elevation no lower than one foot (1') above the elevation of the regional flood plus any increases in flood elevation caused by encroachments on the floodplain that result from designation of a floodway.

STRUCTURE: Anything constructed or erected on the ground or attached to the ground or on site utilities, including, but not limited to, buildings, factories, sheds, detached garages, cabins, manufactured homes, travel trailers/vehicles not meeting the exemption criteria specified in subsection 14-1-12B2 of this chapter and other similar items.

VARIANCE: A modification of a specific permitted development standard required in an official control, including this chapter, to allow an alternative development standard not stated as acceptable in the official control, but only as applied to a particular property for the purpose of alleviating a hardship, practical difficulty or unique circumstances as defined and elaborated upon in the city's respective planning and zoning enabling legislation. (Ord. 107, 2-21-1995; amd. 2003 Code)

14-1-5: GENERAL PROVISIONS:

- A. **Jurisdiction:** This chapter shall apply to all lands within the jurisdiction of the city shown on the official zoning map and/or the attachments thereto as being located within the boundaries of the floodway, flood fringe, or general floodplain district.
- B. **Official Zoning Map:**
1. The official zoning map, together with all materials attached thereto, is hereby adopted by reference and declared to be a part of this chapter¹⁶¹. The attached materials shall include the following:
 - a. Flood insurance study for the city prepared by the federal insurance administration dated March 1980.
 - b. Flood boundary and floodway map, and flood insurance rate map dated September 30, 1980, and the amended map panels (10 of 15 and 15 of 15 dated July 18, 1983).
 - c. A copy of the federal emergency management agency (FEMA) approval letter dated January 17, 1995, (including appropriate attachments) referencing the amended floodway boundary revision (map panel 0015) along Coon Creek between cross sections "L" and "M" just upstream of the South Coon Creek Drive. (Ord. 107, 2-21-1995)
 2. The official zoning map shall be on file in the office of the zoning administrator. (Ord. 107, 2-21-1995; amd. 2003 Code)
- C. **Regulatory Flood Protection Elevation:** The regulatory flood protection elevation shall be an elevation no lower than one foot (1') above the elevation of the regional flood plus any increases in flood elevation caused by encroachments on the floodplain that result from designation of a floodway.
- D. **Interpretation:**
1. In their interpretation and application, the provisions of this chapter shall be held to be minimum requirements and shall be liberally construed in favor of the governing body and shall not be deemed a limitation or repeal of any other powers granted by state statutes.
 2. The boundaries of the zoning districts shall be determined by scaling distances on the official zoning map. Where interpretation is needed as to the exact location of the boundaries of the district as shown on the official zoning map, as for example where there appears to be a conflict between a mapped boundary and actual field conditions and there is a formal appeal of the decision of the zoning administrator, the board of adjustment shall

make the necessary interpretation. All decisions will be based on elevations on the regional (100-year) flood profile and other available technical data. Persons contesting the location of the district boundaries shall be given a reasonable opportunity to present their case to the board and to submit technical evidence.

- E. Abrogation And Greater Restrictions: No structure or land shall hereafter be used and no structure shall be located, extended, converted, or structurally altered without full compliance with the terms of this chapter and other applicable regulations which apply to uses within the jurisdiction of this chapter.
- F. Warning And Disclaimer Of Liability: This chapter does not imply that areas outside of the floodplain districts or land uses permitted within such districts will be free from flooding or flood damages. This chapter shall not create liability on the part of the city or any officer or employee thereof for any flood damages that result from reliance on this chapter or any administrative decision lawfully made thereunder.
- G. Severability: If any section, clause, provision, or portion of this chapter is adjudged unconstitutional or invalid by a court of competent jurisdiction, the remainder of this chapter shall not be affected thereby. (Ord. 107, 2-21-1995)

14-1-6: ESTABLISHMENT OF ZONING DISTRICTS:

- A. Districts Established: The floodplain areas within the jurisdiction of this chapter are hereby divided into three (3) districts: floodway district (FW), flood fringe district (FF), and general floodplain district (GFP).
 - 1. Floodway District: The floodway district shall include those areas designated as floodway on the floodway boundary and floodway map adopted in subsection 14-1-5B of this chapter.
 - 2. Flood Fringe District: The flood fringe district shall include those areas designated as floodway fringe on the flood boundary and floodway map adopted in subsection 14-1-5B of this chapter.
 - 3. General Floodplain District: The general floodplain district shall include those areas designated as unnumbered A zones on the flood insurance rate map adopted in subsection 14-1-5B of this chapter.
- B. Mapping Of District Boundaries: The boundaries of these districts shall be shown as an attachment to the official zoning map.
- C. General Requirements: No new structure or land shall hereafter be used and no structure shall be located, extended, converted, or structurally altered without full compliance with the terms of this chapter and other applicable regulations which apply to uses within the jurisdiction of this chapter. Within the floodway, flood fringe and general floodplain districts, all uses not listed as permitted uses or conditional uses in sections 14-1-7, 14-1-8 and 14-1-9 of this chapter, respectively, shall be prohibited. In addition, a caution is provided here that:
 - 1. New manufactured homes, replacement manufactured homes and certain travel trailers

and travel vehicles are subject to the general provisions of this chapter and specifically section 14-1-12 of this chapter;

2. Modifications, additions, structural alterations or repair after damage to existing nonconforming structures and nonconforming uses of structures or land are regulated by the general provisions of this chapter and specifically section 14-1-15; and

3. As built elevations for elevated or floodproofed structures must be certified by ground surveys, and floodproofing techniques must be designed and certified by a registered professional engineer or architect as stated in section 14-1-14 of this chapter. (Ord. 107, 2-21-1995)

14-1-7: FLOODWAY DISTRICT (FW):

A. Permitted Uses:

1. Uses Enumerated:

General farming, pasture, grazing, outdoor plant nurseries, horticulture, truck farming, forestry, sod farming, and wild crop harvesting.

Industrial-commercial loading areas, parking areas, and airport landing strips.

Private and public golf courses, tennis courts, driving ranges, archery ranges, picnic grounds, boat launching ramps, swimming areas, parks, wildlife and nature preserves, game farms, fish hatcheries, shooting preserves, target ranges, trap and skeet ranges, hunting and fishing areas, and single or multiple purpose recreational trails.

Residential lawns, gardens, parking areas, and play areas.

2. Standards:

a. The use shall have a low flood damage potential.

b. The use shall be permissible in the underlying zoning district.

c. The use shall not obstruct flood flows or increase flood elevations and shall not involve structures, fill, obstructions, excavations or storage of materials or equipment.

B. Conditional Uses:

1. Uses Enumerated:

Structures accessory to the uses listed in subsection A of this section and the uses listed below.

Extraction and storage of sand, gravel, and other materials.

Marinas, boat rentals, docks, piers, wharves, and water control structures.

Placement of fill.

Railroads, streets, bridges, utility transmission lines, and pipelines.

Storage yards for equipment, machinery, or materials.

Structural works for flood control such as levees, dikes and floodwalls constructed to any height where the intent is to protect individual structures and levees or dikes where the intent is to protect agricultural crops for a frequency flood event equal to or less than the 10-year frequency flood event.

Travel trailers and travel vehicles either on individual lots of record or in existing or new subdivisions or commercial or condominium type campgrounds, subject to the exemptions and provisions of subsection 14-1-12B of this chapter.

2. Standards:

a. Increase In Flood Stage Prohibited: No structure (temporary or permanent), fill (including fill for roads and levees), deposit, obstruction, storage of materials, or equipment, or other uses may be allowed as a conditional use that will cause any increase in the stage of the 100-year or regional flood or cause an increase in flood damages in the reaches affected.

b. Procedures And Standards: All floodway conditional uses shall be subject to the procedures and standards contained in subsection 14-1-14C of this chapter.

c. Permitted In Underlying Zoning District: The conditional use shall be permissible in the underlying zoning district.

d. Fill:

(1) Fill, dredge spoil and all similar materials deposited or stored in the floodplain shall be protected from erosion by vegetative cover, mulching, riprap or other acceptable method.

(2) Dredge spoil sites and sand and gravel operations shall not be allowed in the floodway unless a long term site development plan is submitted which includes an erosion/sedimentation prevention element to the plan.

(3) As an alternative, and consistent with subsection B2d(2) of this section, dredge spoil disposal and sand and gravel operations may allow temporary, on site storage of fill or other materials which would have caused an increase to the stage of the 100-year or regional flood but only after the governing body has received an appropriate plan which assures the removal of the materials from the floodway based upon the flood warning time available. The conditional use permit must be title registered with the property in the office of the county recorder.

e. Accessory Structures:

(1) Accessory structures shall not be designed for human habitation.

(2) Accessory structures, if permitted, shall be constructed and placed on the building site so as to offer the minimum obstruction to the flow of floodwaters.

(A) Whenever possible, structures shall be constructed with the longitudinal axis parallel to the direction of flood flow; and

(B) So far as practicable, structures shall be placed approximately on the same flood flow lines as those of adjoining structures.

(3) Accessory structures shall be elevated on fill or structurally dry floodproofed in accordance with FP-1 or FP-2 floodproofing classifications in the state building code. As an alternative, an accessory structure may be floodproofed to the FP-3 or FP-4 floodproofing classification in the state building code, provided the accessory structure constitutes a minimal investment, does not exceed five hundred (500) square feet in size, and for a detached garage, the detached garage must be used solely for parking of vehicles and limited storage. All floodproofed accessory structures must meet the following additional standards, as appropriate:

(A) The structure must be adequately anchored to prevent flotation, collapse or lateral movement of the structure and shall be designed to equalize hydrostatic flood forces on exterior walls; and

(B) Any mechanical and utility equipment in a structure must be elevated to or above the regulatory flood protection elevation or properly floodproofed.

f. Storage Of Materials And Equipment:

(1) The storage or processing of materials that are, in time of flooding, flammable, explosive, or potentially injurious to human, animal, or plant life is prohibited.

(2) Storage of other materials or equipment may be allowed if readily removable from the area within the time available after a flood warning and in accordance with a plan approved by the governing body.

g. Changes In Waterways: Structural works for flood control that will change the course, current, or cross section of protected wetlands or public waters shall be subject to the provisions of Minnesota statutes chapter 103G. Communitywide structural works for flood control intended to remove areas from the regulatory floodplain shall not be allowed in the floodway.

h. Levees, Dikes And Floodwalls: A levee, dike or floodwall constructed in the floodway shall not cause an increase to the 100-year or regional flood, and the technical analysis must assume equal conveyance or storage loss on both sides of a stream. (Ord. 107, 2-21-1995)

14-1-8: FLOOD FRINGE DISTRICT (FF):

A. Permitted Uses:

1. Uses Enumerated: Permitted uses shall be those uses of land or structures listed as

permitted uses in the underlying zoning use district(s). All permitted uses shall comply with the standards for flood fringe permitted uses listed in subsection A2 of this section and the standards for all flood fringe uses listed in subsection C of this section.

2. Standards:

- a. All structures, including accessory structures, must be elevated on fill so that the lowest floor, including basement floor, is at or above the regulatory flood protection elevation. The finished fill elevation for structures shall be no lower than one foot (1') below the regulatory flood protection elevation, and the fill shall extend at such elevation at least fifteen feet (15') beyond the limits of any structure erected thereon.
- b. As an alternative to elevation on fill, accessory structures that constitute a minimal investment and that do not exceed five hundred (500) square feet for the outside dimension at ground level may be internally floodproofed in accordance with subsection 14-1-7B2e(3) of this chapter.
- c. The cumulative placement of fill where at any one time in excess of one thousand (1,000) cubic yards of fill is located on the parcel shall be allowable only as a conditional use, unless said fill is specifically intended to elevate a structure in accordance with subsection A2a of this section.
- d. The storage of any materials or equipment shall be elevated on fill to the regulatory flood protection elevation.
- e. The provisions of subsection C of this section shall apply.

B. Conditional Uses:

1. **Uses Enumerated:** Any structure that is not elevated on fill or floodproofed in accordance with subsections A2a and A2b of this section or any use of land that does not comply with the standards in subsections A2c and A2d of this section shall only be allowable as a conditional use. An application for a conditional use shall be subject to the standards, criteria and evaluation procedures specified in subsections B2 and C of this section and subsection 14-1-14C of this chapter.

2. Standards:

a. Alternative Elevation Methods:

(1) Alternative elevation methods other than the use of fill may be utilized to elevate a structure's lowest floor above the regulatory flood protection elevation. These alternative methods may include the use of stilts, pilings, parallel walls, etc., or abovegrade, enclosed areas such as crawlspaces or tuckunder garages. The base or floor of an enclosed area shall be considered abovegrade and not a structure's basement or lowest floor, if: a) the enclosed area is abovegrade on at least one side of the structure; b) it is designed to internally flood and is constructed with flood resistant materials; c) it is used solely for the parking of vehicles, building access or storage.

(2) The above noted alternative elevation methods are subject to the following

additional standards:

(A) Design And Certification: The structure's design and as built condition must be certified by a registered professional engineer or architect as being in compliance with the general design standards of the state building code and, specifically, that all electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities must be at or above the regulatory flood protection elevation or designed to prevent floodwater from entering or accumulating within these components during times of flooding.

(B) Specific Standards For Abovegrade, Enclosed Areas: Abovegrade, fully enclosed areas such as crawlspaces or tuck under garages must be designed to internally flood, and the design plans must stipulate:

i. The minimum area of openings in the walls where internal flooding is to be used as a floodproofing technique. When openings are placed in a structure's walls to provide for entry of floodwaters to equalize pressures, the bottom of all openings shall be no higher than one foot (1') above grade. Openings may be equipped with screens, louvers, valves, or other coverings or devices; provided, that they permit the automatic entry and exit of floodwaters.

ii. That the enclosed area will be designed of flood resistant materials in accordance with the FP-3 or FP-4 classifications in the state building code and shall be used solely for building access, parking of vehicles or storage.

b. Basements: "Basements", as defined by section 14-1-4 of this chapter, shall be subject to the following:

(1) Residential basement construction shall not be allowed below the regulatory flood protection elevation.

(2) Nonresidential basements may be allowed below the regulatory flood protection elevation, provided the basement is structurally dry floodproofed in accordance with subsection B2c of this section.

c. Nonresidential Structures: All areas of nonresidential structures, including basements, to be placed below the regulatory flood protection elevation shall be floodproofed in accordance with the structurally dry floodproofing classifications in the state building code. Structurally dry floodproofing must meet the FP-1 or FP-2 floodproofing classification in the state building code, and this shall require making the structure watertight with the walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrodynamic loads and the effects of buoyancy. Structures floodproofed to the FP-3 or FP-4 classification shall not be permitted.

d. Fill; Erosion/Sedimentation Control Plan: When, at any one time, more than one thousand (1,000) cubic yards of fill or other similar material is located on a parcel for such activities as on site storage, landscaping, sand and gravel operations, roads, dredge spoil disposal or construction of flood control works, an erosion/sedimentation control plan must be submitted unless the city is enforcing a state approved shoreland management ordinance ¹⁶². In the absence of a state approved shoreland ordinance,

the plan must clearly specify methods to be used to stabilize the fill on site for a flood event at a minimum of the 100-year regional flood event. The plan must be prepared and certified by a registered professional engineer or other qualified individual acceptable to the city. The plan may incorporate alternative procedures for removal of the material from the floodplain if adequate flood warning time exists.

e. Storage Of Materials And Equipment:

(1) The storage or processing of materials that are, in time of flooding, flammable, explosive, or potentially injurious to human, animal, or plant life is prohibited.

(2) Storage of other materials or equipment may be allowed if readily removable from the area within the time available after a flood warning and in accordance with a plan approved by the city.

f. Other Standards: The provisions of subsection C of this section shall also apply.

C. Standards For All Flood Fringe Uses:

1. Access: All new principal structures must have vehicular access at or above an elevation not more than two feet (2') below the regulatory flood protection elevation. If a variance to this requirement is granted, the board of adjustment must specify limitations on the period of use or occupancy of the structure for the times of flooding and only after determining that adequate flood warning time and local flood emergency response procedures exist.

2. Commercial Uses: Accessory land uses, such as yards, railroad tracks, and parking lots, may be at elevations lower than the regulatory protection elevation. However, a permit for such facilities to be used by the employees or the general public shall not be granted in the absence of a flood warning system that provides adequate time for evacuation if the area would inundate to a depth greater than two feet (2') or be subject to flood velocities greater than four feet (4') per second upon occurrence of the regional flood.

3. Manufacturing And Industrial Uses: Measures shall be taken to minimize interference with normal plant operations especially along streams having protracted flood durations. Certain accessory land uses such as yards and parking lots may be at lower elevations subject to requirements set out in subsection C2 of this section. In considering permit applications, due consideration shall be given to needs of an industry whose business requires that it be located in floodplain areas.

4. Fill: Fill shall be properly compacted and the slopes shall be properly protected by the use of riprap, vegetative cover or other acceptable method. The federal emergency management agency (FEMA) has established criteria for removing the special flood hazard area designation for certain structures properly elevated on fill above the 100-year flood elevation. FEMA requirements incorporate specific fill compaction and side slope protection standards for multistructure or multilot developments. These standards should be investigated prior to the initiation of site preparation if a change of special flood hazard area designation will be requested.

5. Encroachment Limit: Floodplain developments shall not adversely affect the hydraulic capacity of the channel and adjoining floodplain of any tributary watercourse or drainage

system where a floodway or other encroachment limit has not been specified on the official zoning map.

6. Travel Trailers And Travel Vehicles: Standards for travel trailers and travel vehicles are contained in subsection 14-1-12B of this chapter.

7. Manufactured Homes: All manufactured homes must be securely anchored to an adequately anchored foundation system that resists flotation, collapse and lateral movement. Methods of anchoring may include, but are not limited to, use of over the top or frame ties to ground anchors. This requirement is in addition to applicable state or local anchoring requirements for resisting wind forces. (Ord. 107, 2-21-1995)

14-1-9: GENERAL FLOODPLAIN DISTRICT:

A. Permitted Uses:

1. Permitted uses shall include those uses permitted by subsection 14-1-7A1 of this chapter.

2. All other uses shall be subject to the floodway/flood fringe evaluation criteria pursuant to section B of this section. Section 14-1-7 of this chapter shall apply if the proposed use is in the floodway district, and section 14-1-8 of this chapter shall apply if the proposed use is in the flood fringe district.

B. Procedures For Floodway And Flood Fringe Determinations Within General Floodplain District:

1. Upon receipt of an application for a conditional use permit for a use within the general floodplain district, the applicant shall be required to furnish such of the following information as is deemed necessary by the zoning administrator for the determination of the regulatory flood protection elevation and whether the proposed use is within the floodway or flood fringe district:

a. A typical valley cross section showing the channel of the stream, elevation of land areas adjoining each side of the channel, cross sectional areas to be occupied by the proposed development, and high water information.

b. Plan (surface view) showing elevations or contours of the ground; pertinent structure, fill, or storage elevations; size, location and spatial arrangement of all proposed and existing structures on the site; location and elevations of streets; photographs showing existing land uses and vegetation upstream and downstream; and soil type.

c. Profile showing the slope of the bottom of the channel or flow line of the stream for at least five hundred feet (500') in either direction from the proposed development.

2. The applicant shall be responsible to submit one copy of the above information to a designated engineer or other expert person or agency for technical assistance in determining whether the proposed use is in the floodway or flood fringe and to determine the regulatory flood protection elevation. Procedures consistent with Minnesota regulations 1983, parts 6120.5000 - 6120.6200 shall be followed in this expert evaluation. The

designated engineer or expert is strongly encouraged to discuss the proposed technical evaluation methodology with the respective department of natural resources' area hydrologist prior to commencing the analysis. The designated engineer or expert shall:

- a. Estimate the peak discharge of the regional flood.
- b. Calculate the water surface profile of the regional flood based upon a hydraulic analysis of the stream channel and overbank areas.
- c. Compute the floodway necessary to convey the regional flood without increasing flood stages more than five-tenths foot (0.5'). A lesser stage increase than five-tenths foot (0.5') shall be required if, as a result of the additional stage increase, increased flood damage would result. An equal degree of encroachment on both sides of the stream within the reach shall be assumed in computing floodway boundaries.

3. The zoning administrator shall present the technical evaluation and findings of the designated engineer or expert to the planning and zoning commission. The planning and zoning commission must formally accept the technical evaluation and the recommended floodway and/or flood fringe district boundary or deny the permit application. The city council, prior to official action, may submit the application and all supporting data and analyses to the federal emergency management agency, the department of natural resources or the planning and zoning commission for review or comment. Once the floodway and flood fringe boundaries have been determined, the governing body shall refer the matter back to the zoning administrator who shall process the permit application consistent with the applicable provisions of sections 14-1-7 and 14-1-8 of this chapter. (Ord. 107, 2-21-1995)

14-1-10: SUBDIVISIONS:

- A. Review Criteria: No land shall be subdivided which is held unsuitable by the city council for reason of flooding, inadequate drainage, water supply or sewage treatment facilities. All lots within the floodplain districts shall contain a building site at or above the regulatory flood protection elevation. All subdivisions shall have water and sewage disposal facilities that comply with the provisions of any city ordinance and have road access both to the subdivision and to the individual building sites no lower than two feet (2') below the regulatory flood protection elevation. For all subdivisions in the floodplain, the floodway and flood fringe boundaries, the regulatory flood protection elevation and the required elevation of all access roads shall be clearly labeled on all required subdivision and platting drawing documents.
- B. Floodway/Fringe Determinations In General Floodplain District: In the general floodplain district, applicants shall provide the information required in subsection 14-1-9B of this section to determine the 100-year flood elevation, the floodway and flood fringe district boundaries and the regulatory flood protection elevation for the subdivision site.
- C. Removal Of Special Flood Hazard Area Designation: The federal emergency management agency (FEMA) has established criteria for removing the special flood hazard area designation for certain structures properly elevated on fill above the 100-year flood elevation. FEMA's requirements incorporate specific fill compaction and side slope protection standards for multistructure or multilot developments. These standards should

be investigated prior to the initiation of site preparation if a change of special flood hazard area designation will be requested. (Ord. 107, 2-21-1995)

14-1-11: UTILITIES AND PUBLIC TRANSPORTATION FACILITIES:

A. Public Utilities: All public utilities and facilities such as gas, electrical, sewer, and water supply systems to be located in the floodplain shall be floodproofed in accordance with the state building code or elevated to above the regulatory flood protection elevation.

B. Public Transportation Facilities: Railroad tracks, roads, and bridges to be located within the floodway district shall comply with subsection 14-1-7B of this chapter. Elevation to the regulatory flood protection elevation shall be provided where failure or interruption of these transportation facilities would result in danger to the public health or safety or where such facilities are essential to the orderly functioning of the area. Minor or auxiliary roads or railroads may be constructed at a lower elevation where failure or interruption of transportation services would not endanger the public health or safety.

C. On Site Sewage Treatment And Water Supply Systems ¹⁶³ :

1. Where public utilities are not provided:

a. On site water supply systems must be designed to minimize or eliminate infiltration of floodwaters into the systems; and

b. New or replacement on site sewage treatment systems must be designed to minimize or eliminate infiltration of floodwaters into the systems and discharge from the systems into floodwaters, and they shall not be subject to impairment or contamination during times of flooding.

2. Any sewage treatment system designed in accordance with the current statewide standards for on site sewage treatment systems shall be determined to be in compliance with this section. (Ord. 107, 2-21-1995)

14-1-12: MANUFACTURED HOMES AND PARKS; TRAVEL TRAILERS AND TRAVEL VEHICLES:

A. Manufactured Homes And Manufactured Home Parks:

1. Manufactured Home Parks: New manufactured home parks and expansions to existing manufactured home parks shall be subject to the provisions placed on subdivisions by section 14-1-10 of this chapter. (Ord. 107, 2-21-1995)

2. Manufactured Homes:

a. The placement of new or replacement of manufactured homes in existing manufactured home parks that are located in floodplain districts will be treated as new structures and may be placed only if elevated in compliance with section 14-1-8 of this chapter. If vehicular road access for preexisting manufactured home parks is not provided in accordance with subsection 14-1-8C1 of this chapter, then replacement

manufactured homes will not be allowed until the property owner develops a flood warning emergency plan acceptable to the city. (Ord. 107, 2-21-1995; amd. 2003 Code)

b. All manufactured homes must be securely anchored to an adequately anchored foundation system that resists flotation, collapse and lateral movement. Methods of anchoring may include, but are not limited to, use of over the top or frame ties to ground anchors. This requirement is in addition to applicable state or local anchoring requirements for resisting wind forces.

B. Travel Trailers And Travel Vehicles:

1. Application Of Provisions: Travel trailers and travel vehicles that do not meet the exemption criteria in subsection B2a of this section, shall be subject to the provisions of this chapter and as specifically spelled out in subsections B2c and B2d of this section.

2. Exemptions:

a. Travel trailers and travel vehicles are exempt from the provisions of this chapter if they are placed in any area listed in subsection B2b of this section, and further, if they meet the following criteria:

(1) Have current licenses required for highway use. (Ord. 107, 2-21-1995)

(2) Are highway ready, meaning on wheels. They are attached to the site only by quick disconnect type utilities commonly used in campgrounds and trailer parks, and the travel trailer or travel vehicle has no permanent structural type additions attached to it. (Ord. 107, 2-21-1995; amd. 2003 Code)

(3) The travel trailer or travel vehicle and associated use must be permissible in any preexisting, underlying zoning use district.

b. Areas exempted for placement of travel/recreational vehicles:

(1) Individual lots or parcels of record.

(2) Existing commercial recreational vehicle parks or campgrounds.

(3) Existing condominium type associations.

c. Travel trailers and travel vehicles exempted in subsection B2a of this section lose this exemption when development occurs on the parcel exceeding five hundred dollars (\$500.00) for a structural addition to the travel trailer/travel vehicle or an accessory structure such as a garage or storage building. The travel trailer/travel vehicle and all additions and accessory structures will then be treated as a new structure and shall be subject to the elevation/floodproofing requirements and the use of land restrictions specified in sections 14-1-7 and 14-1-8 of this chapter.

d. New commercial travel trailer or travel vehicle parks or campgrounds and new residential type subdivisions and condominium associations and the expansion of any existing similar use exceeding five (5) units or dwelling sites shall be subject to the

following:

(1) Any new or replacement travel trailer or travel vehicle will be allowed in the floodway or flood fringe districts, provided said trailer or vehicle and its contents are placed on fill above the regulatory flood protection elevation and properly elevated road access to the site exists in accordance with subsection 14-1-8C1 of this chapter. No fill placed in the floodway to meet the requirements of this subsection shall increase flood stages of the 100-year or regional flood.

(2) All new or replacement travel trailers or travel vehicles not meeting the criteria of subsection B2d(1) of this section may, as an alternative, be allowed as a conditional use if in accordance with the following provisions and the provisions of subsection 14-1-14C of this chapter. The applicant must submit an emergency plan for the safe evacuation of all vehicles and people during the 100-year flood. Said plan shall be prepared by a registered engineer or other qualified individual and shall demonstrate that adequate time and personnel exist to carry out the evacuation. All attendant sewage and water facilities for new or replacement travel trailers or other recreational vehicles must be protected or constructed so as not to be impaired or contaminated during times of flooding in accordance with subsection 14-1-11C of this chapter. (Ord. 107, 2-21-1995)

14-1-13: ADMINISTRATION AND ENFORCEMENT OFFICIALS:

A. Zoning Administrator: A zoning administrator designated by the city council shall administer and enforce this chapter. If he/she finds a violation of the provisions of this chapter, he/she shall notify the person responsible for such violation in accordance with the procedures stated in section 14-1-17 of this chapter.

B. Board Of Adjustment:

1. Board Established: A board of adjustment is hereby established.

2. Rules: The board of adjustment shall adopt rules for the conduct of business and may exercise all of the powers conferred on such boards by state law.

3. Appeals: The board shall hear and decide appeals where it is alleged there is error in any order, requirement, decision, or determination made by an administrative official in the enforcement or administration of this chapter.

4. Variances:

a. The board may authorize, upon appeal in specific cases, such variance from the terms of this chapter as will not be contrary to the public interest and only for those circumstances such as hardship, practical difficulties or circumstances unique to the property under consideration, as provided for in the respective enabling legislation for planning and zoning for cities or counties as appropriate. In the granting of such variance, the board of adjustment shall clearly identify in writing the specific conditions that existed consistent with the criteria specified in the respective enabling legislation which justified the granting of the variance. No variance shall have the effect of allowing in any district uses prohibited in that district, permit a lower degree of flood protection

than the regulatory flood protection elevation for the particular area, or permit standards lower than those required by state law.

b. The zoning administrator shall notify the applicant for a variance that: 1) The issuance of a variance to construct a structure below the base flood level will result in increased premium rates for flood insurance up to amounts as high as twenty five dollars (\$25.00) for one hundred dollars (\$100.00) of insurance coverage; and 2) such construction below the 100-year or regional flood level increases risks to life and property. Such notification shall be maintained with a record of all variances actions. The city shall maintain a record of all variance actions, including justification for their issuance, and report such variances issued in its annual or biennial report submitted to the administrator of the national flood insurance program. (Ord. 107, 2-21-1995)

5. Hearings: Upon filing with the board of adjustment of an appeal from a decision of the zoning administrator, or an application for a variance, the board shall fix a reasonable time for a hearing and give due notice to the parties in interest. The board shall submit by mail to the commissioner of natural resources of the state a copy of the application for proposed variances sufficiently in advance so that the commissioner will receive at least ten (10) days' notice of the hearing.

6. Decisions: The board shall arrive at a decision on such appeal or variance within sixty (60) days. In passing upon an appeal, the board may, so long as such action is in conformity with the provisions of this chapter, reverse or affirm, wholly or in part, or modify the order, requirement, decision or determination of the zoning administrator or other public official. It shall make its decision in writing setting forth the findings of fact and the reasons for its decisions. In granting a variance, the board may prescribe appropriate conditions and safeguards such as those specified in subsection 14-1-14C5 of this chapter, which are in conformity with the purposes of this chapter. Violations of such conditions and safeguards, when made a part of the terms under which the variance is granted, shall be deemed a violation of this chapter punishable under section 14-1-17. A copy of all decisions granting variances shall be forwarded by mail to the commissioner of natural resources of the state within ten (10) days of such action.

7. Appeals From Decisions: Appeals from any decision of the board may be made and as specified in the city's official controls ¹⁶⁴ and Minnesota statutes. (Ord. 107, 2-21-1995; amd. 2003 Code)

14-1-14: PERMITS AND CERTIFICATES ¹⁶⁵ :

A. Use Permit:

1. Permit Required: A use permit issued by the zoning administrator in conformity with the provisions of this chapter shall be secured: prior to the erection, addition, or alteration of any building, structure, or portion thereof; prior to the use or change of use of a building, structure, or land; prior to the change or extension of a nonconforming use; and prior to the placement of fill, excavation of materials, or the storage of materials or equipment within the floodplain.

2. Application For Permit: Application for a use permit shall be made in duplicate to the

zoning administrator on forms furnished by the zoning administrator and shall include the following where applicable: plans in duplicate drawn to scale, showing the nature, location, dimensions, and elevations of the lot; existing or proposed structures, fill, or storage of materials; and the location of the foregoing in relation to the stream channel.

3. State And Federal Permits: Prior to granting a use permit or processing an application for a conditional use permit or variance, the zoning administrator shall determine that the applicant has obtained all necessary state and federal permits.

4. Other Certificates: The applicant shall be required to submit certification by a registered professional engineer, registered architect, or registered land surveyor that the finished fill and building elevations were accomplished in compliance with the provisions of this chapter. Floodproofing measures shall be certified by a registered professional engineer or registered architect.

B. Certificate Of Zoning Compliance: It shall be unlawful to use, occupy, or permit the use or occupancy of any building or premises or part thereof hereafter created, erected, changed, converted, altered, or enlarged in its use or structure until a certificate of zoning compliance shall have been issued by the zoning administrator stating that the use of the building or land conforms to the requirements of this chapter. (Ord. 107, 2-21-1995)

C. Conditional Use Permit:

1. General Provisions:

a. Applications shall be submitted to the zoning administrator who shall forward the application to the planning and zoning commission for consideration. The planning and zoning commission shall hear and forward recommendations regarding applications to the city council for conditional uses permissible under this chapter. Upon filing with the zoning administrator an application for a conditional use permit, the zoning administrator shall submit by mail to the commissioner of natural resources of the state a copy of the application for proposed conditional use sufficiently in advance so that the commissioner will receive at least ten (10) days' notice of the hearing.

b. The city council shall arrive at a decision on a conditional use within sixty (60) days. In granting a conditional use permit, the city council shall prescribe appropriate conditions and safeguards, in addition to those specified in subsection C5 of this section, which are in conformity with the purposes of this chapter. Violations of such conditions and safeguards, when made a part of the terms under which the conditional use permit is granted, shall be deemed a violation of this chapter punishable under section 14-1-17. A copy of all decisions granting conditional use permits shall be forwarded by mail to the commissioner of natural resources of the state within ten (10) days of such action. (Ord. 107, 2-21-1995; amd. 2003 Code)

2. Procedures: Procedures to be followed by the city council in passing on conditional use permit applications within all floodplain districts shall be as follows:

a. Require the applicant to furnish such of the following information and additional information as deemed necessary by the planning and zoning commission for determining the suitability of the particular site for the proposed use:

(1) Plans in triplicate drawn to scale showing the nature, location, dimensions, and elevations of the lot, existing or proposed structures, fill, storage of materials, floodproofing measures, and the relationship of the above to the location of the stream channel.

(2) Specifications for building construction and materials, floodproofing, filling, dredging, grading, channel improvement, storage of materials, water supply and sanitary facilities.

b. Transmit one copy of the information described in subsection C2a(1) of this section to a designated engineer or other expert person or agency for technical assistance, where necessary, in evaluating the proposed project in relation to flood heights and velocities, the seriousness of flood damage to the use, the adequacy of the plans for protection, and other technical matters.

c. Based upon the technical evaluation of the designated engineer or expert, the planning and zoning commission shall determine the specific flood hazard at the site and evaluate the suitability of the proposed use in relation to the flood hazard.

3. Factors Considered For Approval: In passing upon conditional use applications, the city council shall consider all relevant factors specified in other sections of this chapter, and:

a. The danger of life and property due to increased flood heights or velocities caused by encroachments.

b. The danger that materials may be swept onto other lands or downstream to the injury of others.

c. The proposed water supply and sanitation systems and the ability of these systems to prevent disease, contamination, and unsanitary conditions.

d. The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner.

e. The importance of the services provided by the proposed facility to the community.

f. The requirements of the facility for a waterfront location.

g. The availability of alternative locations not subject to flooding for the proposed use.

h. The compatibility of the proposed use with existing development and development anticipated in the foreseeable future.

i. The relationship of the proposed use to the comprehensive plan and floodplain management program for the area.

j. The safety of access to the property in times of flood for ordinary and emergency vehicles.

k. The expected heights, velocity, duration, rate of rise, and sediment transport of the

floodwaters expected at the site.

I. Such other factors which are relevant to the purposes of this chapter.

4. Time For Acting On Application: The city council shall act on an application in the manner described above within sixty (60) days from receiving the application; except, that where additional information is required pursuant to subsections C2 and C3 of this section, the city council shall render a written decision within sixty (60) days from the receipt of such additional information.

5. Conditions Attached To Conditional Use Permits: Upon consideration of the factors listed above and the purposes of this chapter, the city council shall attach such conditions to the granting of conditional use permits as it deems necessary to fulfill the purposes of this chapter. Such conditions may include, but are not limited to, the following:

a. Modification of waste disposal and water supply facilities.

b. Limitations on period of use, occupancy, and operation.

c. Imposition of operational controls, sureties, and deed restrictions.

d. Requirements for construction of channel modifications, dikes, levees, and other protective measures.

e. Floodproofing measures, in accordance with the state building code and this chapter. The applicant shall submit a plan or document certified by a registered professional engineer or architect that the floodproofing measures are consistent with the regulatory flood protection elevation and associated flood factors for the particular area.

D. Construction And Use To Comply: Use permits, conditional use permits, or certificates of zoning compliance issued on the basis of approved plans and applications authorize only the use, arrangement, and construction set forth in such approved plans and applications and no other use, arrangement, or construction. Any use, arrangement, or construction at variance with that authorized shall be deemed a violation of this chapter and punishable as provided by section 14-1-17 of this chapter. (Ord. 107, 2-21-1995)

E. Record Of First Floor Elevation: The building official shall maintain a record of the elevation of the first floor (including basement) of all new structures or additions to existing structures in the floodplain districts. He/she shall also maintain a record of the elevations to which structures or additions to structures are floodproofed. (Ord. 107, 2-21-1995; amd. 2003 Code)

14-1-15: NONCONFORMING USES:

A structure or the use of a structure or premises which was lawful before the passage or amendment of this chapter but which is not in conformity with the provisions of this chapter may be continued subject to the following conditions:

A. Expansions And Alterations:

1. No such use shall be expanded, changed, enlarged, or altered in a way which increases its nonconformity.
 2. Any alteration or addition to any nonconforming structure or nonconforming use which would result in increasing the flood damage potential of that structure or use shall be protected to the regulatory flood protection elevation in accordance with any of the elevation on fill or floodproofing techniques (i.e., FP-1 through FP-4 floodproofing classifications) allowable in the state building code, except as further restricted in subsection A3 of this section.
 3. The cost of any structural alterations or additions to any nonconforming structure over the life of the structure shall not exceed fifty percent (50%) of the market value of the structure unless the conditions of this section are satisfied. The cost of all structural alterations and additions constructed since the adoption of the city's initial floodplain controls must be calculated into today's current cost which would include all costs such as construction materials and a reasonable cost placed on all manpower and labor. If the current cost of all previous and proposed alterations and additions exceeds fifty percent (50%) of the current market value of the structure, then the structure must meet the standards of section 14-1-7 or 14-1-8 of this chapter for new structures depending upon whether the structure is in the floodway or flood fringe, respectively.
- B. Discontinuance Of Use: If any nonconforming use is discontinued for twelve (12) consecutive months, any future use of the building or premises shall conform to this chapter. The assessor shall notify the zoning administrator in writing of instances of nonconforming uses which have been discontinued for a period of twelve (12) months.
- C. Damages: If any nonconforming use is destroyed by any means, including floods, to an extent of fifty percent (50%) or more of its market value at the time of destruction, it shall not be reconstructed except in conformity with the provisions of this chapter. The applicable provisions for establishing new uses or new structures in section 14-1-7, 14-1-8 or 14-1-9 of this chapter will apply depending upon whether the use or structure is in the floodway, flood fringe or general floodplain district, respectively. (Ord. 107, 2-21-1995)

14-1-16: AMENDMENTS:

- A. The floodplain designation on the official zoning map shall not be removed from floodplain areas unless it can be shown that the designation is in error or that the area has been filled to or above the elevation of the regional flood and is contiguous to land outside the floodplain. Special exceptions to this rule may be permitted by the commissioner of natural resources of the state if he determines that, through other measures, lands are adequately protected for the intended use.
- B. All amendments to this chapter, including amendments to the official zoning map, must be submitted to and approved by the commissioner of natural resources of the state prior to adoption. Changes in the official zoning map must meet the federal emergency management agency's (FEMA) technical conditions and criteria and must receive prior FEMA approval before adoption. The commissioner of natural resources must be given ten (10) days' written notice of all hearings to consider an amendment to this chapter, and said notice shall include a draft of the chapter amendment or technical study under consideration. (Ord. 107, 2-21-1995; amd. 2003 Code)

14-1-17: VIOLATION; PENALTIES:

- Violation of the provisions of this chapter or failure to comply with any of its requirements (including violations of conditions and safeguards established in connection with grants of variances or conditional uses) shall constitute a misdemeanor and, upon conviction thereof, shall be punished as defined by law. Nothing herein contained shall prevent the city from taking such other lawful action as is necessary to prevent or remedy any violation. Such actions may include, but are not limited to:
- A. In responding to a suspect violation, the zoning administrator and the city council may utilize the full array of enforcement actions available to it including, but not limited to, prosecution and fines, injunctions, after the fact permits, orders for corrective measures or a request to the national flood insurance program for denial of flood insurance availability to the guilty party. The city must act in good faith to enforce these official controls and to correct violations to the extent possible so as not to jeopardize its eligibility in the national flood insurance program.
 - B. When a violation is either discovered by or brought to the attention of the zoning administrator, the zoning administrator shall immediately investigate the situation and document the nature and extent of the violation of the official control. As soon as it is reasonably possible, this information will be submitted to the appropriate state department of natural resources and federal emergency management agency regional office along with the city's plan of action to correct the violation to the degree possible.
 - C. The zoning administrator shall notify the suspected party of the requirements of this chapter and all other official controls and the nature and extent of the suspected violation of these controls. If the structure and/or use is under construction or development, the zoning administrator may order the construction or development immediately halted until a proper permit or approval is granted by the city. If the construction or development is already completed, the zoning administrator may either: 1) issue an order identifying the corrective actions that must be made within a specified time period to bring the use or structure into compliance with the official controls; or 2) notify the responsible party to apply for an after the fact permit/development approval within a specified period of time not to exceed thirty (30) days. (Ord. 107, 2-21-1995; amd. 2003 Code)

CHAPTER 4

SHORELAND MANAGEMENT ¹⁵⁰

13-4-1: STATUTORY AUTHORIZATION AND POLICY:

- A. Statutory Authorization: This chapter is adopted pursuant to the authorization and policies contained in Minnesota statutes chapter 103F, Minnesota regulations parts 6120.2500 to 6120.3900, and the planning and zoning enabling legislation in Minnesota statutes chapter 462. (Ord. 108, 9-20-1994; amd. 2003 Code)
- B. Policy: The uncontrolled use of shorelands of the city affects the public health, safety, and general welfare, not only by contributing to pollution of public waters, but also by impairing the local tax base. Therefore, it is in the best interests of the public health, safety, and welfare to provide for the wise subdivision, use, and development of shorelands of public waters. The state legislature has delegated responsibility to local governments of the state to regulate the subdivision, use, and development of the shorelands of public waters and thus preserve and enhance the quality of surface waters, conserve the economic and natural environmental values of shorelands, and provide for the wise use of waters and related land resources. This responsibility is hereby recognized by the city. (Ord. 108, 9-20-1994)

13-4-2: GENERAL PROVISIONS:

- A. Jurisdiction: The provisions of this chapter shall apply to the shorelands of the public water bodies as classified in section 13-4-5 of this chapter. Pursuant to Minnesota regulations parts 6120.2500 to 6120.3900, no lake, pond, or flowage less than ten (10) acres in size in municipalities, or twenty five (25) acres in size in unincorporated areas need be regulated in a local government's shoreland regulation. A body of water created by a private user where there was no previous shoreland may, at the discretion of the governing body, be exempt from this chapter.
- B. Compliance: The use of any shoreland or public waters; the size and shape of lots; the use, size, type, and location of structures on lots; the installation and maintenance of water supply and waste treatment systems; the grading and filling of any shoreland area; the cutting of shoreland vegetation; and the subdivision of land shall be in full compliance with the terms of this chapter and other applicable regulations.
- C. Interpretation And Application: In their interpretation and application, the provisions of this chapter shall be held to be minimum requirements, and shall be liberally construed in favor of the governing body, and shall not be deemed a limitation or repeal of any other powers granted by state statutes.
- D. Severability: If any section, clause, provision, or portion of this chapter is adjudged unconstitutional or invalid by a court of competent jurisdiction, the remainder of this chapter shall not be affected thereby.
- E. Abrogation And Greater Restrictions: It is not intended by this chapter to repeal, abrogate, or impair any existing easement, covenants, or deed restrictions. However, where this chapter imposes greater restriction, the provisions of this chapter shall prevail. All other

ordinances inconsistent with this chapter are hereby repealed to the extent of the inconsistency only. (Ord. 108, 9-20-1994)

13-4-3: DEFINITIONS:

Unless specifically defined in this section, words or phrases used in this chapter shall be interpreted so as to give them the same meanings as they have in common usage and so as to give this chapter its most reasonable application. For the purpose of this chapter, the words "must" and "shall" are mandatory and not permissive. All distances, unless otherwise specified, shall be measured horizontally.

ACCESSORY STRUCTURE OR FACILITY: Any building or improvement subordinate to a principal use which, because of the nature of its use, can reasonably be located at or greater than normal structure setbacks.

BLUFF: A topographic feature, such as a hill, cliff, or embankment, having the following characteristics (an area with an average slope of less than 18 percent over a distance of 50 feet or more shall not be considered part of the bluff):

- A. Part or all of the feature is located in a shoreland area;
- B. The slope rises at least twenty five feet (25') above the ordinary high water level of the water body;
- C. The grade of the slope from the toe of the bluff to a point twenty five feet (25') or more above the ordinary high water level averages thirty percent (30%) or greater; and
- D. The slope must drain toward the water body.

BLUFF IMPACT ZONE: A bluff and land located within twenty feet (20') from the top of a bluff.

BOATHOUSE: A structure designed and used solely for the storage of boats or boating equipment.

BUILDING LINE: A line parallel to a lot line or the ordinary high water level at the required setback, beyond which a structure may not extend.

COMMERCIAL PLANNED UNIT DEVELOPMENTS: Are typically uses that provide transient, short term lodging spaces, rooms, or parcels, and their operations are essentially service oriented. For example: hotel/motel accommodations, resorts, recreational vehicle and camping parks, and other primarily service oriented activities are "commercial planned unit developments".

COMMERCIAL USE: The principal use of land or buildings for the sale, lease, rental, or trade of products, goods, and services.

COMMISSIONER: The commissioner of the department of natural resources of the state.

CONDITIONAL USE: A land use or development as defined by ordinance that would not be

appropriate generally, but may be allowed with appropriate restrictions as provided by official controls upon a finding that certain conditions as detailed in the zoning ordinance exist, the use or development conforms to the comprehensive land use plan of the community, and the use is compatible with the existing neighborhood.

DECK: A horizontal, unenclosed platform with or without attached railing, seats, trellises, or other features, attached or functionally related to a principal use or site, and at any point extending more than three feet (3') above ground.

DUPLEX, TRIPLEX, AND QUAD: A dwelling structure on a single lot, having two (2), three (3), and four (4) units respectively, being attached by common walls, and each unit equipped with separate sleeping, cooking, eating, living, and sanitation facilities.

DWELLING SITE: A designated location for residential use by one or more persons using temporary or moveable shelter, including camping and recreational vehicle sites.

DWELLING UNIT: Any structure or portion of a structure or other shelter designed as short term or long term living quarters for one or more persons, including rental or timeshare accommodations such as motel, hotel, resort rooms, and cabins.

EXTRACTIVE USE: The use of land for surface or subsurface removal of sand, gravel, rock, industrial minerals, other nonmetallic minerals, and peat, not regulated under Minnesota statutes sections 93.44 to 93.51.

FOREST LAND CONVERSION: The clear cutting of forested lands to prepare for a new land use other than reestablishment of a subsequent forest stand.

GUEST COTTAGE: A structure used as a dwelling unit that may contain sleeping spaces and kitchen and bathroom facilities in addition to those provided in the primary dwelling unit on a lot.

HARDSHIP: A situation where property in question cannot be put to a reasonable use under the conditions allowed by the official controls; the plight of the landowner is due to circumstances unique to his property, not created by the landowner; and the variance, if granted, will not alter the essential character of the locality. Economic considerations alone shall not constitute a hardship if a reasonable use for the property exists under terms of the official controls.

HEIGHT OF BUILDING: The vertical distance between the highest adjoining ground level at the building, or ten feet (10') above the lowest ground level, whichever is lower, and the highest point of a flat roof, or average height of the highest gable of a pitched or hipped roof.

INDUSTRIAL USE: The use of land or buildings for the production, manufacture, warehousing, storage, or transfer of goods, products, commodities, or other wholesale items.

INTENSIVE VEGETATION CLEARING: The complete removal of trees or shrubs in a contiguous patch, strip, row, or block.

LOT: A parcel of land designated by plat, metes and bounds, registered land survey, auditor's plot, or other accepted means, and separated from other parcels or portions by said

description for the purpose of sale, lease, or separation.

LOT WIDTH: The shortest distance between lot lines measured at the midpoint of the building line.

NONCONFORMITY: Any legal use, structure, or parcel of land already in existence, recorded, or authorized, before the adoption of official controls or amendments thereto, that would not have been permitted to become established under the terms of the official controls as now written, if the official controls had been in effect prior to the date it was established, recorded, or authorized.

ORDINARY HIGH WATER LEVEL: The boundary of public waters and wetlands, and shall be an elevation delineating the highest water level which has been maintained for a sufficient period of time to leave evidence upon the landscape, commonly that point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial. For watercourses, the ordinary high water level is the elevation of the top of the bank of the channel. For reservoirs and flowages, the ordinary high water level is the operating elevation of the normal summer pool.

PLANNED UNIT DEVELOPMENT: A type of development characterized by a unified site design for a number of dwelling units or dwelling sites on a parcel, whether for sale, rent, or lease, and also usually involving clustering of these units or sites to provide areas of common open space, density increases, and a mix of structure types and land uses. These developments may be organized and operated as condominiums, timeshare condominiums, cooperatives, full fee ownership, commercial enterprises, or any combination of these, or cluster subdivisions of dwelling units, residential condominiums, townhouses, apartment buildings, campgrounds, recreational vehicle parks, resorts, hotels, motels, and conversions of structures and land uses to these uses.

PUBLIC WATERS: Any waters as defined in Minnesota statutes, section 103G.005, subdivision 15.

SEMIPUBLIC USE: The use of land by a private, nonprofit organization to provide a public service that is ordinarily open to some persons outside the regular constituency of the organization.

SENSITIVE RESOURCE MANAGEMENT: The preservation and management of areas unsuitable for development in their natural state due to constraints such as shallow soils over groundwater or bedrock, highly erosive or expansive soils, steep slopes, susceptibility to flooding, or occurrence of flora or fauna in need of special protection.

SETBACK: The minimum horizontal distance between a structure, sewage treatment system, or other facility and an ordinary high water level, sewage treatment system, top of a bluff, road, highway, property line, or other facility.

SEWAGE TREATMENT SYSTEM: A septic tank and soil absorption system or other individual or cluster type sewage treatment system as described and regulated in subsection 13-4-6H of this chapter.

SEWER SYSTEM: Pipelines or conduits, pumping stations, and force main, and all other

construction, devices, appliances, or appurtenances used for conducting sewage or industrial waste or other wastes to a point of ultimate disposal.

SHORE IMPACT ZONE: Land located between the ordinary high water level of a public water, and a line parallel to it at a setback of fifty percent (50%) of the structure setback.

SHORELAND: Land located within the following distances from public waters: one thousand feet (1,000') from the ordinary high water level of a lake, pond, or flowage; and three hundred feet (300') from a river or stream, or the landward extent of a floodplain designated by ordinance on a river or stream, whichever is greater. The limits of shorelands may be reduced whenever the waters involved are bounded by topographic divides which extend landward from the waters for lesser distances and when approved by the commissioner.

SIGNIFICANT HISTORIC SITE: Any archaeological site, standing structure, or other property that meets the criteria for eligibility to the national register of historic places, or is listed in the state register of historic sites, or is determined to be an unplatted cemetery that falls under the provisions of Minnesota statutes section 307.08. An historic site meets these criteria if it is presently listed on either register or if it is determined to meet the qualifications for listing after review by the Minnesota state archaeologist or the director of the Minnesota historical society. All unplatted cemeteries are automatically considered to be significant historic sites.

STEEP SLOPE: Land where agricultural activity or development is either not recommended or described as poorly suited due to slope steepness and the site's soil characteristics, as mapped and described in available county soil surveys or other technical reports, unless appropriate design and construction techniques and farming practices are used in accordance with the provisions of this chapter. Where specific information is not available, "steep slopes" are lands having average slopes over twelve percent (12%), as measured over horizontal distances of fifty feet (50') or more, that are not bluffs.

STRUCTURE: Any building or appurtenance, including decks, except aerial or underground utility lines, such as sewer, electric, telephone, telegraph, gas lines, towers, poles, and other supporting facilities.

SUBDIVISION: Land that is divided for the purpose of sale, rent, or lease, including planned unit developments.

SURFACE WATER ORIENTED COMMERCIAL USE: The use of land for commercial purposes, where access to and use of a surface water feature is an integral part of the normal conductance of business. Marinas, resorts, and restaurants with transient docking facilities are examples of such use.

TOE OF THE BLUFF: The lower point of a fifty foot (50') segment with an average slope exceeding eighteen percent (18%).

TOP OF THE BLUFF: The higher point of a fifty foot (50') segment with an average slope exceeding eighteen percent (18%).

VARIANCE: The same as that term is defined or described in Minnesota statutes chapter 462.

WATER ORIENTED ACCESSORY STRUCTURE OR FACILITY: A small, aboveground

building or other improvement, except stairways, fences, docks, and retaining walls, which, because of the relationship of its use to a surface water feature, reasonably needs to be located closer to public waters than the normal structure setback. Examples of such structures and facilities include boathouses, gazebos, screen houses, fish houses, pump houses, and detached decks.

WETLAND: A surface water feature classified as a wetland in the United States fish and wildlife service circular no. 39 (1971 edition). (Ord. 108, 9-20-1994; amd. 2003 Code)

13-4-4: ADMINISTRATION AND ENFORCEMENT ¹⁵¹ :

A. Permit Requirements:

1. Permit Required: A permit is required for the construction of buildings or building additions (and including such related activities as construction of decks and signs), the installation and/or alteration of sewage treatment systems, and those grading and filling activities not exempted by subsection 13-4-6C of this chapter. (Ord. 108, 9-20-1994)

2. Application For Permit: Application for a permit shall be made to the building official on the forms provided. The application shall include the necessary information so that the zoning administrator can determine the site's suitability for the intended use and that a compliant sewage treatment system will be provided. (Ord. 108, 9-20-1994; amd. 2003 Code)

3. Nonconforming Sewage Treatment System: Permits shall stipulate that any identified nonconforming sewage treatment system, as defined by subsection 13-4-6H of this chapter, shall be reconstructed or replaced in accordance with the provisions of this chapter.

B. Certificate Of Zoning Compliance: The zoning administrator shall issue a certificate of zoning compliance for each activity requiring a permit as specified in subsection A of this section. This certificate will specify that the use of land conforms to the requirements of this chapter. Any use, arrangement, or construction at variance with that authorized by permit shall be deemed a violation of this chapter and shall be punishable as provided in subsection E of this section.

C. Notifications To Department Of Natural Resources:

1. Copies of all notices of any public hearings to consider variances, amendments, or conditional uses under local shoreland management controls must be sent to the commissioner or the commissioner's designated representative and postmarked at least ten (10) days before the hearings. Notices of hearings to consider proposed subdivisions/plats must include copies of the subdivision/plat.

2. A copy of approved amendments and subdivisions/plats, and final decisions granting variances of conditional uses under local shoreland management controls must be sent to the commissioner or the commissioner's designated representative and postmarked within ten (10) days of final action.

- D. Administration And Enforcement Official: The zoning administrator is responsible for the administration and enforcement of this chapter.
- E. Violation; Penalty: Any violation of the provisions of this chapter, or failure to comply with any of its requirements (including violations of conditions and safeguards established in connection with grants of variances of conditional uses), shall constitute a misdemeanor and shall be punishable as defined by law. Violations of this chapter can occur regardless of whether or not a permit is required for a regulated activity pursuant to subsection A of this section. (Ord. 108, 9-20-1994)

13-4-5: SHORELAND CLASSIFICATION SYSTEM AND LAND USE DISTRICTS:

- A. Shoreland Classification System: The public waters of the city have been classified in this subsection consistent with the criteria found in Minnesota regulations part 6120.3300, and the "Protected Waters Inventory Map for Anoka County, Minnesota". The shoreland area for the water bodies listed in subsections A1 and A2 of this section shall be as defined in section 13-4-3 of this chapter, definition of "shoreland", and as shown on the official zoning map.

<u>1. Lakes:</u>	<u>Protected Waters Inventory ID Number</u>
a. Natural environment lakes	
b. Recreational development lakes	
Unnamed T32N, R24W	DNR ID #2-74W
Ward Lake T32N, R24W	DNR ID #2-85P
Unnamed T32N, R24W	DNR ID #2-86W
Unnamed T32N, R24W	DNR ID #2-87W
(Lake Leeman) Unnamed T32N, R24W	DNR ID #2-88W
Bunker Lake T32N, R24W	DNR ID #2-90P
c. General development lakes	
Crooked Lake T32N, R24W	DNR ID #2-8P
Round Lake T32N, R24W	DNR ID #2-89P

2. Rivers And Streams:
- a. Remote rivers: none.
- b. Forested rivers: none.
- c. Transition rivers: none.
- d. Agricultural rivers: none.

e. Urban rivers: none.

f. Tributary streams: none.

All protected watercourses in the city shown on the "Protected Water Inventory Map for Anoka County", a copy of which is hereby adopted by reference, not given a classification in subsections A2a through A2e of this section shall be considered "tributary".

B. Land Use District Descriptions:

1. **Criteria For Designation:** The land use districts in subsection B2 of this section and the delineation of a land use district's boundaries on the official zoning map must be consistent with the goals, policies, and objectives of the comprehensive land use plan and the following criteria, considerations, and objectives:

a. **General Considerations And Criteria For All Land Uses:**

- (1) Preservation of natural areas;
- (2) Present ownership and development of shoreland areas;
- (3) Shoreland soil types and their engineering capabilities;
- (4) Topographic characteristics;
- (5) Vegetative cover;
- (6) In-water physical characteristics, values, and constraints;
- (7) Recreational use of the surface water;
- (8) Road and service center accessibility;
- (9) Socioeconomic development needs and plans as they involve water and related land resources;
- (10) The land requirements of industry which, by its nature, requires location in shoreland areas; and
- (11) The necessity to preserve and restore certain areas having significant historical or ecological value.

b. **Factors And Criteria For Planned Unit Developments:**

- (1) Existing recreational use of the surface waters and likely increases in use associated with planned unit developments;
- (2) Physical and aesthetic impacts of increased density;

- (3) Suitability of lands for the planned unit development in the area; and
- (4) Level of current development in the area.
- (5) Amount and types of ownership of undeveloped lands.

2. District Descriptions: These land use districts are in conformance with the criteria specified in Minnesota regulations part 6120.3200, subpart 3:

a. Land Use Districts For Lakes:

(1) Land Use District Uses (R1, R2, R3, R4):

	General Development Lakes	Recreational Development Lakes	Natural Environment Lakes
Single residential	P	P	P
Semipublic	C	C	C
Parks and historic sites	C	C	C
Extractive use	C	C	C
Forest management	P	P	P
Mining of metallic minerals and peat	C	C	C

(2) High Density Residential District Uses (R5, M-1 And M-2):

	General Development Lakes	Recreational Development Lakes	Natural Environment Lakes
Residential planned unit developments	C	C	C
Surface water oriented commercial*	C	C	C
Semipublic	C	C	C
Parks and historic sites	C	C	C
Duplex, triplex, quad residential	P	P	P
Forest management	P	P	P

(3) Water Oriented Commercial District Uses (GR, LB, NB, GB):

	General Development Lakes	Recreational Development Lakes	Natural Environment Lakes

Surface water oriented commercial	P	P	C
Commercial planned unit development**	C	C	C
Public, semipublic	C	C	C
Parks and historic sites	C	C	C
Forest management	P	P	P

(4) General Use District Uses (GR, LB, NB, I):

	General Development	Recreational Development Lakes	Natural Environment Lakes
Commercial	P	P	P
Commercial planned unit development**	C	C	C
Industrial	C	C	C
Public, semipublic	P	P	P
Extractive use	C	C	C
Parks and historic sites	C	C	C
Forest management	P	P	P
Mining of metallic minerals and peat	C	C	C

*As accessory to a residential planned unit development.

**Limited expansion of a commercial planned unit development involving up to six (6) additional dwelling units or sites may be allowed as a permitted use provided the provisions of section 13-4-9 of this chapter are satisfied.

b. Land Use Districts For Rivers And Streams: The land use districts for rivers and streams (remote, forested, transition, agricultural, urban and tributary) shall comply with the land use district provisions as specified in sections 12-13-1, 12-13-2 and 12-13-3 of this code.

3. Use And Upgrading Of Inconsistent Land Use Districts:

a. The land use districts adopted in title 12, chapter 3 of this code, as they apply to shoreland areas, and their delineated boundaries on the official zoning map, may be found to be inconsistent with the land use district designation criteria specified in subsection B2 of this section. These inconsistent land use district designations may continue until revisions are proposed to change either the land use district designation within an existing land use district boundary shown on the official zoning map or to modify the boundary of an existing land use district shown of the official zoning map.

b. When revision is proposed to any inconsistent land use district provision, the following additional criteria and procedures shall apply:

(1) Lakes: When a revision to a land use district designation on a lake is considered, the land use district boundaries and use provisions therein for all the shoreland areas within the jurisdiction of this chapter on said lake must be revised to make them substantially compatible with the framework in subsections B1 and B2 of this section.

(2) Rivers And Streams: When a revision to a land use district designation on a river or stream is proposed, the land use district boundaries and the use provisions therein for all shoreland on both sides of the river or stream within the same classification within the jurisdiction of this chapter must be revised to make them substantially compatible with the framework in subsections B1 and B2 of this section. If the same river classification is contiguous for more than a five (5) mile segment only, the shoreland for a distance of two and one-half (2.5) miles upstream and downstream, or to the class boundary if closer, need be evaluated and revised.

c. When an interpretation question arises about whether a specific land use fits within a given "use" category, the interpretation shall be made by the board of adjustment. When a question arises as to whether a land use district's boundaries are properly delineated on the official zoning map, this decision shall be made by the city council.

d. When a revision is proposed to an inconsistent land use district provision by an individual party or landowner, this individual party or landowner will only be responsible to provide the supporting and/or substantiating information for the specific parcel in question. The planning and zoning commission will direct the zoning administrator to provide such additional information for this water body as is necessary to satisfy subsections B3a and B3b of this section.

e. The city council must make detailed findings of fact and conclusion when taking final action that this revision and the upgrading of any inconsistent land use district designation on said water body are consistent with the enumerated criteria and use provisions of this subsection B. (Ord. 108, 9-20-1994)

13-4-6: ZONING AND WATER SUPPLY/SANITARY PROVISIONS:

A. Lot Area And Width Standards: The lot area (in square feet) and lot width standards (in feet) for single, duplex, triplex and quad residential lots created after the date of enactment of this chapter for the lake and river/stream classifications are the following:

1. Unsewered Lakes:

a. Natural Environment:

	Riparian Lots		Nonriparian Lots	
	Area	Width	Area	Width
Single	108,900	300	108,900	300
Duplex	120,000	300	160,000	400

Triplex	160,000	400	240,000	600
Quad	180,000	500	320,000	800

b. Recreational Development:

	Riparian Lots		Nonriparian Lots	
	Area	Width	Area	Width
Single	108,900	300	108,900	300
Duplex	108,900	300	108,900	300
Triplex	120,000	300	120,000	375
Quad	160,000	375	160,000	490

c. General Development:

	Riparian Lots		Nonriparian Lots	
	Area	Width	Area	Width
Single	20,000	100	40,000	150
Duplex	40,000	180	80,000	265
Triplex	60,000	260	120,000	375
Quad	80,000	340	160,000	490

2. Sewered Lakes:

a. Natural Environment:

	Riparian Lots		Nonriparian Lots	
	Area	Width	Area	Width
Single	40,000	125	20,000	125
Duplex	70,000	225	35,000	220
Triplex	100,000	325	52,000	315
Quad	130,000	425	65,000	410

b. Recreational Development:

	Riparian Lots		Nonriparian Lots	
	Area	Width	Area	Width
Single	20,000	80	15,000	80
Duplex	35,000	135	26,000	135
Triplex	50,000	195	38,000	190

Quad 65,000 255 49,000 245

c. General Development:

	Riparian Lots		Nonriparian Lots	
	Area	Width	Area	Width
Single	15,000	80	11,400	80
Duplex	26,000	135	26,000	135
Triplex	38,000	195	25,000	190
Quad	49,000	255	32,500	245

3. River/Stream Lot Width Standards: There are no minimum lot size requirements for rivers and streams. The lot width standards for single, duplex, triplex and quad residential developments for the six (6) river/stream classifications are:

	Remote	Forested	Transition	Agricultural	Urban And No Sewer	Tributary Sewer
Single	300	200	250	150	100	80
Duplex	450	300	375	225	150	115
Triplex	600	400	500	300	200	150
Quad	750	500	625	375	250	190

4. Additional Special Provisions:

a. Residential subdivisions with dwelling unit densities exceeding those in the tables in subsections A2 and A3 of this section can only be allowed if designed and approved as residential planned unit developments under section 13-4-9 of this chapter. Only land above the ordinary high water level of public waters can be used to meet lot area standards, and lot width standards must be met at both the ordinary high water level and at the building line. The sewer lot area dimensions in subsection A2 of this section can only be used if publicly owned sewer system service is available to the property.

b. Subdivisions of duplexes, triplexes, and quads on natural environment lakes must also meet the following standards: (Ord. 108, 9-20-1994)

(1) Each building must be set back at least one hundred fifty feet (150') from the ordinary high water level; (Ord. 108, 9-20-1994; amd. 2003 Code)

(2) Each building must have common sewage treatment and water systems in one location and serve all dwelling units in the building;

(3) Watercraft docking facilities for each lot must be centralized in one location and serve all dwelling units in the building; and

(4) No more than twenty five percent (25%) of a lake's shoreline can be in duplex,

triplex, or quad developments.

c. One guest cottage may be allowed on lots meeting or exceeding the duplex lot area and width dimensions presented in subsections A1, A2 and A3 of this section, provided the following standards are met:

(1) For lots exceeding the minimum lot dimensions of duplex lots, the guest cottage must be located within the smallest duplex sized lot that could be created including the principal dwelling unit;

(2) A guest cottage must not cover more than seven hundred (700) square feet of land surface and must not exceed fifteen feet (15') in height; and

(3) A guest cottage must be located or designed to reduce its visibility as viewed from public waters and adjacent shorelands by vegetation, topography, increased setbacks, or color, assuming summer leaf-on conditions.

(4) Meets the requirements of section 12-14-16 of this code.

d. Lots intended as controlled accesses to public waters or as recreation areas for use by owners of nonriparian lots within subdivisions are permissible and must meet or exceed the following standards:

(1) They must meet the width and size requirements for residential lots, and be suitable for the intended uses of controlled access lots.

(2) If docking, mooring, or over-water storage of more than six (6) watercraft is to be allowed at a controlled access lot, then the width of the lot (keeping the same lot depth) must be increased by the percent of the requirements for riparian residential lots for each watercraft beyond six (6), consistent with the following table:

CONTROLLED ACCESS LOT FRONTAGE REQUIREMENTS

Ratio Of Lake Size To Shore Length (Acres/Miles)	Required Increase In Frontage (Percent)
Less than 100	25
100 - 200	20
201 - 300	15
301 - 400	10
Greater than 400	5

(3) They must be jointly owned by all purchasers of lots in the subdivision who are provided riparian access rights on the access lot; and

(4) Covenants or other equally effective legal instruments must be developed that specify which lot owners have authority to use the access lot and what activities are allowed. The activities may include watercraft launching, loading, storage, beaching,

mooring, or docking. They must also include other outdoor recreational activities that do not significantly conflict with general public use of the public water or the enjoyment of normal property rights by adjacent property owners. Examples of the nonsignificant conflict activities include swimming, sunbathing, or picnicking. The covenants must limit the total number of vehicles allowed to be parked and the total number of watercraft allowed to be continuously moored, docked, or stored over water, and must require centralization of all common facilities and activities in the most suitable locations on the lot to minimize topographic and vegetation alterations. They must also require all parking areas, storage buildings, and other facilities to be screened by vegetation or topography as much as practical from view from the public water, assuming summer leaf-on conditions.

B. Placement, Design And Height Of Structures:

1. Placement Of Structures On Lots: When more than one setback applies to a site, structures and facilities must be located to meet all setbacks. Where structures exist on the adjoining lots on both sides of a proposed building site, structure setbacks may be altered without a variance to conform to the adjoining setbacks from the ordinary high water level, provided the proposed building site is not located in a shore impact zone or in a bluff impact zone. Structures shall be located as follows:

a. Structure And On Site Sewage System Setbacks (In Feet) From Ordinary High Water Level*:

SETBACKS*

Classes Of Public Waters	Unsewered Structures	Sewered Structures	Sewage Treatment Systems
Lakes			
Natural environment	150	150	150
Recreational development	100	75	75
General development	75	50	50
Rivers			
Remote	200	200	150
Forested and transition	150	150	100
Agriculture, urban and tributary	100	50	75

*One water oriented accessory structure designed in accordance with subsection B2 of this section may be set back a minimum distance of ten feet (10') from the ordinary high water level.

b. Additional Structure Setbacks: The following additional structure setbacks apply, regardless of the classification of the water body:

<u>Setback From:</u>	<u>Setback (In Feet)</u>
Top of bluff	30
Unplatted cemetery	50
Right of way line of federal, state, or county highway	50
Right of way line of city road, public street, or other roads or streets not classified	40

c. Bluff Impact Zones: Structures and accessory facilities, except stairways and landing, must not be placed within bluff impact zones.

d. Uses Without Water Oriented Needs: Commercial, industrial, public and semipublic uses without water oriented needs must be located on lots or parcels without public waters frontage or, if located on lots or parcels with public waters frontage, must either be set back double the normal ordinary high water level setback or be substantially screened from view from the water by vegetation or topography, assuming summer, leaf-on conditions.

2. Design Criteria For Structures:

a. High Water Elevations: Structures must be placed in accordance with any floodplain regulations applicable to the site. Where these controls do not exist, the elevation to which the lowest floor, including basement, is placed or floodproofed must be determined as follows:

(1) For lakes: by placing the lowest floor at a level at least three feet (3') above the highest known water level, or three feet (3') above the ordinary high water level, whichever is higher; (Ord. 108, 9-20-1994)

(2) For rivers and streams: by placing the lowest floor at least three feet (3') above the flood of record, if data is available; if data is not available, by placing the lowest floor at least three feet (3') above the ordinary high water level, or by conducting a technical evaluation to determine effects of proposed construction upon flood stages and flood flows and to establish a flood protection elevation. Under all three (3) approaches, technical evaluations must be done by a qualified engineer or hydrologist consistent with Minnesota statutes chapter 105, Minnesota regulations parts 6120.5000 to 6120.6200 governing the management of floodplain areas. If more than one approach is used, the highest flood protection elevation determined must be used for placing structures and other facilities; and (Ord. 108, 9-20-1994; amd. 2003 Code)

(3) Water oriented accessory structures may have the lowest floor placed lower than the elevation determined in this subsection if the structure is constructed of flood resistant materials to the elevation, electrical and mechanical equipment are placed

above the elevation and, if long duration flooding is anticipated, the structure is built to withstand ice action and wind driven waves and debris.

b. Water Oriented Accessory Structures: Each lot may have one water oriented accessory structure not meeting the normal structure setback in subsection B1 of this section if the water oriented accessory structure complies with the following provisions:

(1) The structure or facility must not exceed ten feet (10') in height, exclusive of safety rails, and cannot occupy an area greater than two hundred fifty (250) square feet. Detached decks must not exceed eight feet (8') above grade at any point;

(2) The setback of the structure or facility from the ordinary high water level must be at least ten feet (10');

(3) The structure or facility must be treated to reduce visibility as viewed from public waters and adjacent shorelands by vegetation, topography, increased setbacks or color, assuming summer, leaf-on conditions;

(4) The roof may be used as a deck with safety rails but must not be enclosed or used as a storage area;

(5) The structure or facility must not be designed or used for human habitation and must not contain water supply or sewage treatment facilities; and

(6) As an alternative for general development and recreational development water bodies, water oriented accessory structures used solely for watercraft storage, and including storage of related boating and water oriented sporting equipment, may occupy an area up to four hundred (400) square feet, provided the maximum width of the structure is twenty feet (20') as measured parallel to the configuration of the shoreline.

c. Stairways, Lifts And Landings: Stairways and lifts are the preferred alternative to major topographic alteration for achieving access up and down bluffs and steep slopes to shore areas. Stairways and lifts must meet the following design requirements:

(1) Landings for stairways and lifts on residential lots must not exceed thirty two (32) square feet in area. Landings larger than thirty two (32) square feet may be used for commercial properties, public open space recreational properties, and planned unit developments;

(2) Canopies or roofs are not allowed on stairways, lifts, or landings;

(3) Stairways, lifts, and landings may be either constructed above the ground on posts or pilings or placed into the ground, provided they are designed and built in a manner that ensures control of soil erosion;

(4) Stairways, lifts, and landings must be located in the most visually inconspicuous portions of lots whenever practical, as viewed from the surface of the public water assuming summer, leaf-on conditions; and

(5) Facilities such as ramps, lifts, or mobility paths for physically handicapped persons are also allowed for achieving access to shore areas; provided, that the dimensional and performance standards of subsections B2c(1) through B2c(4) of this section are complied with in addition to the requirements of Minnesota regulations chapter 1340.

d. Significant Historic Sites: No structure may be placed on a significant historic site in a manner that affects the value of the site unless adequate information about the site has been removed and documented in a public repository.

e. Steep Slopes: The zoning administrator must evaluate possible soil erosion impacts and development visibility from public waters before issuing a permit for construction of sewage treatment systems, roads, driveways, structures, or other improvements on steep slopes. When determined necessary, conditions must be attached to issued permits to prevent erosion and to preserve existing vegetative screening of structures, vehicles, and other facilities as viewed from the surface of public waters, assuming summer, leaf-on vegetation.

3. Height Of Structures: All structures in city residential districts, except churches and nonresidential agricultural structures, must not exceed twenty five feet (25') in height.

C. Shoreland Alterations: Alterations of vegetation and topography will be regulated to prevent erosion into public waters, fix nutrients, preserve shoreland aesthetics, preserve historic values, prevent bank slumping, and protect fish and wildlife habitat.

1. Vegetation Alterations:

a. Vegetation alteration necessary for the construction of structures and sewage treatment systems and the construction of roads and parking areas regulated by subsection D of this section are exempt from the vegetation alteration standards that follow.

b. Removal or alteration of vegetation, except for agricultural and forest management uses as regulated in subsections F2 and F3 of this section, respectfully, is allowed subject to the following standards:

(1) Intensive vegetation clearing within the shore and bluff impact zones and on steep slopes is not allowed. Intensive vegetation clearing for forest land conversion to another use outside of these areas is allowable as a conditional use if an erosion control and sedimentation plan is developed and approved by the soil and water conservation district in which the property is located.

(2) In shore and bluff impact zones and on steep slopes, limited clearing of trees and shrubs and cutting, pruning, and trimming of trees is allowed to provide a view to the water from the principal dwelling site and to accommodate the placement of stairways and landings, picnic areas, access paths, livestock watering areas, beach and watercraft access areas, and permitted water oriented accessory structures or facilities; provided, that:

(A) The screening of structures, vehicles, or other facilities as viewed from the water, assuming summer, leaf-on conditions, is not substantially reduced;

(B) Along rivers, existing shading of water surfaces is preserved; and

(C) The above provisions are not applicable to the removal of trees, limbs, or branches that are dead, diseased, or pose safety hazards.

2. Topographic Alterations/Grading And Filling:

a. Grading and filling and excavations necessary for the construction of structures, sewage treatment systems, and driveways under validly issued construction permits for these facilities do not require the issuance of a separate grading and filling permit. However, the grading and filling standards in this section must be incorporated into the issuance of permits for construction of structures, sewage treatment systems, and driveways.

b. Public roads and parking areas are regulated by subsection D of this section.

c. Notwithstanding subsections C2a and C2b of this section, a grading and filling permit will be required for:

(1) The movement of more than ten (10) cubic yards of material on steep slopes or within shore or bluff impact zones; and

(2) The movement of more than fifty (50) cubic yards of material outside of steep slopes and shore and bluff impact zones.

d. The following considerations and conditions must be adhered to during the issuance of construction permits, grading and grading and filling permits, conditional use permits, variances and subdivision approvals:

(1) Grading or filling in any type 2, 3, 4, 5, 6, 7, or 8 wetland must be evaluated to determine how extensively the proposed activity would affect the following functional qualities of the wetland*:

(A) Sediment and pollutant trapping and retention;

(B) Storage of surface runoff to prevent or reduce flood damage;

(C) Fish and wildlife habitat;

(D) Recreational use;

(E) Shoreline or land stabilization; and

(F) Noteworthiness, including special qualities such as historic significance, critical habitat for endangered plants and animals, or others.

*This evaluation must also include a determination of whether the wetland alteration determination being proposed requires permits, reviews, or approvals by other local, state, or federal agencies such as a watershed district, the Minnesota department of natural resources, or the United States army corps of engineers. The applicant will be

so advised.

- (2) Alterations must be designed and conducted in a manner that ensures only the smallest amount of bare ground is exposed for the shortest time possible;
- (3) Mulches or similar materials must be used, where necessary, for temporary bare soil coverage, and a permanent vegetative cover must be established as soon as possible;
- (4) Methods to minimize soil erosion and to trap sediments before they reach any surface water feature must be used;
- (5) Altered areas must be stabilized to acceptable erosion control standards consistent with the field office technical guides of the local soil and water conservation districts and the United States soil conservation service;
- (6) Fill or excavated material must not be placed in a manner that creates an unstable slope;
- (7) Plans to place fill or excavated material on steep slopes must be reviewed by qualified professionals for continued slope stability and must not create finished slopes of thirty percent (30%) or greater;
- (8) Fill or excavated material must not be placed in bluff impact zones; (Ord. 108, 9-20-1994)
- (9) Any alterations below the ordinary high water level of public waters must first be authorized by the commissioner under Minnesota statutes 103G.245 and 103G.405; (Ord. 108, 9-20-1994; amd. 2003 Code)
- (10) Alteration of topography must only be allowed if it is accessory to permitted or conditional uses and does not adversely affect adjacent or nearby properties; and
- (11) Placement of natural rock riprap, including associated grading of the shoreline and placement of a filter blanket, is permitted if the finished slope does not exceed three feet (3') horizontal to one foot (1') vertical, the landward extent of the riprap is within ten feet (10') of the ordinary high water level, and the height of the riprap above the ordinary high water level does not exceed three feet (3').

e. Excavations where the intended purpose is connection to a public water, such as boat slips, canals, lagoons, and harbors, must be controlled by local shoreland controls. Permission for excavations may be given only after the commissioner has approved the proposed connection to public waters.

D. Placement And Design Of Roads, Driveways And Parking Areas:

1. Public and private roads and parking areas must be designed to take advantage of natural vegetation and topography to achieve maximum screening from view from public waters. Documentation must be provided by a qualified individual that all roads and parking areas are designed and constructed to minimize and control erosion to public waters

consistent with the field office technical guides of the local soil and water conservation district, or other applicable technical materials.

2. Roads, driveways, and parking areas must meet structure setbacks and must not be placed within bluff and shore impact zones, when other reasonable and feasible placement alternatives exist. If no alternatives exist, they may be placed within these areas, and must be designed to minimize adverse impacts.

3. Public and private watercraft access ramps, approach roads, and access related parking areas may be placed within shore impact zones, provided the vegetative screening and erosion control conditions of this subsection are met. For private facilities, the grading and filling provisions of subsection C2 of this section must be met.

E. Storm Water Management: The following general and specific standards shall apply:

1. General Standards:

a. When possible, existing natural drainageways, wetlands, and vegetated soil surfaces must be used to convey, store, filter, and retain storm water runoff before discharge to public waters.

b. Development must be planned and conducted in a manner that will minimize the extent of disturbed areas, runoff velocities, erosion potential, and reduce and delay runoff volumes. Disturbed areas must be stabilized and protected as soon as possible and facilities or methods used to retain sediment on the site.

c. When development density, topographic features, and soil and vegetation conditions are not sufficient to adequately handle storm water runoff using natural features and vegetation, various types of constructed facilities such as diversions, settling basins, skimming devices, dikes, waterways, and ponds may be used. Preference must be given to designs using surface drainage, vegetation, and infiltration rather than buried pipes and manmade materials, and facilities.

2. Specific Standards:

a. Impervious surface coverage of lots must not exceed twenty five percent (25%) of the lot area.

b. When constructed facilities are used for storm water management, documentation must be provided by a qualified individual that they are designed and installed consistent with the field office technical guide of the local soil and water conservation districts.

c. New constructed storm water outfalls to public waters must provide for filtering or settling of suspended solids and skimming of surface debris discharge.

F. Special Provisions:

1. Standards For Commercial, Industrial, Public And Semipublic Uses:

a. Surface water oriented commercial uses and industrial, public, or semipublic uses with

similar need to have access to and use of public waters may be located on parcels or lots with frontage on public waters. Those uses with water oriented needs must meet the following standards:

(1) In addition to meeting impervious coverage limits, setbacks, and other zoning standards in this chapter, the uses must be designed to incorporate topographic and vegetative screening of parking areas and structures;

(2) Uses that require short term watercraft mooring for patrons must centralize these facilities and design them to avoid obstructions to navigation and to be the minimum size necessary to meet the need; and

(3) Uses that depend on patrons arriving by watercraft may use signs and lighting to convey needed information to the public, subject to the following general standards:

(A) In addition to meeting the sign requirements of section 12-14-9 of this code, no advertising sign or supporting facilities for signs may be placed in or upon any public waters. Signs conveying information or safety messages may be placed in or on public waters by a public authority or under a permit issued by the city or its duly designated agency;

(B) Signs may be placed, when necessary, within the shore impact zone if they are designed and sized to be the minimum necessary to convey needed information. They must only convey the location and name of the establishment and the general types of goods or services available. The sign must not contain other detailed information such as product brands and prices, must not be located higher than ten feet (10') above the ground, and must not exceed thirty two (32) square feet in size. If illuminated by artificial lights, the lights must be shielded or directed to prevent illumination out across public waters; and

(C) Other outside lighting may be located within the shore impact zone or over public waters if it is used primarily to illuminate potential safety hazards and is shielded or otherwise directed to prevent direct illumination out across public waters. This does not preclude use of navigational lights.

b. Uses without water oriented needs must be located on lots or parcels without public waters frontage or, if located on lots or parcels with public water frontage, must either be set back double the normal ordinary high water mark level setback or be substantially screened from view from the water by vegetation or topography, assuming summer, leaf-on conditions.

2. Agricultural Use Standards:

a. General cultivation, farming, grazing, nurseries, horticulture, truck farming, sod farming, and wild crop harvesting are permitted uses if steep slopes or shore impact zones are maintained in permanent vegetation or operated under an approved conservation plan (resource management systems) consistent with the field office technical guides of the local soil and water conservation districts or the United States soil conservation service, as provided by a qualified individual or agency. The shore impact zone for parcels with permitted agricultural land uses is equal to a line parallel to and fifty

feet (50') from the ordinary high water level.

b. Animal feedlots must meet the following standards:

(1) New feedlots must not be located in the shoreland of watercourses or in bluff impact zones and must meet a minimum setback of three hundred feet (300') from the ordinary high water level of all public water basins; and

(2) Modifications or expansions to existing feedlots that are located within three hundred feet (300') of the ordinary high water level or within a bluff impact zone are allowed if they do not further encroach into the existing ordinary high water level setbacks, or encroach on bluff impact zones.

3. Forest Management Standards: The harvesting of timber and associated reforestation must be conducted consistent with the provisions of the "Minnesota Nonpoint Source Pollution Assessment-Forestry And Provisions Of Water Quality In Forest Management-Best Management Practices In Minnesota".

4. Extractive Use Standards:

a. Site Development And Restoration Plan: In addition to complying with the provisions of section 12-8-5 of this code, an extractive use site development and restoration plan must be developed, approved, and followed over the course of operation of the site. The plan must address dust, noise, possible pollutant discharges, hours and duration of operation, and anticipated vegetation and topographic alterations. It must also identify topographic alterations and actions to be taken during operation to mitigate adverse environmental impacts, particularly erosion, and must clearly explain how the site will be rehabilitated after extractive activities end.

b. Setbacks Of Processing Machinery: Processing machinery must be located consistent with setback standards for structures from ordinary high water levels of public waters and from bluffs.

5. Mining Of Metallic Minerals And Peat: Mining of metallic minerals and peat, as defined in Minnesota statutes sections 93.44 to 93.51, shall be a conditional use. The provisions of Minnesota statutes sections 93.44 to 93.51 must be satisfied.

G. Conditional Uses: Conditional uses allowable within the shoreland areas shall be subject to the review and approval procedures and criteria and conditions for review of conditional uses established in section 12-15-6 of this code. The following additional evaluation criteria and conditions apply within shoreland areas:

1. Evaluation Criteria: A thorough evaluation of the water body and the topographic, vegetation, and soil conditions on the site must be made to ensure:

a. The prevention of soil erosion or other possible pollution of public waters, both during and after construction;

b. The visibility of structure and other facilities as viewed from public water is limited;

- c. The site is adequate for water supply and on site sewage treatment; and
- d. The types, uses, and numbers of watercraft that the project will generate are compatible in relation to the suitability of public waters to safely accommodate these watercraft.

2. Conditions Attached To Conditional Use Permits: The city council, upon consideration of the criteria listed above and the purposes of this chapter, shall attach such conditions to the issuance of the conditional use permits as it deems necessary to fulfill the purposes of this chapter. Such conditions may include, but are not limited to, the following:

- a. Increased setbacks from the ordinary high water level;
- b. Limitations of the natural vegetation to be removed or the requirement that additional vegetation be planted; and
- c. Special provisions for the location, design, and use of structures, sewage treatment systems, watercraft launching and docking areas, and vehicle parking areas.

H. Water Supply And Sewage Treatment:

1. Water Supply: Any public or private supply of water for domestic purposes must meet or exceed standards for water quality of the Minnesota department of health and the Minnesota pollution control agency.

2. Sewage Treatment ¹⁵² : Any premises used for human occupancy must be provided with an adequate method of sewage treatment, as follows:

- a. Publicly owned sewer systems must be used where available. (Ord. 108, 9-20-1994)
- b. All private sewage treatment systems must conform to the Minnesota pollution control agency standards for individual sewage treatment systems contained in the document titled "Individual Sewage Treatment Systems Standards, Chapter 7080", a copy of which is hereby adopted to be a part of this chapter, and a copy of which is on file in the office of the building official for public use and inspection. (Ord. 108, 9-20-1994; amd. 2003 Code)
- c. On site sewage treatment systems must be set back from the ordinary high water level in accordance with the setbacks contained in subsection B1 of this section.
- d. All proposed sites for individual sewage treatment systems shall be evaluated in accordance with the criteria in the following subsections H2d(1) through H2d(4). If the determination of the site's suitability cannot be made with publicly available, existing information, it shall then be the responsibility of the applicant to provide sufficient soil boring and percolation tests from on site field investigations. Evaluation criteria is as follows:

- (1) Depth to the highest known or calculated ground water table or bedrock.

(2) Soil conditions, properties, and permeability.

(3) Slope.

(4) The existence of lowlands, local surface depressions, and rock outcrops.

e. Nonconforming sewage treatment systems shall be regulated and upgraded in accordance with subsection 13-4-7C of this chapter. (Ord. 108, 9-20-1994)

13-4-7: NONCONFORMITIES:

All legally established nonconformities as of the effective date of this chapter may continue, but they will be managed according to applicable state statutes and other regulations of the city for the subjects of: alterations and additions, repair after damage, discontinuance of use, and intensification of use; except, that the following standards will also apply in shoreland areas:

A. Construction On Nonconforming Lots Of Record:

1. Lots of record in the office of the county recorder on the date of the enactment of local shoreland controls that do not meet the requirements of subsection 13-4-6A of this chapter may be allowed as building sites without variances from lot size requirements, provided the use is permitted in the zoning district, the lot has been in separate ownership from abutting lands at all times since it became substandard, was created compliant with official controls in effect at the time, and sewage treatment and setback requirements of this chapter are met.

2. A variance from setback requirements must be obtained before any use, sewage treatment system, or building permit is issued for a lot. In evaluating the variance, the board of adjustments shall consider sewage treatment and water supply capabilities or constraints of the lot, and shall deny the variance if adequate facilities cannot be provided.

3. If, in a group of two (2) or more contiguous lots under the same ownership, any individual lot does not meet the requirements of subsection 13-4-6A of this chapter, the lot must not be considered as a separate parcel of land for the purposes of sale or development. The lot must be combined with one or more contiguous lots so they equal one or more parcels of land, each meeting the requirements of said subsection 13-4-6A as much as possible. (Ord. 108, 9-20-1994)

B. Additions/Expansions To Nonconforming Structures:

1. All additions or expansions to the outside dimensions of an existing nonconforming structure must meet the setback, height, and other requirements of section 13-4-6 of this chapter. Any deviation from these requirements must be authorized by a variance. (Ord. 108, 9-20-1994; amd. 2003 Code)

2. Deck additions may be allowed without a variance to a structure not meeting the required setback from the ordinary high water level if all of the following criteria and standards are met:

a. The structure existed on the date the structure setbacks were established;

b. A thorough evaluation of the property and structure reveals no reasonable location for a deck meeting or exceeding the existing ordinary high water level setback of the structure;

c. The deck encroachment toward the ordinary high water level does not exceed fifteen percent (15%) of the existing setback of the structure from the ordinary high water level or does not encroach closer than thirty feet (30'), whichever is more restrictive; and

d. The deck is constructed primarily of wood, and is not roofed or screened.

C. Nonconforming Sewage Treatment Systems:

1. A sewage treatment system not meeting the requirements of subsection 13-4-6H of this chapter must be upgraded, at a minimum, at any time a permit or variance of any type is required for any improvement on, or use of, the property. For the purposes of this provision, a sewage treatment system shall not be considered nonconforming if the only deficiency is the sewage treatment system's improper setback from the ordinary high water level. (Ord. 108, 9-20-1994)

2. The city council has, by formal resolution, notified the commissioner of its program to identify nonconforming sewage treatment systems. The city will require upgrading or replacement of any nonconforming system identified by this program within a reasonable period of time which will not exceed two (2) years. Sewage systems installed according to all applicable local shoreland management standards adopted under Minnesota statutes section 103F.211, in effect at the time of installation, may be considered as conforming unless they are determined to be failing; except, that systems using cesspools, leaching pits, seepage pits, or other deep disposal methods, or systems with less soil treatment area separation above ground water than required by the Minnesota pollution control agency chapter 7080 for design of on site sewage treatment systems, shall be considered nonconforming. (Ord. 108, 9-20-1994; amd. 2003 Code)

13-4-8: SUBDIVISION AND PLATTING PROVISIONS ¹⁵³ :

A. Land Suitability: Each lot created through subdivision, including planned unit developments authorized under section 13-4-9 of this chapter, must be suitable in its natural state for the proposed use with minimal alteration. Suitability analysis by the city council shall consider susceptibility to flooding, existence of wetlands, soil and rock formations with severe limitations for development, severe erosion potential, steep topography, inadequate water supply or sewage treatment capabilities, near shore aquatic conditions unsuitable for water based recreation, important fish and wildlife habitat, presence of significant historic sites, or any other feature of the natural land likely to be harmful to the health, safety, or welfare of future residents of the proposed subdivision or of the community.

B. Consistency With Other Controls: Subdivisions must conform to all official controls of the community. A subdivision will not be approved where a later variance from one or more standards in official controls would be needed to use the lots for their intended purpose. In areas not served by publicly owned sewer and water systems, a subdivision will not be approved unless domestic water supply is available and a sewage treatment system consistent with subsections 13-4-6B and H of this chapter can be provided for every lot. Each lot shall meet the minimum lot size and dimensional requirements of subsection 13-4-

6A of this chapter, including at least a minimum contiguous lawn area, that is free of limiting factors sufficient for the construction of two (2) standard soil treatment systems. Lots that would require use of holding tanks must not be approved.

C. Information Requirements: Sufficient information must be submitted by the applicant for the community to make a determination of land suitability. The information shall include at least the following:

1. Topographic contours at ten foot (10') intervals or less from United States geological survey maps or more accurate sources, showing limiting site characteristics;
2. The surface water features required in Minnesota statutes section 505.02, subdivision 1, to be shown on plats obtained from United States geological survey quadrangle topographic maps or more accurate sources;
3. Adequate soils information to determine suitability for building and on site sewage treatment capabilities for every lot from the most current existing sources or from field investigations such as soil borings, percolation tests, or other methods;
4. Information regarding adequacy of domestic water supply; extent of anticipated vegetation and topographic alterations; near shore aquatic conditions, including depths, types of bottom sediments, and aquatic vegetation; and proposed methods for controlling storm water runoff and erosion, both during and after construction activities;
5. Location of 100-year floodplain areas and floodway districts from existing adopted maps or data; and
6. A line or contour representing the ordinary high water level, the "toe" and the "top" of bluffs, and the minimum building setback distances from the top of the bluff and the lake or stream.

D. Dedications: When a land or easement dedication is a condition of subdivision approval, the approval must provide easement over natural drainage or ponding areas for management of storm water and significant wetlands.

E. Platting:

1. All subdivisions that create five (5) or more lots or parcels that are two and one-half (2 1/2) acres or less in size shall be processed as a plat in accordance with Minnesota statutes chapter 505. No permit for construction of buildings or sewage treatment systems shall be issued for lots created after these official controls were enacted, unless the lot was approved as part of a formal subdivision. (Ord. 108, 9-20-1994)

2. Shoreland Plats: All plats in shoreland areas shall be submitted to and reviewed by the state division of waters, soils and minerals before final action by city. (Amended Ord. 8, 10-21-1970)

F. Controlled Access Or Recreational Lots: Lots intended as controlled access to public waters or for recreation use areas for use by nonriparian lots within a subdivision must meet or exceed the sizing criteria in subsection 13-4-6A4 of this chapter. (Ord. 108, 9-20-1994)

13-4-9: PLANNED UNIT DEVELOPMENTS (PUDS) ¹⁵⁴ :

- A. Types Of PUDs Permissible: Planned unit developments (PUDs) are allowed for new projects on undeveloped land, redevelopment of previously built sites, or conversions of existing buildings and land. The land use districts in which they are an allowable use are identified in the land use district descriptions in subsection 13-4-5B of this chapter and per title 12, chapter 12 of this code.
- B. Processing PUDs: Planned unit developments must be processed as a conditional use. The expansion to an existing commercial PUD involving six (6) or less new dwelling units or sites since the date this chapter was adopted is permissible, provided an amended conditional use permit is granted and the total project density does not exceed the allowable densities calculated in the project density evaluation procedures in subsection E of this section. The provisions of title 12, chapter 12 and section 12-15-6 of this code shall apply. Approval cannot occur until the environmental review process (EAW/EIS) is complete.
- C. Application For PUD: The applicant for a PUD must submit the following documents (in addition to the requirements as specified in title 11 and title 12, chapter 12 of this code) prior to final action being taken on the application request:
1. A site plan and/or plat for the project showing location of property boundaries, surface water features, existing and proposed structures and other facilities, land alteration, sewage treatment and water supply systems (where public systems will not be provided), and topographic contours at ten foot (10') intervals or less. When a PUD is a combined commercial and residential development, the site plan/plat must indicate and distinguish which buildings and portions of the project are residential, commercial, or a combination of the two (2).
 2. A property owner association agreement (for residential PUDs) with mandatory membership, all in accordance with the requirements of subsection F of this section.
 3. Deed restriction, covenants, permanent easement, or other instruments that:
 - a. Properly address future vegetative and topographic alterations, construction of additional buildings, beaching of watercraft, and construction of commercial buildings in residential PUDs; and
 - b. Ensure the long term preservation and maintenance of open space in accordance with the criteria and analysis specified in subsection F of this section.
 4. When necessary, a master plan/drawing describing the project and the floor plan for all commercial structures to be occupied.
 5. Those additional documents as requested by the planning and zoning commission and city council that are necessary to explain how the PUD will be designed and will function.
- D. Site Suitable Area Evaluation: Proposed new or expansions to existing planned unit developments must be evaluated using the following procedures and standards to

determine the suitable area for the dwelling unit/dwelling site density evaluation in subsection E of this section.

1. The project parcel must be divided into tiers by locating one or more lines approximately parallel to a line that identifies the ordinary high water level at the following intervals, proceeding landward:

SHORELAND TIER DIMENSIONS

	<u>Unsewered</u> (Feet)	<u>Sewered</u> (Feet)
General development lakes		
First tier	200	200
Second and additional tiers	267	200
Recreational development lakes	267	267
Natural environment lakes	400	320
All river classes	300	300

2. The suitable area within each tier is next calculated by excluding from the tier area all wetlands, bluffs, or land below the ordinary high water level of public waters. This suitable area and the proposed project are then subjected to either the residential or commercial planned unit development density evaluation steps to arrive at an allowable number of dwelling units or sites.

E. Residential And Commercial PUD Density Evaluation: The procedures for determining the base density of a PUD and density increase multipliers are as follows: allowable densities may be transferred from any tier to any other tier further from the water body, but must not be transferred to any other tier closer.

1. Commercial PUD Base Density Evaluation: The suitable area within each tier is divided by the single residential lot size standard for lakes or, for rivers, the single residential lot width standard times the tier depth, unless the city council has specified an alternative minimum lot size for rivers which shall then be used to yield a base density of dwelling units or sites for each tier. Proposed location and numbers of dwelling units or sites for the residential planned unit developments are then compared with the tier, density, and suitability analysis herein and the design criteria in subsection F of this section.

2. Commercial PUD Base Density Evaluation:

- a. Determine the average inside living area size of dwelling units or sites within each tier, including both existing and proposed units and sites. Computation of inside living area sizes need not include decks, patios, stoops, steps, garages, or porches and basements, unless they are habitable space.

- b. Select the appropriate floor area ratio from the following table:

COMMERCIAL PLANNED UNIT DEVELOPMENT

FLOOR AREA RATIOS*

PUBLIC WATERS CLASSES

Second And

*Average Unit Floor Area (Sq. Ft.)	Additional Tiers		
	Sewered General Development Lakes; First Tier On Unsewered General Development Lakes; Urban, Agricultural, Tributary River Segments	On Unsewered General Develop- ment Lakes; Recreational Development Lakes; Transition And Forested River Segments	Natural Environment Lakes And Remote River Segments
200	0.040	0.020	0.010
300	0.048	0.024	0.012
400	0.056	0.028	0.014
500	0.065	0.032	0.016
600	0.072	0.038	0.019
700	0.082	0.042	0.021
800	0.091	0.046	0.023
900	0.099	0.050	0.025
1,000	0.108	0.054	0.027
1,100	0.116	0.058	0.029
1,200	0.125	0.064	0.032
1,300	0.133	0.068	0.034
1,400	0.142	0.072	0.036
1,500	0.150	0.075	0.038

*For average unit floor areas less than shown, use the floor area ratios listed for 200 square feet. For areas greater than shown, use the ratios listed for 1,500 square feet. For recreational camping areas, use the ratios listed at 400 square feet. Manufactured home sites in recreational camping areas shall use a ratio equal to the size of the manufactured home or, if unknown, the ratio listed for 1,000 square feet.

c. Multiply the suitable area within each tier by the floor area ratio to yield total floor area

for each tier allowed to be used for dwelling units or sites.

d. Divide the total floor area by tier computed in subsection E2c of this section by the average inside living area size determined in subsection E2a of this section. This yields a base number of dwelling units and sites for each tier.

e. Proposed locations and numbers of dwelling units or sites for the commercial planned unit development are then compared with the tier, density and suitability analysis herein and the design criteria in subsection F of this section.

3. Density Increase Multipliers:

a. Increases to the dwelling unit or dwelling site base densities previously determined are allowable if the dimensional standards in section 13-4-6 of this chapter are met or exceeded and the design criteria in subsection F of this section are satisfied. The allowable density increases in subsection E3b of this section will only be allowed if structure setbacks from the ordinary high water level are increased to at least fifty percent (50%) greater than the minimum setback, or the impact on the water body is reduced an equivalent amount through vegetative management, topography, or additional means acceptable to the city council, and the setback is at least twenty five percent (25%) greater than the minimum setback.

b. Allowable dwelling unit or dwelling site density increases of residential or commercial planned unit developments:

Maximum Density Increase

Density Evaluation Tiers	Within Each Tier (Percent)
First	50
Second	100
Third	200
Fourth	200
Fifth	200

F. Maintenance And Design Criteria:

1. Maintenance And Administration Requirements:

a. Before final approval of a planned unit development, adequate provisions must be developed for preservation and maintenance in perpetuity of open spaces and for the continued existence and functioning of the development.

b. Deed restrictions, covenants, permanent easements, public dedication and acceptance, or other equally effective and permanent preservation and maintenance of open space are required. The instruments must include all of the following protections:

- (1) Commercial uses prohibited (for residential PUDs);

- (2) Vegetation and topographic alteration other than routine maintenance prohibited;
- (3) Construction of additional buildings or storage of vehicles and other materials prohibited; and
- (4) Uncontrolled beaching of watercraft prohibited.

c. Unless an equally effective alternative community framework is established, when applicable, all residential planned unit developments must use an owners' association with the following features:

- (1) Membership must be mandatory for each dwelling unit or site purchaser and any successive purchasers;
- (2) Each member must pay a pro rata share of the association's expenses, and unpaid assessments can become liens on units or sites;
- (3) Assessments must be adjustable to accommodate changing conditions; and
- (4) The association must be responsible for insurance, taxes, and maintenance of all commonly owned property and facilities.

2. Open Space Requirements: Planned unit developments must contain open space meeting all of the following criteria:

- a. At least fifty percent (50%) of the total project area must be preserved as open space;
- b. Dwelling units or sites, road rights of way, or land covered by road surfaces, parking areas, or structures, except water oriented accessory structures or facilities, are developed areas and shall not be included in the computation of minimum open space;
- c. Open space must include areas with physical characteristics unsuitable for development in their natural state, and areas containing significant historic sites or unplatted cemeteries;
- d. Open space may include outdoor recreational facilities for use by owners of dwelling units or sites, by guests staying in commercial dwelling units or sites, and by the general public;
- e. Open space may include subsurface sewage treatment systems if the use of the space is restricted to avoid adverse impacts on the systems;
- f. Open space must not include commercial facilities or uses, but may contain water oriented accessory structures or facilities;
- g. The appearance of open space areas, including topography, vegetation, and allowable uses, must be preserved by use of restrictive deed covenants, permanent easements, public dedication and acceptance, or other equally effective and permanent means; and
- h. The shore impact zone, based on normal structure setbacks, must be included as

open space. For residential PUDs, at least fifty percent (50%) of the shore impact zone area of existing developments or at least seventy percent (70%) of the shore impact zone area of new developments must be preserved in its natural or existing state. For commercial PUDs, at least fifty percent (50%) of the shore impact zone must be preserved in its natural state.

3. Erosion Control And Storm Water Management: Erosion control and storm water management plans must be developed, and the PUD must:

a. Be designed, and the construction managed, to minimize the likelihood of serious erosion occurring either during or after construction. This must be accomplished by limiting the amount and length of time of bare ground exposure. Temporary ground covers, sediment entrapment facilities, vegetated buffer strips, or other appropriate techniques must be used to minimize erosion impact on surface water features. Erosion control plans approved by a soil and water conservation district may be required if project size and site physical characteristics warrant; and

b. Be designed and constructed to effectively manage reasonable expected quantities and qualities of storm water runoff. Impervious surface coverage within any tier must not exceed twenty five percent (25%) of the tier area; except, that for commercial PUDs, thirty five percent (35%) impervious surface coverage may be allowed in the first tier of general development lakes with an approved storm water management plan and consistency with subsection 13-4-6C of this chapter.

4. Centralization And Design Of Facilities: Centralization and design of facilities and structures must be done according to the following standards:

a. Planned unit developments must be connected to publicly owned water supply and sewer systems, if available. On site water supply and sewage treatment systems must be centralized and designed and installed to meet or exceed applicable standards or rules of the Minnesota department of health and subsections 13-4-6B and H of this chapter. On site sewage treatment systems must be located on the most suitable areas of the development, and sufficient lawn area free of limiting factors must be provided for a replacement soil treatment system for each sewage system;

b. Dwelling units or sites must be clustered into one or more groups and located on suitable areas of the development. They must be designed and located to meet or exceed the following dimensional standard for the relevant shoreland classification: setback from the ordinary high water level, elevation above the surface water features, and maximum height. Setbacks from the ordinary high water level must be increased in accordance with subsection E3 of this section for developments with density increases;

c. Shore recreation facilities, including, but not limited to, swimming areas, docks, and watercraft mooring areas and launching ramps, must be centralized and located in areas suitable for them. Evaluation of suitability must include consideration of land slope, water depth, vegetation, soils, depth to ground water and bedrock, or other relevant factors. The number of spaces provided for continuous beaching, mooring, or docking of watercraft must not exceed one for each allowable dwelling unit or site in the first tier (notwithstanding existing mooring sites in an existing commercially used harbor). Launching ramp facilities, including a small dock for loading and unloading equipment,

may be provided for use by occupants of dwelling units or sites located in other tiers;

d. Structures, parking areas, and other facilities must be treated to reduce visibility as viewed from public waters and adjacent shorelands by vegetation, topography, increased setbacks, color, or other means acceptable to the city council, assuming summer, leaf-on conditions. Vegetative and topographic screening must be preserved, if existing, or may be required to be provided;

e. Accessory structures and facilities, except water oriented accessory structures, must meet the required principal structure setback and must be centralized; and

f. Water oriented accessory structures and facilities may be allowed if they meet or exceed design standards contained in subsection 13-4-6B of this chapter and are centralized.

G. Conversions: The city council may allow existing resorts or other land uses and facilities to be converted to residential planned unit developments if all of the following standards are met:

1. Proposed Conversions: Proposed conversion must be initially evaluated using the same procedures for residential planned unit developments involving all new construction. Inconsistencies between existing features of the development and these standards must be identified.

2. Deficiencies: Deficiencies involving water supply and sewage treatment, structure color, impervious coverage, open space, and shore recreation facilities must be corrected as part of the conversion or as specified in the conditional use permit.

3. Shore And Bluff: Shore and bluff impact zone deficiencies must be evaluated and reasonable improvements made as part of the conversion. These improvements must include, where applicable, the following:

a. Removal of extraneous buildings, docks, or other facilities that no longer need to be located in shore or bluff impact zones;

b. Remedial measures to correct erosion sites and improve vegetative cover and screening of buildings and other facilities as viewed from the water; and

c. If existing dwelling units are located in shore or bluff impact zones, conditions are attached to approvals of conversions that preclude exterior expansions in any dimension or substantial alterations. The conditions must also provide for future relocation of dwelling units, where feasible, to other locations, meeting all setback and elevation requirements when they are rebuilt or replaced.

4. Existing Dwellings Or Sites: Existing dwelling unit or dwelling site densities that exceed standards in subsection E of this section may be allowed to continue but must not be allowed to be increased, either at the time of conversion or in the future. Efforts must be made during the conversion to limit impacts of high densities by requiring seasonal use, improving vegetative screening, centralizing shore recreation facilities, installing new sewage treatment systems, or other means. (Ord. 108, 9-20-1994)

CHAPTER 5 BLUFFLAND AND RIVERLAND DEVELOPMENT

13-5-1: POLICY AND AUTHORIZATION:

These provisions are for the controlling of bluffland and riverland development in order to protect and preserve the scenic, recreational, natural, historical and scientific values of the Rum River in Andover in a manner consistent with Minnesota statutes and the management plan for the Rum River. (Ord. 223, 8-19-1997)

13-5-2: PURPOSE:

The purpose of this chapter is to:

- A. Establish a scenic river district along the bluffland and shoreland of the Rum River as required by the management plan for the Rum River.
- B. Regulate within the Rum River district, a land use district, the area of the lots, and the length of bluffland and water frontage suitable for building sites.
- C. Regulate the setback of structures and sanitary waste treatment facilities from bluff lines and shorelines to protect the existing and/or natural scenic values, vegetation, soils, water quality, floodplain areas, and bedrock from disruption by manmade structures or facilities.
- D. Regulate alterations of the natural vegetation and topography.
- E. Maintain property values and prevent poorly planned development.
- F. Conserve and protect the natural scenic values and resources of the Rum River and maintain a high standard of environmental quality.
- G. Comply with Minnesota statutes and the management plan for the Rum River. (Ord. 223, 8-19-1997)

13-5-3: GENERAL PROVISIONS:

- A. Jurisdiction: The jurisdiction of this chapter shall include all lands designated within the Rum River land use district within the jurisdiction of Andover as defined in the management plan for the Rum River.
- B. Compliance With Provisions: The use of any land within the Rum River land use district; the size and shape of lots; the use and location of structures on lots; the installation and maintenance of water supply and waste disposal facilities; the filling, grading, lagooning, or dredging of any river area; the cutting of vegetation or alteration of the natural topography within the district; and the subdivision of land shall be in full compliance with the terms of this chapter and other applicable regulations.
- C. Interpretation And Application: In their interpretation and application, the provisions of this

chapter shall be held to be minimum requirements, and shall not be deemed a limitation or repeal of any powers or rights granted by Minnesota statutes.

D. Severability: It is hereby declared to be the intent of the city that several provisions of this chapter are separable in accordance with the following:

1. If any court of competent jurisdiction shall adjudge any provision of this chapter to be invalid, such judgment shall not affect any other provisions of this chapter not specifically included in said judgment.

2. If any court of competent jurisdiction shall adjudge invalid the application of any provision of this chapter to a particular property, building, or other structure, such judgment shall not affect the application of said provision to any other property, building, or structure not specifically included in said judgment.

E. Abrogation And Greater Restrictions: It is not intended by this chapter to repeal, abrogate or impair any existing easements, covenants, deed restrictions, or land use controls. Where this chapter imposes greater restrictions, the provisions of this chapter shall prevail. (Ord. 223, 8-19-1997)

13-5-4: DEFINITIONS:

For the purpose of this chapter, certain terms and words are hereby defined as follows:

AGRICULTURAL USE: The use of land for the production of food or fiber, their storage on the area, and/or raising thereon of domestic pets and domestic farm animals.

BLUFF LINE: A line along the top of a slope connecting the points at which the slope becomes more than twelve percent (12%). This applies to those slopes within the land use district which are beyond the setback provisions from the ordinary high water mark.

BUILDING LINE: That line measured across the width of the lot at the point where the main structure is placed in accordance with setback provisions.

CAMPGROUND: An area accessible by vehicle and containing campsites or camping spots for tents and trailer camping.

CLEAR CUTTING: The removal of an entire stand of vegetation.

COMMISSIONER: The commissioner of natural resources of the state.

CONDITIONAL USE: A use of land which is permitted only when allowed by the city council after a public hearing, if certain conditions are met which eliminate or minimize the incompatibility with other permitted uses of the district.

ESSENTIAL SERVICES: Underground or overhead gas, electrical, stream or water distribution systems; collection, communication, supply, or disposal systems, including poles, wires, mains, drains, sewers, pipes, conduits, cables, fire alarm boxes, traffic signals, hydrants and other similar equipment and accessories in conjunction therewith; but not including buildings or

transmission services.

FORESTRY: The use and management, including logging, of a forest, woodland or plantation and related research and educational activities, including the construction, alteration or maintenance of woodroads, skidways, landings, and fences.

HARDSHIP: As used in connection with a variance under this chapter, the property in question cannot be put to a reasonable use under the conditions allowed by this chapter. Economic considerations alone shall not constitute a hardship if any reasonable use for the property exists under the terms of this chapter.

LOT: Shall be considered to be an individual building site which shall be occupied by no more than one principal structure equipped with sanitary facilities, together with such open spaces as are required under the provisions of the zoning ordinance, having not less than the minimum area required by the zoning ordinance for a building site in the district in which such lot is situated and having its principal frontage on a public street.

MANUFACTURED HOME: A housing unit designed for transportation after fabrication on streets and highways on its own wheels or on a flatbed trailer to the site where only minor assembly operations are necessary.

MINERALS: Soil, stone, clay, sand, gravel and other similar solid material or substance to be mined from natural deposits.

MINING: All or any part of the process involved in the extraction of minerals by removing the overburden and extracting directly from the soils, clay, stone, sand and gravel and other similar solid material or substance deposits thereby exposed.

MODULAR HOME: A nonmobile housing unit that is basically fabricated at a central factory and transported to a building site where final installations are made, permanently affixing it to the site, and built to meet or exceed the state building code.

NONCONFORMING USE: Any use established before February 3, 1981, which does not conform to the use restrictions of a particular zoning district. This should not be confused with substandard dimensions of a conforming use.

OPEN SPACE RECREATION USES: Recreation uses particularly oriented to and utilizing the outdoor character of an area, including hiking and riding trails, primitive campsites, campgrounds, waysides, parks and recreational areas.

ORDINARY HIGH WATER MARK: A mark delineating the highest water level which has been maintained for a sufficient period of time to leave evidence upon the landscape. The ordinary high water mark is commonly that point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial. In areas where the ordinary high water mark is not evident, setbacks shall be measured from the stream bank of the following water bodies that have permanent flow or open water: the main channel, adjoining side channels, backwaters and sloughs.

PLANNED UNIT DEVELOPMENT: A development having two (2) or more principal uses or structures on a single parcel of land and developed according to an approved plan.

PRIMITIVE CAMPSITES: An area that consists of individual remote campsites accessible only by foot or water.

SCREENED: When a structure is built or placed on a lot or vegetation is planted such that when the structure is built it is visually inconspicuous as viewed from the river during the summer months. "Visually inconspicuous" means difficult to see or not readily noticeable in summer months as viewed from the river.

SELECTIVE CUTTING: The removal of single scattered trees.

SETBACK: The minimum horizontal distance between a structure and the ordinary high water mark or lot line, bluff line, or street. Distances are to be measured from the most outwardly extended portion of the structure.

SEWAGE TREATMENT SYSTEM: Any system for the collection, treatment and dispersion of sewage including, but not limited to, septic tanks, soil absorption systems and drain fields.

SINGLE-FAMILY DWELLING: A detached building containing one dwelling unit.

STRUCTURE: Any building, sign or appurtenance thereto, except aerial or underground utility lines, such as sewer, electric, telephone, telegraph, or gas lines, including towers, poles, and other supporting appurtenances, and fences used to control livestock or delineate boundaries.

SUBDIVISION: Improved or unimproved land or lands which are divided for the purpose of ready sale or lease, or divided successively within a five (5) year period for the purpose of sale or lease, into three (3) or more lots or parcels of less than five (5) acres each, contiguous in area and which are under common ownership or control.

SUBSTANDARD USE: Any use within the land use district existing prior to February 3, 1981, which is permitted within the applicable land use district but does not meet the minimum lot area, length of water frontage, structure setbacks or other dimensional standards of this chapter.

VARIANCE: Any modification or variation of official controls where it is determined that by reason of exceptional circumstances, the strict enforcement of the official controls would cause unnecessary hardship.

WETLAND: Land which is annually subject to periodic or continual inundation by water and commonly referred to as a bog, swamp, or marsh. (Ord. 223, 8-19-1997; amd. 2003 Code)

13-5-5: SCENIC RIVER DISTRICT REGULATIONS AND REQUIREMENTS:

A. District Established And Designated:

1. In order to preserve and protect the Rum River and its adjacent lands which possess outstanding scenic, recreational, natural, historical, scientific and similar values, the Rum River in Andover has been given the scenic river classification and the uses and classification of this river and its adjacent lands are hereby designated by land use zoning districts, the boundaries of which are based on the management plan for the Rum River.

2. The boundaries of the Rum River scenic land use district are shown on the map designated as the Andover official zoning map, which is made a part of this chapter and is on file in the offices of the zoning administrator ¹⁵⁵. In case of conflict between the map and the property descriptions in the management plan for the Rum River, the latter shall prevail. (Ord. 223, 8-19-1997; amd. 2003 Code)

B. Minimum District Dimensional Requirements:

1. The following chart sets forth the minimum area, setbacks, and the requirements of the Rum River scenic river district:

a. Minimum lot size:

- (1) Riparian lots: 4 acres.
- (2) Nonriparian lots: 2 1/2 acres.

b. Lot width at building line:

- (1) Lots of record: 300 feet.
- (2) Newly created lots: 300 feet.

c. Lot width at ordinary high water mark: 300 feet.

d. Building setbacks:

- (1) From ordinary high water mark: 150 feet.
- (2) From bluff line: 30 feet.

e. On site sewage treatment system setback from ordinary high water mark: 100 feet.

f. Maximum structure height: 35 feet. This requirement shall not apply to buildings used primarily for agricultural uses.

g. Controlled vegetative cutting area (see subsection E of this section):

- (1) Setback from ordinary high water mark: 150 feet.
- (2) Setback from bluff line: 30 feet.

h. Side yard setbacks:

- (1) From street (corner lot): 30 feet.
- (2) From interior lot line: 10 feet.

i. Front yard setback (building line closest to street): 40 feet.

j. Lot depth from high water mark: 250 feet.

2. On the Cedar Creek tributary designated in the management plan for the Rum River, the following setbacks also apply within the land use district:

a. Building setbacks from ordinary high water mark: 100 feet.

b. On site sewage treatment system setback from ordinary high water mark: 75 feet.

c. Controlled vegetative cutting area setback from ordinary high water mark (see subsection E of this section): 100 feet.

3. No structure shall be placed on any slope greater than twelve percent (12%) (12 feet vertical rise in 100 feet horizontal distance), unless such structures can be screened from river view with natural vegetation; where practicable, sewage disposal system facilities can be installed so as to comply with the sanitary provisions of subsection D of this section; and the building permit applicant can prove to the city council that any potential erosion or sedimentation problems related to locating such a structure either do not exist or that adequate measures will be taken to prevent such problems through special construction methods.

4. No structures shall be placed in any floodway. Structures proposed within a floodplain shall be consistent with the city and/or statewide "Standards And Criteria For Management Of Flood Plain Areas Of Minnesota" ¹⁵⁶.

5. Lots of record in the office of the county recorder which meet all legal requirements of the city prior to February 3, 1981, but do not meet the dimensional requirements of this chapter shall be allowed as building sites, provided such use is permitted in the land use district, the lot was in separate ownership prior to February 3, 1981, and all sanitary and dimensional requirements of this chapter are complied with as far as practicable.

6. If in a group of contiguous lots under single ownership, any individual lot does not meet the lot width requirements of this chapter, such individual lot cannot be considered as a separate parcel of land for purposes of sale or development, but must be combined with adjacent lots under the same ownership so that the combination of lots will equal one or more parcels of land each meeting the lot width requirements of this chapter; except, that such lots which meet or exceed sixty percent (60%) or more of the lot width standards of these regulations may be considered as a separate parcel of land for the purpose of sale and development, if on site sewage disposal systems can be installed so as to comply with these regulations.

C. Uses Within Districts:

1. Purpose: The purpose of establishing standards and criteria for uses in the Rum River land use district shall be to protect and preserve existing natural, scenic, historical, scientific, and recreational values, to maintain proper relationships between various land use types, and to prohibit new residential, commercial, or industrial uses that are inconsistent with the statewide standards and criteria for wild and scenic rivers and the management plan for the Rum River.

2. Permitted And Conditional Uses:

a. In the following tables of uses: "P" means permitted use and "C" means conditional use. Certain of the following uses are subject to the zoning dimension provisions and sanitary provisions of subsections A, B and D of this section. All of the following uses are subject to the vegetative cutting provisions of subsection E of this section:

(1) Governmental campgrounds, subject to management plan specifications and approval of the commissioner: P

(2) Private campgrounds, subject to management plan specifications and the provisions of section 13-5-13 of this chapter (certification): C

(3) Public accesses, road access type with boat launching facilities subject to management plan specifications and approval of the commissioner: P

(4) Public accesses, trail access type, subject to management plan specifications and approval of the commissioner: P

(5) Temporary docks: C

(6) Other governmental open space recreational uses, subject to management plan specifications and the approval of the commissioner: P

(7) Other private open space recreational uses, subject to management plan specifications and the provisions of section 13-5-13 of this chapter (certification): C

(8) Agricultural uses: P

(9) Single-family residential uses, except manufactured and modular homes: P

(10) Forestry uses: P

(11) Essential services: P

(12) Sewage disposal systems: P

(13) Private roads and minor public streets: P

(14) Signs approved by federal, state, or local government which are necessary for public health and safety, and signs indicating areas that are available or not available for public use: P

(15) Signs not visible from the river that are not specified in (14) above: P

(16) Governmental resource management for improving fish and wildlife habitat, wildlife management areas, nature areas; accessory roads: P

(17) Underground mining that does not involve surface excavation in the land use

district: C

(18) Utility transmission power lines (60KV through 199KV) and pipelines, subject to the provisions of subsection E of this section: C

(19) Public roads, subject to the provisions of subsection E of this section: C

b. All uses not listed as permitted or conditional uses shall not be allowed within the applicable land use district without review and approval of the city council and commissioner of natural resources.

D. Water And Sewer:

1. Sewer System Requirements:

a. Any new dwelling intended for human occupancy must provide for an adequate method of sewage treatment. Public or municipal collection and treatment facilities must be used where available and feasible. Where public or municipal facilities are not available, all new on site individual sewer treatment systems shall conform to the minimum standards and administrative procedures set forth in other applicable local ordinances ¹⁵⁷, the minimum standards of the Minnesota pollution control agency (individual sewage treatment systems standards) and subsection B of this section.

b. No person, firm or corporation shall install, alter, repair or extend any individual sewer disposal system or private well without first obtaining a permit for such action from the city for the specific installation, alteration, repair, or extension. Prior to issuance of any such permit, the city shall require that percolation rate tests and, at the discretion of the building official, soil boring tests be done on the proposed site for an individual sewer disposition to determine whether or not the site is capable of supporting a conforming sewage treatment system.

2. Water Supply: Any new public or new private supply of water for domestic purposes must conform to Minnesota department of health standards for water quality and the administrative procedures of other applicable local ordinances ¹⁵⁸.

E. Landscape Alterations:

1. General Provisions: The vegetative cutting provisions shall apply to those areas specified in subsection B of this section. The following are general provisions, within designated setback areas:

a. Clear cutting, except for any authorized public services such as roads and utilities, shall not be permitted.

b. Selective cutting of trees in excess of four inches (4") in diameter at breast height shall be permitted, provided cutting is spaced in several cutting operations and a continuous tree cover is maintained.

c. The cutting provisions as stated above shall not be deemed to prevent:

(1) The removal of diseased or insect infested trees, or of rotten or damaged trees that present safety hazards.

(2) Pruning understory vegetation, shrubs, plants, brushes, and grasses, or from harvesting crops, or cutting suppressed trees or trees less than four inches (4") in diameter at breast height. (Ord. 223, 8-19-1997)

2. Clear Cutting: Clear cutting anywhere in the scenic river district is subject to the following standards and criteria:

a. Clear cutting shall not be used as a cutting method where soil, slope, or other watershed conditions are determined by the city council to be fragile and subject to severe erosion and/or sedimentation.

b. Clear cutting shall be conducted only where clear cut blocks, patches or strips are, in all cases, shaped and blended with the natural terrain.

c. The size of clear cut blocks, patches or strips shall be kept at the minimum necessary.

d. Where feasible, all clear cuts shall be conducted between September 15 and May 15. If natural regeneration will not result in adequate vegetative cover, areas in which clear cutting is conducted shall be planted to prevent erosion and to maintain the aesthetic quality of the area. Where feasible, replanting shall be performed in the same spring, or the following spring.

3. Grading And Filling: Grading and filling work done within the scenic river district shall require a permit and shall comply with the following:

a. Grading and filling of the natural topography which is not necessary to a permitted or conditional use shall not be permitted in the Rum River land use district. (Ord. 223, 8-19-1997; amd. 2003 Code)

b. Grading and filling of the natural topography which is accessory to a permitted or conditional use shall not be conducted without an approved grading and filling permit from the city. A grading and filling permit may be issued only if the conditions of this subsection are properly satisfied.

c. Grading and filling of the natural topography which is necessary to a permitted or conditional use shall be performed in a manner which minimizes earthmoving, erosion, tree clearing, and the destruction of natural topography.

d. Grading and filling in of the natural topography shall also meet the following standards:

(1) The smallest amount of bare ground is exposed for as short a time as feasible.

(2) Temporary ground cover such as mulch is used and permanent ground cover is planted.

(3) Methods to prevent erosion and to trap sediment are employed.

(4) Fill is stabilized to accepted engineering standards.

4. Resultant Changes To River; Permit Required: Any activity which will change or diminish the course, current or cross section of any public waters, including, but not limited to, filling, excavating or placing of any materials in or on the beds of public waters, is prohibited unless authorized by a previously obtained permit from the commissioner of natural resources pursuant to Minnesota statutes. "Public waters" shall be as defined in Minnesota statutes.

5. Tampering With Wetlands Prohibited: Drainage or filling in of wetlands is not allowed within the land use district designated by this chapter.

6. Utility Transmission Crossing: All utility transmission crossings of land within the Rum River land use district shall require a conditional use permit. The construction of such transmission services shall be subject to the standards and criteria of Minnesota statutes. With respect to electric power utility transmission crossings, a conditional use permit shall be required for crossings of 69 kilovolts through 199 kilovolts. No conditional use permit shall be required for high voltage (200 kilovolts or greater) transmission lines under control of the environmental quality board pursuant to Minnesota statutes. However, lines of 200 kilovolts or more which are exempt by the environmental quality board shall require a conditional use permit.

7. Construction Of Public Roads: In addition to such permits as may be required by Minnesota statutes, a conditional use permit shall be required for any construction or reconstruction of public roads within the Rum River land use district. Such construction or reconstruction shall be subject to the standards and criteria of Minnesota statutes, and city street and road standards as adopted by the city council. A conditional use permit is not required for minor public streets which are streets intended to serve primarily as an access to abutting properties, however, they shall be constructed or reconstructed to comply with city street and road standards. Public roads include township, county, and municipal roads and highways which serve or are designed to serve flows of traffic between communities or other traffic generating areas.

F. Subdivisions: No land shall be subdivided which is determined by the governing body or the commissioner to be unsuitable by reason of flooding, inadequate for development, severe erosion potential, unfavorable topography, inadequate water supply or sewage treatment capabilities or any other feature likely to be harmful to the health, safety, or welfare of the future residents of the proposed subdivision or the community. Percolation rate tests and soil boring tests shall be required as deemed necessary by the city building official, to be done by the subdivider, and the results submitted to the city council to assure that each lot in the proposed subdivision is capable of supporting a sewage treatment system of the type recommended by the Minnesota pollution control agency standards for individual sewage treatment systems ¹⁵⁹.

G. Planned Unit Developments: A planned unit development may be allowed only when the proposed clustering provides a better means of preserving agricultural land, open space, woods, scenic views, wetlands, and other features of the natural environment than traditional subdivision development. Except for minimum setbacks and height limits, altered dimensional standards may be allowed as exceptions to this chapter for planned unit developments, provided:

1. Preliminary plans are approved by the commissioner prior to their enactment by the governing body.
2. Central sewage facilities are installed which meet the standards, criteria, rules or regulations of the Minnesota department of health and the pollution control agency.
3. Open space is preserved. This may be accomplished through the use of restrictive deed covenants, public dedications, granting of scenic easements, or other methods.
4. There is not more than one centralized boat launching facility for each planned unit development. (Ord. 223, 8-19-1997)

13-5-6: ADMINISTRATION OF PROVISIONS:

The provisions of this chapter shall be administered by the city council. The city council shall act upon all questions as they arise in the administration of this chapter, shall hear and decide appeals, and shall review any order, requirements, decisions or determination as provided by Minnesota statutes. Permit fees and inspection fees shall be established by ordinance ¹⁶⁰ and shall be collected by the city for deposit with the city and credited to the general fund. (Ord. 223, 8-19-1997; amd. 2003 Code)

13-5-7: PERMITS REQUIRED:

Permits from the city are required by this chapter and other applicable ordinances for the construction of buildings, public or private water supply and sewage treatment systems, the grading and filling of the natural topography and erection of signs within the Rum River land use district. (Ord. 223, 8-19-1997)

13-5-8: NONCONFORMING AND SUBSTANDARD USES:

A. Nonconforming Uses:

1. Uses which are prohibited by this chapter but which are in existence prior to the effective date of this chapter shall be nonconforming uses. Such uses shall not be intensified, enlarged, or expanded.
2. All private sanitary sewer systems inconsistent with the performance standards of the city's sanitary sewer ordinances and the minimum standards of the Minnesota pollution control agency and the state plumbing code within the Rum River scenic river district shall be brought into conformity or discontinued within the time frame specified in title 10, chapter 4 of this code.

- B. Substandard Uses:** All uses in existence prior to February 3, 1981, which are permitted uses within the newly established land use district, but do not meet the minimum lot area, setbacks or other dimensional requirements of this chapter are substandard uses. All substandard uses, except for substandard signs, shall be allowed to continue subject to the following conditions and exceptions:

1. Any structural alteration or addition to a substandard use which will increase the

substandard setback shall not be allowed.

2. Where a setback pattern from the ordinary high water mark has already been established on both sides of a proposed building site, the setback of the proposed structure may be allowed to conform to that pattern. This provision shall apply to lots which do not meet the minimum lot width requirements in subsection 13-5-5B of this chapter. (Ord. 223, 8-19-1997)

13-5-9: VARIANCES:

The granting of a variance requires the presence of the following conditions:

- A. The strict enforcement of the land use controls will result in unnecessary hardship.
- B. Granting of the variance is not contrary to the purpose and intent of the zoning provisions herein established by these standards and criteria, and is consistent with management plan for the Rum River.
- C. There are exceptional circumstances unique to the subject property which were not created by the landowners. (Ord. 223, 8-19-1997)
- D. Granting of the variance will not allow any use which is neither a permitted nor a conditional use in the Rum River land use district.
- E. Granting of the variance will not alter the essential character of the locality as established by the management plan for the Rum River. (Ord. 223, 8-19-1997; amd. 2003 Code)

13-5-10: PLATS:

- A. Copies To State: Copies of all plats within the boundary of the Rum River land use district shall be forwarded to the commissioner within ten (10) days of approval by the city council.
- B. Inconsistent Plats: Approval of a plat which is inconsistent with this chapter is permissible only if the detrimental impact of the inconsistency is more than overcome by other protective characteristics of the proposal. All inconsistent plats approved by the city must be certified in accordance with section 13-5-13 of this chapter. (Ord. 223, 8-19-1997)

13-5-11: AMENDMENTS:

- A. Amendments Authorized; Certification: This chapter may be amended whenever the public necessity and the general welfare require such amendments by the procedure specified in this section. Amendments to this chapter must be certified by the commissioner as specified in section 13-5-13 of this chapter.
- B. Initiation Of Amendment; Application: Amendments of this chapter may be initiated by a petition to the planning and zoning commission or by action of the city council. An application for an amendment shall be filed with the city.
- C. Public Hearing: Upon receipt in proper form of the application and other requested

materials, the planning and zoning commission shall conduct a public hearing in the manner prescribed by Minnesota statutes.

- D. City Council Recommendation: Within sixty (60) days following the public hearing, the city council shall make a report of its recommendations on the proposed amendment and shall file a copy with the commissioner. Certification from the commissioner must be obtained as specified in section 13-5-13 of this chapter before the proposed amendment becomes effective. (Ord. 223, 8-19-1997)

13-5-12: CONDITIONAL USE PERMITS:

- A. A copy of application to consider issuance of a conditional use permit shall be received by the commissioner at least thirty (30) days prior to such hearings or meetings to consider issuance of a conditional use permit. A copy of the decision shall be forwarded to the commissioner within ten (10) days of such action. (Ord. 223, 8-19-1997; amd. 2003 Code)
- B. Conditional use permits relating to private or commercial recreational development must be certified in accordance with section 13-5-13 of this chapter. (Ord. 223, 8-19-1997)

13-5-13: CERTIFICATION PROCEDURES:

- A. State Certification Required: Certain land use decisions which directly affect the use of land within the Rum River land use district and involve any of the following actions must be certified by the commissioner: (Ord. 223, 8-19-1997; amd. 2003 Code)
1. Adopting or amending an ordinance including rezoning of particular tracts of land.
 2. Granting a variance from a provision of this chapter which relates to the zoning dimension provisions of subsection 13-5-5B of this chapter or any other dimension provisions established in the management plan for the Rum River.
 3. Approving a plat which is inconsistent with this chapter.
 4. Granting a conditional use permit for a private or commercial recreational development.
- B. Procedure: Certification procedure is as follows:
1. A copy of all notices of any public hearings, or where a public hearing is not required, a copy of the application to consider zoning amendments, variances, or inconsistent plats under local ordinance shall be received by the commissioner at least thirty (30) days prior to such hearings or meetings to consider such actions. The notice of application shall include a copy of the proposed inconsistent plat, or a description of the requested variance.
 2. The Andover city council shall notify the commissioner of its decision on the proposed action within ten (10) days of the decision.
 3. The action becomes effective when either:
 - a. The final decision taken by the city has previously received certification of approval

from the commissioner; or

b. The city receives certification of approval after its final decision; or

c. Thirty (30) days have elapsed from the day the commissioner received notice of the final decision, and the city has received from the commissioner neither certification of approval nor notice of nonapproval; or

d. The commissioner certifies his or her approval within thirty (30) days after conducting a public hearing.

4. In case the commissioner gives notice of nonapproval of an ordinance, variance or inconsistent plat, either the applicant or the city council may, within thirty (30) days of said notice, file with the commissioner a request for hearing. If the demand for hearing is not made within thirty (30) days, the notice of nonapproval becomes final. Where a hearing is requested, it shall be:

a. Held by the city within sixty (60) days of the demand and after at least two (2) weeks' published notice.

b. Conducted in accordance with Minnesota statutes.

The commissioner shall certify his or her approval or disapproval of the proposed action within thirty (30) days of the hearing. (Ord. 223, 8-19-1997)

C. Permit And Certification Table: The following table summarizes the permit and certification process within the Rum River land use district: (Ord. 223, 8-19-1997; amd. 2003 Code)

Land Use District Permits	Action Necessary
Building permits	LP
Sign construction permits	LP
Septic permits	LP
Water supply permits	LP
Grading, filling permits	LP
Conditional use permits, general conditional use	PH-FD
Conditional use permits for private recreational developments	PH-CC
Amendments to provisions	PH-CC
Amendments to district boundary	PH-CC
Inconsistent plats	PH-CC
Planned unit development	PH-CC
Variances	PH-WA

Plats

PH (notification not required)-FD

LP - Permit issued by the city council in accordance with this chapter and all other local ordinances.

CC - Certification by the commissioner of natural resources prior to final local approval.

PH - Public hearing necessary by the city council giving thirty (30) days' notice of the hearing to the commissioner of natural resources.

FD - City council forwards any decisions to the commissioner of natural resources within ten (10) days after taking final action.

WA - The commissioner of natural resources shall submit, after notice of public hearing and before the city council gives preliminary approval, a written review and approval or denial of the project.

(Ord. 223, 8-19-1997)

13-5-14: VIOLATION; PENALTIES:

It is declared unlawful for any person to violate any of the terms and provisions of this chapter. Violation thereof shall be a misdemeanor and shall be punishable as provided under state law. Each day that a violation is permitted to exist shall constitute a separate offense. In the event of a violation of this chapter, the city council or the commissioner of natural resources, in addition to other remedies, may institute appropriate actions or proceedings to prevent, restrain, or abate such violations. (Ord. 223, 8-19-1997)

CHAPTER 6

BUFFER STRIPS AND STANDARDS FOR PROTECTION OF WETLANDS AND STORM WATER PONDS

13-6-1: INCORPORATION OF STATE REGULATIONS:

This chapter hereby incorporates by reference the wetlands conservation act of 1991 (Minnesota statutes section 103G.221 et seq., hereinafter referred to as the WCA) and any future amendments adopted by the legislature. All wetlands and activities shall comply with those regulations as adopted under the WCA. (Ord. 114A, 7-17-2001)

13-6-2: FINDINGS AND INTENT:

The city finds it necessary to regulate the use of lands surrounding wetlands and storm water ponds. Buffer strips are necessary and beneficial to maintaining the health of wetlands and storm water ponds. These strips of land surrounding wetlands and storm water ponds protect their shorelines from erosion, while serving to filter sediment, chemicals and other nutrients before storm water discharges into these water features. Buffer strips are also beneficial in providing habitat for wildlife. It is the intent of this chapter to establish and maintain a buffer strip that abuts all wetlands and storm water ponds that may be left undisturbed, or in its natural condition. (Ord. 114A, 7-17-2001; amd. 2003 Code)

13-6-3: PURPOSE AND IMPLEMENTATION:

Through the adoption and enforcement of this chapter, the city shall promote the general health, safety, and welfare of its residents by both conserving and protecting water features of the city. The city seeks to accomplish the following purposes:

- A. To satisfy all of the requirements of the wetlands conservation act of 1991, as amended;
- B. To balance the need to preserve and protect natural resources and systems with both the rights of private property owners and the need to support the efficient use of developable land within the city;
- C. To promote water quality by maintaining the ability to recharge ground water and receive the discharge of ground water, to retain sediment and toxicants and filter and strip nutrients from surface water runoff before it discharges into community lakes and streams, thus avoiding the contamination and eutrophication of these water features; and
- D. To provide wildlife habitat and thereby support the maintenance of diversity of both plant and animal species within the city. (Ord. 114A, 7-17-2001)

13-6-4: DEFINITIONS:

BUFFER STRIP: A one rod (16.5 feet or 5 meters) wide area abutting a wetland and/or storm water pond that shall be left undisturbed or in its natural condition during the development, building and landscaping phases. The buffer strip shall not be included within the one hundred foot (100') buildability requirement of section 11-1-4 of this code, definition of "buildable lots".

WETLANDS: Lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For the purposes of this definition, "wetlands" must:

- A. Have a predominance of hydric soils;
- B. Be inundated or saturated by surface water or ground water at a frequency and duration sufficient to support a prevalence of hydrophytic vegetation typically adapted for life in saturated soil conditions; and
- C. Under normal circumstances, support a prevalence of such hydrophytic vegetation. (Ord. 114A, 7-17-2001)

13-6-5: BUFFER STRIPS AND SETBACKS:

- A. **Buffer Strips Required:** For lots of record created after the adoption of this chapter, a buffer strip shall be established abutting all wetlands and/or storm water ponds. The buffer provisions of this chapter shall not apply to developments that have paid the preliminary plat fee (as established in subsection 11-2-2B of this code) to the city within thirty (30) days after the adoption of this chapter.
- B. **Requirements:** Buffer strips shall be established and maintained in accordance with the following requirements:
 - 1. Buffer strips shall be identified within each lot by active protective fencing approved by the city. The developer shall be responsible for the placement of the fencing. A one rod (16.5 feet or 5 meters, measured linear) wide undisturbed buffer strip shall be maintained abutting all wetlands and/or storm water ponds during the development and building phases. (Ord. 114A, 7-17-2001)
 - 2. Buffer strips shall apply to all wetlands and/or storm water ponds.
 - 3. Buffer strips abutting storm water ponds shall be measured from the 100-year flood elevation surrounding the storm water pond.
- C. **Fencing:**
 - 1. Active protective fencing shall be installed by the developer/builder along the most upland edge of all buffer strips prior to any development and/or building construction. These fences will be a minimum of three feet (3') high. Geotextile fabric fencing (silt fence) is acceptable as long as it meets MNDOT 3733 type 3.
 - 2. All fencing barriers must be installed prior to and maintained throughout development and/or building construction. The fencing barriers are intended to inform the developer, builder and property owner of the buffer strip protection process.
 - 3. All fencing barriers shall not be removed until construction and/or development has been completed. It shall be the responsibility of the builder or property owner to remove all fencing barriers once the lot has been landscaped (soil and/or seed established). (Ord. 114A, 7-17-2001; amd. 2003 Code)

D. Exemptions From Provisions:

1. City initiated projects (i.e., trails, roads, etc.) may be exempt from the buffer strip requirements.
2. No height requirements shall apply to grass and weeds that are located in the buffer strip. (Ord. 114, 7-16-1996; amd. 2003 Code)

13-6-6: BUFFER STRIP PROTECTION PLAN:

A. A wetland buffer strip protection plan shall be submitted either as part of the grading, drainage and erosion control plan or as a separate drawing, to include the following:

1. Location of all wetlands.
2. Location of wetland buffer measures.
3. Location of buffer strips.
4. All required setbacks from the buffer strips.

B. The following notes shall be indicated on the wetland buffer strip plan in large letters:

1. Contact the city prior to any land disturbance.
2. All wetland buffer strip protection measures shall be installed prior to development and/or building construction. (Ord. 114, 7-16-1996)

13-6-7: VARIANCES:

A. Request For Variance: Requests for variances shall be made in accordance with the procedures and requirements set forth in section 11-1-9 of this code.

B. Standards For Granting Variance: Variances may only be granted when the standards and criteria set forth in section 11-1-9 of this code have been met. Variances shall not be granted which would circumvent the intent and purposes of this chapter. (Ord. 114, 7-16-1996)

13-6-8: INSPECTIONS AND INVESTIGATIONS:

The city administrator or his or her duly authorized employees shall inspect all premises and places within the city as often as practicable to determine whether any condition described in this chapter exists. The inspector shall investigate all reported wetland incidents. (Ord. 114, 7-16-1996)

13-6-9: VIOLATION; PENALTY:

A. Notice Of Violation:

1. A general notice will be given to any developer, builder, or property owner who fails to comply with the provisions of this chapter. The notice will state the following information:

- a. The violation.
- b. Items or work to be completed in order to comply.
- c. Date work to be completed.

2. Failure to comply with this notice will result in an order to stop work on the site.

B. Violation A Misdemeanor; Penalty: Any person (firm, or corporation) who violates any section of this chapter or obstructs staff or their representatives from carrying out their duties, shall be guilty of a misdemeanor and, upon conviction thereof, shall be punished as defined by state law. (Ord. 114, 7-16-1996)

TITLE 11 SUBDIVISION REGULATIONS

CHAPTER 1 GENERAL SUBDIVISION PROVISIONS

11-1-1: SHORT TITLE:

This title shall be known as the *SUBDIVISION ORDINANCE OF THE CITY* and will be referred to herein as "this title". (Amended Ord. 10, 2-15-1972)

11-1-2: INTERPRETATION, SCOPE AND APPLICATION OF PROVISIONS:

- A. Interpretation And Scope: All land subdivisions within the city shall equal or exceed the standards set forth in this title. The standards established by this title are not intended to repeal, abrogate, annul or impair private agreements or restrictive covenants, including state and county regulations running with the land, which are equal to or more restrictive than the standards hereby established; except, that the most restrictive shall apply.
- B. Application Of Provisions: The provisions of this title shall apply to all registered land surveys within the city, and the standards, regulations and procedures hereof shall govern the subdivision of land by registered land survey. Building permits shall be withheld on tracts which have been subdivided by unapproved registered land surveys, and the city shall decline to accept tracts as streets or roads or to improve, repair or maintain such tracts within an unapproved registered land survey. (Amended Ord. 10, 2-15-1972)

11-1-3: PLATTING AUTHORITY:

The council shall serve as the platting authority in accordance with Minnesota laws of 1965, chapter 670 (Minnesota statutes section 462.358). No plat, replat, subdivision of land or registered land survey shall be filed or accepted for filing by the county recorder unless it is accompanied by a certified copy of a resolution adopted by the affirmative vote of a majority of the members of the council approving such plat, replat, subdivision of land or registered land survey. (Amended Ord. 10, 2-15-1972)

11-1-4: DEFINITIONS:

For the purpose of this title, certain words and terms are hereby defined as follows:

ALLEY: A public right of way which affords a secondary means of access to abutting property. No alley shall be allowed.

ANDOVER REVIEW COMMITTEE: Consists of the following departments:

Administration

Building

Engineering

Finance

Fire

Planning and zoning

Police

Public works

BLOCK: An area of land within a subdivision that is entirely bounded by streets, or by streets and the exterior boundary or boundaries of the subdivision, or a combination thereof with a stream or lake.

BOULEVARD: That portion of the street right of way between the curb line and the property line.

BUILDABLE LOTS: A. In areas lacking municipal sanitary sewer, all lots or parcels shall have an area of at least twenty two thousand five hundred (22,500) square feet with a finished grade of at least six feet (6') above the seasonal high water mark. All organic material shall be removed and replaced with granular material with no more than five percent (5%) organic material by volume. The lowest floor shall be at least three feet (3') above the seasonal high water mark or one foot (1') above the designated or designed 100-year flood elevation, whichever is higher, in the area of construction pursuant to title 9, chapter 3 of this code unless evidence is submitted and certified by a geotechnical engineer, that shall be reviewed and certified by an independent geotechnical engineer hired by the city at the expense of the developer and approved by the city council, that a separation of less than three feet (3') can be achieved and is warranted.

B. In areas served by municipal sanitary sewer, all lots or parcels shall have all organic material removed and replaced with granular material with no more than five percent (5%) organic material by volume for the front one hundred feet (100') of depth of the lot at a minimum width of the lot as required for that zoning district by the zoning ordinance. The lowest floor shall be at least three feet (3') above the seasonal high water mark or one foot (1') above the designated or designed 100-year flood elevation, whichever is higher, in the area of construction pursuant to title 9, chapter 3 of this code unless evidence is submitted and certified by a geotechnical engineer, that shall be reviewed and certified by an independent geotechnical engineer hired by the city at the expense of the developer and approved by the city council, that a separation of less than three feet (3') can be achieved and is warranted.

BUTT LOT: A lot at the end of a block located between two (2) corner lots.

COMPREHENSIVE PLAN: Unless otherwise stated, it is the general plan for land use, transportation, and community facilities prepared and maintained by the community planning and zoning commission.

DESIGN STANDARDS: The specifications to landowners or subdividers for the preparation of

plats, both preliminary and final, indicating among other things, the optimum, minimum or maximum dimensions of such items as rights of way, blocks, easements, lots, etc.

EASEMENT: A grant by a property owner for the use of a portion of land for the expressed purpose of constructing and maintaining slopes or grade transitions or utilities, including, but not limited to, electric and telephone lines, sanitary and storm sewer lines, surface drainageways and gas lines.

ENGINEER: Denotes the city engineer unless otherwise stated.

FINAL PLAT: A drawing or map of a subdivision which meets all of the requirements of the city and is in such form as meets state and county requirements for purposes of recording.

GRADE, SLOPE OR GRADIENT: The rate of vertical rise or drop from any fixed horizontal line or point.

IMPROVEMENTS: The construction or installation of public or private utilities including, but not limited to, potable water, sanitary sewer systems, storm sewers, roads and other thoroughfares, sidewalks, curbs and gutters, paving, barricades, trees and other plantings, lighting, fuel or energy and the transmission thereof, transportation systems or facilities connected therewith and communication systems which are necessary, desirable or convenient in the maintenance of the health, safety and the general welfare.

LOT: A parcel of land delineated upon and thereafter described by reference to a plat, registered land survey or auditor's subdivisions, or other similar recorded dedicatory document.

OPEN SPACES: Areas set aside for the preservation of natural open spaces to counteract the effects of urban congestion and monotony.

OWNER: Any combination involving a person; firm; corporation, including a foreign, domestic or nonprofit corporation; a partnership, including a limited partnership; a trust; a political subdivision of the state; or other legal entity or business organization, having sufficient legal proprietary interest in the land sought to be subdivided to commence and maintain proceedings to subdivide the same under this title.

PARKS AND PLAYGROUNDS: Public lands and open space in the city dedicated for use for recreation purposes.

PEDESTRIANWAY: A public or private right of way within or across a block or blocks to provide access for pedestrians and which may be used for utilities.

PLANNING AND ZONING COMMISSION: The planning and zoning commission of Andover
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PRELIMINARY PLAT: The tentative drawing or chart indicating the proposed layout of the subdivision to be submitted hereunder in compliance with the comprehensive plan and these regulations including required supporting data.

PROTECTIVE COVENANTS: Contracts made between private parties as to the manner in

which land may be used, with the view of protecting and preserving the physical and economic integrity of a given area.

REQUIRED PUBLIC IMPROVEMENTS: Those improvements in any proposed subdivision, including streets, water and sewer systems, storm water drainage systems and others which are required in connection with the approval of any plat or other subdivision.

RIGHT OF WAY: The publicly owned area between adjacent private property lines within the limits of a street, pedestrianway, or thoroughfare.

SEASONAL HIGH WATER MARK: Is indicated by mottled soils or is the highest anticipated water table.

SKETCH PLAN: An informal drawing or sketch of the proposed development submitted to the clerk for consideration prior to submittal of preliminary plat.

STREET: A publicly owned right of way affording primary access by pedestrians and vehicles whether designated as a street, highway, thoroughfare, parkway, road, avenue, or however otherwise designated.

Arterial Roads: The major traffic carriers feeding to the state highways system. City arterials are comprised mostly of existing county roads in the city as defined in the comprehensive plan. Minimum new access spacing shall be six hundred sixty feet (660').

Collector Streets: Feeders to the arterial roads as defined in the comprehensive plan or generally with an ADT of one thousand (1,000) or greater or a municipal aid street for the city. Minimum new access spacing shall be three hundred thirty feet (330').

Cul-De-Sac: A street with only one outlet and having an appropriate terminal for the safe and convenient reversal of traffic movement.

Minor (Rural) City Street: A rural roadway which serves abutting properties and the local needs for a neighborhood.

Minor Urban City Street: A street used primarily for access to the abutting properties and the local needs for a neighborhood.

Service Street Or Service Road: A street which is adjacent to a thoroughfare and which provides access to abutting properties and protection from through traffic.

Thoroughfares: A main road or public highway identified as a municipal state aid county, state, or other limited access highway.

STREET WIDTH: The shortest distance between the lot lines delineating the right of way of a street.

SUBDIVIDER: Any person, firm or corporation having sufficient proprietary interest in land in order to subdivide the same under this title.

SUBDIVISION: The division of a tract of land into two (2) or more lots or parcels of land for the

purpose of transfer of ownership or building development. The term includes resubdivision and, when appropriate to the context, shall relate to the process of subdividing or to the land subdivided.

TOPSOIL BORROW: For general use as a turf growing medium shall meet the requirements outlined in the most current MNDOT standard specifications for construction and be in accordance with MNDOT 3877 topsoil borrow or as approved by the city engineer. (Amended Ord. 10, 2-15-1972; amd. 2003 Code)

11-1-5: EASEMENTS TO BE DEDICATED:

- A. **Dedication Of Easements:** The city shall require as a condition of the approval of the preliminary plat the dedication of all easements for utilities, drainage, street rights of way, surface water ponding and such other public uses as shall be found necessary, convenient or desirable by the city to ensure the timely extension of utilities to adjacent properties in accordance with exhibit A of the development policy guideline adopted by the city council and on file in the office of the city clerk.
- B. **Submission To City Council:** Prior to the submission of a final plat, registered land survey or land subdivision to the city council for approval, the subdivider shall furnish the city with all easements for utilities, drainage, street rights of way, surface water ponding, and such other public uses as shall be found to be necessary, convenient or desirable by the city. Said easements shall be in proper form for recording in the office of the county recorder. Duplicate certificates of title shall be made available for the filing of easements on registered land. No final plat shall be approved by the city council until there has been full compliance with this section.
- C. **Necessity Of Easement Determined:** In the case where the land subdivision is to be approved administratively and the city determines that an easement is necessary as stated in this section, the city council shall act on the subdivision to determine the need and extent of the easement to be dedicated. The subdivider shall furnish the city with all easements found to be necessary by the city council. (Amended Ord. 10, 2-15-1972)

11-1-6: RESTRICTIONS ON FILING AND RECORDING CONVEYANCES:

A. Restrictions On Filing And Recording:

1. No conveyance of land to which these regulations are applicable shall be filed or recorded if the land is described in the conveyance by metes and bounds or by reference to an unapproved registered land survey made after April 21, 1961, or to an unapproved plat made after such regulations became effective. This provision does not apply to a conveyance if the land described:

a. Was a separate parcel of record April 1, 1945, or the date of adoption of subdivision regulations under laws 1945, chapter 287, whichever is the later, or of the adoption of subdivision regulations pursuant to a home rule charter; or

b. Was the subject of a written agreement to convey entered into prior to such time;

c. Was a separate parcel of not less than two and one-half (2 1/2) acres in area and one hundred fifty feet (150') in width on January 1, 1966, or is a single parcel of land not less than five (5) acres in area and having a width of not less than three hundred feet (300').

2. In any case in which compliance with the foregoing restrictions will create an unnecessary hardship, and failure to comply does not interfere with the purpose of the subdivision regulations, the platting authority may waive such compliance by adoption of a resolution to that effect, and the conveyance may then be filed or recorded. Any owner or agent of the owner of land who conveys a lot or parcel in violation of the provisions of this subsection shall be guilty of a misdemeanor and, upon conviction thereof, shall be punished as defined by state law. The city may enjoin such conveyance or may recover such penalty by a civil action in any court of competent jurisdiction. When a property owner, either residential or commercial, wishes to move interior lot lines and by doing so does not create any additional buildable lots by moving said property lines, and the moving of said property lines does not create any lot which is below the standards for the applicable zoning district in which it lies, such new property descriptions may be approved by the zoning administrator if the resulting configuration will have no adverse effects on surrounding property. Should the zoning administrator determine the moving of interior lot lines may have an adverse effect on either adjoining property or may circumvent other applicable zoning restrictions, the administrator then shall require the request be processed in the normal manner as a variance to this title by both the planning and zoning commission and the city council. Any lot so realigned shall be accompanied by a certificate of survey.

B. Hardship: In any case in which compliance with the foregoing restrictions will create an unnecessary hardship and failure to comply does not interfere with the purpose of this title, the council may waive such compliance by adoption of a resolution to that effect. The conveyance may then be filed or recorded.

C. Penalty: Any owner or agent of the owner of land who conveys a lot or parcel in violation of the provisions of this section shall forfeit and pay to the city a penalty of not less than one hundred dollars (\$100.00) for each lot or parcel so conveyed. The city may enjoin such conveyance or may recover such penalty by a civil action in any court of competent jurisdiction. (Amended Ord. 10, 2-15-1972)

11-1-7: RESTRICTIONS ON ISSUANCE OF PERMITS:

A. Improvements: All electric and gas distribution lines or piping, roadways, walks and other similar improvements shall be constructed only on a street, or other public way or easement which is designated on an approved plat, or properly indicated on the official map of the city, or which has otherwise been approved by the council. (Amended Ord. 10, 2-15-1972)

B. Access: No permit for the erection of any building shall be issued unless such building is to be located upon a parcel of land abutting a public street right of way which has been accepted and is currently maintained by the city, or which has otherwise been approved by the city council. This limitation on issuing permits shall not apply to planned unit developments approved by the city council pursuant to title 13, chapter 3 of this code. (Amended Ord. 10, 2-15-1972; amd. 2003 Code)

C. Limitations: No building permit shall be issued for the erection of any building on any land

conveyed in violation of the provisions of this title. No permit shall be issued for the erection of any building on any tract of land described by metes and bounds and consisting of less than five (5) acres and having a width of less than three hundred feet (300'). (Amended Ord. 10, 2-15-1972)

11-1-8: PREVIOUSLY APPROVED PLATS EXEMPT:

All preliminary or final plats, registered land surveys, or other subdivisions of land approved by the city council but not filed with the county recorder under previous ordinances shall not be subject to requirements of this title, provided said subdivision is filed within six (6) months of the effective date of this title. (Amended Ord. 10, 2-15-1972)

11-1-9: VARIANCES:

- A. Hardship: The council may grant a variance from the requirements of this title as to specific tracts of land where it is shown that by reason of topography or other physical conditions strict compliance with these requirements could cause an exceptional and undue hardship to the enjoyment of a substantial property right; provided, that a variance may be granted only if the variance does not adversely affect the adjacent property owners and comprehensive development plan or the spirit and intent of this title.
- B. Procedure: Written application for a variance shall be filed with the clerk, and shall state fully all facts relied upon by the applicant. The application shall be supplemented with maps, plans or other data which may aid in an analysis of the matter. The application shall be referred to the planning and zoning commission for its recommendation and report to the council.
- C. Council Action: No variance shall be granted by the council unless it shall have received the affirmative vote of a majority of the full council. (Amended Ord. 10, 2-15-1972)

11-1-10: ENFORCEMENT AND PENALTY:

- A. Unless approved as a final plat as provided herein, no subdivision shall be entitled to record in the county recorder's office or have any validity, and the city shall not issue building permits for any structure on a lot in any proposed subdivision. The city shall not permit any public improvements to be installed unless the preliminary plat is approved and shall not permit any services until approval of the final plat and recording of same.
- B. Any firm, person, or corporation who violates any of the provisions of these regulations, or who sells, leases, or offers for sale or lease any lot, block or tract of land herein regulated before all the requirements of these regulations have been complied with, shall be guilty of a misdemeanor and, upon conviction thereof, shall be punished as defined by state law. Each day that a violation is permitted to exist shall constitute a separate offense.
- C. The platting, replatting, subdividing or conveyance of land not in accordance with the requirements of this title may be enforced by mandamus, injunction, or any other appropriate remedy in any court of competent jurisdiction. (Amended Ord. 10, 2-15-1972)

CHAPTER 2

SUBDIVISION PLATS AND PROCEDURES

11-2-1: SKETCH PLAN:

- A. Sketch Plan Authorized: Prior to platting any tract of land, the subdivider may prepare a subdivision sketch plan for review by the Andover review committee (ARC), planning and zoning commission and the city council. Such sketch plan will be considered as having been submitted for review and discussion between the subdivider and the Andover review committee (ARC), planning and zoning commission and the city council. No fee shall be required of the subdivider for the submission of a sketch plan. However, review time by the ARC shall be billed towards the project, provided the project continues beyond the sketch plan phase to the review of the preliminary plat.
- B. Compliance With City Provisions; Modifications: On the basis of the subdivision sketch plan, the ARC, planning and zoning commission and the city council will advise the subdivider of the extent to which the plan conforms to the comprehensive plan, design standards of this title and to other ordinances of the city, county, and state. There will be discussion on possible modification necessary to secure approval of the plan. (Amended Ord. 10, 2-15-1972; amd. 2003 Code)
- C. Procedure For Submission And Review: The sketch plan shall be submitted and reviewed in accordance with the following procedures:
1. The subdivider shall submit ten (10) copies of the sketch plan to the community development director for review by the Andover review committee. The ARC shall review and comment on the sketch plan within ten (10) days of the submittal by the subdivider.
 2. Upon ARC review and comment, the sketch plan shall be placed on the next available agenda of the planning and zoning commission, but no sooner than ten (10) days after being reviewed by the ARC. Notification shall be sent to adjacent property owners within three hundred fifty feet (350') ten (10) days prior to the meeting of the planning and zoning commission. Failure to receive such notification shall not invalidate the proceedings.
 3. Upon planning and zoning commission review and comment, the sketch plan shall be placed on the next available city council agenda, but no sooner than ten (10) days after being reviewed by the planning and zoning commission.
- D. Required Information: The subdivider shall provide the following minimum information:
1. Site location.
 2. A sketch of the site showing its general shape and location of wetlands, forested areas, proposed ponding locations, adjacent roadways, municipal state aid designations, waterways, existing buildings and any other significant features of the immediate area.
 3. Type of development proposed.
 4. A preliminary road layout and lotting arrangement indicating minimum proposed lot size.

5. Aerial photo (most current) with the sketch plan overlay.

E. Additional Requirements: The subdivider can be required to show adjacent property and any other property as determined necessary for proper review as required by the ARC, planning and zoning commission, and city council. (Amended Ord. 10, 2-15-1972)

11-2-2: PRELIMINARY PLAT:

A. Minimum Lot Size: There shall be no conveyance of land described by metes and bounds if the conveyance is less than five (5) acres in area and three hundred feet (300') in width.

B. Procedure: Prior to platting and subdividing any tract of land into two (2) or more lots, the following procedures shall be followed:

1. ARC Review:

a. Upon completion of the sketch plan review process as provided in section 11-2-1 of this chapter, the subdivider shall file ten (10) copies of the preliminary plat with the community development director for review by the Andover review committee. No preliminary plat shall be filed or submitted for ARC review that has not completed the sketch plan review process.

b. The Andover review committee will review the plat with the developer to ensure it is complete in accordance with city ordinances. The ARC will reply within thirty (30) days of the submittal as to whether the plat is or is not complete. If the plat is found to be incomplete, the procedure stated in subsection B1a of this section shall continue until such time as the plat is found to be complete. If the plat is found to be in compliance with city ordinances by the Andover review committee, the community development director will forward a preliminary plat application to the subdivider for submittal to the city clerk. No incomplete preliminary plat application will be accepted by the city clerk. The subdivider can appeal items of contention to the city council. Variance requests shall be identified and processed as outlined in section 11-1-9 of this title. (Amended Ord. 10, 2-15-1972)

2. Fee: At the time of the filing of the preliminary plat, the subdivider shall pay to the city a fee as set by title 1, chapter 7 of this code for plats involving residential lots only, a fee as set by title 1, chapter 7 of this code for plats involving other than residential lots, plus a fee set by title 1, chapter 7 of this code for each acre of land in all preliminary plats. (Amended Ord. 10, 2-15-1972; amd. 2003 Code)

3. Distribution Of Copies: The clerk shall receive ten (10) copies in addition to those requested under subsection B1a of this section and refer seven (7) copies of the preliminary plat to the planning and zoning commission and one copy to the engineer.

4. Engineer's Report: The engineer shall submit a written report to the planning and zoning commission, which shall deal with drainage, streets, and other engineering matters pertinent to said preliminary plat. Said report shall be submitted to the planning and zoning commission prior to the public hearing prescribed in subsection B5 of this section.

5. Planning And Zoning Commission Hearing:

a. The planning and zoning commission shall hold a public hearing on the preliminary plat within sixty (60) days after said complete preliminary plat and complete application are filed with the clerk. At said hearing, all persons interested in the plat shall be heard.

b. Notice of time and place of hearing and the full legal description of the area to be subdivided shall be published once in the official newspaper of the city at least ten (10) days before the day of the hearing. The subdivider shall furnish the clerk with the names and mailing addresses of the owners of all land within three hundred fifty feet (350') of boundaries of the preliminary plat, and the clerk shall give mailed notice of the hearing to said owners at least ten (10) days prior to the day of the hearing, although failure of any property owner to receive such notification shall not invalidate the proceedings.

c. The planning and zoning commission shall conduct the hearing on the preliminary plat and shall make its report to the council within thirty (30) days after said hearing.

6. Council Action:

a. After the council receives the report of the planning and zoning commission, the council, at its next regular scheduled meeting, shall act to approve or disapprove the preliminary plat. The report of the planning and zoning commission shall be placed on the agenda of the city council in the following manner:

(1) Recommendations from the planning and zoning commission meeting held on the second Tuesday shall be placed on the agenda of the city council at the first Tuesday meeting of the following month.

(2) Recommendations from the planning and zoning commission meeting held on the fourth Tuesday shall be placed on the agenda of the city council at the third Tuesday meeting of the following month, unless there are five (5) Tuesdays in the given month from which the recommendation of the planning and zoning commission is made, in which case, the recommendation shall be placed on the agenda of the city council at the first Tuesday meeting of the following month.

b. If the council shall disapprove the plat, the grounds for any such disapproval shall be set forth in the proceedings of the council and reported to the subdivider within fourteen (14) days thereafter.

c. Approval of a preliminary plat by the council is tentative only, subject to the compliance with all requirements and recommendations as a basis for preparation of the final plat.

7. Petition To Rezone: At the time of the filing of the preliminary plat, the subdivider shall submit to the clerk a petition for rezoning to the proposed future use of said land if the land is not already so zoned. The owner of said land shall join in said petition.

8. Approval Of Engineering Factors: Subsequent approval by the council shall be required of all engineering considerations presented in the preliminary plat which include, but which shall not be limited to, easements, water supply, sewage disposal, storm drainage, surface water storage, gas and electric services, road gradients and widths, and the surfacing of streets, prior to the approval of the final plat by the council.

9. Time Limit On Actions: The council shall act on the preliminary plat within one hundred twenty (120) days of the date on which it was filed with the clerk. If the report of the planning and zoning commission has not been received within said period, the council shall act without such report.

C. Preliminary Plat Schedule: Preliminary plats shall be filed in accordance with the schedule adopted in the development policy guidelines. (Amended Ord. 10, 2-15-1972)

D. Required Preliminary Plat Data: It shall be a condition to the acceptance of a preliminary plat application filed with the clerk that said plat shall include the data required hereunder. The preliminary plat shall be submitted in accordance with subsection B of this section.

1. Identification And Description:

a. Proposed name of subdivision, which name shall not duplicate nor be alike in pronunciation to the name of any plat heretofore recorded in the county. (Amended Ord. 10, 2-15-1972; amd. 2003 Code)

b. Full legal description of the land involved in the plat.

c. Names and addresses of the owner and subdivider of the land, and the designer and surveyor of the plat. If the subdivider is not the fee owner of the land, the subdivider shall submit the written consent of the fee owner to the filing of the preliminary plat.

d. Graphic scale of not smaller than one inch to fifty feet (1" = 50').

e. North point, designated as true north.

f. Date of preparation.

g. Certification by registered land surveyor certifying to accuracy of survey.

2. Existing Conditions:

a. All boundary line surveys, including measured distances and angles, which shall be tied into the nearest quarter section or section line by traverse.

b. Total acreage, calculated to the nearest 0.1 acre.

c. Existing zoning classifications for tract of land in and within three hundred feet (300') of the preliminary plat.

d. Location and names of existing or platted streets and other public ways, parks and public open spaces, permanent buildings and structures, easements, and section and municipal boundary lines within the plat and to a distance of one hundred feet (100') beyond. (Amended Ord. 10, 2-15-1972)

e. If the preliminary plat is a rearrangement or a replat of any recorded plat, the lot and block arrangement of the original plat, its original name, and all revised or vacated roadways shall be shown by dotted line. (Amended Ord. 10, 2-15-1972; amd. 2003

Code)

f. Location and width of existing streets (including type of surfacing), railroads, sanitary sewers, water mains, storm sewers, gas, telephone, electric, cable TV, culverts, grades, invert elevations and locations of catch basins, manholes and hydrants and any underground facilities within the plat and to a distance of one hundred feet (100') beyond.

g. Boundary lines of land within one hundred feet (100') of the tract of land within the plat, and the name of the owner thereof, but including all contiguous land owned or controlled by the subdivider or owner of the tract proposed to be platted.

h. Topographic data, including contours at vertical intervals of not more than two feet (2'); except, that where the horizontal contour interval is one hundred feet (100') or more, a one foot (1') vertical interval shall be shown. Watercourses, lakes, marshes, wooded areas, rock outcrops, drainage tile, and other significant physical features shall be shown. U.S. geodetic survey datum shall be used for all topographic mapping where available.

i. A copy of the restrictive covenants, if any, concerning the property being platted.

j. Soils.

k. Such other data as may be requested by the engineer.

3. Design Features:

a. Layout of proposed streets, showing right of way widths and proposed names of streets. The name of any street heretofore used in the city or its environs shall not be used, unless the proposed street is an extension of an already named street, in which event, said name shall be used.

b. Locations and widths of pedestrianways and utility easements.

c. Profiles of existing and proposed centerline grades of streets, storm sewers, drainage ditches and culverts; also sanitary sewers and water mains where required by the platting authority.

d. An overall grading/drainage/erosion control plan showing existing contours at two foot (2') intervals in dashed lines and proposed contours in heavier solid lines. Minimum basement floor elevations of all proposed buildings shall be shown. Maximum slope areas shall be four to one (4:1) or as approved by the city engineer. On urban plats, each lot shall show proposed elevations at all lot corners and intermediate proposed elevations along all lot lines or any additional location as deemed necessary by the engineer and shall be submitted and accepted by the city prior to the issuance of building permits.

e. A tree protection plan shall be required showing all information as defined by the tree preservation policy as adopted by the city council and on file in the city clerk's office⁹⁴.

f. Layouts of lots and blocks with numbers of each, square footage of lots and lot dimensions scaled to the nearest foot.

g. Areas, other than streets, pedestrianways and utility easements, intended to be dedicated or reserved for public use, including the size of such areas.

h. Minimum front and side yard building setback lines as required by the zoning ordinance of the city⁹⁵.

i. Proposed method of disposing of surface water drainage within and beyond the limits of the plat.

j. Whenever a portion of a tract of land is proposed for subdividing and said tract is large enough or is intended for future subdivision, a plan for the future subdivision of the entire tract shall be submitted to the planning and zoning commission. Such future subdivision shall include: proposed lots, road easements for cross streets, utility easements, and such other data as required for future subdivisions. When an individual applies for a building permit on such a lot, he shall submit a scaled site plan showing the location of the proposed structure on the lot so that it will be located in conformance with the proposed resubdivision street patterns. The home shall be placed so that it will not be in conflict with the proposed street pattern of said resubdivision.

k. The Andover review committee shall review all revisions to the preliminary plat. If the revision is significant, it will be forwarded to the planning and zoning commission and/or the city council for review.

4. Additional Information To Be Furnished:

a. Statement of proposed use of lots, i.e., whether residential, commercial, industrial or combination thereof. If residential, state type and number of dwelling units. Furnish sufficient details for all types of usage in order to reveal the effect of the subdivision development on traffic, fire protection and density of population.

b. Source of water supply.

c. Facilities for sewage disposal.

d. If zoning changes are contemplated, the proposed zoning plan for the area.

e. In areas affected by inadequate surface drainage or subjected to periodic flooding, furnish proposals designed to make the area safe for occupancy and to provide for adequate street and lot drainage.

f. Floodplain management area boundaries for Coon Creek, Cedar Creek, and the Rum River.

g. Proposals for street lighting, curb, gutter, sidewalks and boulevard improvements.

h. Such other information as shall be requested by the planning and zoning commission

or engineer.

i. A location map showing the plat location in the city. The location map shall have an approximate scale between one inch equals one thousand five hundred feet (1" = 1,500') and one inch equals two thousand feet (1" = 2,000') and shall be of sufficient size to locate the plat relative to the nearest county roadways. The location map shall show the proposed street layout and the layout of all existing streets platted or unplatted, within one-half (1/2) mile of the proposed plat. The streets and roadways shall be labeled with their proposed or existing names. Adjacent platted areas shall be labeled with their plat name.

j. The preliminary plat shall show the number of linear road miles within the plat.

k. The preliminary plat shall show the location of all "area identification" signs. Conditional use permit for area identification signs shall be applied for in conjunction with the preliminary plat in accordance with the zoning ordinance⁹⁶. (Amended Ord. 10, 2-15-1972)

11-2-3: FINAL PLAT:

A. Procedure: Prior to council approval of a final plat, the following procedures shall be followed:

1. Filing Of Final Plat: Within one year following approval of the preliminary plat, unless an extension of time is requested in writing by the subdivider and granted by the council, the subdivider shall file seven (7) copies of the final plat with the clerk and shall pay a filing fee therefor as set forth by ordinance⁹⁷. The final plat shall incorporate all changes required by the council, and in all other respects, it shall conform to the preliminary plat as approved. If the final plat is not filed within one year following approval of the preliminary plat, the approval of the preliminary plat shall be considered void. The final plat may constitute only that portion of the preliminary plat which the subdivider proposes to record and develop at that time; provided, that such portion shall conform to all requirements of this title, and provided further, that the remaining portions of the preliminary plat not proposed to be recorded, developed and submitted as a final plat, or granted an extension, shall be subject to the right of the city to adopt new or revised platting and subdivision regulations. (Amended Ord. 10, 2-15-1972; amd. 2003 Code)

2. Filing Of Plat And Abstract: At the time of filing the final plat with the clerk, the subdivider shall also file with the clerk an abstract of title or registered property abstract, certified to date, evidencing ownership of the premises involved in the plat.

3. Referrals: The clerk shall refer copies of the final plat to the engineer and shall refer the abstract to the attorney for their examination and report.

4. Reports: The engineer and attorney shall submit their reports to the council within fifteen (15) days after the filing of the final plat. The engineer shall state whether the final plat and the improvements conform to the engineering and design standards and specifications of the city. The attorney shall state his opinion as to title of the premises involved.

5. Fees: The subdivider shall pay the fees of the engineer and attorney for their services and reports rendered in connection with the final plat.
 6. Compliance With Law: The final plat shall be prepared in accordance with all applicable state laws and county ordinances.
- B. Council Action: The council shall act on the final plat within sixty (60) days of the date on which it was filed with the clerk. The final plat shall not be approved if it does not conform to the preliminary plat, including all changes required by the council, or does not meet the engineering and design standards and specifications of the city.
- C. Recording Final Plat: Following approval of the final plat by the council, the clerk shall promptly notify the subdivider of said approval, and within thirty (30) days thereafter, the final plat shall be recorded with the county recorder. The subdivider shall forthwith furnish the clerk with a tracing and three (3) copies of the final plat as recorded, showing evidence of the recording on said copies. Failure of the subdivider to comply with the requirement of recording shall be cause for rescission of approval.
- D. Required Final Plat Data: It shall be a condition to the approval of a final plat that the following data shall be shown on said plat or shall be furnished therewith:
1. Municipal, township, county or section lines accurately tied to the boundaries of the subdivision by distances and angles.
 2. Accurate angular and lineal dimensions for all lines, angles and curvatures used to describe boundaries, streets, easements, areas reserved for public use, and other important features shall be shown. Complete curve data shall be shown, including radii, internal angles, points and curvatures, tangent bearings, and lengths of all arcs. Dimensions of lot lines shall be shown in feet and hundredths of feet. No ditto work shall be permitted in indicating dimension. (Amended Ord. 10, 2-15-1972)
 3. Official monuments as designated and adopted by the county surveyor and approved by the district court for use as judicial monuments shall be set at each corner or angle of the outside boundary of the final plat. Location of all monuments shall be shown. (Amended Ord. 10, 2-15-1972; amd. 2003 Code)
 4. Pipes or steel rods shall be placed at each corner of each lot, and the location thereof shall be shown.
 5. An identification system for all lots and blocks shall be shown.
 6. Streets shall be named, and all names shall be shown. A sequence of street naming shall be followed consistent with the pattern that has been established in the area.
 7. In the event the final plat is a replat of an earlier subdivision, the original platting of the subdivision shall be shown and identified by dotted lines.
 8. Judicial and county ditches shall be shown by dimensions and angles as determined from county records.

9. Low land and water areas shall be indicated by an identification symbol. (Amended Ord. 10, 2-15-1972)

10. The maximum high water level as defined in the department of natural resources' statewide standards and criteria for management of shoreland areas of Minnesota shall be shown. (Amended Ord. 10, 2-15-1972; amd. 2003 Code)

11. All utility and drainage easements, and the dimensions thereof, shall be shown.

12. The names and platting of adjoining subdivisions shall be shown and identified by dotted lines to a distance of one hundred feet (100') from the boundaries of the subdivision under consideration. Lot, block and street arrangements of such adjoining subdivisions shall be shown. Where adjacent land is unplatted, it shall be so indicated.

13. Before any residential plat may be approved and before any permit may be issued for a residence therein, the subdivider shall first present competent proof that the natural ground water level at all times in said subdivision is not less than three feet (3') below the level of the lowest portion of the proposed structure, or that a satisfactory system of ground water control will be constructed as an integral part of the proposed residential subdivision. (Amended Ord. 10, 2-15-1972)

CHAPTER 3 DESIGN STANDARDS

11-3-1: GENERAL REQUIREMENTS:

- A. The planning and zoning commission, in its review of a preliminary plat, shall determine whether the proposed subdivision is in conformity with the comprehensive plan and shall take into consideration the requirements of the city and the best use of the land. Particular attention shall be given to the arrangement, location and widths of streets, drainage and lot sizes and arrangements.
- B. The preliminary plat shall cover all of the owner's contiguous land or any other property of the owner as deemed necessary by the planning and zoning commission in consideration of rural and urban differences, the zoning ordinance and the comprehensive plan. The final plat may cover only a portion of the preliminary plat, provided it is in conformity with the approved preliminary plat.
- C. Where the parcel of land is subdivided into tracts larger than required for building lots, such tracts shall be divided so as to allow for the opening of streets and ultimate extension of adjacent streets.
- D. Unplatted portions of land (outlots) or private easements controlling access to public ways shall not be approved within the plat. (Amended Ord. 10, 2-15-1972)

11-3-2: STREET PLAN:

- A. Compliance With Comprehensive Plan: The arrangement, character, extent, width, grade and location of all streets shall conform to the comprehensive plan, the approved standard

street specifications, and all applicable ordinances; and all streets shall be considered in their relation to existing and planned streets, to reasonable circulation of traffic, to topographical convenience and safety, and in their appropriate relation to the proposed uses of the area to be served.

- B. Continuation Of Existing And Future Streets: The arrangement of streets in new subdivisions shall make provision for the continuation of existing and future streets in adjoining areas.
- C. Frontage Restrictions: No preliminary plat shall be approved wherein lots front on the right of way of state, county, or city arterial or collector roads. Such lots may front on service roads with entrances to the above or at intervals of six hundred sixty feet (660') for arterials and three hundred thirty feet (330') for collectors. (Amended Ord. 10, 2-15-1972)

11-3-3: STREETS:

A. Widths:

1. All right of way and roadway widths shall conform to the following minimum dimensions:

Classification	Typical Roadway	
	Right Of Way Width	Width - Curb Face To Curb Face
Arterial	120 feet	Variable
Collector/municipal state aid	66 feet	Variable
* Minor (urban) city street	60 feet	32 feet —
* Minor (rural) city street	60 feet	24 feet —
Cul-de-sac	120 feet	93 foot diameter
Service	60 feet	32 feet

2. Right of way and street widths may vary depending upon anticipated traffic volume, planned function of street and character of abutting land use.

B. Horizontal Curve Radius: The minimum horizontal curve radius on minor streets shall be fifty feet (50') or as required by the city engineer. (Amended Ord. 10, 2-15-1972)

C. Grades: Streets grades shall not exceed seven percent (7%) for minor and collector streets and four percent (4%) for thoroughfares, and in no case shall they be less than one-half percent (0.5%) on streets with curb and gutter; or one percent (1%) on minor rural city street sections. Grades within thirty feet (30') of street intersections shall not exceed two percent (2%). (Amended Ord. 10, 2-15-1972; amd. 2003 Code)

D. Vertical Curves: Different connecting street gradients shall be connected with vertical curves. Vertical curves shall be designed in accordance with MNDOT guidelines with a

minimum design speed of thirty (30) miles per hour or as required by the city engineer.

E. Street Jogs: Street jogs in minor and service streets shall have a centerline offset of not less than one hundred fifty feet (150'). Street jogs shall be avoided in all other streets.

F. Minor Streets: Minor streets shall be so aligned that their use by through traffic will be discouraged.

G. Cul-De-Sacs: The maximum length of cul-de-sac streets shall be five hundred feet (500') measured along the centerline from the intersection to the center of the cul-de-sac area. Each cul-de-sac shall have a terminus of nearly circular shape, with a minimum right of way diameter of one hundred twenty feet (120.0'), and a minimum roadway diameter of ninety three feet (93.0') in the urban service area and the rural service area. Temporary cul-de-sacs shall be required in all new subdivisions to make provision for the continuation of future streets in adjoining areas when the length of the street exceeds two hundred ten feet (210.0') from the centerline of the intersecting streets. Each temporary cul-de-sac shall be required to have a minimum roadway diameter of eighty feet (80.0') and constructed with bituminous curbing as defined in the city standards. Adjacent property owners/developers benefiting from the street continuation shall be responsible for the removal of the temporary cul-de-sac and shall be required to replace the street in accordance with current city requirements and standards. The property line at the intersection of the turnaround and the straight portion of the street shall be rounded at a radius of not less than twenty feet (20.0').

H. Service Streets: In those instances where a subdivision abuts or contains an existing or planned thoroughfare or a railroad right of way, the planning and zoning commission may require a service street approximately parallel to and on each side of such right of way in order to provide protection to residential properties and to provide separation of through and local traffic. Such service streets shall be located at a suitable distance from the thoroughfare or railroad right of way in order to provide for park use of the intervening land in residential districts, or to provide for commercial or industrial use of the intervening land in commercial or industrial districts. The requirements of approach grades and future grade separations shall be considered in establishing the separation distance between said service streets and the thoroughfare or railroad right of way.

I. Half Streets: Half streets shall be prohibited except where necessary to complete the right of way of an existing half street.

J. Reserve Strips: Reserve strips controlling access to streets are prohibited.

K. Private Streets: Private streets shall not be approved. All proposed streets shown on the plat shall be offered for dedication as public streets.

L. Adjoining Property: Street right of way shall not be planned so as to cause hardship to owners of adjoining property.

M. Intersections: The angle formed by the intersection of streets shall not be less than sixty degrees (60°), with ninety degree (90°) intersections preferred. Intersections of more than four (4) corners are prohibited. Access to a street shall be not less than sixty feet (60') from an intersection.

N. Boulevard Sodding ⁹⁸ : In subdivisions where sewer and water are going to be installed, four inches (4") of topsoil and boulevard sodding shall be required. In others, four inches (4") of topsoil shall be spread, seeded, mulched and disc anchored.

O. Tangent: A tangent of at least one hundred feet (100') in length shall be introduced between reverse curves on thoroughfare and collector streets, and a tangent of at least fifty feet (50') in length shall be introduced between reverse curves on all streets except selected minor streets and lanes.

P. Corners: Rights of way of street intersections shall be rounded by a radius of not less than twenty feet (20').

Q. Collector Streets: As defined for this section, collector streets are feeders to the arterial roads as defined in the comprehensive plan or generally with an ADT of one thousand (1,000) or greater, or a municipal state aid street for the city. (Amended Ord. 10, 2-15-1972)

11-3-4: EASEMENTS:

A. Utility Easements: Easements at least twenty feet (20') wide, centered on rear and side lot lines, shall be provided for utilities where required by the platting authority. Utility easements shall have continuity of alignment from block to block and lot to lot. Easements may be required along lot lines to right of way so as to provide for street lighting.

B. Drainage Easements: Where a subdivision is traversed by a watercourse, drainageway or stream, a drainage easement conforming substantially with the lines of such watercourse shall be provided, with further width as shall be adequate for storm water drainage of the areas. (Amended Ord. 10, 2-15-1972)

11-3-5: BLOCKS:

A. Lengths: The maximum length of blocks shall be one thousand three hundred twenty feet (1,320'). Pedestrianways at least ten feet (10') wide may be required at the approximate center of blocks over six hundred sixty feet (660') in length. Provisions for additional accessways to schools, parks, and other public grounds may be required.

B. Off Street Areas: Blocks intended for commercial, industrial, or uses other than single-family dwellings shall be so designed to provide adequate off street areas for parking, loading, and such other facilities as shall be required by the zoning ordinance of the city ⁹⁹.

C. Width: All blocks shall be so designed to provide for two (2) tiers of lots unless conditions exist to render this requirement undesirable. (Amended Ord. 10, 2-15-1972)

11-3-6: LOTS:

A. Minimum Lot Size: The minimum lot area and dimensions shall be as specified in the respective zoning districts of the city zoning ordinance, and in addition, the following standards shall apply:

1. Served By Municipal Sanitary Sewer: In areas served by municipal sanitary sewer systems, no lot shall contain less than eleven thousand four hundred (11,400) square feet nor have a width of less than eighty feet (80') at the building setback line. Adequate rear yard area shall be provided to maintain a utilizable space for each lot as determined by the planning and zoning commission. Corner lots shall be a minimum of one hundred feet (100') wide as measured at the building setback line or ninety feet (90') wide for back to back lots with a thirty five foot (35') front setback, except for two-family lots which shall be required to be one hundred fifty percent (150%) of a single-family minimum area and width. Residential lots shall be required to have the lowest floor to be a minimum of three feet (3') above the seasonal high water mark or one foot (1') above the designated or designed 100-year flood elevation, whichever is higher, unless evidence is submitted and certified by a geotechnical engineer, that shall be reviewed and certified by an independent geotechnical engineer hired by the city at the expense of the developer and approved by the city council, that a separation of less than three feet (3') can be achieved and is warranted. Any subdivision, lot split or replatting of existing developments shall be required to meet the standards of the original development or to meet the average size of the existing lots. On continuing streets where houses were constructed prior to the adoption of ordinance 10H, adopted April 5, 1983, the setback shall be thirty five feet (35') unless the existing structures would indicate a lesser setback to maintain uniformity in R-2, R-3 and R-4 districts. (Amended Ord. 10, 2-15-1972)

2. No Municipal Sanitary Sewer And Outside Metropolitan Urban Service Area: In areas which are not served by municipal sanitary sewer and outside the metropolitan urban service area, no residential lot shall be developed for residential purposes unless it contains a minimum of one hundred eight thousand nine hundred (108,900) square feet, of which twenty two thousand five hundred (22,500) square feet of contiguous land area is buildable, with a minimum width of at least one hundred fifty feet (150') and a minimum depth of one hundred fifty feet (150'). In addition, there shall also be two (2) five thousand (5,000) square foot areas designated and staked for the primary and secondary on site septic drain field based on design criteria for a four (4) bedroom home. The designated drain field locations as stated above shall comply with chapter 7080, Minnesota pollution control agency individual sewage treatment systems program, as amended. The location of the primary and secondary sites shall be indicated on the preliminary grading plan, and the design specifications for the drain fields shall be submitted at the time of the submittal of the preliminary plat. Said lot shall be required to have a finished grade of at least six feet (6') above the seasonal high water mark and shall also require the lowest floor to be a minimum of three feet (3') above the seasonal high water mark or one foot (1') above the designated or designed 100-year flood elevation, whichever is higher, unless evidence is submitted and certified by a geotechnical engineer, that shall be reviewed and certified by an independent geotechnical engineer hired by the city at the expense of the developer and approved by the city council, that a separation of less than three feet (3') can be achieved and is warranted. Said lot shall also have a width of at least three hundred feet (300') as measured at the front building setback line. For lots which abut a cul-de-sac, the lot width at the setback line is to be a minimum of one hundred sixty feet (160'). Two (2) lots maximum are allowed at the end of each cul-de-sac regardless of the lot width. The preliminary plat shall show a feasible plan for future resubdivision by which lots may be resubdivided to meet the size and dimension standards of lots in areas served by municipal sewer where the city deems it necessary in those areas that can be served in the future. These provisions shall not apply to plats approved by the city prior to October 17, 1978. (Amended Ord. 10, 2-15-1972; amd. 2003 Code)

- B. Location: All lots shall have at least the minimum required frontage on a publicly dedicated street.
- C. Corner Lots: Corner lots shall be platted at least ten feet (10') wider than interior lots on all lots of less than three hundred feet (300') in width at the building setback line.
- D. Butt Lots: The use of butt lots shall be avoided wherever possible.
- E. Watercourses: Lots abutting upon a watercourse, drainageway, or stream shall have such additional depth or width as may be required to protect house sites from flooding and shall be subject to restrictions of the department of natural resources and U.S. corps of engineers.
- F. Double Frontage Lots: Lots with frontage on two (2) parallel streets shall not be permitted except where lots back on arterial streets or highways. Double frontage lots shall have an additional depth for screen planting along the rear lot line of ten feet (10').
- G. Access To Thoroughfares: In those instances where a plat is adjacent to a limited access highway or other major highway or thoroughfare, no direct vehicular access shall be permitted from individual lots to such highway.
- H. Natural Features: In the subdividing of land, regard shall be shown for all natural features, including tree growth, watercourses, historic places and similar amenities of the area which, if preserved, will add attractiveness and stability to the area.
- I. Lot Remnants: Lot remnants which are below minimum lot area or dimension must be added to adjacent or surrounding lots rather than be allowed to remain as an unusable outlot or parcel. (Amended Ord. 10, 2-15-1972)

11-3-7: PARKS, PLAYGROUNDS, OPEN SPACE AND PUBLIC USES:

- A. Lands For Public Use Required: Pursuant to Minnesota statutes section 462.358, as amended, the city council shall require all owners or developers, as a prerequisite to approval of a plat, subdivision or development of land, to convey to the city or dedicate to the public use for park or playground purposes, a reasonable portion of the area being platted, subdivided or developed as hereinafter specified; said portion to be approved and acceptable to the city, or in lieu thereof, the owners or developers shall, at the option of the city, pay to the city, for the use in the acquisition of public parks, open space and playgrounds, development of existing public park and playground sites, and debt retirement in connection with land previously required for public parks and playgrounds, an equivalent amount in cash based upon the undeveloped land value of that portion of said land that would have otherwise been required to be dedicated. The form of contribution (cash or land) shall be decided by the city based upon need and conformance with approved city plans.
- B. Dedicated Lands:
 - 1. Requirements: Any land to be dedicated as a requirement of this section shall be reasonably adaptable for use for active park and recreation purposes and shall be at a location convenient to the people to be served. Factors used in evaluating the adequacy of

proposed park and recreation areas shall include size, shape, topography, geology, tree cover, access and location.

2. **Standards For Determination:** The park and recreation commission shall recommend to the city council adoption of the comprehensive park development plan for determining what portion of each such development should reasonably be required to be so conveyed or dedicated. Such comprehensive park development plan may take into consideration the zoning classification assigned to the land to be developed, the particular proposed use for such land, amenities to be provided, and factors of density and site development, as proposed by the owners or developers. The park and recreation commission shall further recommend changes and amendments to the comprehensive park development plan to reflect changes in the usage of land which may occur, changes in zoning classifications and concepts and changes in planning and development concepts that relate to the development and usages to which the land may be put.

3. **Park And Recreation Commission Recommendation:** The park and recreation commission shall, in each case, recommend to the city council the total area and location of such land that the commission feels should be so conveyed or dedicated within the development for park, playground, open space and public use purposes.

C. Cash Contribution In Lieu Of Lands:

1. Amount Determined:

a. In those instances where a cash contribution is to be made by the owners or developers in lieu of a conveyance or dedication of land for park, playground, open space or public use purposes, the park and recreation commission shall recommend to the city council the amount of cash said commission feels should be so contributed. Such recommendation shall be based on the market value of the undeveloped land that would otherwise have been conveyed or dedicated. (Amended Ord. 10, 2-15-1972)

b. In lieu of land dedication, the city may require from the developer or owner a cash contribution which is based on a fee per lot/unit basis for the development of residentially zoned property. In the case of the development of commercial/industrial zoned property, the city may require a cash contribution from the developer or owner which is based on ten percent (10%) of the market value of the land. These fees are established and adopted by ordinance ¹⁰⁰ and are effective for any plat that has not received preliminary plat approval after the date of publication of this title. The fees would also apply to plats that have received preliminary plat approval but have not received final plat approval by the city council within twelve (12) months of the publication date of this title.

2. **Market Value Of Lands:** "Market value", for the purposes of this title, shall be determined as of the time of the final plat approval without improvements in accordance with the following: (Amended Ord. 10, 2-15-1972; amd. 2003 Code)

a. The park and recreation commission and owners or developers may recommend to the city council the market value. The city council, after reviewing the park and recreation commission's recommendation, may agree with the owner or the developer as to market value.

b. The owner or the developer may select from a list one of three (3) accredited appraisers that has been approved by the city to establish the market value. The appraisal shall be at the expense of the owner or the developer. Such appraisal shall be accepted by the city council and the owner or developer as being an accurate appraisal of "market value".

D. Density And Open Space Requirements: Land area so conveyed or dedicated for park, open space and playground purposes may not be used by an owner or developer as an allowance for development as set out in the city zoning ordinance. The land shall be in addition to (except for subsection E of this section), and not in lieu of, open space requirements for planned unit developments pursuant to title 13, chapter 3 of this code.

E. Credit For Private Open Space: Where private open space for park and recreation purposes is provided in a proposed development and such space is to be privately owned and maintained by the owner of that development, such areas may be used for credit at the discretion of the city council against the requirement of dedication for park and recreation purposes, provided the city council finds it is in the public interest to do so and that the following standards are met:

1. That yards, court areas, setbacks and open space required to be maintained by city ordinances shall not be included in the computation of such private open space;

2. That the private ownership and maintenance of the open space is adequately provided for by written agreement;

3. That the private open space is restricted for park and recreation purposes by recorded covenants which run with the land in favor of the owners of the property within the development and which cannot be eliminated without the consent of the city council;

4. That the proposed private open space is reasonably adaptable for use for park and recreational purposes, taking into consideration such factors as size, shape, topography, geology, access and location of the private open space;

5. That facilities proposed for the open space are in substantial accordance with the provisions of the recreational element of the comprehensive plan and are approved by the city council; and

6. That where such credit is granted, the amount of credit shall not exceed one hundred percent (100%) for the development of the amount calculated under subsection F of this section.

F. Minimum Area Of Dedicated Land: Developers of land within the city shall be required to dedicate to the city for park, open space and playground purposes as a minimum that percentage of gross land area as set out below:

Residential: 10%

Commercial-industrial: 10%

G. Metes And Bounds Lot Splits: The park and recreation commission may recommend cash

payment in lieu of park land on metes and bounds lot splits less than twenty (20) acres in size. The payment amount shall be determined through the same process outlined in subsection C of this section.

H. Administrative Procedures: The park and recreation commission shall establish such administrative procedures as they may deem necessary and required to implement the provisions of this title. (Amended Ord. 10, 2-15-1972)

CHAPTER 4 REQUIRED IMPROVEMENTS

11-4-1: GENERAL CONDITIONS:

Upon receipt of preliminary plat approval by the council and prior to council approval of the final plat, the subdivider shall make provision, in the manner hereinafter set forth, for the installation, at the sole expense of the subdivider, of such improvements as shall be required by the city, which improvements may include, but are not limited to, streets, sidewalks, public water systems, sanitary sewer systems, surface and storm drainage systems, and public utility services. The installation of said improvements shall be in conformity with approved construction plans and specifications and all applicable standards and ordinances. (Amended Ord. 10, 2-15-1972)

11-4-2: DEVELOPMENT CONTRACT:

Prior to the installation of any required improvements and prior to approval of the final plat, the subdivider shall enter into a contract with the city to construct said improvements at the sole expense of the subdivider and in accordance with approved construction plans and specifications and all applicable standards and ordinances. Said contract shall provide for the supervision of construction by the engineer, and said contract shall require that the city be reimbursed for all costs incurred by the city for engineering and legal fees and other expenses in connection with the making of such improvements. The performance of said contract shall be financially secured by a cash escrow deposit or irrevocable letter of credit as hereinafter set forth. (Ord. 10FF, 8-5-2002)

11-4-3: FINANCIAL SECURITY:

The development contract shall require the subdivider to make a cash escrow deposit or, in lieu thereof, to furnish a letter of credit in the following amounts and upon the following conditions:

- A. Escrow Deposit: The subdivider shall deposit with the finance director/treasurer a cash amount as required by the city development contract with the total cost of such improvements as estimated by the engineer, including the estimated expenses of the city for engineering and legal fees and other expenses incurred by the city in connection with the making of such improvements.
- B. Letter Of Credit: In lieu of a cash escrow deposit, the subdivider may furnish an irrevocable letter of credit, with a corporate surety as required by the city development contract with the total cost of such improvements as estimated by the engineer, including the estimated

expense of the city for engineering and legal fees and other expenses incurred by the city in connection with the making of such improvements.

- C. Conditions: The development contract shall provide for a completion date on which all of the required improvements shall be fully installed, completed and accepted by the city. The completion date shall be determined by the council after consultation with the engineer and the subdivider, and shall be reasonable in relation to the construction to be performed, the seasons of the year and proper correlation with construction activities in the subdivision. The development contract shall provide that in the event the required improvements are not completed within the time allotted, the city shall be allowed to exercise its power to recover on the letter of credit or utilize the escrow deposit to complete the remaining construction to city standards and specifications. In the event the amount of funds recovered is insufficient to cover the cost of construction, the council may assess the remaining cost to the lands within the subdivision. (Ord. 10FF, 8-5-2002)

11-4-4: CONSTRUCTION PLANS:

Construction plans and specifications for the required improvements conforming in all respects with the standards and ordinances of the city shall be prepared at the expense of the subdivider by a professional engineer registered by the state. Such plans and specifications shall become a part of the performance contract. Two (2) prints of said plans and specifications shall be filed with the clerk. (Amended Ord. 10, 2-15-1972)

11-4-5: INSPECTIONS:

All required improvements shall be inspected during the course of construction by the engineer, and acceptance of said improvements by the city shall require the prior written certification by the engineer that said improvements have been constructed in compliance with the plans and specifications. (Amended Ord. 10, 2-15-1972)

11-4-6: PREEXISTING IMPROVEMENTS:

Improvements which have been completed prior to application for final plat approval or execution of the performance contract shall be accepted as equivalent improvements, provided the engineer shall certify in writing that said improvements conform to city standards. (Amended Ord. 10, 2-15-1972)

11-4-7: COMPLETED IMPROVEMENTS DOCUMENTED:

Upon completion of installation of all required improvements, the subdivider shall file with the clerk a reproducible tracing and two (2) copies of plans and specifications showing all improvements as finally constructed and installed. (Amended Ord. 10, 2-15-1972)

11-4-8: STREET IMPROVEMENT STANDARDS:

A. With Municipal Sanitary Sewer And/Or Water:

1. Grading: The full width of the right of way of each street shall be graded, including the subgrade of the areas to be paved, in accordance with the standards and specifications

which have been adopted by resolution of the city council.

2. Paving: All streets shall be paved with concrete or bituminous surfacing in accordance with the standards and specifications which have been adopted by resolution of the city council.
3. Sodding ¹⁰¹ : The portion of the street right of way beyond the paved surface shall receive four inches (4") of approved topsoil and shall be sodded or a cash escrow provided prior to issuance of a certificate of occupancy by the city.
4. Curb And Gutter: Concrete curb and gutter shall be installed on both sides of the paved surface of all streets except lanes.
5. Private Driveways: All private driveways providing access to public rights of way shall be hard surfaced and, if serving two (2) adjoining lots abutting the public right of way, shall be of a width designated by the city.
6. Street Signs: Street signs of a design approved by the city shall be installed at each street intersection.
7. Screening: Screen planting shall be as required by the platting authority.

B. Without Municipal Sanitary Sewer And/Or Water:

1. Grading: The full width of the right of way of each street shall be graded, including the subgrade, in accordance with the standards and specifications which have been adopted by resolution of the city council.
2. Road Surfaces: Temporary road surfaces and dust coat shall be as shown in city standards.
3. Sodding Or Seeding ¹⁰² : Topsoil and sod or seeding consisting of a minimum of four inches (4") of topsoil with the appropriate seed mixture and application rate and mulched and disc anchored as required in the city standards.
4. Driveways: Driveways shall be hard surfaced from the street to the property line.
5. Street Signs: Street signs of a design approved by the city shall be installed at each street intersection.
6. Screening: Screen planting shall be as required by the platting authority. (Amended Ord. 10, 2-15-1972)

11-4-9: DRAINAGE FACILITIES:

Storm sewers, culverts and water drainage facilities shall be required when, in the opinion of the engineer, such facilities are necessary to ensure adequate drainage for the area. All such drainage facilities shall be constructed in accordance with standards and specifications established by the city. Drainage facilities shall be provided to convey surface water to publicly

owned or controlled drainage facilities. (Amended Ord. 10, 2-15-1972)

11-4-10: SUBSURFACE CONDITIONS:

The subdivider shall cause tests to be made of subsurface conditions to determine the nature and extent of subsurface soil, rock and water. The location and results of said tests shall be made available to the city. (Amended Ord. 10, 2-15-1972)

11-4-11: WATER AND SEWER SYSTEMS:

Where connection with the city water and sanitary sewer system is deemed feasible by the council, the subdivider shall be required to install water and sanitary sewer mains and services in the subdivision in addition to permanent streets. (Amended Ord. 10, 2-15-1972)

11-4-12: SIDEWALKS AND PEDESTRIANWAYS:

Where sidewalks and pedestrianways are required by the city, they shall be hard surfaced in accordance with city standards. Grades shall be approved by the engineer. Sidewalks shall be placed in the public right of way one foot (1') from the property line and shall be at least five feet (5') wide. (Amended Ord. 10, 2-15-1972)

11-4-13: PUBLIC UTILITIES:

- A. **Underground Utilities:** All telephone, electric and gas service lines shall be placed underground within dedicated public ways or recorded easements in such manner as not to conflict with other underground services and in accordance with city standards. All underground installation of service lines within street rights of way shall be completed prior to street surfacing. Upon completion of the installation of underground service lines in dedicated public ways, a tracing and two (2) copies of plans and specifications showing the completed installation shall be filed with the clerk.
- B. **Utility Poles:** All utility poles, except those providing street lighting, shall be placed in rear lot line easements.
- C. **Easements:** All underground utility service lines, including water, drainage and sanitary sewer systems, which traverse private property shall be installed within recorded easements. (Amended Ord. 10, 2-15-1972)

11-4-14: NONCONFORMING PROVISIONS:

Nonconformance with the standards and ordinances of the city in the development of property by the subdivider or his/her agents shall be cause for the engineer or the administrator to order cessation of all construction within the subdivision. In such event, no further construction shall be allowed until written authorization is obtained from the city. (Amended Ord. 10, 2-15-1972)

Appendix E
Groundwater Appropriations Information

**DNR Water Appropriation Permits
Anoka County**

All Active Permits - By County & Location

8/22/2003

Permit #/Inst	Permittee	Use	CO	Typ	Rng	Sec	QQ	Sec	sh	Water Well	Resource	Unique Code	Name	--- Permitted ---				--- Reported Pumping MG ---				Stat
														Acres	GPM	MG/Y	1998	1999	2000	2001	2002	
720123 - 5	SPRING LAKE PARK, CITY OF	211	2	30	24	1	ADCC	20	563006	1	CMTS	5,300	398.6	38.4	70.0	118.0	81.1	1				
720123 - 4	SPRING LAKE PARK, CITY OF	211	2	30	24	2	CABC	20	180920	1	CECRMCTS	5,300	398.6	84.7	94.4	58.6	62.6	1				
720123 - 1	SPRING LAKE PARK, CITY OF	211	2	30	24	2	CDA	20	206638	1	CFRNPML	5,300	398.6	53.0	62.8	52.4	11.2	1				
720123 - 2	SPRING LAKE PARK, CITY OF	211	2	30	24	2	CDA	20	223294	1	CSLFCMCTS	5,300	398.6	16.3	107.0	72.4	96.0	1				
756230 - 1	ST PAUL, CITY OF	211	2	30	24	10	DC	20	3	MISSISSIPPI	17,000	20,000.0	15,666.8	14,099.5	13,760.7	11,824.4	12,200.3	1				
756230 - 2	ST PAUL, CITY OF	211	2	30	24	10	DC	20	3	MISSISSIPPI	17,000	20,000.0						1				
756230 - 3	ST PAUL, CITY OF	211	2	30	24	10	DC	20	3	MISSISSIPPI	17,000	20,000.0						1				
756230 - 4	ST PAUL, CITY OF	211	2	30	24	10	DC	20	3	MISSISSIPPI	17,000	20,000.0						1				
756244 - 10	FRIDLEY, CITY OF	211	2	30	24	11	CDCC	20	206658	1	QBAA	2,400.0	2,400.0	220.2	111.8	178.8	142.7	127.0	1			
756244 - 11	FRIDLEY, CITY OF	211	2	30	24	11	CDCC	20	206657	1	CSTLCMCTS	2,400.0	2,400.0	208.2	126.8	187.4	191.7	162.3	1			
631021 - 1	BRAND-BROADWAY ASSOC	212	2	30	24	12	BCA	20	206659	1	QBAA	400	27.0					2				
631021 - 2	BRAND-BROADWAY ASSOC	212	2	30	24	12	BCA	20	206660	1	OPDCOECR	400	27.0	43.1	32.8	45.5	44.7	32.2	1			
756244 - 12	FRIDLEY, CITY OF	211	2	30	24	12	CAA	20	209207	1	CJDN	2,400.0	2,400.0	267.5	160.8	239.3	243.6	186.1	1			
016070 - RW-2	DETERMAN-BROWNE INC	271	2	30	24	12	CAA	20	614162	1	QWTA	20	11.0					0.3	1			
016070 - RW-3	DETERMAN-BROWNE INC	271	2	30	24	12	CAA	20	632114	1	QWTA	20	11.0					0.2	1			
756244 - 4	FRIDLEY, CITY OF	211	2	30	24	14	DCAA	20	201158	1	CMTS	2,400.0	2,400.0	198.3	86.0	113.1	112.3	91.8	1			
756244 - 3	FRIDLEY, CITY OF	211	2	30	24	14	DCAB	20	206670	1	CMTS	2,400.0	2,400.0	165.7	117.4	127.3	141.7	122.4	1			
756244 - 7	FRIDLEY, CITY OF	211	2	30	24	14	DCAD	20	206678	1	OPDC	2,400.0	2,400.0	4.9	23.8	5.3	45.5	45.6	1			
756244 - 9	FRIDLEY, CITY OF	211	2	30	24	14	DCBD	20	206672	1	OPCJ	2,400.0	2,400.0			0.1	0.1		1			
756244 - 2	FRIDLEY, CITY OF	211	2	30	24	14	DCDC	20	206674	1	CMTS	2,400.0	2,400.0	31.7	62.1	31.0	10.8		1			
756244 - 6	FRIDLEY, CITY OF	211	2	30	24	14	DCDD	20	206673	1	OPCJ	2,400.0	2,400.0	108.3	144.9	209.0	120.0	125.4	1			
756244 - 8	FRIDLEY, CITY OF	211	2	30	24	14	DCDD	20	206669	1	OPDC	2,400.0	2,400.0	43.4	11.7	110.2	128.3	25.8	1			
756244 - 5	FRIDLEY, CITY OF	211	2	30	24	14	DCBA	20	206675	1	CMTS	2,400.0	2,400.0	146.1	82.9	136.5	122.4	133.9	1			
916160 - 1	IND SCHOOL DIST 14	283	2	30	24	14	DDCB	20	206679	1	OPDC	400	8.0	4.8	3.4	7.0	1.1	1				
600717 - 1	STYLMARK INC	249	2	30	24	15	ADDA	20	206680	1	OPCJ	150	20.0	0.9	1.0	1.3	1.1	1				
681184 - 1	IND SCHOOL DIST 14	283	2	30	24	23	BA	20	206683	1	OPDC	400	36.0	6.6	5.1	6.2	6.7	2.8	1N			
756244 - 1	FRIDLEY, CITY OF	211	2	30	24	23	DCAA	20	206685	1	CFRNCMCTS	2,400.0	2,400.0	0.2	0.0	0.0	0.0	0.0	1			
806110 - 1	COLUMBIA HEIGHTS, CITY OF	283	2	30	24	26	AAAC	20	2	SANDY LAKE(SULLIVAN LAKE)B	150	1.3						1				
966184 - 1	KURT MANUFACTURING COMPANY	271	2	30	24	27	AAA	20	538076	1	QBAA	40	20.0	17.5	16.6	15.8	20.4	21.0	1			
670153 - 1	KURT MANUFACTURING COMPANY	247	2	30	24	27	AAAB	20	235543	1	OPDC	60	15.0						1			
876280 - 1	UNITED DEFENSE L P	271	2	30	24	27	ABA	20	431652	1	QWTA	133	70.0						1			
756244 - 13	FRIDLEY, CITY OF	211	2	30	24	27	BAD	20	206696	1	OPCJ	2,400.0	2,400.0	0.0	0.0	0.0	0.0	0.0	1			
926127 - 10	US NAVY	271	2	30	24	27	BAD	20	206696	1	OPCJ	1,000	526.0						1			
926127 - 7	US NAVY	271	2	30	24	27	CAC	20	611096	1	QBAA	1,000	526.0						1E			
926127 - 8	US NAVY	271	2	30	24	27	CAC	20	611095	1	QWTA	1,000	526.0						1E			
926127 - 9	US NAVY	271	2	30	24	27	CAC	20	611098	1	QWTA	1,000	526.0						1E			
926127 - 3A	US NAVY	271	2	30	24	27	CAC	20	611097	1	QWTA	1,000	526.0						1E			
926127 - 5A	US NAVY	271	2	30	24	27	CAD	20	1	QBAA	1,000	526.0	102.8	113.2	130.5	80.8	92.0	92.0	1E			
926127 - 5B	US NAVY	271	2	30	24	27	DBC	20	1	QWTA	1,000	526.0	68.7	74.6	80.3	65.9	79.0	79.0	1E			
876280 - 2	UNITED DEFENSE L P	271	2	30	24	27	DBC	20	1	QBAA	1,000	526.0	35.6	39.4	46.3	29.6	47.8	47.8	1E			
876280 - 3	UNITED DEFENSE L P	271	2	30	24	34	ABA	20	431653	1	QWTA	133	70.0	8.6	10.1	10.7	8.7	8.5	1			
866292 - RW-1	BURLINGTON NORTHERN SANTA FE	271	2	30	24	34	ABA	20	431654	1	QBAA	133	70.0	13.7	16.6	16.3	11.0	14.2	1			
866292 - 1	ACME METAL SPINNING	247	2	30	24	34	ADDA	20	110488	1	QWTA	130	69.0	1.6	24.5	9.1	9.1	9.3	1			
786216 - 1	MINNEAPOLIS, CITY OF	271	2	30	24	34	ADA	20	1	MISSISSIPPI	15	5.0	0.6	0.8	0.8	0.2	0.4	1				
866292 - RW-2	BURLINGTON NORTHERN SANTA FE	271	2	30	24	34	BAD	20	3	MISSISSIPPI	125,000.0	24,628.5	23,863.2	24,844.0	26,058.3	23,430.9	23,430.9	1				
866292 - RW-3	BURLINGTON NORTHERN SANTA FE	271	2	30	24	34	DAB	20	559393	1	QWTAOSTP	130	69.0	7.5	24.3	7.8	5.9	7.6	1			
876280 - 4	UNITED DEFENSE L P	271	2	30	24	34	DAB	20	559394	1	QWTAOSTP	130	69.0	5.8	15.1	5.1	5.5	5.8	1			
876280 - 5	UNITED DEFENSE L P	271	2	30	24	34	DCC	20	431655	1	QBAA	133	70.0	9.8	9.0	9.0	7.3	11.4	1			
996139 - 1	GREEN VALUE NURSERY	271	2	30	24	34	DCC	20	431656	1	QBAA	133	70.0	10.6	10.1	12.7	8.8	13.7	1			
996139 - 2	GREEN VALUE NURSERY	285	2	31	22	1	BBD	20	436687	1	OPCJ	130	5.0	2.1	2.7	2.7	0.0	13.5	1			
		285	2	31	22	1	BBDA	20	566113	1	OPDCCJDN	130	5.0	2.7	6.4	6.4	0.1	13.5	1			

DNR Water Appropriation Permits

Anoka County

All Active Permits - By County & Location

8/22/2003

Permit #	Inst	Permittee	Use	CO	Twp	Rng	Sec	Q	Q	Q	Q	shed	Water Well	Resource	Code	Unique	Acres	Permitted	MGY	1998	1999	2000	2001	2002	Stat
																		-----	-----						
756237	- 1	WALDOCH, DANIEL	290	2	31	22	4	BC				20	5		5	40	500	6.1							
896385	- 1	ROBINSON, ALLAN	284	2	31	22	6	CCD				20	448834	1	160	300	63.5		26.8	13.8	38.3	27.1	3.5	1	
996118	* 1	ROBINSON LANDSCAPING	284	2	31	22	6	DCD				20	624188	1	80	300	10.8		36.4	17.3	26.6	9.5	1.3	1	
806263	- 1	ROBINSON LANDSCAPING	284	2	31	22	7	BADD				20	231862	1	230	800	38.0								
776489	- 1	GORDON REHBEIN FARMS	290	2	31	22	13	BDB				20	150406	1	200	700	55.3								
916246	- 1	CENTERVILLE, CITY OF	211	2	31	22	14	DCD				20	511091	1	1,275	1,275	108.0		0.3	0.0	3.7	1.6	4.6	1	
756283	- 1	MN DEPARTMENT OF CORRECTIONS	213	2	31	22	18	ABDB				20	208566	1	340	340	40.0		34.2	35.8	38.9	38.5	34.2	1E	
016066	- 1	CENTENNIAL SCHOOLS ISD #12	283	2	31	22	18	DCA				20	562962	1	240	13.0									
033068	- 1	ANOKA COUNTY PARKS	281	2	31	22	20	DCDD				20	208569	1	55	1,200	35.9								
033068	- POND	ANOKA COUNTY PARKS	281	2	31	22	21	BCB				20	5	55	1,200	35.9									
916246	- 2	CENTERVILLE, CITY OF	211	2	31	22	23	ACA				20	512748	1	1,275	1,275	108.0		51.2	54.2	74.9	80.4	66.5	1	
756228	- 1	ST PAUL, CITY OF	211	2	31	22	23	D				20	2	31,249	8,000.0										
776104	- 1	LACASSE, CYRIL	290	2	31	22	24	DAC				20	1	87	500	24.0			0.9	1.8	0.3	2.4			
856168	- 4	LINO LAKES, CITY OF	211	2	31	22	25	ABA				20	554207	1	2,925	335.0		69.4	66.2	87.2	106.8				
856168	- 1	LINO LAKES, CITY OF	211	2	31	22	28	ABAA				20	240171	1	2,925	335.0		83.0	63.6	83.0	62.5				
856168	- 3	LINO LAKES, CITY OF	211	2	31	22	28	DABA				20	559373	1	2,925	335.0		75.9	104.7	124.5	122.8				
856168	- 2	LINO LAKES, CITY OF	211	2	31	22	30	BDB				20	110471	1	2,925	335.0		65.7	59.8	77.6	98.3				
866090	- 1	BLE LLC	212	2	31	22	31	ABD				20	249501	1	140	7.0		0.6	0.6	0.6	0.5	0.3			
866090	- 2	BLE LLC	212	2	31	22	31	ABD				20	429651	1	140	7.0		3.3	3.3	3.3	3.9	2.7			
756229	- 1	ST PAUL, CITY OF	211	2	31	22	35	D				20	2	1,000.0											
906006	- 1	IND SCHOOL DIST 11	283	2	31	23	6	CCA				20	208611	1	30	11	16.0		10.4	9.1	9.6	10.3	8.8	1	
766227	- 12	BLAINE, CITY OF	211	2	31	23	7	ABA				20	224698	1	18,775	2,136.0		390.3	384.0	389.0	467.8	615.6			
766227	- 13	BLAINE, CITY OF	211	2	31	23	7	ABA				20	224699	1	18,775	2,136.0		24.4	0.2	30.2	31.2	9.1			
766227	- 9	BLAINE, CITY OF	211	2	31	23	7	ADA				20	208618	1	18,775	2,136.0		45.3	11.3	23.5	25.4	5.5			
766227	- 5	BLAINE, CITY OF	211	2	31	23	7	CDA				20	208615	1	18,775	2,136.0		89.8	135.8	89.1	45.7	6.7			
766227	- 7	BLAINE, CITY OF	211	2	31	23	7	DCC				20	208616	1	18,775	2,136.0		81.1	58.4	122.8	108.8				
033169	- 1	NORTH PINE AGGREGATE INC	252	2	31	23	9					20	2,000	260.0											
776393	- 1	FRICKE, TERRY & STEVE	284	2	31	23	9	ABA				20	133213	1	100	850	16.6		7.3	0.1	6.0	6.3			
906232	- 1	FRICKE & SONS SOD INC	284	2	31	23	10	BAA				20	506625	1	160	800	35.0		2.4	1.1	3.9	3.0			
896424	- 1	FRICKE & SONS SOD INC	289	2	31	23	10	BAB				20	20	160	350	96.0		14.5	5.2	27.0	14.9				
016126	- 1	TOURNAMENT PLAYERS CLUB	281	2	31	23	16	AB				20	2,490	52.1	120	2,490	52.1								
776081	- 1	TOURNAMENT PLAYERS CLUB	281	2	31	23	16	BDAC				20	114392	1	120	500	52.1		21.8	21.8	46.4	50.9	50.7	1	
026002	- 1	ENEBAK CONSTRUCTION CO	252	2	31	23	17	DA				20	20	600	130.0										
026111	- 1	ENEBAK CONSTRUCTION CO	252	2	31	23	18	DD				20	20	450	97.2										
956032	- 1	ENEBAK CONSTRUCTION CO	283	2	31	23	18	DDDD				20	546145	1	10	40	4.9		0.1	0.0	0.1	9.6	0.0		
016088	- 1	ENEBAK CONSTRUCTION CO	252	2	31	23	19	AAA				20	1,500	150.0											
766227	- 2	BLAINE, CITY OF	211	2	31	23	19	BADD				20	208628	1	18,775	2,136.0		74.1	101.7	89.7	89.7	185.3	34.3	1	
766227	- 1	BLAINE, CITY OF	211	2	31	23	19	CABB				20	208629	1	18,775	2,136.0		193.5	192.5	199.9	199.9	125.0	6.6	1	
766227	- 8	BLAINE, CITY OF	211	2	31	23	20	BAB				20	208630	1	18,775	2,136.0		187.9	139.1	122.7	74.9	276.1	62.7	1	
906008	- 1	MINNESOTA AMATEUR SPORTS COMMISSION	283	2	31	23	20	DDA				20	5	70	800	42.8									
896421	- 1	NATIONAL SPORTS CENTER FOUNDATION	283	2	31	23	21	BCAB				20	114414	1	60	500	21.2		3.5	1.9	2.4	2.2			
766227	- 11	BLAINE, CITY OF	211	2	31	23	24	DBB				20	208633	1	18,775	2,136.0		171.5	201.8	233.5	330.0	284.9			
766227	- 6	BLAINE, CITY OF	211	2	31	23	24	DBC				20	208634	1	18,775	2,136.0		247.2	216.7	266.1	209.4	135.1			
866072	- 1	IND SCHOOL DIST 12	213	2	31	23	24	DDAC				20	209209	1	500	3.0									
590782	- 3	CIRCLE PINES, CITY OF	211	2	31	23	25	ACDC				20	208636	1	2,100	200.0		109.3	86.4	89.4	82.6	62.7			
590782	- 2	CIRCLE PINES, CITY OF	211	2	31	23	25	BADB				20	208637	1	2,100	200.0		75.7	64.1	87.5	61.8	59.3			
766227	- 10	BLAINE, CITY OF	211	2	31	23	29	BCAA				20	208643	1	18,775	2,136.0		121.2	46.5	114.0	72.5	264.1			
766227	- 16	BLAINE, CITY OF	211	2	31	23	30	DCAC				20	151587	1	18,775	2,136.0		96.6	177.8	261.3	206.9	117.1			
766187	- 7	ANOKA, CITY OF	211	2	31	23	32	ACA				20	453792	1	8,500	1,200.0		119.9	266.8	279.3	260.8	210.7			
766227	- 4	BLAINE, CITY OF	211	2	31	23	32	BACA				20	208645	1	18,775	2,136.0		21.7	1.0	0.1	7.5	0.4			

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Permit #	Inst	Permittee	Use	COT	Wp	Rng	Sec	QQ	Q	sh	Well	Resource	Acres	GPM	MG/Y	1998	1999	2000	2001	2002	Stat	
766227	- 3	BLAINE, CITY OF	211	2	31	23	32	BADB	20	208646	1	CJDNPMRC	18,775	2,136.0	0.2	0.2					1	
866056	- 1	CEMSTONE PRODUCTS	248	2	31	23	32	CDD	20	255337	1			250	5.0	3.1	4.0	3.6	3.7	3.9	1	
866073	- 1	CENTENNIAL MHP	212	2	31	23	34	AADD	20	208648	1	QBAA		925	83.0	37.2	39.3	33.2	38.5	38.3	1	
866073	- 2	CENTENNIAL MHP	212	2	31	23	34	ADA	20	407899	1	QBAA		925	83.0						1	
856036	- 1	PAUL REVERE COMM LLP	212	2	31	23	35	ABB	20	249759	1			160	7.0	4.7	4.7	4.8	4.6	4.6	1	
660584	- 1	LINGTON, CITY OF	211	2	31	23	35	BAAA	20	208996	1	QBAA		1,000	100.0	79.3	75.3	65.8	92.3	96.1	1	
866138	- 1	RESTWOOD TERRACE M H PARK	212	2	31	23	35	CAB	20	208651	1	QBAA		1,600	15.0	14.3	14.6	14.8	14.7	14.9	1	
866138	- 2	RESTWOOD TERRACE M H PARK	212	2	31	23	35	CAB	20	208992	1	QBAA		1,600	15.0						1	
766227	- 14	BLAINE, CITY OF	211	2	31	23	35	DAB	20	233109	1	CIGLCMTS	18,775	2,136.0	42.8	57.9	90.6	103.0			76.8	1
906014	- 1	ANOKA COUNTY PARKS DEPT	261	2	31	24	1	BBC	20	431681	1	CFRNCIGL	100	6.5	4.6	2.6	2.5	2.5	2.5	4.9	1	
700845	- 1	BUNKER HILLS GOLF CLUB	281	2	31	24	1	CBB	20	231864	1	QBAA	270	190	195.0	0.7	1.1	0.1	4.3	2.2	1	
700845	- 3	BUNKER HILLS GOLF CLUB	281	2	31	24	2	CBB	20	500696	1	QBAA	270	190	195.0	35.5	38.2	42.8	47.3	25.4	1	
806139	- 18	COON RAPIDS, CITY OF	211	2	31	24	2	DCD	20	110469	1	CMTS	21,500	3,000.0	22.9	3.4	49.4	175.4			122.3	1
700845	- 2	BUNKER HILLS GOLF CLUB	281	2	31	24	2	DAA	20	234866	1	QBAAQBAA	270	190	195.0	39.6	39.4	40.3	46.1	29.1	1	
776532	- 1	LAWRENCE, DOUGLAS	284	2	31	24	4	DDB	20	3	COON CREEK		75	500	9.0	1.0	8.4	0.2	0.2		1	
756189	- 1	ANOKA RED-E-MIX INC	249	2	31	24	6	BDDC	21	209293	1	QWTA	60	3.0	2.9	3.0	2.2	2.2	2.6	2.0	1	
756133	- 2	FEDERAL CARTRIDGE CO	248	2	31	24	6	DACB	20	209306	1	CFIG	1,750	158.5	0.5	0.4	4.6	1.0	1.0	0.1	1	
756133	- 1	FEDERAL CARTRIDGE CO	248	2	31	24	6	DADC	20	209305	1	CFIG	1,750	158.5	7.9	6.2	4.0	4.6	4.6	2.9	1	
756133	- 3	FEDERAL CARTRIDGE CO	248	2	31	24	6	DADC	20	209308	1	CFIG	1,750	158.5	50.6	61.9	51.2	41.3	45.3	45.3	1	
766187	- 3	ANOKA, CITY OF	211	2	31	24	7	BCAD	20	202971	1	QUUUCECR	8,500	1,200.0	266.3	115.3	173.0	107.5			88.6	1
906252	- 1	REISLING PARK NORTH III	283	2	31	24	8	CDB	20	503723	1	CSLF	7	125	4.1	0.8	0.8	0.8	0.8	0.8	1	
806139	- 4	COON RAPIDS, CITY OF	211	2	31	24	9	DCCC	20	202972	1	CFRNPIMRC	21,500	3,000.0	10.0	3.2	19.0	13.7	10.1		1	
806139	- 16	COON RAPIDS, CITY OF	211	2	31	24	11	ADA	20	168720	1	CFRNCMTS	21,500	3,000.0	60.3	11.5	50.9	48.2	24.6		1	
896344	- 1	PETERSON, ROBERT R	290	2	31	24	12	AAA	20				80	500	36.0	23.5	19.1	21.5	21.5		1	
766329	- 1	MORNINGSIDE MEMORIAL	282	2	31	24	12	DD	20	114417	1	CFRN	40	100	10.0	7.1	3.5	5.8	1.9	1.7	1	
806139	- 21	COON RAPIDS, CITY OF	211	2	31	24	13	ACC	20	474384	1	QBAA	21,500	3,000.0	202.8	44.9	196.9	133.3	57.4		1	
806139	- 8	COON RAPIDS, CITY OF	211	2	31	24	13	ACC	20	202932	1	CFRNCMTS	21,500	3,000.0	408.8	410.7	356.8	263.0	269.0		1	
806139	- 9	COON RAPIDS, CITY OF	211	2	31	24	13	ACD	20	202931	1	CFRNCPCR	21,500	3,000.0	11.4	70.2	6.0	8.7	17.6		1	
806139	- 1	COON RAPIDS, CITY OF	211	2	31	24	13	BCC	20	202926	1	CSTLCECR	21,500	3,000.0	3.9	1.0	9.0	15.5	5.7		1	
806139	- 2	COON RAPIDS, CITY OF	211	2	31	24	13	CCC	20	202929	1	CSTLPMSC	21,500	3,000.0	4.4	0.8	9.1	15.2	6.6		1	
806139	- 10	COON RAPIDS, CITY OF	211	2	31	24	13	DBA	20	202930	1	CFRNCMTS	21,500	3,000.0	370.1	402.7	365.3	303.4	277.3		1	
926135	- 1	ANOKA-RAMSEY COMM COLLEGE	283	2	31	24	17	AD	20	473464	1	QBAA	25	300	11.0	10.4	8.8	10.2	8.9	5.8	1E	
906012	- 1	REISLING TOWNHOUSE ASSOCIATION	283	2	31	24	17	BAA	20	503670	1	CFRN	2	60	1.4	1.2	1.0	1.3	1.3	1.1	1	
806139	- 6	COON RAPIDS, CITY OF	211	2	31	24	17	BBA	20	202937	1	CFRN	21,500	3,000.0	111.7	12.8	35.7	108.2	88.3		1	
806139	- 19	COON RAPIDS, CITY OF	211	2	31	24	21	AAC	20	110475	1	QBAA	21,500	3,000.0	175.5	135.2	200.4	175.5	301.6		1	
806139	- 20	COON RAPIDS, CITY OF	211	2	31	24	21	ADB	20	420956	1	QBAA	21,500	3,000.0	576.8	561.9	519.9	542.6	359.9		1	
806139	- 7	COON RAPIDS, CITY OF	211	2	31	24	21	CDA	20	202943	1	CSTLPMSC	21,500	3,000.0	17.2	2.6	42.9	57.0	29.0		1	
806139	- 17	COON RAPIDS, CITY OF	211	2	31	24	21	DAA	20	150357	1	QBAA	21,500	3,000.0	68.7	58.6	62.2	88.9	96.9		1	
806139	- 13	COON RAPIDS, CITY OF	211	2	31	24	22	BCB	20	161413	1	CIGLCMTS	21,500	3,000.0	146.5	15.1	37.0	157.4	107.4		1	
806139	- 14	COON RAPIDS, CITY OF	211	2	31	24	22	BCB	20	110460	1	CFRNPIMRC	21,500	3,000.0	297.7	319.7	224.0	90.6	295.0		1	
806139	- 15	COON RAPIDS, CITY OF	211	2	31	24	22	BCD	20	110461	1	CFRNCMTS	21,500	3,000.0	174.2	234.8	204.9	141.1	209.0		1	
806139	- 22	COON RAPIDS, CITY OF	211	2	31	24	22	BCD	20	474385	1	QBAA	21,500	3,000.0	45.6	37.6	67.2	59.9	62.3		1	
806139	- 5	COON RAPIDS, CITY OF	211	2	31	24	25	ACB	20	202951	1	CSTLPMSC	21,500	3,000.0	8.1	1.2	21.4	30.9	13.2		1	
806139	- 12	COON RAPIDS, CITY OF	211	2	31	24	27	AAA	20	168721	1	CFRNCMTS	21,500	3,000.0	36.1	3.3	26.5	38.0	48.0		1	
806139	- 11	COON RAPIDS, CITY OF	211	2	31	24	27	BAA	20	202965	1	CFRNCMTS	21,500	3,000.0	213.7	284.0	525.3	607.1	296.0		1	
806139	- 23	COON RAPIDS, CITY OF	211	2	31	24	27	BAA	20	463020	1	QWTA	21,500	3,000.0	33.9	72.2	44.1	35.9	58.7		1	
766187	- 1	ANOKA, CITY OF	211	2	31	25	1	AADA	21	209269	1	QWTA	8,500	1,200.0	0.3	0.7	0.1	12.5	0.4		1	
916190	- 1	IMI CORNELIUS INC	271	2	31	25	1	AADA	21	201178	1	QUUUCIGL	8,500	1,200.0	0.7	0.7	0.0	6.6	0.1		1	
766186	- 1	ANOKA, CITY OF	281	2	31	25	1	BABB	21	209269	1	QWTA	120	850	53.0	46.2	54.1	49.5	47.1		1	

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Permit #	Inst	Permittee	Use	CO	Twp	Rng	Sec	Q	Q	Q	sh	Water Well	Resource	Acres	Permitted GPM	MGY	1998	1999	2000	2001	2002	Stat		
766188	-1	ANOKA, CITY OF	283	2	31	25	1	C	B	B	21	20188	1	QWTA	30	330	7.0	4.9	3.5	4.1	4.4	3.1	1	
766187	-4	ANOKA, CITY OF	211	2	31	25	1	C	B	B	20	20191	1	CMTSPMHN	8,500	1,200.0	60.5	148.1	41.7	178.4	257.4	1	1	
766187	-5	ANOKA, CITY OF	211	2	31	25	1	C	B	B	20	201218	1	CFRNCPCR	8,500	1,200.0	238.7	141.8	155.7	38.9	94.6	1	1	
946131	-1	IMI CORNELIUS INC	271	2	31	25	1	C	B	A	21	1	QWTA	100	53.0	23.1	19.6	23.0	39.5	21.0	21.0	1	1	
756046	-1	TROUT AIR	272	2	32	22	25	B	B	B	20	208989	1	CSTLQMTS	1,400	340.0	64.8	64.8	64.8	64.8	64.4	1	1	
651311	-1	OSBORNE, WALTER	212	2	32	23	8	B	D		20	231873	1	CFIG		17.7	6.1	6.1	6.2	6.2	6.2	1	1	
651311	-2	OSBORNE, WALTER	212	2	32	23	8	B	D		20	228787	1	CFIG		17.7	6.1	6.1	6.2	6.2	6.2	1	1	
896039	-1	FIELDS & SONS INC, EDWARD	290	2	32	23	10	D	D		20	439900	1		65	400	22.8	7.5	38.4	19.7	4.4	1	1	
896190	-1	FIELDS & SONS INC, EDWARD	290	2	32	23	12	B	A		20	444820	1	CSLF	160	300	130.0	17.7	26.3	90.1	42.2	1	1	
896260	-1	FIELDS & SONS INC, EDWARD	290	2	32	23	12	C	B	A	20	444802	1	CFRNCPCR	53	400	37.4	4.5	10.3	2.2	4.1	1	1	
896261	-1	FIELDS & SONS INC, EDWARD	290	2	32	23	13	C	D	B	20	444802	1	CFRNCPCR	50	500	41.0	25.0	25.0	30.0	4.7	1	1	
896025	-1	HOFFMAN, WARREN	284	2	32	23	15	D	A		20	450537	1	CFIG	30	400	11.6	0.4	1.0	0.4	1.9	1	1	
896468	-1	PETERSON, DENNIS	290	2	32	23	22	B	B		20	107442	1	OSTP	40	800	80.0	1.6	19.6	13.9	1.9	1	1	
776064	-1	HOGDAL, VIRGIL	284	2	32	23	24	D	B	A	20	449127	1	CFIG	80	400	65.2	17.1	36.3	17.8	6.5	1	1	
896399	-1	HOFFMAN, WARREN	284	2	32	23	24	D	B	A	20	4	4		60	400	19.6	26.0	24.0	30.0	1	1		
896233	-1	STEEN, GARY A & ANN M	289	2	32	23	27	B	A		20	4	4		36	500	23.5	0.7	6.1	6.1	1	1		
896469	-1	STEEN, MR & MRS GARY	289	2	32	23	27	C	C	A	20	4	4		30	500	13.0	1.1	1.1	0.9	1	1		
700791	-1	NATIONAL GOLF OPERATION PARTNERSH	281	2	32	23	31	A	C	C	20	208594	1	CFRNCMTS	140	1,200	100.0	86.3	64.7	88.7	43.3	1	1	
700791	-1	NATIONAL GOLF OPERATION PARTNERSH	281	2	32	23	31	A	C	C	20	208594	1	CFRNCMTS	140	1,200	100.0	86.3	64.7	88.7	43.3	1	1	
033015	-1	WOODLAND DEVELOPMENT CORP	212	2	32	23	31	D	A		20	554238	1	QWTA	140	1,200	100.0	49.5	42.8	49.5	42.8	1	1	
006108	-2	NATIONAL GOLF OPERATION PARTNERSH	281	2	32	23	31	D	B		20	510541	1	CFRNCMTS	60	800	67.0	1.6	1.7	1.6	6.3	1	1	
006108	-3	NATIONAL GOLF OPERATION PARTNERSH	281	2	32	23	31	D	B		20	615970	1	QBAA	60	800	67.0	35.4	58.1	35.4	24.9	1	1	
006108	-1	NATIONAL GOLF OPERATION PARTNERSH	281	2	32	23	31	D	B		20	5	5		60	800	67.0	30.7	30.7	30.8	1	1		
766218	-1	GLATT, JAMES J	290	2	32	24	3	D			21	4	COUNTY DITCH 71	30	450	5.0						1	1	
026006	-1	ANOKA HENNEPIN ISD #11	283	2	32	24	9	A	D		21	611085	1	CFIG	13	250	11.0	1.2	1.2	1.2	7.4	1	1	
896258	-1	FIELDS & SONS INC, EDWARD	290	2	32	24	16	C	D		20	4	COON CREEK	85	400	60.3							1	1
906183	-1	DEHN JR, ROBERT J	290	2	32	24	17	B	A		21	447821	1		16	80	2.5	2.3	0.7	2.1	0.3	1	1	
776370	-1	FIELDS & SONS INC, EDWARD	290	2	32	24	21	D	B		20	4	4		80	500	13.3	12.3	1.2	9.1	5.3	1	1	
906040	-1	SLYZUK, KENNETH	290	2	32	24	22	B	C	D	20	438988	1	CECRCMTS	260	400	40.0	2.2	2.2	2.2	2.2	1	1	
876059	-5	ANDOVER, CITY OF	211	2	32	24	22	D	A	B	20	559342	1	CFIG	7,800	1,100.0	163.1	165.7	199.7	277.9	245.0	1	1	
876059	-4	ANDOVER, CITY OF	211	2	32	24	22	D	A	D	20	516065	1	CFIG	7,800	1,100.0	253.9	162.0	174.8	206.2	180.5	1	1	
876059	-7	ANDOVER, CITY OF	211	2	32	24	22	D	C	B	21	578986	1	CFIG	7,800	1,100.0			72.9	98.8	98.8	1	1	
906043	-1	IND SCHOOL DIST 11	283	2	32	24	22	D	D	A	20	438989	1	CFRNCIGL	20	150	14.0	13.8	10.6	11.0	9.7	1	1	
976132	-1	ANOKA HENNEPIN ISD #11	283	2	32	24	22	D	D	A	20	559369	1	CFIG	22	200	15.0	10.5	10.0	9.2	13.3	1	1	
876059	-6	ANDOVER, CITY OF	211	2	32	24	27	A	B	A	20	578903	1	CFIG	7,800	1,100.0	9.7	113.6	149.2	60.2	43.5	1	1	
936100	-EW-1	MN POLLUTION CONTROL AGENCY	271	2	32	24	27	D	B	C	20	482912	1	QWTA	165	90.0	90.0	0.8	1.2	0.9	0.9	1E	1	1
936100	-EW-2	MN POLLUTION CONTROL AGENCY	271	2	32	24	27	D	B	D	20	482913	1	QWTA	165	90.0	0.2	0.3	0.3	0.6	0.8	1E	1	1
936100	-EW-3	MN POLLUTION CONTROL AGENCY	271	2	32	24	27	D	B	D	20	482914	1	QWTA	165	90.0	0.2	0.2	0.2	0.3	0.4	1E	1	1
936100	-EW-4	MN POLLUTION CONTROL AGENCY	271	2	32	24	27	D	B	D	20	439861	1	QWTA	165	90.0	4.7	1.2	0.9	1.4	1.5	1E	1	1
936100	-EW-9	MN POLLUTION CONTROL AGENCY	271	2	32	24	27	D	C	B	20	534895	1	QWTA	165	90.0	0.3	0.3	0.2	0.3	0.2	1E	1	1
936100	-EW-7	MN POLLUTION CONTROL AGENCY	271	2	32	24	27	D	D	A	20	485498	1	QWTA	165	90.0	6.5	9.1	8.7	8.2	3.1	1E	1	1
936100	-EW-5	MN POLLUTION CONTROL AGENCY	271	2	32	24	27	D	D	B	20	482915	1	QWTA	165	90.0	3.0	3.5	1.7	1.8	1.4	1E	1	1
936100	-EW-6	MN POLLUTION CONTROL AGENCY	271	2	32	24	27	D	B	B	20	485497	1	QWTA	165	90.0	7.5	12.1	4.2	2.3	0.6	1E	1	1
896091	-1	NATIONAL GOLF OPERATION PARTNERSH	281	2	32	24	29	D	D	D	20	444592	1	CAMB	24	500	10.0	2.7	4.4	3.9	0.4	0.0	1	1
896091	-1	NATIONAL GOLF OPERATION PARTNERSH	281	2	32	24	29	D	D	D	20	5	5		24	500	10.0	5.5	6.0	6.0	0.0	1	1	
766187	-6	ANOKA, CITY OF	211	2	32	24	30	C	D	D	C	21	224625	1	CIGLQMTS	8,500	1,200.0	453.3	369.4	492.4	503.6	305.1	1	1
936137	-1	ANOKA HENNEPIN ISD #11	283	2	32	24	31	B	A	C	B	21	512754	1	CFIG	19	260	15.0	14.7	9.1	14.9	8.9	1	1
745289	-1	ANOKA, CITY OF	283	2	32	24	31	D	D	D	20	1	1		24	300	17.0	9.0	8.5	9.0	8.5	1	1	
876059	-1	ANDOVER, CITY OF	211	2	32	24	32	A	C	D	20	171011	1	CMTSPMSU	7,800	1,100.0	50.7	5.4	0.5	1.1	1.1	1	1	

DNR Water Appropriation Permits
Anoka County

All Active Permits - By County & Location

8/22/2003

Permit #	Inst	Permittee	Use	CO	Typ	Rng	Sec	QQ	QQ	shed	Water	Well	Resource	Code	Name	--- Reported Pumping MG ---					Stat		
																1998	1999	2000	2001	2002			
																MG/Y	Acres	GPM					
876059	- 2	ANDOVER, CITY OF	211	2	32	24	32	DBB	20	415932	1	CMTSPMHN	7,800	1,100.0	120.4	164.7	116.7	164.7	120.4	96.7	1		
876059	- 3	ANDOVER, CITY OF	211	2	32	24	35	ABD	20	431683	1	CMSH	7,800	1,100.0	37.5	50.8	74.2	50.8	37.5	121.0	1		
033090	- 1	RAMSEY ORGANIC INC	262	2	32	25	5	BC	20		5		140	35.0							1		
866340	- 1	RUM RIVER HILLS GOLF CLUB	281	2	32	25	11	DDB	21	405888	1	CFRNCIGL	300	30.0	8.3	9.8	11.2	9.8	8.3	8.7	1		
846068	- 1	RAMSEY, CITY OF	283	2	32	25	16	BCD	21	150546	1	CIGLCECR	300	24.0	23.7	21.5	15.5	21.5	23.7	24.1	1		
936124	- 1	LINKS AT NORTHFORK GC LLC	281	2	32	25	19	BDB	20	463021	1	CFIG	1,200	56.0	36.0	34.1	32.8	34.1	36.0	27.5	1		
936124	- POND	LINKS AT NORTHFORK GC LLC	281	2	32	25	19	BDB	20		5		1,200	56.0							1		
916175	- BW12	MN POLLUTION CONTROL AGENCY	271	2	32	25	22	DDA	21	463036	1	QWTA	1,100	580.0	3.1	1.4	0.3	1.4	3.5	2.7	1E		
916175	- BW10	MN POLLUTION CONTROL AGENCY	271	2	32	25	22	DDD	20	463034	1	QWTA	1,100	580.0	0.7	1.0	2.3	1.0	0.4	0.5	1E		
916175	- BW11	MN POLLUTION CONTROL AGENCY	271	2	32	25	22	DDD	20	463035	1	QWTA	1,100	580.0	1.7	0.5	0.3	0.5	0.0	0.1	1E		
033183	- 1	S/J LOUIS CONSTRUCTION INC	252	2	32	25	23	AD	21		1		2,700	100.0							1		
731443	- 1	ANOKA HENNEPIN ISD #11	213	2	32	25	23	DCA	21	241443	1		150	12.7	11.0	8.0	8.0	10.3	9.0	7.0	1N		
560132	- 1	RIVERSIDE FARMS	290	2	32	25	24	DAA	21		3	MISSISSIPPI	800	14.6	6.2	6.4	6.4	9.1	6.1	2.2	1		
856005	- 1	RAMSEY, CITY OF	211	2	32	25	25	DCCA	21	161441	1	CIGL	4,900	500.0	162.9	82.5	101.7	81.6	81.6	99.1	1		
856005	- 2	RAMSEY, CITY OF	211	2	32	25	25	DCDC	21	416183	1	CIGLCECR	4,900	500.0	27.4	12.1	13.5	8.4	8.4	8.2	1		
916175	- RW-1	MN POLLUTION CONTROL AGENCY	271	2	32	25	26	BCB	21	463037	1	QBAAACSF	1,100	580.0	9.6	2.6	2.6	0.1	18.7		1E		
916175	- RW-2	MN POLLUTION CONTROL AGENCY	271	2	32	25	26	BCB	21	463038	1	QBAAACSF	1,100	580.0	12.7	2.9	2.9				1E		
916175	- RW-3	MN POLLUTION CONTROL AGENCY	271	2	32	25	26	BCC	21	463039	1	QBAA	1,100	580.0	28.4	30.5	28.9	30.3	30.3	13.7	1E		
916175	- BW-8	MN POLLUTION CONTROL AGENCY	271	2	32	25	27	AAA	20	463032	1	QWTA	1,100	580.0	1.9	8.5	3.4	2.7	2.7	2.1	1E		
916175	- BW-9	MN POLLUTION CONTROL AGENCY	271	2	32	25	27	AAA	20	463033	1	QWTA	1,100	580.0	0.4	3.9	3.5	7.2	7.2	2.6	1E		
916175	- BW-5	MN POLLUTION CONTROL AGENCY	271	2	32	25	27	AAB	20	463029	1	QWTA	1,100	580.0	4.9	5.7	8.2	9.2	9.2	7.9	1E		
916175	- BW-6	MN POLLUTION CONTROL AGENCY	271	2	32	25	27	AAB	20	463030	1	QWTA	1,100	580.0	5.6	7.0	4.7	6.6	6.6	5.8	1E		
916175	- BW-7	MN POLLUTION CONTROL AGENCY	271	2	32	25	27	AAB	20	463031	1	QWTA	1,100	580.0	2.0	4.3	2.4	3.2	3.2	2.9	1E		
916175	- BW-2	MN POLLUTION CONTROL AGENCY	271	2	32	25	27	ABA	20	463026	1	QWTA	1,100	580.0	1.0	1.4	1.2	4.8	4.8	6.3	1E		
916175	- BW-3	MN POLLUTION CONTROL AGENCY	271	2	32	25	27	ABA	20	463027	1	QWTA	1,100	580.0	3.2	5.9	6.3	5.8	5.8	5.2	1E		
916175	- BW-4	MN POLLUTION CONTROL AGENCY	271	2	32	25	27	ABA	20	463028	1	QWTA	1,100	580.0	8.8	3.9	4.8	3.2	3.2	1.2	1E		
916175	- RW-1	MN POLLUTION CONTROL AGENCY	271	2	32	25	27	ABB	20	463025	1	QWTA	1,100	580.0	3.3	2.9	4.2	4.2	1.0		1E		
916175	- RW-4	MN POLLUTION CONTROL AGENCY	271	2	32	25	27	ADD	21	463040	1	QWTA	1,100	580.0	19.5	13.5	14.5	8.2	8.2	4.2	1E		
916175	- RW-5	MN POLLUTION CONTROL AGENCY	271	2	32	25	27	ADD	21	463041	1	QWTAACSFL	1,100	580.0	28.9	27.5	44.3	31.2	31.2	10.1	1E		
916175	- RW-6	MN POLLUTION CONTROL AGENCY	271	2	32	25	27	ADD	21	463042	1	QWTAACSFL	1,100	580.0	31.5	30.6	42.0	29.5	29.5	8.6	1E		
916175	- RW-7	MN POLLUTION CONTROL AGENCY	271	2	32	25	27	ADD	21	463043	1	QWTAACSFL	1,100	580.0	19.9	17.4	17.3	11.0	11.0	4.0	1E		
916175	- RW-8	MN POLLUTION CONTROL AGENCY	271	2	32	25	27	BCD	20	463044	1	QBAAACSF	1,100	580.0	30.8	4.4						1E	
856005	- 3	RAMSEY, CITY OF	211	2	32	25	28	AADC	21	580303	1	CFIG	4,900	500.0	105.9	152.2	205.8	155.2	127.1	127.1	1		
856005	- 4	RAMSEY, CITY OF	211	2	32	25	28	ABCC	21	580313	1	CFIG	4,900	500.0	9.7	77.8	89.1	155.9	112.3	112.3	1		
856005	- 5	RAMSEY, CITY OF	211	2	32	25	28	ACCC	21	593672	1	CFIG	4,900	500.0							1		
756095	- 1	NATHE, JOSEPH	290	2	32	25	29	CDC	20		3	MISSISSIPPI	1,600	20.4	5.3	6.8	17.5	17.5	9.5	5.3	1		
756095	- 2	NATHE, JOSEPH	290	2	32	25	29	CDC	20		3	MISSISSIPPI	1,600	20.4	1.9	1.7	3.1	3.1	3.2	2.8	1		
856001	- 1	OAK TERRACE ESTATES	212	2	32	25	34	ADB	20	203770	1	QBAA	110	7.0	2.9	2.9	2.9	3.1	3.2	2.8	1		
856001	- 2	OAK TERRACE ESTATES	212	2	32	25	34	ADB	20	208770	1	CSLFCFRN	110	7.0	2.9	2.9	3.1	3.2	2.8	2.8	1		
996047	- 1	MARSHALL CONCRETE PRODUCTS INC	248	2	32	25	35	BABC	20	122215	1	CFRN	32	7.0	0.4	1.5	1.1	1.1	2.4	2.4	1		
866102	- 1	WOODLYN COURT PARTNERSHIP LLP	212	2	32	25	35	CAD	20	249783	1		50	3.5	0.1	0.0	0.0	0.4	0.4	0.5	1		
866102	- 2	WOODLYN COURT PARTNERSHIP LLP	212	2	32	25	35	CAD	20	249784	1		50	3.5	1.0	1.1	1.2	1.2	0.8	0.9	1		
866069	- 1	LINWOOD TERRACE CO	212	2	33	22	8	DBAA	37	221648	1	CFRNCNDR	200	12.0	6.9	6.4	7.0	7.0	6.7	5.8	1		
906217	- PW1C	MN POLLUTION CONTROL AGENCY	271	2	33	23	8	ADD	21	538089	1		150	79.0	1.7	0.9	0.9	0.1	0.1	0.4	1E		
906217	- PW2B	MN POLLUTION CONTROL AGENCY	271	2	33	23	8	ADD	21	538088	1		150	79.0	0.9	0.5	0.3	0.0	0.0	1.4	1E		
906217	- PW2C	MN POLLUTION CONTROL AGENCY	271	2	33	23	8	ADD	21	538086	1		150	79.0	2.7	2.4	3.0	3.0	1.4	0.9	1E		
906217	- PW3B	MN POLLUTION CONTROL AGENCY	271	2	33	23	8	ADD	21	538087	1		150	79.0	1.1	1.8	0.8	1.0	1.0	1.5	1E		
906217	- PW4B	MN POLLUTION CONTROL AGENCY	271	2	33	23	8	ADD	21	538085	1		150	79.0	0.2	0.0	0.0	0.0	0.3	0.0	1E		
906217	- PW1	MN POLLUTION CONTROL AGENCY	271	2	33	23	9	BCC	21	501985	1		150	79.0	1.4	2.4	1.0	2.0	2.0	1.4	1E		
906217	- PW5B	MN POLLUTION CONTROL AGENCY	271	2	33	23	9	CBB	21	538084	1		150	79.0	2.6	0.4	0.4	0.3	0.3	1.8	1E		

DNR Water Appropriation Permits

Anoka County

All Active Permits - By County & Location

8/22/2003

Permit #	Inst	Permittee	Use	CO	Typ	Rng	Sec	QQ	QQ	QQ	shed	Water	Well	Resource	Unique	Code/Name	Acres	GPM	MG/Y	1998	1999	2000	2001	2002	Stat
986109	- 1	HIDDEN HAVEN GOLF CLUB	281	2	33	23	17	CB	21	603626	1	CFRNGECR	48	500	34.0	28.8	13.4	15.8	14.0	10.5	1				
986109	- 2	HIDDEN HAVEN GOLF CLUB	281	2	33	23	17	CB	21	598698	1	CFIG	48	500	34.0	13.4	15.8	14.0	10.5	1					
926043	- 1	IND SCHOOL DIST 15	283	2	33	23	18	ABA	21	464823	1		20	150	14.0	13.4	15.8	14.0	10.5	1					
986108	- 1	GJDS INC	281	2	33	23	19	AAAB	21	438183	1	CIGL	30	280	26.0	20.1	10.9	9.4	7.8	1					
986108	- 2	GJDS INC	281	2	33	23	19	AAAB	21	438184	1	CIGL	30	280	26.0	9.0	10.9	9.4	7.8	1					
996129	- 1	B & B HOFFMAN SOD FARM	284	2	33	23	20	DD	21	647755	1	3 CROOKED BROOK	300	700	13.0	9.0	10.9	9.4	7.8	1					
026103	- 1	HOFFMAN BROTHERS SOD INC	284	2	33	23	28	ADC	21	647755	1	QBAA	420	700	68.5	0.8	16.2	7.2	7.8	1					
986131	- 1	HOFFMAN BROTHERS SOD INC	290	2	33	23	29	A	21	450137	1	4 ANOKA CO DITCH #13	225	550	19.0	0.8	16.2	41.8	6.5	1					
906309	- 1	VIKING MEADOWS GOLF CLUB	281	2	33	23	29	DDC	21	209224	1	CFRNGMNTS	50	200	35.3	8.5	8.2	14.6	6.5	1					
866067	- 1	VILLAGE GREEN NORTH	212	2	33	23	32	CDD	21	209224	1	CFRNGMNTS	50	200	35.3	10.0	8.2	14.6	6.5	1					
896346	- 1	CARLOS AVERY TURF NURSERY	284	2	33	23	36	DCA	20	255359	1		340	200	62.7	10.8	10.8	10.8	10.8	1					
896346	- 2	CARLOS AVERY TURF NURSERY	284	2	33	23	36	DCA	20	255359	1		340	200	62.7	1.1	10.8	10.8	10.8	10.8	1				
016035	- 1	PONDS GOLF COURSE	281	2	33	24	4	BAD	21	647318	1	4 CO DITCH 12	340	200	62.7	19.3	19.3	27.8	26.4	1					
700161	- 1	PQT COMPANY	290	2	33	24	17	BC	21	647318	1	3 RUM	140	600	91.2	19.3	19.3	27.8	26.4	1					
866151	- 1	ST PATRICKS CATHOLIC CHURCH	290	2	33	24	17	BC	21	647318	1	3 RUM	140	600	91.2	19.3	19.3	27.8	26.4	1					
906193	- 1	LEE, PATRICK WAYNE	282	2	33	24	22	DBCA	21	415869	1	CFRN	80	100	19.0	7.3	5.7	3.8	3.6	1					
776482	- 1	MORITZ, DIANE	290	2	33	24	34	DCB	21	404744	1	QBAA	5	40	5.3	5.3	5.7	3.8	3.6	1					
796329	- 1	ST FRANCIS, CITY OF	290	2	33	25	19	BAD	21	404744	1	CFIGCMESH	150	500	40.8	5.4	16.9	13.3	10.3	1					
796329	- 3	ST FRANCIS, CITY OF	290	2	33	25	19	BAD	21	404744	1	CFIGCMESH	120	900	40.0	10.7	17.1	15.8	10.3	1					
936092	- 1	IND SCHOOL DIST 15	211	2	34	24	32	BCCD	21	209221	1	CECRMNTS	2,300	2,300	200.0	52.9	69.7	64.5	64.5	1					
926050	- 1	IND SCHOOL DIST 15	283	2	34	24	32	DAAD	21	622765	1	QBAA	2,300	2,300	200.0	52.9	69.7	64.5	64.5	1					
926050	- 1	IND SCHOOL DIST 15	283	2	34	24	32	DAA	21	433300	1	CMTS	20	200	13.0	0.0	5.8	6.2	5.1	1					
796329	- 2	ST FRANCIS, CITY OF	283	2	34	24	32	DAD	21	505700	1	CFIG	20	140	14.0	3.9	5.7	6.1	5.8	1					
796329	- 2	ST FRANCIS, CITY OF	211	2	34	24	33	CCBC	21	184885	1	CMTS	2,300	2,300	200.0	92.8	88.3	49.6	24.4	1					

Appendix F
Pollution Sources as Identified by MPCA


Minnesota Pollution Control Agency
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Site ID	Site Name	County
121939	EVELAND/ANOKA SCHOOL DISTRICT	Anoka
122036	ANDOVER ELEMENTARY SCHOOL	Anoka
122184	ANOKA-HENNEPIN HIGH SCHOOL	Anoka
123111	FESTIVAL FOODS	Anoka
130	CITY OF ANDOVER	Anoka
15222	KOTTKES BUS SERVICE INC	Anoka
16193	ANDOVER ELEMENTARY SCHOOL	Anoka
16324	MMCP	Anoka
165	ACE SOLID WASTE INC	Anoka
17619	ANDOVER PUBLIC WORKS SHOP	Anoka
18701	SUPERAMERICA #4477	Anoka
18726	BILL'S SUPERETTE #7	Anoka
18893	Spur #5250	Anoka
18972	RENOLLETT TRUCKING INC	Anoka
19387	OAKVIEW MIDDLE SCHOOL	Anoka
20102	RIVERDALE ASSEMBLY OF GOD	Anoka
20156	PRECISION WOOD PRODUCTS	Anoka
20824	MEADOW CREEK CHURCH	Anoka
231	MAJESTIC FARMS INC	Anoka
235	EDWARD FIELDS & SONS	Anoka
4506	TOM THUMB FOOD MARKETS	Anoka
4507	TOM THUMB FOOD MARKETS	Anoka
4519	ANOKA COUNTY HWY BLDG	Anoka
4533	ANDOVER SUPERAMERICA #806	Anoka
4554	TOTAL MART #5303	Anoka
4574	WARD LAKE SOD INC	Anoka
4608	BUNKER HILLS ACTIVITIES CENTER	Anoka
4610	BUNKER HILLS PARK SHOP	Anoka
4612	ANOKA COUNTY PARK MAINTENANCE SHOP	Anoka
53216	CITY OF ANDOVER	Anoka
54912	M & S DRYWALL SUPPLY	Anoka
54979	BECK'S AUTO	Anoka

This page was last updated Wednesday Feb 25th, 2004

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If you have questions or problems, contact webmaster@pca.state.mn.us
Minnesota Pollution Control Agency, 520 Lafayette Road, St. Paul, MN 55155-4194
Phone: 651-296-6300, 800-657-3864; 24-hour emergency number: 651-649-5451 or 800-422-0798; TTY: 651-282-5332, TTY 24-hour emergency number: 651-297-5353 or 800-627-3529


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[Water](#)[Cleanup](#)

Minnesota Leaking Aboveground/Underground Storage Tank Sites

[Waste](#)[News/Notices](#)

The following sites resemble the search information that you entered. To find out more information on the sites click on the leak ID number

[Permits](#)[Rules/Regulations](#)[Hot Topics](#)[Programs](#)[Publications](#)[About MPCA](#)

Leak ID	Site Name	County
3655	CITY OF ANDOVER	Anoka
6461	SPEEDY MARKET #16	Anoka
7469	BROOKS FOOD STORE # 54	Anoka
8378	ANOKA CO HWY DEPT BUNKER LAKE SHOP	Anoka
9489	KOTTKES BUS SERVICE INC	Anoka
10262	FORMER TOM THUMB FOOD MARKET	Anoka
10686	BILL'S SUPERETTE #7	Anoka
11529	EDWARD FIELDS AND SONS	Anoka
12029	SOD FARM	Anoka
12190	ACE SOLID WASTE	Anoka
13687	Erickson Residence	Anoka
13688	Eveland Residence	Anoka
13802	Ace Solid Waste Storage Building	Anoka
2269	ACE SOLID WASTE COMPANY	Anoka
1379	MR OLSON	Anoka
14063	Precision Wood Prod.	Anoka

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Underground Storage Tank Information

CITY OF ANDOVER

An MPCA Leaking Underground Storage Tank Site.

ID Number: 3655

[Groundwater](#) [Cleanup Actions](#) [Legal Entity](#) [Treatments](#) [Reporting](#)

Site Address: 1758 CROSSTOWN BLVD NW
City: ANDOVER
Site Zip Code: 55304
County: Anoka
Release Discovered Date: 05-DEC-90
Release Report Date: 06-DEC-90
Leaksite Conditional Closure Date: 27-OCT-91
Leaksite Complete Site Closure Date: 18-SEP-92
Contaminated Soils Remaining: Y
Offsite Contamination: U
Product Released: Gasoline Regular
Project Manager: [Fawcett, David](#)

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Underground Storage Tank Information

SPEEDY MARKET #16

An MPCA Leaking Underground Storage Tank Site.
ID Number: 6461

[Groundwater](#) | [Cleanup Actions](#) | [Legal Entity](#) | [Treatments](#) | [Reporting](#)

Site Address: 13725 CROSSTOWN DR NW

City: ANDOVER

Site Zip Code: 55304

County: Anoka

Release Discovered Date: 25-JUN-93

Release Report Date: 25-JUN-93

Leaksite Conditional Closure Date:

Leaksite Complete Site Closure Date: 27-OCT-99

Contaminated Soils Remaining: U

Offsite Contamination: U

Product Released: Gasoline, Type Unknown

Project Manager: McCann, Jim

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Underground Storage Tank Information**BROOKS FOOD STORE # 54**

An MPCA Leaking Underground Storage Tank Site.

ID Number: 7469

Groundwater	Cleanup Actions	Legal Entity	Treatments	Reporting
-----------------------------	---------------------------------	------------------------------	----------------------------	---------------------------

Site Address: 13660 CROSSTOWN BLVD NW**City:** ANDOVER**Site Zip Code:** 55304**County:** Anoka**Release Discovered Date:** 13-JUN-94**Release Report Date:** 14-JUN-94**Leaksite Conditional Closure Date:****Leaksite Complete Site Closure Date:** 09-DEC-94**Contaminated Soils Remaining:** U**Offsite Contamination:** U**Product Released:** Unknown**Project Manager:** Abdella, Jelil

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Underground Storage Tank Information

ANOKA CO HWY DEPT BUNKER LAKE SHOP

An MPCA Leaking Underground Storage Tank Site.
ID Number: 8378

Groundwater	Cleanup Actions	Legal Entity	Treatments	Reporting
-----------------------------	---------------------------------	------------------------------	----------------------------	---------------------------

Site Address: 1440 BUNKER LAKE BLVD

City: ANDOVER

Site Zip Code: 55304

County: Anoka

Release Discovered Date: 16-MAY-95

Release Report Date: 17-MAY-95

Leaksite Conditional Closure Date:

Leaksite Complete Site Closure Date: 13-FEB-96

Contaminated Soils Remaining: U

Offsite Contamination: U

Product Released: Hydraulic Fluid

Project Manager: Gregg, Kim

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Underground Storage Tank Information**KOTTKES BUS SERVICE INC**

An MPCA Leaking Underground Storage Tank Site.

ID Number: 9489

Groundwater	Cleanup Actions	Legal Entity	Treatments	Reporting
-----------------------------	---------------------------------	------------------------------	----------------------------	---------------------------

Site Address: 13625 JAY ST NW**City:** ANDOVER**Site Zip Code:** 55304**County:** Anoka**Release Discovered Date:** 23-JUL-96**Release Report Date:** 23-JUL-96**Leaksite Conditional Closure Date:****Leaksite Complete Site Closure Date:** 31-MAR-00**Contaminated Soils Remaining:** U**Offsite Contamination:** U**Product Released:** Unknown**Project Manager:** [McCann, Jim](#)

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Underground Storage Tank Information

FORMER TOM THUMB FOOD MARKET

 An MPCA Leaking Underground Storage Tank Site.
 ID Number: 10262

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Site Address: 3681 ROUND LAKE BLVD**City:** ANDOVER**Site Zip Code:** 55303**County:** Anoka**Release Discovered Date:** 25-JUN-97**Release Report Date:** 25-JUN-97**Leaksite Conditional Closure Date:****Leaksite Complete Site Closure Date:** 19-SEP-97**Contaminated Soils Remaining:** U**Offsite Contamination:** U**Product Released:** Unknown**Project Manager:** Koplitz, Mark

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Underground Storage Tank Information

BILL'S SUPERETTE #7

An MPCA Leaking Underground Storage Tank Site.

ID Number: 10686

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Site Address: 14041 ROUND LAKE BLVD

City: ANDOVER

Site Zip Code: 55304

County: Anoka

Release Discovered Date: 25-AUG-97

Release Report Date: 25-AUG-97

Leaksite Conditional Closure Date:

Leaksite Complete Site Closure Date: 24-JUN-03

Contaminated Soils Remaining: Y

Offsite Contamination: N

Product Released: Gasoline Unleaded

Project Manager: McCann, Jim

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Underground Storage Tank Information

EDWARD FIELDS AND SONS

An MPCA Leaking Underground Storage Tank Site.
 ID Number: 11529

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Site Address: 15421 ROUNDLAKE BLVD

City: ANDOVER

Site Zip Code: 55304

County: Anoka

Release Discovered Date: 13-JUL-98

Release Report Date: 14-JUL-98

Leaksite Conditional Closure Date:

Leaksite Complete Site Closure Date: 19-APR-02

Contaminated Soils Remaining: Y

Offsite Contamination: N

Product Released: Diesel

Project Manager: McLain, Chris

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Underground Storage Tank Information

SOD FARM

An MPCA Leaking Underground Storage Tank Site.
ID Number: 12029

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Site Address: 17700 WARD LAKE DR NW

City: ANDOVER

Site Zip Code: 55304

County: Anoka

Release Discovered Date: 28-OCT-98

Release Report Date: 28-OCT-98

Leaksite Conditional Closure Date:

Leaksite Complete Site Closure Date:

Contaminated Soils Remaining: U

Offsite Contamination: U

Product Released:

Project Manager: McLain, Chris

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Underground Storage Tank Information**ACE SOLID WASTE**
 An MPCA Leaking Underground Storage Tank Site.
 ID Number: 12190

Groundwater	Cleanup Actions	Legal Entity	Treatments	Reporting
-----------------------------	---------------------------------	------------------------------	----------------------------	---------------------------

Site Address: 3118 NW 162ND LN**City:** ANDOVER**Site Zip Code:** 55304**County:** Anoka**Release Discovered Date:** 24-NOV-98**Release Report Date:** 30-NOV-98**Leaksite Conditional Closure Date:****Leaksite Complete Site Closure Date:** 20-DEC-00**Contaminated Soils Remaining:** Y**Offsite Contamination:** U**Product Released:** Diesel**Project Manager:** VanPatten, Stacey

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Underground Storage Tank Information

Erickson Residence

An MPCA Leaking Underground Storage Tank Site.
ID Number: 13687

[Groundwater](#) | [Cleanup Actions](#) | [Legal Entity](#) | [Treatments](#) | [Reporting](#)

Site Address: 14610 Crosstown Blvd

City: Andover

Site Zip Code: 55304

County: Anoka

Release Discovered Date: 19-OCT-00

Release Report Date: 20-OCT-00

Leaksite Conditional Closure Date:

Leaksite Complete Site Closure Date: 13-MAY-02

Contaminated Soils Remaining: Y

Offsite Contamination: N

Product Released: Fuel Oil 1 & 2

Project Manager: [Ebertz, Jessica](#)

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Underground Storage Tank Information
Eveland Residence

An MPCA Leaking Underground Storage Tank Site.
 ID Number: 13688

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Site Address: 14722 Crosstown Blvd

City: Andover

Site Zip Code: 55304

County: Anoka

Release Discovered Date: 19-OCT-00

Release Report Date: 20-OCT-00

Leaksite Conditional Closure Date:

Leaksite Complete Site Closure Date: 31-OCT-01

Contaminated Soils Remaining: U

Offsite Contamination: N

Product Released: Gasoline Unleaded

Project Manager: McCann, Jim

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Underground Storage Tank Information**Ace Solid Waste Storage Building**

An MPCA Leaking Underground Storage Tank Site.

ID Number: 13802

Groundwater	Cleanup Actions	Legal Entity	Treatments	Reporting
-----------------------------	---------------------------------	------------------------------	----------------------------	---------------------------

Site Address: 3138 - 162ND LN NW**City:** ANDOVER**Site Zip Code:** 55304**County:** Anoka**Release Discovered Date:** 08-DEC-00**Release Report Date:** 08-DEC-00**Leaksite Conditional Closure Date:****Leaksite Complete Site Closure Date:** 17-JAN-02**Contaminated Soils Remaining:** Y**Offsite Contamination:** U**Product Released:** Fuel Oil 1 & 2**Project Manager:** VanPatten, Stacey

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 An MPCA Leaking Underground Storage Tank Site.
 ID Number: 2269
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[Groundwater](#) | [Cleanup Actions](#) | [Legal Entity](#) | [Treatments](#) | [Reporting](#)
[Hot Topics](#)[Programs](#)**Site Address:** 3118 NW 162ND LN[Publications](#)**City:** ANDOVER[About MPCA](#)**Site Zip Code:** 55304**County:** Anoka**Release Discovered****Date:****Release Report Date:** 02-FEB-90**Leaksite Conditional****Closure Date:****Leaksite Complete Site Closure Date:** 17-MAY-96**Contaminated Soils Remaining:** Y**Offsite Contamination:** Y**Product Released:** Gasoline Regular**Project Manager:** Kania, Lauralin

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An MPCA Leaking Underground Storage Tank Site.

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ID Number: 1379

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[Groundwater](#) | [Cleanup Actions](#) | [Legal Entity](#) | [Treatments](#) | [Reporting](#)
[Hot Topics](#)[Programs](#)**Site Address:** 2148 BUNKER LAKE BLVD[Publications](#)**City:** ANDOVER[About MPCA](#)**Site Zip Code:****County:** Anoka**Release Discovered****Date:****Release Report****Date:** 28-JUL-89**Leaksite Conditional****Closure Date:****Leaksite Complete****Site Closure Date:** 11-OCT-91**Contaminated Soils****Remaining:** N**Offsite****Contamination** U**Product Released:** Waste Oil**Project Manager:** [Fawcett, David](#)

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Underground Storage Tank Information

Precision Wood Prod.

An MPCA Leaking Underground Storage Tank Site.
ID Number: 14063

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Site Address: 3138 - 162ND LN NW

City: ANDOVER

Site Zip Code: 55304

County: Anoka

Release Discovered

Date:

Release Report Date: 01-JUL-00

Leaksite Conditional

Closure Date:

Leaksite Complete

Site Closure Date:

Contaminated Soils Remaining: U

Offsite Contamination: U

Product Released:

Project Manager: [Ebertz, Jessica](#)

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Appendix G
NPDES Phase II and Stormwater Pollution Prevention Plan

City of Andover

NOTE:

The annual report is due June 30, 2008.
A revised SWPPP will be submitted with the
annual report.

STORM WATER POLLUTION
PREVENTION PROGRAM
(SWPPP)

Revised: October 2006

City of Andover
1685 Crosstown Boulevard NW
Andover, Minnesota 55304
(763)755-5100





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Pollution
Control
Agency

General Stormwater Permit (MN R 040000) Application for Small Municipal Separate Storm Sewer Systems (MS4s)

RETURN THIS APPLICATION TO:

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

NO FEE

Application deadline: **June 1, 2006**

PLEASE READ: As you complete this form, read the instructions carefully. Use your keyboard's "Tab" key to move through the fields of this form. Select check-boxes and enter text as indicated. Save, and print.

I. MS4 Information

A. Application Type

- New applicant (this MS4 has no previous application for MS4 coverage on file at MPCA)
 Application for re-issuance of coverage (this MS4 applied in 2003)

B. MS4 Owner General Contact (the community, municipality, agency or other party having ownership or operation control of the MS4)

City of Andover

Community, municipality, agency or other party having ownership or operational control of the MS4

1685 Crosstown Blvd.

Mailing Address

Andover

MN

55304

City

State

Zip Code

Anoka

County

41-0983248

6138823

Federal Tax ID

State Tax ID

C. General Contact (official, staff member, consultant or other) for all general correspondence about Permit compliance issues between the MPCA and your MS4

Berkowitz

David

City

Engineer

Last Name

First Name

Title

1685 Crosstown Blvd.

Mailing Address

Andover

MN

55304

City

State

Zip Code

763-755-5100

dberkowitz@ci.andover.mn.us

Telephone (include area code)

E-mail Address

II. Certification of the Storm Water Pollution Prevention Program (SWPPP)

- A. Have you developed a Storm Water Pollution Prevention Program for your MS4? Yes
Municipalities must demonstrate how their Storm Water Pollution Prevention Program will be implemented and enforced over the term of the five-year Permit. SWPPPs must incorporate appropriate educational components, all required BMPs and the measurable goals associated with each. Storm Water Pollution Prevention Programs must address the specific requirements contained in Part V. G. of the Permit. SWPPPs must outline how the six minimum control measures will be addressed, the contact person, department in charge, timeline and measures that will be implemented to meet the schedules required by the Permit. Attach a BMP Summary Sheet to this application for *each* BMP in your SWPPP.
- B. Does your SWPPP address all of the six Minimum Control Measures as outlined in the Permit? Yes
The General Permit requires that you incorporate all six of the defined Minimum Control Measures in your Stormwater Pollution Prevention Program. You are required to implement mandatory BMPs which are directly associated to each of the Six Minimum Control Measures.
- C. Have you attached the included BMP Summary Sheets, one for each of the Best Management Practices required by the Permit? Yes
There are 34 required BMPs all of which require that the provided BMP Summary Sheet be filled out completely and included with your Storm Water Pollution Prevention Program. If any of these required sheets are missing, your application will not be considered complete and will be returned to you.

III. Reporting and Recordkeeping

- A. I have read and understand Part VI *Evaluating, Recordkeeping, and Reporting of the MS4 General Permit* and certify that we intend to comply with the applicable requirements of those sections as well as the Permit as a whole. Yes

- B. Where will your SWPPP be available to the public for review?

Andover City Hall	www.ci.andover.mn.us	
<i>Name of Location</i>	<i>If your SWPPP is available electronically, indicate location</i>	
1685 Crosstown Blvd.		
<i>Street Address</i>		
Andover	MN	55304
<i>City</i>	<i>State</i>	<i>ZIP Code</i>
Kameron Kytonen	763-755-5100	
<i>Contact Name</i>	<i>Contact Phone Number</i>	
M-F 8-4:30		
<i>Hours of Availability</i>		

IV. Limitations of Coverage

- A. Part II Limitations on Coverage and Appendix C Yes
I have read and understand Part II *Coverage Under This Permit* and Appendix C *Limitations on Coverage* of the MS4 General Permit and certify that we intend to comply with the applicable requirements of those sections as well as the Permit as a whole.
- B. Outstanding Resource Value Waters (ORVWs)
Please refer to the *Guidance Manual for Small Municipal Separate Storm Sewer Systems (MS4s)* to complete this section. An interactive map is available on the MPCA Web site that identifies Special Waters: <http://pca-gis04.pca.state.mn.us>

1. Prohibited Waters

Does the MS4 discharge into **Prohibited Waters** as defined in Minn. R. 7050.0180, subp. 3, 4, and 5? See Attachment Four of the *Guidance Manual for Small Municipal Separate Storm Sewer Systems (MS4s)* for further information.

Yes No

2. Restricted Discharge

Does the MS4 discharge into waters with a **Restricted Discharge** as defined in Minn. R. 7050.0180, subp. 6, 6a, and 6b? If yes, please list below and comply with Part IX, Appendix C, Item B. See Attachment Four of the *Guidance Manual for Small Municipal Separate Storm Sewer Systems (MS4s)* for further information.

Yes No

3. Prohibited or Restricted Waters

If you answered "yes" to either Question 1 or 2, have you included a map that outlines, at a minimum, the DNR minor sub-watersheds in your jurisdiction with ANY discharges to Prohibited or Restricted Waters? You are required by the Permit to provide this map along with your application. [IX.B.2.b]

Yes No

Identify all discharges to Outstanding Resource Value Waters (ORVWs) from your MS4:

Name of Water Body	Type (lake, stream, river)
Rum River	river

4. If you answered "yes" to either Question 1 or 2, who is the person responsible for ensuring compliance with this Permit condition?

Name: David Berkowitz Position: City Engineer Phone: 763-755-5100

C. Special Waters

1. Trout Waters

Does the MS4 discharge into **Trout Waters** as defined in Minn. R. 6264.0050 subp. 2 & 4? If yes, please list below and comply with Part IX, Appendix C, Item C. See Attachments Two and Three of the *Guidance Manual for Small Municipal Separate Storm Sewer Systems (MS4s)* for further information.

Yes No

2. Wetlands

Does the MS4 discharge into **Wetlands** as defined in Minn. R. 7050.0130, subp. F?

Yes No

3. Environmental Review

Does the MS4 have a process to assure coordination with appropriate Agencies and to evaluate discharges that require applicable **Environmental Review** as required by State or federal laws? See Part IX of the *Guidance Manual for Small Municipal Separate Storm Sewer Systems (MS4s)* for further information.

Yes No

Who is the person responsible for ensuring compliance with this Permit condition?

Name: David Berkowitz Position: City Engineer Phone: 763-755-5100

4. Endangered or Threatened Species

Does the MS4 have a process to assure coordination with appropriate Agencies and to evaluate discharges whose direct, indirect, interrelated, interconnected, or independent impacts may jeopardize a listed **Endangered or Threatened Species** or adversely modify a designated critical habitat? See Part IX of the *Guidance Manual for Small Municipal Separate Storm Sewer Systems (MS4s)* for further information.

Yes No

Who is the person responsible for ensuring compliance with this Permit condition?

Name: David Berkowitz Position: City Engineer Phone: 763-755-5100

5. Historic Places and Archeological Sites

Does the MS4 have a process to assure coordination with appropriate Agencies and to evaluate discharges which may adversely affect properties listed or eligible for listing in the National Register of Historic Places or affecting known or discovered archeological sites? See Part IX of the *Guidance Manual for Small Municipal Separate Storm Sewer Systems (MS4s)* for further information.

Yes No

Who is the person responsible for ensuring compliance with this Permit condition?

Name: David Berkowitz Position: City Engineer Phone: 763-755-5100

6. Drinking Water Sources

Does the MS4 have any discharges that may affect Source Water Protection as defined in part IX.H of the General Permit?

Yes No

If "yes," does the MS4 have BMPs incorporated into the SWPPP to protect drinking water sources that the MS4 discharge may affect?

Yes No

V. Owner or Operator Certification

The person with overall, MS4 legal responsibility must sign the application. This person shall be duly authorized to sign the application and may be either a principal executive officer or ranking elected official. (see Minn. R. 7001.0060).

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons, who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete (Minn. R. 7001.0070).

I also certify under penalty of law that I have read, understood, and accepted all terms and conditions of the National Pollutant Discharge Elimination System (NPDES) General Storm Water Permit for MS4s that authorizes storm water discharges identified in this application form.

I understand that as a Permittee, I am legally accountable under the Clean Water Act to ensure compliance with the terms and conditions of the NPDES General Storm Water Permit for MS4s.

I also understand that MPCA enforcement actions (pursuant to Minn. Stat. §115.07, 116.072, and Section 309 of the Clean Water Act) may be taken against me or the MS4 if the terms and conditions of the NPDES General Storm Water Permit for MS4s are not met.

C. General Contact (official, staff member, consultant or other) for all general correspondence about Permit compliance issues between the MPCA and your MS4

X *David D. Berkowitz*
Authorized Signature

6/1/06
Date

Berkowitz
Last Name

David
First Name

City Engineer
Title

1685 Crosstown Blvd.
Mailing Address

Andover
City

MN
State

55304
ZIP Code

763-755-5100
Telephone (include area code)

dberkowitz@ci.andover.mn.us
E-mail Address

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 1-PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1a-1

***BMP Title:** Distribute Educational Materials

***BMP Description:**

See "BMP Description" on pages 5 and 6 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on pages 5 and 6 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on pages 5 and 6 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Kameron Kytönen

Department: Engineering

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1b-1

***BMP Title:** Implement an Education Program

***BMP Description:**

See "BMP Description" on pages 5 through 14 and 43 through 45 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on pages 5 through 14 and 43 through 45 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on pages 5 through 14 and 43 through 45 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Kameron Kytönen

Department: Engineering

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1c-1

***BMP Title:** Education Program: Public Education and Outreach

***Audience(s) Involved:**

See "BMP Description" on pages 5 through 14 and 43 through 45 of the City of Andover Storm Water Pollution Prevention Program.

***Educational Goals for Each Audience:**

See "BMP Description" and "Measurable Goals" on pages 5 through 14 and 43 through 45 of the City of Andover Storm Water Pollution Prevention Program.

***Activities Used to Reach Educational Goals:**

See "BMP Description" and "Specific Components and Notes" on pages 5 through 14 and 43 through 45 of the City of Andover Storm Water Pollution Prevention Program.

***Activity Implementation Plan:**

See "BMP Description" and "Timeline/Implementation Schedule" on pages 5 through 14 and 43 through 45 of the City of Andover Storm Water Pollution Prevention Program.

***Performance Measures:**

See "BMP Description" and "Measurable Goals" on pages 5 through 14 and 43 through 45 of the City of Andover Storm Water Pollution Prevention Program.

***Responsible Party for this BMP:**

Name: Kameron Kytonen

Department: Engineering

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1c-2

***BMP Title:** Education Program: Public Participation

***Audience(s) Involved:**

See "BMP Description" on pages 5 through 16 of the City of Andover Storm Water Pollution Prevention Program.

***Educational Goals for Each Audience:**

See "BMP Description" and "Measurable Goals" on pages 5 through 16 of the City of Andover Storm Water Pollution Prevention Program.

***Activities Used to Reach Educational Goals:**

See "BMP Description" and "Specific Components and Notes" on pages 5 through 16 of the City of Andover Storm Water Pollution Prevention Program.

***Activity Implementation Plan:**

See "BMP Description" and "Timeline/Implementation Schedule" on pages 5 through 16 of the City of Andover Storm Water Pollution Prevention Program.

***Performance Measures:**

See "BMP Description" and "Measurable Goals" on pages 5 through 16 of the City of Andover Storm Water Pollution Prevention Program.

***Responsible Party for this BMP:**

Name: Kameron Kytonen

Department: Engineering

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1c-3

***BMP Title:** Education Program: Illicit Discharge Detection and Elimination

***Audience(s) Involved:**

See "BMP Description" on pages 5 through 14 and 43-45 of the City of Andover Storm Water Pollution Prevention Program.

***Educational Goals for Each Audience:**

See "BMP Description" and "Measurable Goals" on pages 5 through 14 and 43-45 of the City of Andover Storm Water Pollution Prevention Program.

***Activities Used to Reach Educational Goals:**

See "BMP Description" and "Specific Components and Notes" on pages 5 through 14 and 43-45 of the City of Andover Storm Water Pollution Prevention Program.

***Activity Implementation Plan:**

See "BMP Description" and "Timeline/Implementation Schedule" on pages 5 through 14 and 43-45 of the City of Andover Storm Water Pollution Prevention Program.

***Performance Measures:**

See "BMP Description" and "Measurable Goals" on pages 5 through 14 and 43-45 of the City of Andover Storm Water Pollution Prevention Program.

***Responsible Party for this BMP:**

Name: Kameron Kytonen

Department: Engineering

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

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BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1c-4

***BMP Title:** Education Program: Construction Site Run-off Control

***Audience(s) Involved:**

See "BMP Description" on pages 5 and 11 of the City of Andover Storm Water Pollution Prevention Program.

***Educational Goals for Each Audience:**

See "BMP Description" "Measurable Goals" on pages 5 and 11 of the City of Andover Storm Water Pollution Prevention Program.

***Activities Used to Reach Educational Goals:**

See "BMP Description" and "Specific Components and Notes" on pages 5 and 11 of the City of Andover Storm Water Pollution Prevention Program.

***Activity Implementation Plan:**

See "BMP Description" and "Timeline/Implementation Schedule" on pages 5 and 11 of the City of Andover Storm Water Pollution Prevention Program.

***Performance Measures:**

See "BMP Description" and "Measurable Goals" on pages 5 and 11 of the City of Andover Storm Water Pollution Prevention Program.

***Responsible Party for this BMP:**

Name: Kameron Kytonen

Department: Engineering

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

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BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1c-5

***BMP Title:** Education Program: Post-Construction Stormwater Management in New Development and Redevelopment

***Audience(s) Involved:**

See "BMP Description" on pages 5, 12 and 16 of the City of Andover Storm Water Pollution Prevention Program.

***Educational Goals for Each Audience:**

See "BMP Description" and "Measurable Goals" on pages 5, 12 and 16 of the City of Andover Storm Water Pollution Prevention Program.

***Activities Used to Reach Educational Goals:**

See "BMP Description" and "Specific Components and Notes" on pages 5, 12 and 16 of the City of Andover Storm Water Pollution Prevention Program.

***Activity Implementation Plan:**

See "BMP Description" and "Timeline/Implementation Schedule" on pages 5, 12 and 16 of the City of Andover Storm Water Pollution Prevention Program.

***Performance Measures:**

See "BMP Description" and "Measurable Goals" on pages 5, 12 and 16 of the City of Andover Storm Water Pollution Prevention Program.

***Responsible Party for this BMP:**

Name: Kameron Kytonen

Department: Engineering

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

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BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1c-6

***BMP Title:** Education Program: Pollution Prevention/Good Housekeeping for Municipal Operations

***Audience(s) Involved:**

See "BMP Description" on pages 5 and 43-45 of the City of Andover Storm Water Pollution Prevention Program.

***Educational Goals for Each Audience:**

See "BMP Description" and "Measurable Goals" on pages 5 and 43-45 of the City of Andover Storm Water Pollution Prevention Program.

***Activities Used to Reach Educational Goals:**

See "BMP Description" and "Specific Components and Notes" on pages 5 and 43-45 of the City of Andover Storm Water Pollution Prevention Program.

***Activity Implementation Plan:**

See "BMP Description" and "Timeline/Implementation Schedule" on pages 5 and 43-45 of the City of Andover Storm Water Pollution Prevention Program.

***Performance Measures:**

See "BMP Description" and "Measurable Goals" on pages 5 and 43-45 of the City of Andover Storm Water Pollution Prevention Program.

***Responsible Party for this BMP:**

Name: Kameron Kytönen

Department: Engineering

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1d-1

***BMP Title:** Coordination of Education Program

***BMP Description:**

See "BMP Description" on page 14 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on page 14 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on page 14 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Kameron Kytonen

Department: Engineering

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1e-1

***BMP Title:** Annual Public Meeting

***BMP Description:**

See "BMP Description" on pages 15 and 16 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on pages 15 and 16 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on pages 15 and 16 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Kameron Kytonen

Department: Engineering

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 2-PUBLIC PARTICIPATION/INVOLVEMENT

Unique BMP Identification Number: 2a-1

***BMP Title:** Comply with Public Notice Requirements

***BMP Description:**

See "BMP Description" and "Specific Components and Notes" on pages 15 and 16 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on pages 15 and 16 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on pages 15 and 16 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Kameron Kytonen

Department: Engineering

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 2-PUBLIC PARTICIPATION/INVOLVEMENT

Unique BMP Identification Number: 2b-1

***BMP Title:** Solicit Public Input and opinion on the Adequacy of the SWPPP

***BMP Description:**

See "BMP Description" and "Specific Components and Notes" on pages 15 and 16 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on pages 15 and 16 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on pages 15 and 16 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Kameron Kytönen

Department: Engineering

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 2-PUBLIC PARTICIPATION/INVOLVEMENT

Unique BMP Identification Number: 2c-1

***BMP Title:** Consider Public Input

***BMP Description:**

See "BMP Description" and "Specific Components and Notes" on pages 15 and 16 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on pages 15 and 16 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on pages 15 and 16 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Kameron Kytonen

Department: Engineering

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 3-ILLICIT DISCHARGE DETECTION AND ELIMINATION

Unique BMP Identification Number: 3a-1

<p>*BMP Title: Storm Sewer System Map</p>
<p>*BMP Description: See "BMP Description" on page 22 of the City of Andover Storm Water Pollution Prevention Program.</p> <p>Location(s) in SWPPP of detailed information relating to this BMP:</p>
<p>*Measurable Goals: See "Measurable Goals" on page 22 of the City of Andover Storm Water Pollution Prevention Program.</p>
<p>*Timeline/Implementation Schedule: See "Timeline/Implementation Schedule" on page 22 of the City of Andover Storm Water Pollution Prevention Program.</p>
<p>Specific Components and Notes:</p>
<p>*Responsible Party for this BMP: Name: David Berkowitz Department: Engineering Phone: 763-755-5100 E-mail: dberkowitz@ci.andover.mn.us</p>

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 3-ILLCIT DISCHARGE DETECTION AND
ELIMINATION

Unique BMP Identification Number: 3b-1

<p>*BMP Title: Regulatory Control Program</p>
<p>*BMP Description: See "BMP Description" on page 23 of the City of Andover Storm Water Pollution Prevention Program.</p> <p>Location(s) in SWPPP of detailed information relating to this BMP:</p>
<p>*Measurable Goals: See "Measurable Goals" on page 23 of the City of Andover Storm Water Pollution Prevention Program.</p>
<p>*Timeline/Implementation Schedule: See "Timeline/Implementation Schedule" on page 23 of the City of Andover Storm Water Pollution Prevention Program.</p>
<p>Specific Components and Notes:</p>
<p>*Responsible Party for this BMP: Name: Kameron Kytonen Department: Engineering Phone: 763-755-5100 E-mail: kkytonen@ci.andover.mn.us</p>

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 3-ILLCIT DISCHARGE DETECTION AND
ELIMINATION

Unique BMP Identification Number: 3c-1

***BMP Title:** Illicit Discharge Detection and Elimination Plan

***BMP Description:**

See "BMP Description" on pages 23 through 26 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on pages 23 through 26 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on pages 23 through 26 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Kameron Kytonen

Department: Engineering

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 3-ILLCIT DISCHARGE DETECTION AND
ELIMINATION

Unique BMP Identification Number: 3d-1

***BMP Title:** Public and Employee Illicit Discharge Information Program

***BMP Description:**

See "BMP Description" on pages 1 and 17 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on pages 1 and 17 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on pages 1 and 17 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Kameron Kytonen

Department: Engineering

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 3-ILLICIT DISCHARGE DETECTION AND
ELIMINATION

Unique BMP Identification Number: 3e-1

***BMP Title:** Identification of Non Stormwater Discharges and Flows

***BMP Description:**

See "BMP Description" on pages 17, 25, 26, 33, 34, 45, 47 and 49 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on pages 17, 25, 26, 33, 34, 45, 47 and 49 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on pages 17, 25, 26, 33, 34, 45, 47 and 49 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Kameron Kytonen

Department: Engineering

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 4-CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Unique BMP Identification Number: 4a-1

***BMP Title:** Ordinance or other Regulatory Mechanism

***BMP Description:**

See "BMP Description" on pages 27, 30 and 31 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on pages 27, 30 and 31 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on pages 27, 30 and 31 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Kameron Kytonen

Department: Engineering

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 4-CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Unique BMP Identification Number: 4b-1

***BMP Title:** Construction Site Implementation of Erosion and Sediment Control BMPs

***BMP Description:**

See "BMP Description" on pages 10,11, 17, 23, 27 and 32 through 34, of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on pages 10,11, 17, 23, 27 and 32 through 34, of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on pages 10,11, 17, 23, 27 and 32 through 34, of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Kameron Kytonen

Department: Engineering

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 4-CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Unique BMP Identification Number: 4c-1

***BMP Title:** Waste Controls for Construction Site Operators

***BMP Description:**

See "BMP Description" on pages 27 and 32 through 34 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on pages 27 and 32 through 34 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on pages 27 and 32 through 34 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: David Berkowitz

Department: Engineering

Phone: 763-755-5100

E-mail: dberkowitz@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 4-CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Unique BMP Identification Number: 4d-1

***BMP Title:** Procedure for Site Plan Review

***BMP Description:**

See "BMP Description" on page 30 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on page 30 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on page 30 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: David Berkowitz

Department: Engineering

Phone: 763-755-5100

E-mail: dberkowitz@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 4-CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Unique BMP Identification Number: 4e-1

<p>*BMP Title: Establishment of Procedures for the Receipt and Consideration of Reports of Stormwater Noncompliance</p>
<p>*BMP Description: See "BMP Description" on pages 17, 27, and 32 through 34 of the City of Andover Storm Water Pollution Prevention Program.</p> <p>Location(s) in SWPPP of detailed information relating to this BMP:</p>
<p>*Measurable Goals: See "Measurable Goals" on pages 17, 27, and 32 through 34 of the City of Andover Storm Water Pollution Prevention Program.</p>
<p>*Timeline/Implementation Schedule: See "Timeline/Implementations Schedule" on pages 17, 27, and 32 through 34 of the City of Andover Storm Water Pollution Prevention Program.</p>
<p>Specific Components and Notes:</p>
<p>*Responsible Party for this BMP: Name: Kameron Kytonen Department: Engineering Phone: 763-755-5100 E-mail: kkytonen@ci.andover.mn.us</p>

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 4-CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Unique BMP Identification Number: 4f-1

***BMP Title:** Establishment of Procedures for Site Inspections and Enforcement

***BMP Description:**

See "BMP Description" on pages 32 through 34 and 40 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on pages 32 through 34 and 40 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on pages 32 through 34 and 40 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Kameron Kytonen

Department: Engineering

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 5-POST-CONSTRUCTION STORMWATER MANAGEMENT IN
NEW DEVELOPMENT AND REDEVELOPMENT

Unique BMP Identification Number: 5a-1

***BMP Title:** Development and Implementation of Structural and/or Non-structural BMPs

***BMP Description:**

See "BMP Description" on pages 36, 37, 40 and 41 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on pages 36, 37, 40 and 41 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementations Schedule" on pages 36, 37, 40 and 41 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: David Berkowitz

Department: Engineering

Phone: 763-755-5100

E-mail: dberkowitz@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 5-POST-CONSTRUCTION STORMWATER MANAGEMENT IN
NEW DEVELOPMENT AND REDEVELOPMENT

Unique BMP Identification Number: 5b-1

***BMP Title:** Regulatory Mechanism to Address Post Construction Runoff from New Development and Redevelopment

***BMP Description:**

See "BMP Description" on pages 27, 36, 37, 38, 40 and 41 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on pages 27, 36, 37, 38, 40 and 41 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on pages 27, 36, 37, 38, 40 and 41 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: David Berkowitz

Department: Engineering

Phone: 763-755-5100

E-mail: dberkowitz@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 5-POST-CONSTRUCTION STORMWATER MANAGEMENT IN
NEW DEVELOPMENT AND REDEVELOPMENT

Unique BMP Identification Number: 5c-1

***BMP Title:** Long-term Operation and Maintenance of BMPs

***BMP Description:**

See "BMP Description" on pages 25, 36, 37, 40 and 41 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on pages 25, 36, 37, 40 and 41 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on pages 25, 36, 37, 40 and 41 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: David Berkowitz

Department: Engineering

Phone: 763-755-5100

E-mail: dberkowitz@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6a-1

***BMP Title:** Municipal Operations and Maintenance Program

***BMP Description:**

See "BMP Description" on pages 42 through 49 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on pages 42 through 49 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on pages 42 through 49 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Frank Stone

Department: Public Works

Phone: 763-755-8118

E-mail: fstone@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6a-2

***BMP Title:** Street Sweeping**

***BMP Description:**

See "BMP Description" on page 46 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on page 46 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on page 46 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Irwin Russell

Department: Public Works

Phone: 763-755-8118

E-mail: irussell@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6b-2

***BMP Title:** Annual Inspection of All Structural Pollution Control Devices

***BMP Description:**

See "BMP Description" on page 49 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on page 49 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on page 49 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Brian Kraabel

Department: Public Works

Phone: 763-755-8118

E-mail: bkraabel@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6b-3

***BMP Title:** Inspection of a Minimum of 20 percent of the MS4 Outfalls, Sediment Basins and Ponds Each Year on a Rotating Basis

***BMP Description:**

See "BMP Description" on page 49 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on page 49 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on page 49 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Brian Kraabel

Department: Public Works

Phone: 763-755-8118

E-mail: bkraabel@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6b-4

***BMP Title:** Annual Inspection of All Exposed Stockpile, Storage and Material Handling Areas

***BMP Description:**

See "BMP Description" on page 49 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on page 49 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on page 49 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Brian Kraabel

Department: Public Works

Phone: 763-755-8118

E-mail: bkraabel@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6b-5

***BMP Title:** Inspection Follow-up Including the Determination of Whether Repair, Replacement, or Maintenance Measures are Necessary and the Implementation of the Corrective Measures

***BMP Description:**

See "BMP Description" on pages 46, 47 and 49 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on pages 46, 47 and 49 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on pages 46, 47 and 49 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Brian Kraabel

Department: Public Works

Phone: 763-755-8118

E-mail: bkraabel@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6b-6

***BMP Title:** Record Reporting and Retention of All Inspections and Responses to the Inspections

***BMP Description:**

See "BMP Description" on page 49 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on page 49 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on page 49 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Brian Kraabel

Department: Public Works

Phone: 763-755-8118

E-mail: bkraabel@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: Andover

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6b-7

***BMP Title:** Evaluation of Inspection Frequency

***BMP Description:**

See "BMP Description" on page 49 of the City of Andover Storm Water Pollution Prevention Program.

Location(s) in SWPPP of detailed information relating to this BMP:

***Measurable Goals:**

See "Measurable Goals" on page 49 of the City of Andover Storm Water Pollution Prevention Program.

***Timeline/Implementation Schedule:**

See "Timeline/Implementation Schedule" on page 49 of the City of Andover Storm Water Pollution Prevention Program.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Brian Kraabel

Department: Public Works

Phone: 763-755-8118

E-mail: bkraabel@ci.andover.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

**City of Andover SWPPP
Minimum Control Measure (MCM) Summary**

The following is a summary of the BMP's chosen by the City of Andover. Each BMP is categorized into one or more Minimum Control Measures to meet the Maximum Extent Practicable standard set forth in the permit requirements. Where a BMP addresses more than one MCM, it is listed under every appropriate MCM.

Public Education and Outreach

1b-1, 1c-1 through 1c-6	Storm Water Education Program/Implement an Education Program, Education Program: Public Education and Outreach, Public Participation, Illicit Discharge Detection and Elimination, Construction Site Runoff Control, Post-Construction Storm Water Management in New Development and Redevelopment, Pollution Prevention/Good Housekeeping for Municipal Operations
1a-1	Storm Water Update Newsletter Articles/Distribute Educational Materials
1.A.2	Local Cable Channel Announcements
1.A.3	Storm Water Information Website
1.A.4	Presentation to School Classrooms
1.A.5	Natural Resources-Related Inspections
1.A.6	Pre-construction Meetings for New Developments
1.A.7	Presentation to City Council
1.A.8	Presentation to City Staff
1d-1	Coordination of Education Program
2a-1, 2b-1, 2c-1	Comply With Public Notice Requirements/Solicit Public Input and Opinion on the Adequacy of the SWPPP/Consider Public Input
2.B, 1e-1	Annual Public Meeting
2.C, 3d-1, 3e-1	Non-compliance Complaints and Reports/Public and Employee Illicit Discharge Elimination Program/Identification of Non-Storm Water Discharges and Flows
2.D	Adopt-A-Street
2.E	Adopt-A-Pond
2.F	City of Andover/4H Public Service Announcements (PSA's)
2.G	Watershed Organization
3b-1, 3c-1	Illicit Discharge, Detection and Enforcement Ordinance/Regulatory Control Program/Illicit Discharge, Detection and Elimination Plan
4a-1, 4b-1	Construction Site Erosion and Waste Control Ordinance or Other Regulatory Mechanism/Construction Site Implementation of Erosion and Sediment Control BMP's
6.A.1	Park and Open Space Fertilizer/Chemical Application Licensing Program
6a-1	Municipal Operations and Maintenance Program
6.A.3	Storm Water System Maintenance Training Program

Public Participation and Involvement

1b-1, 1c-1 through 1c-6	Storm Water Education Program/Implement an Education Program, Education Program: Public Education and Outreach, Public Participation, Illicit Discharge Detection and Elimination, Construction Site Runoff Control, Post-Construction Storm Water Management in New Development and Redevelopment, Pollution Prevention/Good Housekeeping for Municipal Operations
1a-1	Storm Water Update Newsletter Articles/Distribute Educational Materials
1.A.2	Local Cable Channel Announcements
1.A.3	Storm Water Information Website
1.A.4	Presentation to School Classrooms
1.A.5	Natural Resources-Related Inspections
1.A.6	Pre-construction Meetings for New Developments
1.A.7	Presentation to City Council
1.A.8	Presentation to City Staff
1d-1	Coordination of Education Program
2a-1, 2b-1, 2c-1	Comply With Public Notice Requirements/Solicit Public Input and Opinion on the Adequacy of the SWPPP/Consider Public Input
2.B, 1e-1	Annual Public Meeting
2.C, 3d-1, 3e-1	Non-compliance Complaints and Reports/Public and Employee Illicit Discharge Elimination Program/Identification of Non-Storm Water Discharges and Flows
2.D	Adopt-A-Street
2.E	Adopt-A-Pond
2.F	City of Andover/4H Public Service Announcements (PSA's)
2.G	Watershed Organization
6.A.1	Park and Open Space Fertilizer/Chemical Application Licensing Program

Illicit Discharge Detection and Elimination

1b-1, 1c-1 through 1c-6	Storm Water Education Program/Implement an Education Program, Education Program: Public Education and Outreach, Public Participation, Illicit Discharge Detection and Elimination, Construction Site Runoff Control, Post-Construction Storm Water Management in New Development and Redevelopment, Pollution Prevention/Good Housekeeping for Municipal Operations
1a-1	Storm Water Update Newsletter Articles/Distribute Educational Materials
1.A.2	Local Cable Channel Announcements
1.A.3	Storm Water Information Website
1.A.4	Presentation to School Classrooms
1.A.5	Natural Resources-Related Inspections
1.A.6	Pre-construction Meetings for New Developments
1.A.7	Presentation to City Council
1.A.8	Presentation to City Staff
1.A.8	Presentation to City Staff
1d-1	Coordination of Education Program
2.C, 3d-1, 3e-1	Non-compliance Complaints and Reports/Public and Employee Illicit Discharge Elimination Program/Identification of Non-Storm Water Discharges and Flows
2.D	Adopt-A-Street
2.E	Adopt-A-Pond
2.F	City of Andover/4H Public Service Announcements (PSA's)
2.G	Watershed Organization
3a-1	Storm Water System Map
3b-1, 3c-1	Illicit Discharge, Detection and Enforcement Ordinance/Regulatory Control Program/Illicit Discharge, Detection and Elimination Plan
3.C.1	Post Construction Septic System Maintenance
3.C.2	Conducting Camera Tests
3.C.3	Sanitary Sewer Maintenance
4c-1	Waste Controls for Construction Site Operators
4.C.3	Building Inspections
4e-1, 4f-1	Establishment of Procedures for the Receipt and Consideration of Reports of Storm Water Noncompliance/Establishment of Procedures for Site Inspections and Enforcement
6.A.1	Park and Open Space Fertilizer/Chemical Application Licensing Program
6a-1	Municipal Operations and Maintenance Program
6.A.3	Storm Water System Maintenance Training Program
6.A.4	Automobile Maintenance Program
6a-2	Parking Lot and Street Cleaning
6.B.2	Storm Drain System Cleaning
6.B.3	Road Salt Materials Management Program
6b-2 through 6b-7	Inspection of All Structural Pollution Control Devices/Inspection of a Minimum of 20% of Outfalls, Sediment Basins and Ponds Each Year on a Rotating Basis/Annual Inspection of All Exposed Stockpile, Storage and Material Handling Areas/Inspection Follow-Up/Record Recording and Retention of All Inspections and Responses to the Inspections/Evaluation of Inspections Frequency
6.C.1	Wellhead Protection Plan
6.C.2	Nondegradation for Selected MS4s

Construction Site Storm Water Runoff Control

1b-1, 1c-1 through 1c-6	Storm Water Education Program/Implement an Education Program, Education Program: Public Education and Outreach, Public Participation, Illicit Discharge Detection and Elimination, Construction Site Runoff Control, Post-Construction Storm Water Management in New Development and Redevelopment, Pollution Prevention/Good Housekeeping for Municipal Operations
1a-1	Storm Water Update Newsletter Articles/Distribute Educational Materials
1.A.2	Local Cable Channel Announcements
1.A.3	Storm Water Information Website
1.A.6	Pre-construction Meetings for New Developments
2.C, 3d-1, 3e-1	Non-compliance Complaints and Reports/Public and Employee Illicit Discharge Elimination Program/Identification of Non-Storm Water Discharges and Flows
2.G	Watershed Organization
4a-1, 4b-1	Construction Site Erosion and Waste Control Ordinance or Other Regulatory Mechanism/Construction Site Implementation of Erosion and Sediment Control BMP's
4.A.1	Floodplain Regulation
4.A.2	Shoreland Protection
4d-1	Procedure for Site Plan Review
4.C.1	Construction Site Entrance Criteria
4c-1	Waste Controls for Construction Site Operators
4.C.3	Building Inspections
4e-1, 4f-1	Establishment of Procedures for the Receipt and Consideration of Reports of Storm Water Noncompliance/Establishment of Procedures for Site Inspections and Enforcement
5.A	Development and Re-Development Plan Review Program
5.B	Storm Water Ponds
5a-1	Development and Implementation of Structural and/or Non-structural BMP's
5.E	Buffer Strip Ordinance
5.F	Stabilization Sodding or Seeding

Post-Construction Storm Water Management

1b-1, 1c-1 through 1c-6	Storm Water Education Program/Implement an Education Program, Education Program: Public Education and Outreach, Public Participation, Illicit Discharge Detection and Elimination, Construction Site Runoff Control, Post-Construction Storm Water Management in New Development and Redevelopment, Pollution Prevention/Good Housekeeping for Municipal Operations
1a-1	Storm Water Update Newsletter Articles/Distribute Educational Materials
1.A.2	Local Cable Channel Announcements
1.A.3	Storm Water Information Website
1.A.4	Presentation to School Classrooms
1.A.5	Natural Resources-Related Inspections
1.A.6	Pre-construction Meetings for New Developments
1d-1	Coordination of Education Program
2.C, 3d-1, 3e-1	Non-compliance Complaints and Reports/Public and Employee Illicit Discharge Elimination Program/Identification of Non-Storm Water Discharges and Flows
3b-1, 3c-1	Illicit Discharge, Detection and Enforcement Ordinance/Regulatory Control Program/Illicit Discharge, Detection and Elimination Plan
4a-1, 4b-1	Construction Site Erosion and Waste Control Ordinance or Other Regulatory Mechanism/Construction Site Implementation of Erosion and Sediment Control BMP's
4.A.1	Floodplain Regulation
4.A.2	Shoreland Protection
5.A	Development and Re-Development Plan Review Program
5.B	Storm Water Ponds
5a-1	Development and Implementation of Structural and/or Non-structural BMP's
5.D	Water Resource Management Plan
5.E	Buffer Strip Ordinance
5.F	Stabilization Sodding or Seeding
5b-1, 5c-1	Regulatory Mechanism to Address Post Construction Runoff from New Development and Redevelopment/Long-term Operation and Maintenance of BMP's

Municipal Pollution Prevention/Good Housekeeping

1b-1, 1c-1 through 1c-6	Storm Water Education Program/Implement an Education Program, Education Program: Public Education and Outreach, Public Participation, Illicit Discharge Detection and Elimination, Construction Site Runoff Control, Post-Construction Storm Water Management in New Development and Redevelopment, Pollution Prevention/Good Housekeeping for Municipal Operations
1a-1	Storm Water Update Newsletter Articles/Distribute Educational Materials
1.A.2	Local Cable Channel Announcements
1.A.3	Storm Water Information Website
1d-1	Coordination of Education Program
2.C, 3d-1, 3e-1	Non-compliance Complaints and Reports/Public and Employee Illicit Discharge Elimination Program/Identification of Non-Storm Water Discharges and Flows
2.G	Watershed Organization
3a-1	Storm Water System Map
3.C.2	Conducting Camera Tests
3.C.3	Sanitary Sewer Maintenance
6.A.1	Park and Open Space Fertilizer/Chemical Application Licensing Program
6a-1	Municipal Operations and Maintenance Program
6.A.3	Storm Water System Maintenance Training Program
6.A.4	Automobile Maintenance Program
6a-2	Parking Lot and Street Cleaning
6.B.2	Storm Drain System Cleaning
6.B.3	Road Salt Materials Management Program
6b-2 through 6b-7	Inspection of All Structural Pollution Control Devices/Inspection of a Minimum of 20% of Outfalls, Sediment Basins and Ponds Each Year on a Rotating Basis/Annual Inspection of All Exposed Stockpile, Storage and Material Handling Areas/Inspection Follow-Up/Record Recording and Retention of All Inspections and Responses to the Inspections/Evaluation of Inspections Frequency
6.C.1	Wellhead Protection Plan
6.C.2	Nondegradation for Selected MS4s

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 1b-1, 1c-1 through 1c-6

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/> Public education & outreach	<input checked="" type="checkbox"/> Construction site runoff controls
<input checked="" type="checkbox"/> Public participation & involvement	<input checked="" type="checkbox"/> Post-construction stormwater management
<input checked="" type="checkbox"/> Illicit discharge detection & elimination	<input checked="" type="checkbox"/> Pollution prevention/Good housekeeping

BMP Title:

Storm Water Education Program/Implement an Education Program, Education Program: Public Education and Outreach, Public Participation, Illicit Discharge Detection and Elimination, Construction Site Runoff Control, Post-Construction Storm Water Management in New Development and Redevelopment, Pollution Prevention/Good Housekeeping for Municipal Operations

BMP Description:

The City of Andover has and will continue to facilitate an education program that is aimed at educating residents, businesses, contractors and City staff and officials about various storm water quality topics including hazards associated with illegal discharges and improper disposal of waste through a combination of but not limited to newsletter articles, announcements, presentations, meetings and during property evaluations. These are covered in more detail in other bmp's. The goal is to improve all audiences' behavior to protect the quality and integrity of our water bodies.

Measurable Goals:

- Number of people reached
- Number of people attending meetings and presentations
- Number of inspections done
- Increased awareness, appreciation and behavior toward our natural resources

Timeline / Implementation Schedule:

- On-going
- More information in other bmp's

Specific Components & Notes (optional):

- Newsletter articles
- Presentation to City staff and council
- Local cable channel announcements
- Pre-construction meetings
- Natural resources-related inspections
- Automobile maintenance and training program

Responsible Person for this BMP

Name: Kameron Kytönen
 Title: Natural Resources Technician
 Phone: 763-755-5100
 E-mail: kkytonen@ci.andover.mn.us

Responsible Department or Organization

Dept. or Org.: Engineering
 Dept. Head: David Berkowitz
 Phone: 763-755-5100
 E-mail: dberkowitz@ci.andover.mn.us

Educational components related to this BMP (description or number – optional):

- The audience or audiences involved: See "Description"
- Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior: See "Description"
- Activities used to reach educational goals for each audience: See "Specific Components"
- Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules: See "Responsible Person", "Responsible Department" and "Timeline"
- Available performance measures that can be used to determine success in reaching education goals: See "Measurable Goals"

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 1.A.1

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/> Public education & outreach	<input checked="" type="checkbox"/> Construction site runoff controls
<input checked="" type="checkbox"/> Public participation & involvement	<input checked="" type="checkbox"/> Post-construction stormwater management
<input checked="" type="checkbox"/> Illicit discharge detection & elimination	<input checked="" type="checkbox"/> Pollution prevention/Good housekeeping

BMP Title: Storm Water Update Newsletter Articles/Distribute Educational Materials	
BMP Description: The City of Andover has and will continue to include articles in the City newsletter to update residents and businesses on a quarterly basis. It will explain storm water related issues including, but not limited to, those listed within the specific components below.	
<u>Measurable Goals:</u> <ul style="list-style-type: none"> Number of newsletter articles Number of households reached 	<u>Timeline / Implementation Schedule:</u> <ul style="list-style-type: none"> On-going
<u>Specific Components & Notes (optional):</u> <ul style="list-style-type: none"> Environmentally friendly lawn care practices Native plantings Sweeping up grass clippings, leaves, etc. Public meetings and presentations Public awareness and changes to the SWPPP 	
<u>Responsible Person for this BMP</u>	<u>Responsible Department or Organization</u>
Name: Kameron Kytonen	Dept. or Org.: Engineering
Title: Natural Resources Technician	Dept. Head: David Berkowitz
Phone: 763-755-5100	Phone: 763-755-5100
E-mail: kkytonen@ci.andover.mn.us	E-mail: dberkowitz@ci.andover.mn.us
<u>Educational components related to this BMP (description or number – optional):</u> <ul style="list-style-type: none"> <u>The audience or audiences involved:</u> See "Description" <u>Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior:</u> See "Description" <u>Activities used to reach educational goals for each audience:</u> See "Specific Components" <u>Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules:</u> See "Responsible Person", Responsible Department" and "Timeline" <u>Available performance measures that can be used to determine success in reaching education goals:</u> See "Measurable Goals" 	

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 1.A.2

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/> Public education & outreach	<input checked="" type="checkbox"/> Construction site runoff controls
<input checked="" type="checkbox"/> Public participation & involvement	<input checked="" type="checkbox"/> Post-construction stormwater management
<input checked="" type="checkbox"/> Illicit discharge detection & elimination	<input checked="" type="checkbox"/> Pollution prevention/Good housekeeping

BMP Title:
Local Cable Channel Announcements

BMP Description:
The City of Andover has and will continue to work with the local cable channel (QCTV) to produce and air announcements on various stormwater related topics including but not limited to the topics outlined below to educate and inform all viewers of the importance of storm water quality improvement.

<p>Measurable Goals:</p> <ul style="list-style-type: none"> • Number of announcements produced annually • Number of times aired on cable channel • Number of households reached • Feedback from viewers • Increased appreciation, awareness and behavior towards our natural resources 	<p>Timeline / Implementation Schedule:</p> <ul style="list-style-type: none"> • On-going • At least 1 per year
--	---

Specific Components & Notes (optional):

- Program history
- Challenges cities are facing
- Environmentally friendly lawn care practices
- Proper disposal of hazardous substances (i.e. oil)
- Native plantings
- Projects cities are undergoing to improve storm water quality (i.e. native prairie projects)

Responsible Person for this BMP	Responsible Department or Organization
Name: Kameron Kytonen	Dept. or Org.: Engineering
Title: Natural Resources Technician	Dept. Head: David Berkowitz
Phone: 763-755-5100	Phone: 763-755-5100
E-mail: kkytonen@ci.andover.mn.us	E-mail: dberkowitz@ci.andover.mn.us

Educational components related to this BMP (description or number – optional):

- The audience or audiences involved: See "Description"
- Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior: See "Description"
- Activities used to reach educational goals for each audience: See "Specific Components"
- Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules: See "Responsible Person", "Responsible Department" and "Timeline"
- Available performance measures that can be used to determine success in reaching education goals: See "Measurable Goals"

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 1.A.3

Minimum Control Measures Addressed by This BMP

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;"><input checked="" type="checkbox"/></td><td>Public education & outreach</td></tr> <tr><td style="text-align: center;"><input checked="" type="checkbox"/></td><td>Public participation & involvement</td></tr> <tr><td style="text-align: center;"><input checked="" type="checkbox"/></td><td>Illicit discharge detection & elimination</td></tr> </table>	<input checked="" type="checkbox"/>	Public education & outreach	<input checked="" type="checkbox"/>	Public participation & involvement	<input checked="" type="checkbox"/>	Illicit discharge detection & elimination	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;"><input checked="" type="checkbox"/></td><td>Construction site runoff controls</td></tr> <tr><td style="text-align: center;"><input checked="" type="checkbox"/></td><td>Post-construction stormwater management</td></tr> <tr><td style="text-align: center;"><input checked="" type="checkbox"/></td><td>Pollution prevention/Good housekeeping</td></tr> </table>	<input checked="" type="checkbox"/>	Construction site runoff controls	<input checked="" type="checkbox"/>	Post-construction stormwater management	<input checked="" type="checkbox"/>	Pollution prevention/Good housekeeping
<input checked="" type="checkbox"/>	Public education & outreach												
<input checked="" type="checkbox"/>	Public participation & involvement												
<input checked="" type="checkbox"/>	Illicit discharge detection & elimination												
<input checked="" type="checkbox"/>	Construction site runoff controls												
<input checked="" type="checkbox"/>	Post-construction stormwater management												
<input checked="" type="checkbox"/>	Pollution prevention/Good housekeeping												

<p>BMP Title: Storm Water Information Website</p>	
<p>BMP Description: The City of Andover has developed a Website within the current City Web location to discuss the specific components listed below. The Website provides citizens with an understanding of the NPDES regulations and how the City is meeting those requirements, along with information for residents on improving storm water quality.</p>	
<p>Measurable Goals:</p> <ul style="list-style-type: none"> Website developed and posted for public access Feedback from website users 	<p>Timeline / Implementation Schedule:</p> <ul style="list-style-type: none"> On-going
<p>Specific Components & Notes (optional):</p> <ul style="list-style-type: none"> Program history Storm water goals Challenges cities are facing Actions people can take to improve storm water quality 	
<p>Responsible Person for this BMP</p> <p>Name: Kameron Kytonen Title: Natural Resources Technician Phone: 763-755-5100 E-mail: kkytonen@ci.andover.mn.us</p>	<p>Responsible Department or Organization</p> <p>Dept. or Org.: Engineering Dept. Head: David Berkowitz Phone: 763-755-5100 E-mail: dberkowitz@ci.andover.mn.us</p>
<p>Educational components related to this BMP (description or number – optional):</p> <ul style="list-style-type: none"> <u>The audience or audiences involved:</u> See "Description" <u>Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior:</u> See "Description" <u>Activities used to reach educational goals for each audience:</u> See "Specific Components" <u>Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules:</u> See "Responsible Person", "Responsible Department" and "Timeline" <u>Available performance measures that can be used to determine success in reaching education goals:</u> See "Measurable Goals" 	

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 1.A.4

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/>	Public education & outreach	<input type="checkbox"/>	Construction site runoff controls
<input checked="" type="checkbox"/>	Public participation & involvement	<input checked="" type="checkbox"/>	Post-construction stormwater management
<input checked="" type="checkbox"/>	Illicit discharge detection & elimination	<input type="checkbox"/>	Pollution prevention/Good housekeeping

BMP Title:

Presentation to School Classrooms

BMP Description:

The City of Andover will make an effort to contact area schools and give brief presentations on topics related to storm water quality issues to help students and teachers understand the importance of improving storm water quality.

Measurable Goals:

- Number of presentations
- Number of attendees
- Increased awareness, appreciation and behavior toward our natural resources

Timeline / Implementation Schedule:

- Fall-2006: first presentation
- Minimum of 2 presentations per year

Specific Components & Notes (optional):

- Native plantings
- Environmentally friendly lawn care practices
- Rain gardens

Responsible Person for this BMP

Name: Kameron Kytonen
 Title: Natural Resources Technician
 Phone: 763-755-5100
 E-mail: kkytonen@ci.andover.mn.us

Responsible Department or Organization

Dept. or Org.: Engineering
 Dept. Head: David Berkowitz
 Phone: 763-755-5100
 E-mail: dberkowitz@ci.andover.mn.us

Educational components related to this BMP (description or number – optional):

- The audience or audiences involved: See "Description"
- Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior: See "Description"
- Activities used to reach educational goals for each audience: See "Specific Components"
- Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules: See "Responsible Person", "Responsible Department" and "Timeline"
- Available performance measures that can be used to determine success in reaching education goals: See "Measurable Goals"

BMP Description Sheet

MS4 Name : City of Andover

Unique Identifying Number: 1.A.5

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/> Public education & outreach <input checked="" type="checkbox"/> Public participation & involvement <input checked="" type="checkbox"/> Illicit discharge detection & elimination	<input type="checkbox"/> Construction site runoff controls <input checked="" type="checkbox"/> Post-construction stormwater management <input type="checkbox"/> Pollution prevention/Good housekeeping
--	--

BMP Title: Natural Resources-Related Inspections	
BMP Description: The City of Andover has and will continue to provide customer service to Andover residents. One large part of this is doing site evaluations at the request of the residents. Staff consults with residents in person and/or over the phone related to various natural resources topics including but not limited to the list below.	
Measurable Goals: <ul style="list-style-type: none"> Number of inspections Increased awareness, appreciation and behavior toward our natural resources 	Timeline / Implementation Schedule: <ul style="list-style-type: none"> On-going
Specific Components & Notes (optional): <ul style="list-style-type: none"> Native plantings Oak wilt and Dutch elm disease control Environmentally friendly lawn care practices Rain gardens 	
Responsible Person for this BMP Name: Kameron Kytonen Title: Natural Resources Technician Phone: 763-755-5100 E-mail: kkytonen@ci.andover.mn.us	Responsible Department or Organization Dept. or Org.: Engineering Dept. Head: David Berkowitz Phone: 763-755-5100 E-mail: dberkowitz@ci.andover.mn.us
Educational components related to this BMP (description or number – optional): <ul style="list-style-type: none"> <u>The audience or audiences involved:</u> See "Description" <u>Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior:</u> See "Description" <u>Activities used to reach educational goals for each audience:</u> See "Specific Components" <u>Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules:</u> See "Responsible Person", "Responsible Department" and "Timeline" <u>Available performance measures that can be used to determine success in reaching education goals:</u> See "Measurable Goals" 	

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 1.A.6

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/>	Public education & outreach	<input checked="" type="checkbox"/>	Construction site runoff controls
<input checked="" type="checkbox"/>	Public participation & involvement	<input checked="" type="checkbox"/>	Post-construction stormwater management
<input checked="" type="checkbox"/>	Illicit discharge detection & elimination	<input type="checkbox"/>	Pollution prevention/Good housekeeping

BMP Title:

Pre-construction Meetings for New Developments

BMP Description:

Prior to grading for new developments in the City, staff meets with the Developer, project engineer and contractor(s) to discuss the project in detail. Staff emphasizes that proper site maintenance including but not limited to proper erosion control, tree preservation, construction waste management and street sweeping are activities that shall be implemented by the appropriate parties.

Measurable Goals:

- Number of meetings
- Number of attendees
- Proper site maintenance on active developments

Timeline / Implementation Schedule:

- On-going

Specific Components & Notes (optional):

- Proper installation of silt fence and tree protection fencing
- Cyclical street sweepings
- Construction site waste management
- Penalties for non-compliance

Responsible Person for this BMP

Name: Kameron Kytonen

Title: Natural Resources Technician

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Responsible Department or Organization

Dept. or Org.: Engineering

Dept. Head: David Berkowitz

Phone: 763-755-5100

E-mail: dberkowitz@ci.andover.mn.us

Educational components related to this BMP (description or number – optional):

- The audience or audiences involved: See "Description"
- Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior: See "Description"
- Activities used to reach educational goals for each audience: See "Specific Components"
- Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules: See "Responsible Person", "Responsible Department" and "Timeline"
- Available performance measures that can be used to determine success in reaching education goals: See "Measurable Goals"

BMP D scription She t

MS4 Name: City of Andover

Unique Identifying Number: 1.A.7

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/>	Public education & outreach	<input type="checkbox"/>	Construction site runoff controls
<input checked="" type="checkbox"/>	Public participation & involvement	<input type="checkbox"/>	Post-construction stormwater management
<input checked="" type="checkbox"/>	Illicit discharge detection & elimination	<input type="checkbox"/>	Pollution prevention/Good housekeeping

<p><u>BMP Title :</u> Presentation to City Council</p>	
<p><u>BMP Description:</u> The City of Andover annually prepares a presentation to the City Council to explain the specific components listed below. This presentation will increase Council awareness of storm water runoff issues and justify the importance of implementing the SWPPP provisions.</p>	
<p><u>Measurable Goals:</u></p> <ul style="list-style-type: none"> • Completed presentation • Number of attendees 	<p><u>Timeline / Implementation Schedule:</u></p> <ul style="list-style-type: none"> • Annual presentation each year of Permit
<p><u>Specific Components & Notes (optional):</u></p> <ul style="list-style-type: none"> • NPDES regulations • Urban storm water impacts to water bodies • SWPPP provisions and compliance • Current SWPPP status and challenges 	
<p><u>Responsible Person for this BMP</u></p> <p>Name: Kameron Kytonen Title: Natural Resources Technician Phone: 763-755-5100 E-mail: kkytonen@ci.andover.mn.us</p>	<p><u>Responsible Department or Organization</u></p> <p>Dept. or Org.: Engineering Dept. Head: David Berkowitz Phone: 763-755-5100 E-mail: dberkowitz@ci.andover.mn.us</p>
<p><u>Educational components related to this BMP (description or number – optional):</u></p> <ul style="list-style-type: none"> • <u>The audience or audiences involved:</u> See "Description" • <u>Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior:</u> See "Description" • <u>Activities used to reach educational goals for each audience:</u> See "Specific Components" • <u>Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules:</u> See "Responsible Person"; Responsible Department" and "Timeline" • <u>Available performance measures that can be used to determine success in reaching education goals:</u> See "Measurable Goals" 	

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 1.A.8

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/>	Public education & outreach	<input type="checkbox"/>	Construction site runoff controls
<input checked="" type="checkbox"/>	Public participation & involvement	<input type="checkbox"/>	Post-construction stormwater management
<input checked="" type="checkbox"/>	Illicit discharge detection & elimination	<input type="checkbox"/>	Pollution prevention/Good housekeeping

BMP Title:

Presentation to City Staff

BMP Description:

The City of Andover prepares a presentation to the City Staff on a yearly basis to explain the specific components listed below. This presentation will increase Staff awareness of storm water runoff issues and justify the importance of implementing the SWPPP provisions.

Measurable Goals:

- Completed presentations
-

Timeline / Implementation Schedule :

- Annual presentation each year of Permit

Specific Components & Notes (optional):

- NPDES regulations
- Urban storm water impacts to water bodies
- SWPPP provisions
- Current SWPPP status and challenges
- Responsible departments for BMPs
- Environmentally friendly lawn care practices
- Rain gardens
- Increased awareness, appreciation and behavior toward our natural resources

Responsible Person for this BMP

Name: Kameron Kytonen

Title: Natural Resources Technician

Phone: 763-755-5100

E-mail: kkytonen@ci.andover.mn.us

Responsible Department or Organization

Dept. or Org.: Engineering

Dept. Head: David Berkowitz

Phone: 763-755-5100

E-mail: dberkowitz@ci.andover.mn.us

Educational components related to this BMP (description or number – optional):

- The audience or audiences involved: See "Description"
- Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior: See "Description"
- Activities used to reach educational goals for each audience: See "Specific Components"
- Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules: See "Responsible Person", "Responsible Department" and "Timeline"
- Available performance measures that can be used to determine success in reaching education goals: See "Measurable Goals"

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 1d-1

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/> Public education & outreach	<input checked="" type="checkbox"/> Construction site runoff controls
<input checked="" type="checkbox"/> Public participation & involvement	<input checked="" type="checkbox"/> Post-construction stormwater management
<input checked="" type="checkbox"/> Illicit discharge detection & elimination	<input checked="" type="checkbox"/> Pollution prevention/Good housekeeping

<p>BMP Title: Coordination of Educational Program</p>	
<p>BMP Description: The City of Andover has and will continue to work with, share and exchange ideas with (network) and join forces with other public and/or private groups including but not limited to the "Minnesota Water-Let's Keep it Clean" Work Team, the "Metro Water Resource Coordinators Group," the Coon Creek Watershed District (CCWD), Lower Rum River Watershed Management Organization (LRRWMO), Anoka Conservation District (ACD), Department of Natural Resources (DNR) and Minnesota Pollution Control Agency (MPCA) to maintain the operation of a sound stormwater educational program aimed at all audiences that meets the Permit requirements.</p>	
<p>Measurable Goals:</p> <ul style="list-style-type: none"> Number of collaborative effort functions Number of attendees at meetings Continued improvement of program effectiveness Maintain communication channels between numerous groups for most up to date information Share information with other groups to facilitate efficient educational program 	<p>Timeline / Implementation Schedule:</p> <ul style="list-style-type: none"> On-going Attend and participate in yearly Work Team meetings Attend and participate in at least 3 "Water Resource Coordinators Group" meetings per year Attend and participate in yearly Technical Advisory Committee (TAC) meetings
<p>Specific Components & Notes (optional):</p> <ul style="list-style-type: none"> Newsletter articles Meetings and presentations Environmentally friendly lawn care practices Native plantings and rain gardens 	
<p>Responsible Person for this BMP</p> <p>Name: Kameron Kytonen Title: Natural Resources Technician Phone: 763-755-5100 E-mail: kkytonen@ci.andover.mn.us</p>	<p>Responsible Department or Organization</p> <p>Dept. or Org.: Engineering Dept. Head: David Berkowitz Phone: 763-755-5100 E-mail: dberkowitz@ci.andover.mn.us</p>
<p>Educational components related to this BMP (description or number – optional):</p> <ul style="list-style-type: none"> <u>The audience or audiences involved:</u> See "Description" <u>Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior:</u> See "Description" <u>Activities used to reach educational goals for each audience:</u> See "Specific Components" <u>Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules:</u> See "Responsible Person", "Responsible Department" and "Timeline" <u>Available performance measures that can be used to determine success in reaching education goals:</u> See "Measurable Goals" 	

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 2a-1, 2b-1, 2c-1

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/> Public education & outreach <input checked="" type="checkbox"/> Public participation & involvement <input type="checkbox"/> Illicit discharge detection & elimination	<input type="checkbox"/> Construction site runoff controls <input type="checkbox"/> Post-construction stormwater management <input type="checkbox"/> Pollution prevention/Good housekeeping
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BMP Title:

Comply With Public Notice Requirements/Solicit Public Input and Opinion on the Adequacy of the SWPPP/Consider Public Input

BMP Description:

The City of Andover currently provides a notice of public informational meeting addressing the Storm Water Pollution Prevention Program at least 30 days prior to the meeting. The notice include all components listed below and are distributed in areas to best notify a diverse group of citizens within the Andover jurisdiction. Refer to BMP 2.B, 1e-1 for more detailed information with regard to the public meeting

Measurable Goals:

- Completed public notice

Timeline / Implementation Schedule:

- On-going
- Annually

Specific Components & Notes (optional):

- Date, time and location
- Description of how the meeting will be conducted
 - Presentation followed by public meeting
- Location of the SWPPP for review prior to the meeting
- Location of notice
 - City Newsletter
 - Local Newspaper

Responsible Person for this BMP

Name: Kameron Kytonen
 Title: Natural Resources Technician
 Phone: 763-755-5100
 E-mail: kkytonen@ci.andover.mn.us

Responsible Department or Organization

Dept. or Org.: Engineering
 Dept. Head: David Berkowitz
 Phone: 763-755-5100
 E-mail: dberkowitz@ci.andover.mn.us

Educational components related to this BMP (description or number – optional):

- The audience or audiences involved: See "Description"
- Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior: See "Description"
- Activities used to reach educational goals for each audience: See "Specific Components"
- Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules: See "Responsible Person", "Responsible Department" and "Timeline"
- Available performance measures that can be used to determine success in reaching education goals: See "Measurable Goals"

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 2.B, 1e-1

Minimum Control Measures Addressed by This BMP

- | | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | Public education & outreach |
| <input checked="" type="checkbox"/> | Public participation & involvement |
| <input type="checkbox"/> | Illicit discharge detection & elimination |

- | | |
|--------------------------|---|
| <input type="checkbox"/> | Construction site runoff controls |
| <input type="checkbox"/> | Post-construction stormwater management |
| <input type="checkbox"/> | Pollution prevention/Good housekeeping |

<p>BMP Title: Annual Public Meeting</p>	
<p>BMP Description: Conduct an annual public meeting to receive public opinion on the adequacy and effectiveness of the SWPPP program components. The City welcomes comments, both written and oral before, during and after the meeting. Comments on the program are accepted at any time, and SWPPP's are available at City Hall for all audiences.</p>	
<p>Measurable Goals:</p> <ul style="list-style-type: none"> • Completed public meeting and attendance • Number of comments 	<p>Timeline / Implementation Schedule:</p> <ul style="list-style-type: none"> • Annual meeting in each year of the Permit cycle • The City will respond to comments in a reasonable timeframe as needed. • The City will consider the comments and make adjustments to the SWPPP as needed
<p>Specific Components & Notes (optional):</p> <ul style="list-style-type: none"> • Establish meeting procedures and processes for speakers and written material • Consider timely, relevant written materials submitted by the public • Allow interested persons time to make oral statements on SWPPP 	
<p>Responsible Person for this BMP</p> <p>Name: Kameron Kytonen Title: Natural Resources Technician Phone: 763-755-5100 E-mail: kkytonen@ci.andover.mn.us</p>	<p>Responsible Department or Organization</p> <p>Dept. or Org.: Engineering Dept. Head: David Berkowitz Phone: 763-755-5100 E-mail: dberkowitz@ci.andover.mn.us</p>
<p>Educational components related to this BMP (description or number – optional):</p> <ul style="list-style-type: none"> • <u>The audience or audiences involved:</u> See "Description" • <u>Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior:</u> See "Description" • <u>Activities used to reach educational goals for each audience:</u> See "Specific Components" • <u>Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules:</u> See "Responsible Person", "Responsible Department" and "Timeline" • <u>Available performance measures that can be used to determine success in reaching education goals:</u> See "Measurable Goals" 	

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 2.C, 3d-1, 3e-1

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/>	Public education & outreach	<input checked="" type="checkbox"/>	Construction site runoff controls
<input checked="" type="checkbox"/>	Public participation & involvement	<input checked="" type="checkbox"/>	Post-construction stormwater management
<input checked="" type="checkbox"/>	Illicit discharge detection & elimination	<input checked="" type="checkbox"/>	Pollution prevention/Good housekeeping

<p>BMP Title: Non-compliance Complaints and Reports/Public and Employee Illicit Discharge Elimination Program/Identification of Non-Storm Water Discharges and Flows</p>	
<p>BMP Description: The City presently has personnel available on a normal working day basis and voice mail for residents to report illicit discharges, construction site sedimentation and erosion violations, other stormwater related issues and to provide comments on the SWPPP. City staff keeps thorough records of these complaints, and responds to the calls as needed. In addition, staff will develop a process to evaluate, determine the significance of and address (if determined to be significant contributors of pollutants to the City) those non-storm water discharges listed in the permit under part V.G.3.e under the timeline established in the permit.</p>	
<p>Measurable Goals:</p> <ul style="list-style-type: none"> • Number and type of calls/complaints from the community • Number and type of city staff actions initiated based on calls received • Number and type of responses from the violators • Compliance level 	<p>Timeline / Implementation Schedule:</p> <ul style="list-style-type: none"> • On-going • Staff responds within a reasonable timeframe to calls related to these items; the more serious the issue, the quicker the response • Process in place by June 30, 2010
<p>Specific Components & Notes (optional):</p> <ul style="list-style-type: none"> • Increase public participation • Allows citizen reports on illicit discharge detection • Allows citizen reports on construction site erosion violations • Complaint and response log 	
<p>Responsible Person for this BMP</p> <p>Name: Kameron Kytonen Title: Natural Resources Technician Phone: 763-755-5100 E-mail: kkytonen@ci.andover.mn.us</p>	<p>Responsible Department or Organization</p> <p>Dept. or Org.: Engineering Dept. Head: David Berkowitz Phone: 763-755-5100 E-mail: dberkowitz@ci.andover.mn.us</p>
<p>Educational components related to this BMP (description or number – optional):</p> <ul style="list-style-type: none"> • <u>The audience or audiences involved:</u> See "Description" • <u>Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior:</u> See "Description" • <u>Activities used to reach educational goals for each audience:</u> See "Specific Components" • <u>Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules:</u> See "Responsible Person", "Responsible Department" and "Timeline" • <u>Available performance measures that can be used to determine success in reaching education goals:</u> See "Measurable Goals" 	

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 2.D

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/> Public education & outreach <input checked="" type="checkbox"/> Public participation & involvement <input checked="" type="checkbox"/> Illicit discharge detection & elimination	<input type="checkbox"/> Construction site runoff controls <input type="checkbox"/> Post-construction stormwater management <input type="checkbox"/> Pollution prevention/Good housekeeping
--	---

BMP Title:
Adopt-A-Street

BMP Description:
The City presently has and will continue to implement an Adopt-A-Street program to assist in keeping the streets and boulevards free of debris. This program will be expanded and promoted to the residents of Andover. It gives Andover residents an opportunity to help improve the quality of storm water.

<p><u>Measurable Goals:</u></p> <ul style="list-style-type: none"> • Number of streets adopted • Number of residents participating in program 	<p><u>Timeline / Implementation Schedule:</u></p> <ul style="list-style-type: none"> • On-going
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Specific Components & Notes (optional):

- Increase public participation
- Increased appreciation, awareness and behavior towards our natural resources

Responsible Person for this BMP	Responsible Department or Organization
Name: Frank Stone	Dept. or Org.: Public Works
Title: Public Works Superintendent	Dept. Head: Frank Stone
Phone: 763-755-8118	Phone:
E-mail: fstone@ci.andover.mn.us	E-mail:

Educational components related to this BMP (description or number – optional):

- The audience or audiences involved: See "Description"
- Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior: See "Description"
- Activities used to reach educational goals for each audience: See "Specific Components"
- Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules: See "Responsible Person", "Responsible Department" and "Timeline"
- Available performance measures that can be used to determine success in reaching education goals: See "Measurable Goals"

BMP Description Sheet

MS4 Nam : City of Andover

Unique Identifying Number: 2.E

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/> Public education & outreach <input checked="" type="checkbox"/> Public participation & involvement <input checked="" type="checkbox"/> Illicit discharge detection & elimination	<input type="checkbox"/> Construction site runoff controls <input type="checkbox"/> Post-construction stormwater management <input type="checkbox"/> Pollution prevention/Good housekeeping
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<p>BMP Title: Adopt-A-Pond</p>	
<p>BMP Description: The City will coordinate an Adopt-A-Pond program to assist in keeping areas in and around the numerous storm water ponds free of debris and litter and to enhance the vegetation around the ponds. The City will promote this to Andover residents. It will give Andover residents and opportunity to improve storm water quality by picking up litter and/or planting native vegetation around the ponds.</p>	
<p>Measurable Goals:</p> <ul style="list-style-type: none"> Number of ponds adopted Number of residents participating in program 	<p>Timeline / Implementation Schedule:</p> <ul style="list-style-type: none"> First pond to be adopted by April 2008
<p>Specific Components & Notes (optional):</p> <ul style="list-style-type: none"> Increase public participation Increased appreciation, awareness and behavior towards our natural resources 	
<p>Responsible Person for this BMP</p> <p>Name: Kameron Kytonen Title: Natural Resources Technician Phone: 763-755-5100 E-mail: kkytonen@ci.andover.mn.us</p>	<p>Responsible Department or Organization</p> <p>Dept. or Org.: Engineering Dept. Head: David Berkowitz Phone: 763-755-5100 E-mail: dberkowitz@ci.andover.mn.us</p>
<p>Educational components related to this BMP (description or number – optional):</p> <ul style="list-style-type: none"> <u>The audience or audiences involved:</u> See "Description" <u>Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior:</u> See "Description" <u>Activities used to reach educational goals for each audience:</u> See "Specific Components" <u>Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules:</u> See "Responsible Person", "Responsible Department" and "Timeline" <u>Available performance measures that can be used to determine success in reaching education goals:</u> See "Measurable Goals" 	

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 2.F

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/>	Public education & outreach	<input type="checkbox"/>	Construction site runoff controls
<input checked="" type="checkbox"/>	Public participation & involvement	<input type="checkbox"/>	Post-construction stormwater management
<input checked="" type="checkbox"/>	Illicit discharge detection & elimination	<input type="checkbox"/>	Pollution prevention/Good housekeeping

BMP Title:

City of Andover/4H Public Service Announcements (PSA's)

BMP Description:

The City has and will continue to coordinate with a local 4H Chapter and the local cable channel to design, produce and air PSA's emphasizing important actions people should take to improve storm water quality. These PSA's are primarily aimed at residents of Andover, although they're also aired in Anoka, Champlin and Ramsey.

Measurable Goals:

- Number of PSA's produced annually
- Number of times aired on cable channel
- Number of households reached
- Feedback from viewers
- Increased appreciation, awareness and behavior towards our natural resources

Timeline / Implementation Schedule :

- Design, produce and air at least 1 annually

Specific Components & Notes (optional):

- Sweeping up grass clippings and leaves
- Proper disposal of oil and vehicle fluids
- Important actions to take while ice-fishing
- Native plantings
- Outfalls drain into water bodies (emphasis on this to make people change actions around home)

Responsible Person for this BMP

Name: Kameron Kytonen
 Title: Natural Resources Technician
 Phone: 763-755-5100
 E-mail: kkytonen@ci.andover.mn.us

Responsible Department or Organization

Dept. or Org.: Engineering
 Dept. Head: David Berkowitz
 Phone: 763-755-5100
 E-mail: dberkowitz@ci.andover.mn.us

Educational components related to this BMP (description or number – optional):

- The audience or audiences involved: See "Description"
- Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior: See "Description"
- Activities used to reach educational goals for each audience: See "Specific Components"
- Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules: See "Responsible Person", "Responsible Department" and "Timeline"
- Available performance measures that can be used to determine success in reaching education goals: See "Measurable Goals"

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 2.G

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/>	Public education & outreach	<input checked="" type="checkbox"/>	Construction site runoff controls
<input checked="" type="checkbox"/>	Public participation & involvement	<input type="checkbox"/>	Post-construction stormwater management
<input checked="" type="checkbox"/>	Illicit discharge detection & elimination	<input checked="" type="checkbox"/>	Pollution prevention/Good housekeeping

BMP Title:

Watershed Organization

BMP Description:

Participate in Lower Rum River Watershed Organization. Coordinate with Coon Creek Watershed District.

Measurable Goals:

- Meetings attended

Timeline / Implementation Schedule :

- On-going

Specific Components & Notes (optional):

- Watershed Management Plans

Responsible Person for this BMP

Name: Todd Haas

Title: Assistant City Engineer

Phone: 763-755-5100

E-mail: thaas@ci.andover.mn.us

Responsible Department or Organization

Dept. or Org.: Engineering

Dept. Head: David Berkowitz

Phone: 763-755-5100

E-mail: dberkowitz@ci.andover.mn.us

Educational components related to this BMP (description or number – optional):

- The audience or audiences involved: See "Description"
- Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior: See "Description"
- Activities used to reach educational goals for each audience: See "Specific Components"
- Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules: See "Responsible Person", "Responsible Department" and "Timeline"
- Available performance measures that can be used to determine success in reaching education goals: See "Measurable Goals"

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 3a-1

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/> Public education & outreach	<input type="checkbox"/> Construction site runoff controls
<input type="checkbox"/> Public participation & involvement	<input type="checkbox"/> Post-construction storm water management
<input checked="" type="checkbox"/> Illicit discharge detection & elimination	<input checked="" type="checkbox"/> Pollution prevention/Good housekeeping

BMP Title:
Storm Water System Map

BMP Description:
Much of the piping system, inlets, ditches, wetland and detention/retention pond information is available on existing maps, as-built drawings and subdivision plans. The City is currently compiling all this information onto one single map.

<p><u>Measurable Goals:</u></p> <ul style="list-style-type: none"> • Storm water system map 	<p><u>Timeline / Implementation Schedule:</u></p> <ul style="list-style-type: none"> • Completed storm water system map by June 30, 2008
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- Specific Components & Notes (optional):**
- Ponds, streams, county ditches, lakes and wetlands
 - All catch basins and structural pollution control devices
 - All storm sewer piping
 - All outfalls

Responsible Person for this BMP	Responsible Department or Organization
Name: David Berkowitz	Dept. or Org.: Engineering
Title: City Engineer	Dept. Head: David Berkowitz
Phone: 763-755-5100	Phone:
E-mail: dberkowitz@ci.andover.mn.us	E-mail:

- Educational components related to this BMP (description or number – optional):**
- The audience or audiences involved: See "Description"
 - Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior: See "Description"
 - Activities used to reach educational goals for each audience: See "Specific Components"
 - Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules: See "Responsible Person", "Responsible Department" and "Timeline"
 - Available performance measures that can be used to determine success in reaching education goals: See "Measurable Goals"

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 3b-1, 3c-1

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/>	Public education & outreach	<input type="checkbox"/>	Construction site runoff controls
<input checked="" type="checkbox"/>	Public participation & involvement	<input type="checkbox"/>	Post-construction stormwater management
<input checked="" type="checkbox"/>	Illicit discharge detection & elimination	<input type="checkbox"/>	Pollution prevention/Good housekeeping

BMP Title:

Illicit Discharge, Detection and Enforcement Ordinance/Regulatory Control Program/Illicit Discharge, Detection and Elimination Plan

BMP Description:

The City of Andover currently has language in an existing ordinance prohibiting the dumping of non-storm water substances into storm sewers, and has a process for detecting, responding to calls, cleaning up and penalizing (if necessary). However, the City is working on an official ordinance relating to illicit discharge and is going to include more detail with regard to a formal procedure for detection, enforcement and penalties.

Measurable Goals:

- Completed ordinance
- Increased awareness, appreciation and behavior toward our natural resources

Timeline / Implementation Schedule:

- Completed Illicit Discharge, Detection and Enforcement Ordinance by December, 2007

Specific Components & Notes (optional):

- Meeting with City Attorney
- Septic system control
- Illicit connections control
- Illegal dumping control
- Right of entry provision
- Camera tests
- penalties

Responsible Person for this BMP

Name: Kameron Kytonen
 Title: Natural Resources Technician
 Phone: 763-755-5100
 E-mail: kkytonen@ci.andover.mn.us

Responsible Department or Organization

Dept. or Org.: Engineering
 Dept. Head: David Berkowitz
 Phone: 763-755-5100
 E-mail: dberkowitz@ci.andover.mn.us

Educational components related to this BMP (description or number – optional):

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 3.C.1

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/> Public education & outreach	<input type="checkbox"/> Construction site runoff controls
<input type="checkbox"/> Public participation & involvement	<input checked="" type="checkbox"/> Post-construction stormwater management
<input checked="" type="checkbox"/> Illicit discharge detection & elimination	<input type="checkbox"/> Pollution prevention/Good housekeeping

BMP Title: Post Construction Septic System Maintenance	
BMP Description: City Ordinance #221 requires bi-annual filing with the City of a maintenance report of on-site sewage disposal system and pumping on a three-year frequency. The ordinance also makes provisions for inspection and abatement of system failure.	
Measurable Goals: <ul style="list-style-type: none"> • Reports submitted 	Timeline / Implementation Schedule: <ul style="list-style-type: none"> • On-going
Specific Components & Notes (optional): <ul style="list-style-type: none"> • Bi-Annual Report • Capacity Requirement • Individual Sewage Treatment System Professional Licensing Inspection • Enforcement 	
Responsible Person for this BMP	Responsible Department or Organization
Name: Donald Olson	Dept. or Org.: Building
Title: Building Official	Dept. Head: Donald Olson
Phone: 763-755-5100	Phone:
E-mail: dolson@ci.andover.mn.us	E-mail:
Educational components related to this BMP (description or number – optional):	

BMP Description Sheet

MS4 Nam : City of Andover

Unique Identifying Number: 3.C.2

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/> Public education & outreach	<input type="checkbox"/> Construction site runoff controls
<input type="checkbox"/> Public participation & involvement	<input type="checkbox"/> Post-construction stormwater management
<input checked="" type="checkbox"/> Illicit discharge detection & elimination	<input checked="" type="checkbox"/> Pollution prevention/Good housekeeping

BMP Title:
Conducting Camera Tests

BMP Description:
The City has developed a program to televise storm sewer systems to identify structural problems and eliminate illegal and/or improper connections to the storm drainage systems and receiving waters. The City will develop a program to televise a certain area in the City each year by breaking the City down into zones and doing these on a rotating basis. Accurate records will be kept. Illicit discharge connections will be identified using the specific components listed below. The City of Andover will outline proper enforcement procedures in the Illicit Discharge, Detection and Enforcement Ordinance.

<p><u>Measurable Goals:</u></p> <ul style="list-style-type: none"> • Length of storm sewer televised each year • Number of work orders as a result of televising observation • Number of violations • Number of enforcement actions 	<p><u>Timeline / Implementation Schedule:</u></p> <ul style="list-style-type: none"> • Develop program to cyclically televise city • On-going
--	--

Specific Components & Notes (optional):

- Televising
- Faulty systems
- Illicit discharges
- Maintenance to system

Responsible Person for this BMP	Responsible Department or Organization
Name: Brian Kraabel	Dept. or Org.: Public Works
Title: Public Utilities Supervisor	Dept. Head: Frank Stone
Phone: 763-755-8118	Phone: 763-755-8118
E-mail: bkraabel@ci.andover.mn.us	E-mail: fstone@ci.andover.mn.us

Educational components related to this BMP (description or number – optional):

BMP Description Sheet

MS4 Name: City of Andover

Uniqu Identifying Number: 3.C.3

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/> Public education & outreach <input type="checkbox"/> Public participation & involvement <input checked="" type="checkbox"/> Illicit discharge detection & elimination	<input type="checkbox"/> Construction site runoff controls <input type="checkbox"/> Post-construction stormwater management <input checked="" type="checkbox"/> Pollution prevention/Good housekeeping
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BMP Title:

Sanitary Sewer Maintenance

BMP Description:

The City has an on-going program of inspecting and cleaning the sanitary sewer system. The City has developed a program to televise a certain area in the City each year by breaking the City down into zones and doing these on a rotating basis. Approximately 1/5 of the system is cleaned each year.

Measurable Goals:

- Miles of sanitary sewer televised
- Miles of sanitary sewer cleaned

Timeline / Implementation Schedule:

- On-going

Specific Components & Notes (optional):

Responsible Person for this BMP

Name: Brian Kraabel
 Title: Public Utilities Supervisor
 Phone: 763-755-8118
 E-mail: bkraabel@ci.andover.mn.us

Responsible Department or Organization

Dept. or Org.: Public Works
 Dept. Head: Frank Stone
 Phone: 763-755-8118
 E-mail: fstone@ci.andover.mn.us

Educational components related to this BMP (description or number – optional):

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 4a-1, 4b-1

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/> Public education & outreach <input type="checkbox"/> Public participation & involvement <input type="checkbox"/> Illicit discharge detection & elimination	<input checked="" type="checkbox"/> Construction site runoff controls <input checked="" type="checkbox"/> Post-construction stormwater management <input type="checkbox"/> Pollution prevention/Good housekeeping
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BMP Title:

Construction Site Erosion and Waste Control Ordinance or Other Regulatory Mechanism/Construction Site Implementation of Erosion and Sediment Control BMP's

BMP Description:

Currently, the City has construction site erosion and sedimentation control regulations and policies. The development contracts for new developments outline the requirements for proper construction site erosion control and the City process for inspections, enforcement and penalties for non-compliance. However, the City is working on an official ordinance related to construction site erosion and waste control and is going to include more detail with regard to formal procedures for detection, enforcement and penalties. This ordinance will meet or exceed the provisions set forth under part V.G.4 of the permit and the MPCA Construction Storm Water Permit.

Post-construction runoff from New Development and Redevelopment policies, enforcement and sanctions will also be covered in this ordinance.

Measurable Goals:

- Completed ordinance

Timeline / Implementation Schedule:

- Completed Construction Site Erosion and Waste Control Ordinance by April 2007

Specific Components & Notes (optional):

- Inspection program
- Entrance criteria
- Debris storage and maintenance
- Waste disposal
- Street sweeping
- Silt fence requirements
- Timelines for compliance
- Penalties for non-compliance

Responsible Person for this BMP

Name: Kameron Kytönen
 Title: Natural Resources Technician
 Phone: 763-755-5100
 E-mail: kkytonen@ci.andover.mn.us

Responsible Department or Organization

Dept. or Org.: Engineering
 Dept. Head: David Berkowitz
 Phone: 763-755-5100
 E-mail: dberkowitz@ci.andover.mn.us

Educational components related to this BMP (description or number – optional):

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 4.A.1

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/>	Public education & outreach	<input checked="" type="checkbox"/>	Construction site runoff controls
<input type="checkbox"/>	Public participation & involvement	<input checked="" type="checkbox"/>	Post-construction stormwater management
<input type="checkbox"/>	Illicit discharge detection & elimination	<input type="checkbox"/>	Pollution prevention/Good housekeeping

BMP Title: Floodplain Regulation	
BMP Description: The City presently has a Floodplain ordinance regulating land uses, structures, barriers and erosion control.	
Measurable Goals: <ul style="list-style-type: none"> Number of permits issued 	Timeline / Implementation Schedule: <ul style="list-style-type: none"> On-going
Specific Components & Notes (optional): <ul style="list-style-type: none"> Floodplain ordinance 	
Responsible Person for this BMP	Responsible Department or Organization
Name: David Berkowitz	Dept. or Org.: Engineering
Title: City Engineer	Dept. Head: David Berkowitz
Phone: 763-755-5100	Phone:
E-mail: dberkowitz@ci.andover.mn.us	E-mail:
Educational components related to this BMP (description or number – optional):	

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 4.A.2

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/> Public education & outreach	<input checked="" type="checkbox"/> Construction site runoff controls
<input type="checkbox"/> Public participation & involvement	<input checked="" type="checkbox"/> Post-construction stormwater management
<input type="checkbox"/> Illicit discharge detection & elimination	<input type="checkbox"/> Pollution prevention/Good housekeeping

BMP Title:

Shoreland Protection

BMP Description:

The City presently has a Shoreland ordinance regulating development, waste treatment systems, grading and filling and cutting of vegetation on shoreland abutting public waters as defined by State Regulations.

Measurable Goals:

- Shoreland developments

Timeline / Implementation Schedule:

- On-going

Specific Components & Notes (optional):

- Shoreland ordinance

Responsible Person for this BMP

Name: David Berkowitz

Title: City Engineer

Phone: 763-755-5100

E-mail: dberkowitz@ci.andover.mn.us

Responsible Department or Organization

Dept. or Org.: Engineering

Dept. Head: David Berkowitz

Phone:

E-mail:

Educational components related to this BMP (description or number – optional):

BMP Description Sheet

MS4 Name: City of Andover

Uniqu Identifying Number: 4d-1

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/> Public education & outreach	<input checked="" type="checkbox"/> Construction site runoff controls
<input type="checkbox"/> Public participation & involvement	<input type="checkbox"/> Post-construction stormwater management
<input type="checkbox"/> Illicit discharge detection & elimination	<input type="checkbox"/> Pollution prevention/Good housekeeping

<u>BMP Title:</u> Procedure for Site Plan Review	
<u>BMP Description:</u> The City of Andover has a procedure for construction site plan review. The City will incorporate mandatory provisions and adopted guidelines in the Construction Site Erosion and Waste Control Ordinance.	
<u>Measurable Goals:</u> • Number of plans reviewed	<u>Timeline / Implementation Schedule:</u> • On-going
<u>Specific Components & Notes (optional):</u> <ul style="list-style-type: none"> • Define communication link between Planning and Zoning and Engineering • Timeline for a site plan review process • Site plan review fees and City permit application • BMP requirements • Construction Site Erosion and Waste Control Ordinance 	
<u>Responsible Person for this BMP</u>	<u>Responsible Department or Organization</u>
Name: David Berkowitz	Dept. or Org.: Engineering
Title: City Engineer	Dept. Head: David Berkowitz
Phone: 763-755-5100	Phone:
E-mail: dberkowitz@ci.andover.mn.us	E-mail:
<u>Educational components related to this BMP (description or number – optional):</u>	

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 4.C.1

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/>	Public education & outreach	<input checked="" type="checkbox"/>	Construction site runoff controls
<input type="checkbox"/>	Public participation & involvement	<input type="checkbox"/>	Post-construction stormwater management
<input type="checkbox"/>	Illicit discharge detection & elimination	<input type="checkbox"/>	Pollution prevention/Good housekeeping

BMP Title : Construction Site Entrance Criteria	
BMP Description: As a part of the proposed Construction Site Erosion and Waste Control Ordinance, the City will include entrance control criteria.	
Measurable Goals: <ul style="list-style-type: none"> • Ordinance adoption 	Timeline / Implementation Schedule: <ul style="list-style-type: none"> • Will be a part of timeline for ordinance
Specific Components & Notes (optional): <ul style="list-style-type: none"> • Gravel entrances • Cyclical street sweeping 	
Responsible Person for this BMP	Responsible Department or Organization
Name: David Berkowitz	Dept. or Org.: Engineering
Title: City Engineer	Dept. Head: David Berkowitz
Phone: 763-755-5100	Phone:
E-mail: dberkowitz@ci.andover.mn.us	E-mail:
Educational components related to this BMP (description or number – optional):	

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 4c-1

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/>	Public education & outreach	<input checked="" type="checkbox"/>	Construction site runoff controls
<input type="checkbox"/>	Public participation & involvement	<input type="checkbox"/>	Post-construction stormwater management
<input checked="" type="checkbox"/>	Illicit discharge detection & elimination	<input type="checkbox"/>	Pollution prevention/Good housekeeping

BMP Title:
Waste Controls for Construction Site Operators

BMP Description:
The City requires on-site construction site debris enclosures. Sites are periodically inspected to insure effectiveness. Policy will be reviewed and included in proposed Construction Site Erosion and Waste Control Ordinance.

Measurable Goals:

- Adopted ordinance

Timeline / Implementation Schedule:

- Will be a part of timeline for ordinance

Specific Components & Notes (optional):

- Subdivision Control Ordinance
- Developer's Contract
- Water Resource Management Plan

Responsible Person for this BMP	Responsible Department or Organization
Name: David Berkowitz	Dept. or Org.: Engineering
Title: City Engineer	Dept. Head: David Berkowitz
Phone: 763-755-5100	Phone:
E-mail: dberkowitz@ci.andover.mn.us	E-mail:

Educational components related to this BMP (description or number – optional):

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 4.C.3

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/>	Public education & outreach	<input checked="" type="checkbox"/>	Construction site runoff controls
<input type="checkbox"/>	Public participation & involvement	<input type="checkbox"/>	Post-construction stormwater management
<input checked="" type="checkbox"/>	Illicit discharge detection & elimination	<input type="checkbox"/>	Pollution prevention/Good housekeeping

<p><u>BMP Title:</u> Building Inspections</p>	
<p><u>BMP Description:</u> The City Building Inspectors are out in the field on a daily basis performing formal, arranged inspections throughout the various phases of the home-building process. While performing these inspections, they verify the construction sites are properly maintained to ensure proper compliance with the NPDES Phase II permit process with regard to the specific components below.</p>	
<p><u>Measurable Goals:</u></p> <ul style="list-style-type: none"> • Number of building inspections • Number of violations • Number of enforcement actions 	<p><u>Timeline / Implementation Schedule:</u></p> <ul style="list-style-type: none"> • On-going
<p><u>Specific Components & Notes (optional):</u></p> <ul style="list-style-type: none"> • Maintenance of tree protection and silt fence • Streets and gutters free of sediment and debris • Construction site waste properly managed and maintained on site 	
<p><u>Responsible Person for this BMP</u></p> <p>Name: Donald Olson</p> <p>Title: Building Official</p> <p>Phone: 763-755-5100</p> <p>E-mail: dolson@ci.andover.mn.us</p>	<p><u>Responsible Department or Organization</u></p> <p>Dept. or Org.: Building</p> <p>Dept. Head: Donald Olson</p> <p>Phone:</p> <p>E-mail:</p>
<p><u>Educational components related to this BMP (description or number – optional):</u></p>	

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 4e-1, 4f-1

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/>	Public education & outreach	<input checked="" type="checkbox"/>	Construction site runoff controls
<input type="checkbox"/>	Public participation & involvement	<input type="checkbox"/>	Post-construction stormwater management
<input checked="" type="checkbox"/>	Illicit discharge detection & elimination	<input type="checkbox"/>	Pollution prevention/Good housekeeping

<p><u>BMP Title:</u> Establishment of Procedures for the Receipt and Consideration of Reports of Storm Water Noncompliance/Establishment of Procedures for Site Inspections and Enforcement</p>	
<p><u>BMP Description:</u> City staff is responsible for performing routine inspections of construction sites to verify that proper erosion control is maintained, streets and gutters are free of debris and sediment and tree protection is maintained. Staff has and will continue to see that this takes place as needed. If a site is noticed to be out of compliance, staff will follow through with a formal enforcement process with reasonable deadlines to correct the violation(s), and will facilitate necessary penalties as needed. As mentioned in BMP 2.C, 3d-1, 3e-1, staff adequately responds to complaints with regard to this to ensure compliance.</p>	
<p><u>Measurable Goals:</u></p> <ul style="list-style-type: none"> • Number of inspections • Number of violations • Number of penalties assessed 	<p><u>Timeline / Implementation Schedule:</u></p> <ul style="list-style-type: none"> • On-going
<p><u>Specific Components & Notes (optional):</u></p> <ul style="list-style-type: none"> • Development inspection log • Buffer Strip Ordinance • Tree Protection Plan • Tree and silt fence inspections records • Complaint and response log 	
<p>Responsible Person for this BMP</p> <p>Name: Kameron Kytönen</p> <p>Title: Natural Resources Technician</p> <p>Phone: 763-755-5100</p> <p>E-mail: kkytonen@ci.andover.mn.us</p>	<p>Responsible Department or Organization</p> <p>Dept. or Org.: Engineering</p> <p>Dept. Head: David Berkowitz</p> <p>Phone: 763-755-5100</p> <p>E-mail: dberkowitz@ci.andover.mn.us</p>
<p><u>Educational components related to this BMP (description or number – optional):</u></p>	

BMP Description Sheet

MS4 Name: City of Andover

Uniqu Identifying Number: 5.A

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/>	Public education & outreach	<input checked="" type="checkbox"/>	Construction site runoff controls
<input type="checkbox"/>	Public participation & involvement	<input checked="" type="checkbox"/>	Post-construction stormwater management
<input type="checkbox"/>	Illicit discharge detection & elimination	<input type="checkbox"/>	Pollution prevention/Good housekeeping

BMP Title:
Development and Re-Development Plan Review Program

BMP Description:
The City of Andover has established procedures, guidelines and policies for a Development and Re-Development Plan Review. The specific components listed below are current practices conducted by the City. The City Planning Department will be responsible for implementing proper procedures for the program.

<p>Measurable Goals:</p> <ul style="list-style-type: none"> • Number of plan reviews performed 	<p>Timeline / Implementation Schedule:</p> <ul style="list-style-type: none"> • Continue plan review
--	--

Specific Components & Notes (optional):

- Storm water wetland detention
- Stabilization seeding and sodding
- Outlet stabilization
- Slope rip-rap stabilization
- Water Resources Management Plan
- Timeline for a site plan review process
- Wetland buffer strips
- Scenic River Ordinance
- Shoreland Ordinance

Responsible Person for this BMP	Responsible Department or Organization
Name: Courtney Bednarz	Dept. or Org.: Planning
Title: City Planner	Dept. Head: Will Neumeister
Phone: 763-755-5100	Phone: 763-755-5100
E-mail: cbednarz@ci.andover.mn.us	E-mail: wneumeister@ci.andover.mn.us

Educational components related to this BMP (description or number – optional):

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 5.B

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/> Public education & outreach	<input checked="" type="checkbox"/> Construction site runoff controls
<input type="checkbox"/> Public participation & involvement	<input checked="" type="checkbox"/> Post-construction stormwater management
<input type="checkbox"/> Illicit discharge detection & elimination	<input type="checkbox"/> Pollution prevention/Good housekeeping

BMP Title:
Storm Water Ponds

BMP Description:
The City and/or Coon Creek Watershed District (CCWD) and Lower Rum River Watershed Management Organization (LRRWMO) require wet ponds, dry ponds, sedimentation basin, detention or retention basins and/or storm water wetlands as appropriate for storm water management volume and treatment.

- Measurable Goals:**
- Subdivision reviews
 - Number of storm water ponds

- Timeline / Implementation Schedule:**
- On-going

- Specific Components & Notes (optional):**
- Water Resource Management Plan
 - Subdivision Contract Ordinance
 - Surface Water Management Plan

Responsible Person for this BMP	Responsible Department or Organization
Name: David Berkowitz	Dept. or Org.: Engineering
Title: City Engineer	Dept. Head: David Berkowitz
Phone: 763-755-5100	Phone:
E-mail: dberkowitz@ci.andover.mn.us	E-mail:

Educational components related to this BMP (description or number – optional):

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 5a-1

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/>	Public education & outreach	<input checked="" type="checkbox"/>	Construction site runoff controls
<input type="checkbox"/>	Public participation & involvement	<input checked="" type="checkbox"/>	Post-construction stormwater management
<input type="checkbox"/>	Illicit discharge detection & elimination	<input type="checkbox"/>	Pollution prevention/Good housekeeping

BMP Title:

Development and Implementation of Structural and/or Non-structural BMP's

BMP Description:

Currently, the City requires outlet structure stabilization within the standard specifications for construction including but not limited to tie-rods, silt fence, stabilization sodding or seeding and Class II or III rip-rap or other measures as appropriate. The City will continue to include this BMP during construction to reduce slope erosion and outlet failure. More detail on these measures is included in additional BMP's.

Measurable Goals:

- Number of structures stabilized

Timeline / Implementation Schedule:

- On-going

Specific Components & Notes (optional):

- Class II or III rip-rap
- Tie-rods
- Stabilization sodding or seeding
- Silt fence

Responsible Person for this BMP

Name: David Berkowitz

Title: City Engineer

Phone: 763-755-5100

E-mail: dberkowitz@ci.andover.mn.us

Responsible Department or Organization

Dept. or Org.: Engineering

Dept. Head: David Berkowitz

Phone:

E-mail:

Educational components related to this BMP (description or number – optional):

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 5.D

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/> Public education & outreach	<input type="checkbox"/> Construction site runoff controls
<input type="checkbox"/> Public participation & involvement	<input checked="" type="checkbox"/> Post-construction stormwater management
<input type="checkbox"/> Illicit discharge detection & elimination	<input type="checkbox"/> Pollution prevention/Good housekeeping

BMP Title:
Water Resources Management Plan

BMP Description:
The City of Andover has a Water Resource Management Plan (WRMP) to comply with State and Watershed District requirements, which identifies the specific components listed below. The WRMP was revised in March of 2005. The City will continue to update the plan as needed.

Measurable Goals:

- Completed WRMP for Andover

Timeline / Implementation Schedule:

- On-going

Specific Components & Notes (optional):

- Geology and soil types
- Water resources
- Sensitive resources
- Wetland inventory
- Water quality goals
- Land uses

Responsible Person for this BMP	Responsible Department or Organization
Name: David Berkowitz	Dept. or Org.: Engineering
Title: City Engineer	Dept. Head: David Berkowitz
Phone: 763-755-5100	Phone:
E-mail: dberkowitz@ci.andover.mn.us	E-mail:

Educational components related to this BMP (description or number – optional):

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 5.E

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/>	Public education & outreach	<input checked="" type="checkbox"/>	Construction site runoff controls
<input type="checkbox"/>	Public participation & involvement	<input checked="" type="checkbox"/>	Post-construction stormwater management
<input type="checkbox"/>	Illicit discharge detection & elimination	<input type="checkbox"/>	Pollution prevention/Good housekeeping

BMP Title:
Buffer Strip Ordinance

BMP Description:
The City of Andover currently operates under a Buffer Strip Ordinance requiring a 16½ foot vegetated buffer for wetland protection. Staff works with the local watershed districts to ensure proper compliance. Staff also educates residents about the importance of buffer strips along wetlands.

Measurable Goals:

- Number of inquiries about improvements proposed to be along wetlands
- Number of violations

Timeline / Implementation Schedule :

- On-going

Specific Components & Notes (optional):

- Buffer Strip Ordinance

Responsible Person for this BMP	Responsible Department or Organization
Name: David Berkowitz	Dept. or Org.: Engineering
Title: City Engineer	Dept. Head: David Berkowitz
Phone: 763-755-5100	Phone:
E-mail: dberkowitz@ci.andover.mn.us	E-mail:

Educational components related to this BMP (description or number – optional):

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 5.F

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/>	Public education & outreach	<input checked="" type="checkbox"/>	Construction site runoff controls
<input type="checkbox"/>	Public participation & involvement	<input checked="" type="checkbox"/>	Post-construction stormwater management
<input type="checkbox"/>	Illicit discharge detection & elimination	<input type="checkbox"/>	Pollution prevention/Good housekeeping

BMP Title:

Stabilization Sodding or Seeding

BMP Description:

Currently the City of Andover requires proper sodding or seeding consistent with the provisions within the Subdivision and Lawn Requirement Ordinances. The City will continue to enforce this requirement to ensure timely vegetative cover after soil disturbance to stabilize the surfaces and limit or prevent erosion and or deposition. City staff ensures that all new construction projects are properly vegetated during the formal "grading inspection," which is typically done prior to issuance of the Certificate of Occupancy (CO). Generally, CO's are not issued until this requirement has been satisfied.

Measurable Goals:

- Number of grading inspections
- Number of violations to sodding or seeding provision
- Number and types of enforcement actions

Timeline / Implementation Schedule:

- On-going

Specific Components & Notes (optional):

- Seed mix design consistent with State Department of Transportation Standard Specifications
- Growing season determination for proper seeding schedules
- Seed certification requirements
- Installation requirement

Responsible Person for this BMP

Name: Donald Olson

Title: Building Official

Phone: 763-755-5100

E-mail: dolson@ci.andover.mn.us

Responsible Department or Organization

Dept. or Org.: Building

Dept. Head: Donald Olson

Phone:

E-mail:

Educational components related to this BMP (description or number – optional):

BMP Description Sheet

MS4 Name: City of Andover

Uniqu Identifying Number: 5b-1, 5c-1

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/>	Public education & outreach	<input type="checkbox"/>	Construction site runoff controls
<input type="checkbox"/>	Public participation & involvement	<input checked="" type="checkbox"/>	Post-construction stormwater management
<input type="checkbox"/>	Illicit discharge detection & elimination	<input type="checkbox"/>	Pollution prevention/Good housekeeping

BMP Title:

Regulatory Mechanism to Address Post Construction Runoff from New Development and Redevelopment/Long-term Operation and Maintenance of BMP's

BMP Description:

Currently, the City has post-construction control regulations and policies in place through the City's Water Resource Management Plan (WRMP) and Coon Creek Watershed District (CCWD) and Lower Rum River Watershed Management Organization (LRRWMO) to ensure effective long-term water quality conditions. The City's WRMP is an enforceable policy approved by the City Council. Also, the City performs necessary inspections and maintenance to its public infrastructure to ensure their proper working condition and to help keep water bodies clean (see BMP's under MCM 6). Additional details will be provided in BMP 4a-1, 4b-1. The City has a storm water utility fee established to help fund repairs and improvements and procedures in place to ensure long-term operation and maintenance of BMP's installed to address post-construction runoff.

Measurable Goals:

- Water quality standards met through provisions of WRMP

Timeline / Implementation Schedule:

- On-going

Specific Components & Notes (optional):

- Water Resources Management Plan

Responsible Person for this BMP

Name: David Berkowitz
 Title: City Engineer
 Phone: 763-755-5100
 E-mail: dberkowitz@ci.andover.mn.us

Responsible Department or Organization

Dept. or Org.: Engineering
 Dept. Head: David Berkowitz
 Phone:
 E-mail:

Educational components related to this BMP (description or number – optional):

BMP Description Sheet

MS4 Name : City of Andover

Unique Identifying Number: 6.A.1

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/> Public education & outreach <input checked="" type="checkbox"/> Public participation & involvement <input checked="" type="checkbox"/> Illicit discharge detection & elimination	<input type="checkbox"/> Construction site runoff controls <input type="checkbox"/> Post-construction stormwater management <input checked="" type="checkbox"/> Pollution prevention/Good housekeeping
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BMP Title:

Park and Open Space Fertilizer/Chemical Application Licensing Program

BMP Description:

The City of Andover controls fertilizer and pesticide/herbicide applications. The City will ensure contracted employees are licensed.

Measurable Goals:

- Number of licensed contractors

Timeline / Implementation Schedule :

- On-going

Specific Components & Notes (optional):

- Fertilizer application training
- Pesticide/herbicide application training

Responsible Person for this BMP	Responsible Department or Organization
Name: Kevin Starr	Dept. or Org.: Public Works
Title: Parks Department Supervisor	Dept. Head: Frank Stone
Phone: 763-755-8118	Phone: 763-755-8118
E-mail: kstarr@ci.andover.mn.us	E-mail: fstone@ci.andover.mn.us

Educational components related to this BMP (description or number – optional):

- The audience or audiences involved: See "Description"
- Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior: See "Description"
- Activities used to reach educational goals for each audience: See "Specific Components"
- Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules: See "Responsible Person", "Responsible Department" and "Timeline"
- Available performance measures that can be used to determine success in reaching education goals: See "Measurable Goals"

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 6a-1

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/> Public education & outreach <input type="checkbox"/> Public participation & involvement <input checked="" type="checkbox"/> Illicit discharge detection & elimination	<input type="checkbox"/> Construction site runoff controls <input type="checkbox"/> Post-construction stormwater management <input checked="" type="checkbox"/> Pollution prevention/Good housekeeping
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BMP Title:

Municipal Operations and Maintenance Program

BMP Description:

The City of Andover presently provides fleet maintenance inspections and training. The Vehicle Maintenance Department annually inspects all of its fleet and provides necessary maintenance. Building maintenance is contracted. Hazardous materials are handled by a State Hazmat team. The City will continue training for its employees with regard to municipal operations as needed. More detail on the training component is covered in other BMP's.

Measurable Goals:

- Number of employees trained per year
- Number of vehicles inspected each year

Timeline / Implementation Schedule:

- On-going

Specific Components & Notes (optional):

- Automobile Maintenance Program
 - Vehicle inspection training
 - Vehicle washing training
- Spill clean-up training

Responsible Person for this BMP

Name: Frank Stone
 Title: Public Works Superintendent
 Phone: 763-755-8118
 E-mail: fstone@ci.andover.mn.us

Responsible Department or Organization

Dept. or Org.: Public Works
 Dept. Head: Frank Stone
 Phone:
 E-mail:

Educational components related to this BMP (description or number – optional):

- The audience or audiences involved: See "Description"
- Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior: See "Description"
- Activities used to reach educational goals for each audience: See "Specific Components"
- Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules: See "Responsible Person", "Responsible Department" and "Timeline"
- Available performance measures that can be used to determine success in reaching education goals: See "Measurable Goals"

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 6.A.3

Minimum Control Measures Addressed by This BMP

<input checked="" type="checkbox"/> Public education & outreach <input type="checkbox"/> Public participation & involvement <input checked="" type="checkbox"/> Illicit discharge detection & elimination	<input type="checkbox"/> Construction site runoff controls <input type="checkbox"/> Post-construction stormwater management <input checked="" type="checkbox"/> Pollution prevention/Good housekeeping
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BMP Title :
Storm Water System Maintenance Training Program

BMP Description:
The City of Andover presently provides storm water system maintenance training to its employees in the Public Works Utilities Department. The program focuses on the components listed below. The City will continue to train employees on proper maintenance of the storm sewer system.

<u>Measurable Goals:</u> <ul style="list-style-type: none"> • Number of employees trained per year 	<u>Timeline / Implementation Schedule:</u> <ul style="list-style-type: none"> • On-going
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Specific Components & Notes (optional):

- Parking Lot and Street Cleaning
- Storm Drain System Cleaning

Responsible Person for this BMP	Responsible Department or Organization
Name: Brian Kraabel	Dept. or Org.: Public Works
Title: Public Utilities Supervisor	Dept. Head: Frank Stone
Phone: 763-755-8118	Phone: 763-755-8118
E-mail: bkraabel@ci.andover.mn.us	E-mail: fstone@ci.andover.mn.us

Educational components related to this BMP (description or number – optional):

- The audience or audiences involved: See "Description"
- Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior: See "Description"
- Activities used to reach educational goals for each audience: See "Specific Components"
- Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules: See "Responsible Person", "Responsible Department" and "Timeline"
- Available performance measures that can be used to determine success in reaching education goals: See "Measurable Goals"

BMP D scription Sheet

MS4 Name: City of Andover

Unique Identifying Number: 6.A.4

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/> Public education & outreach	<input type="checkbox"/> Construction site runoff controls
<input type="checkbox"/> Public participation & involvement	<input type="checkbox"/> Post-construction stormwater management
<input checked="" type="checkbox"/> Illicit discharge detection & elimination	<input checked="" type="checkbox"/> Pollution prevention/Good housekeeping

BMP Title:

Automobile Maintenance Program

BMP Description:

The City of Andover currently operates an Automobile Maintenance Program, which requires inspection, corrective actions and employee training. The City plans to continue with the program and report the percentage of vehicles inspected and the number of employees trained in proper procedures.

Measurable Goals:

- Number of vehicles in fleet inspected each year
- Number of employees trained per year in vehicle maintenance and reporting procedures within the Fleet Maintenance Training Program

Timeline / Implementation Schedule:

- On-going
- Training done every other year

Specific Components & Notes (optional):

- Vehicle washing procedures
- Maintenance intervals
- Inspection requirements and checklists
- Documenting and reporting procedures
- Fleet and Building Inspection and Maintenance Training Program

Responsible Person for this BMP

Name: Frank Stone
 Title: Public Works Superintendent
 Phone: 763-755-8118
 E-mail: fstone@ci.andover.mn.us

Responsible Department or Organization

Dept. or Org.: Public Works
 Dept. Head: Frank Stone
 Phone:
 E-mail:

Educational components related to this BMP (description or number – optional):

- The audience or audiences involved: See "Description"
- Education goals for each audience in terms of increased awareness, increased understanding, acquired skills, and/or desired changes in behavior: See "Description"
- Activities used to reach educational goals for each audience: See "Specific Components"
- Activity implementation plans, including responsible department in charge, entities responsible for given activities, and schedules: See "Responsible Person", "Responsible Department" and "Timeline"
- Available performance measures that can be used to determine success in reaching education goals: See "Measurable Goals"

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 6a-2

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/>	Public education & outreach	<input type="checkbox"/>	Construction site runoff controls
<input type="checkbox"/>	Public participation & involvement	<input type="checkbox"/>	Post-construction stormwater management
<input checked="" type="checkbox"/>	Illicit discharge detection & elimination	<input checked="" type="checkbox"/>	Pollution prevention/Good housekeeping

BMP Title:

Parking Lot and Street Cleaning

BMP Description:

The City of Andover currently uses three City owned mechanical street sweepers to remove sediment and debris from the road surface within the jurisdiction and minimize the amount received by the storm sewer system. The City plans to continue to use the current system of street and City parking lot sweeping which involves training, storage, disposal and sweeping schedules.

Measurable Goals:

- Number of employees trained per year
- Number of lane miles swept
- Number of parking lots swept

Timeline / Implementation Schedule:

- On-going
- All city streets swept twice each year

Specific Components & Notes (optional):

- Sweeping schedule
- Location of disposal pile
- Sweeper maintenance schedule

Responsible Person for this BMP

Name: Irwin Russell
 Title: Streets Dept. Supervisor
 Phone: 763-755-8118
 E-mail: irussell@ci.andover.mn.us

Responsible Department or Organization

Dept. or Org.: Public Works
 Dept. Head: Frank Stone
 Phone: 763-755-8118
 E-mail: fstone@ci.andover.mn.us

Educational components related to this BMP (description or number – optional):

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 6.B.2

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/> Public education & outreach <input type="checkbox"/> Public participation & involvement <input checked="" type="checkbox"/> Illicit discharge detection & elimination	<input type="checkbox"/> Construction site runoff controls <input type="checkbox"/> Post-construction stormwater management <input checked="" type="checkbox"/> Pollution prevention/Good housekeeping
--	--

BMP Title :

Storm Drain System Cleaning

BMP Description:

The City of Andover currently operates a sewer cleaning truck (Vac truck) to clean out catchbasin sumps and remove debris from the storm sewer lines as needed. The City is broken down into zones and they are done on a rotating basis. The City will ensure that at least 20% will be cleaned out each year.

Measurable Goals:

- Number of sumps cleaned each year
- Miles of storm sewer pipe cleaned each year

Timeline / Implementation Schedule:

- On-going

Specific Components & Notes (optional):

- Storm Sewer System Maintenance Training Program
- Storm sewer and sump cleaning schedule
- Storm sewer system map
- Sewer cleaning truck maintenance schedule
- Storm sewer inspection program

Responsible Person for this BMP

Name: Brian Kraabel
 Title: Public Utilities Supervisor
 Phone: 763-755-8118
 E-mail: bkraabel@ci.andover.mn.us

Responsible Department or Organization

Dept. or Org.: Public Works
 Dept. Head: Frank Stone
 Phone: 763-755-8118
 E-mail: fstone@ci.andover.mn.us

Educational components related to this BMP (description or number – optional):

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 6.B.3

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/> Public education & outreach	<input type="checkbox"/> Construction site runoff controls
<input type="checkbox"/> Public participation & involvement	<input type="checkbox"/> Post-construction stormwater management
<input checked="" type="checkbox"/> Illicit discharge detection & elimination	<input checked="" type="checkbox"/> Pollution prevention/Good housekeeping

BMP Title:

Road Salt Materials Management Program

BMP Description:

The City of Andover will develop a program to track the amount of road salt applied during an annual reporting cycle. The City will evaluate the application rates and compare them to industry standards and adjust the applications as needed.

Measurable Goals:

- Amount of road salt applied each year
- Number of employees trained per year in road salt management and application rates

Timeline / Implementation Schedule:

- On-going

Specific Components & Notes (optional):

- Storm Sewer System Maintenance Training Program
- Documentation of the amount of road salt applied at the end of each day

Responsible Person for this BMP	Responsible Department or Organization
Name: Irwin Russell	Dept. or Org.: Public Works
Title: Streets Dept. Supervisor	Dept. Head: Frank Stone
Phone: 763-755-8118	Phone: 763-755-8118
E-mail: irussell@ci.andover.mn.us	E-mail: fstone@ci.andover.mn.us

Educational components related to this BMP (description or number – optional):

BMP Description Sheet

MS4 Name: City of Andover

Unigu Identifying Number: 6b-2 through 6b-7

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/> Public education & outreach <input type="checkbox"/> Public participation & involvement <input checked="" type="checkbox"/> Illicit discharge detection & elimination	<input type="checkbox"/> Construction site runoff controls <input type="checkbox"/> Post-construction stormwater management <input checked="" type="checkbox"/> Pollution prevention/Good housekeeping
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BMP Title :

Inspection of All Structural Pollution Control Devices/Inspection of a Minimum of 20% of Outfalls, Sediment Basins and Ponds Each Year on a Rotating Basis/Annual Inspection of All Exposed Stockpile, Storage and Material Handling Areas/Inspection Follow-Up/Record Recording and Retention of All Inspections and Responses to the Inspections/Evaluation of Inspections Frequency

BMP Description:

The City of Andover will inspect at a minimum 20% of the outfalls, sediment basins and ponds and pollution control devices such as trap manholes, grit chambers, sumps, floatable skimmers, traps and separators each year. The City will also inspect all exposed stockpile, storage and material handling areas on an annual basis. The City is broken down into zones and they are done on a rotating basis. The City will adjust the inspections schedules as needed depending on the results. Accurate, detailed records will be kept consistent with permit requirements.

Measurable Goals:

- Number of municipal utilities inspected each year

Timeline / Implementation Schedule:

- On-going

Specific Components & Notes (optional):

- Outfall, sediment basins and pond inspection form
- Pollution control device inspection form
- Storm sewer system map
- Storm Water System Maintenance Training Program
- Documented photos of inspections
- Detailed record-keeping

Responsible Person for this BMP

Name: Brian Kraabel
 Title: Public Utilities Supervisor
 Phone: 763-755-8118
 E-mail: bkraabel@ci.andover.mn.us

Responsible Department or Organization

Dept. or Org.: Public Works
 Dept. Head: Frank Stone
 Phone: 763-755-8118
 E-mail: fstone@ci.andover.mn.us

Educational components related to this BMP (description or number – optional):

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 6.C.1

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/> Public education & outreach	<input type="checkbox"/> Construction site runoff controls
<input type="checkbox"/> Public participation & involvement	<input type="checkbox"/> Post-construction stormwater management
<input checked="" type="checkbox"/> Illicit discharge detection & elimination	<input checked="" type="checkbox"/> Pollution prevention/Good housekeeping

BMP Title :
Wellhead Protection Plan

BMP Description:
The City of Andover is currently in the process of preparing a Wellhead Protection Plan under Project # 03-27 (Wellhead Protection Update/Andover Water System) to protect areas identified as vulnerable. The plan will identify BMP's to prevent high vulnerable wells from possible wellhead contaminants. The City has a map of these sources as well. Finally, the City will review and consider utilizing the Minnesota Department of Health (MDH) guidance when preparing this plan.

<p><u>Measurable Goals:</u></p> <ul style="list-style-type: none"> • Adequate protection of drinking water from storm water discharges 	<p><u>Timeline / Implementation Schedule :</u></p> <ul style="list-style-type: none"> • Wellhead Protection Plan to be completed by October 2007
--	--

Specific Components & Notes (optional):

Responsible Person for this BMP	Responsible Department or Organization
Name: David Berkowitz	Dept. or Org.: Engineering
Title: City Engineer	Dept. Head: David Berkowitz
Phone: 763-755-5100	Phone:
E-mail: dberkowitz@ci.andover.mn.us	E-mail:

Educational components related to this BMP (description or number – optional):

BMP Description Sheet

MS4 Name: City of Andover

Unique Identifying Number: 6.C.2

Minimum Control Measures Addressed by This BMP

<input type="checkbox"/>	Public education & outreach	<input type="checkbox"/>	Construction site runoff controls
<input type="checkbox"/>	Public participation & involvement	<input type="checkbox"/>	Post-construction stormwater management
<input checked="" type="checkbox"/>	Illicit discharge detection & elimination	<input checked="" type="checkbox"/>	Pollution prevention/Good housekeeping

BMP Title:

Nondegradation for Selected MS4s/Discharge to Waters with Restricted Discharges Assessment and Proposed Changes

BMP Description:

The City of Andover will prepare a loading assessment, a nondegradation report, follow the public participation requirements, meet with the MPCA, make necessary modifications to the SWPPP and follow all of the necessary steps to meet the deadlines and requirements set forth under Part X. Appendix D and Part XI Appendix E of the General Permit.

The City will follow the provisions set forth under part IX.B.2.c of the permit as well, as it has a water body (the Rum River) with restricted discharges. The City will work with the PCA as needed. This requirement will be met through the non-degradation process.

Measurable Goals:

- Satisfy the requirements set forth by the General Permit and MPCA
- Continue to educate all audiences and improve the quality and lower the quantity of storm water runoff

Timeline / Implementation Schedule:

- The City will prepare and submit the required materials listed under Part X. Appendix D, item E by December 1, 2007
- The City will respond to and coordinate with the MPCA, during the review, notice and preliminary determination processes
- The City will modify the SWPPP, as per the approved modifications to meet the permit requirements in a timely manner
- Discharge to Waters with Restricted Discharges Assessment and Proposed Changes by December 1, 2007

Specific Components & Notes (optional):

Responsible Person for this BMP

Name: David Berkowitz

Title: City Engineer

Phone: 763-755-5100

E-mail: dberkowitz@ci.andover.mn.us

Responsible Department or Organization

Dept. or Org.: Engineering

Dept. Head: David Berkowitz

Phone:

E-mail:

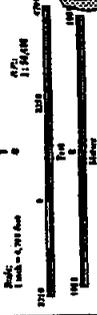
Educational components related to this BMP (description or number – optional):

KAMERON, I HOUND TUB 10%. ADDITIONAL IMPROVEMENTS

NOTE: CREWMO D.B.N.T. INCLUDES. RURAL RESERVE

**City of Anderson, Minnesota
Firearm/Bow
Discharge Map**

This document is not a legally recorded map or survey used to establish boundaries or used as evidence. This map is a compilation of records and information from various public sources. The City reserves the right to amend this map at any time without notice.



PROHIBITED ZONE

* The discharge of firearms and bows are prohibited

RESTRICTED ZONE

* Ten (10) Acres (minimum) required for discharge of firearms. No City permit required.

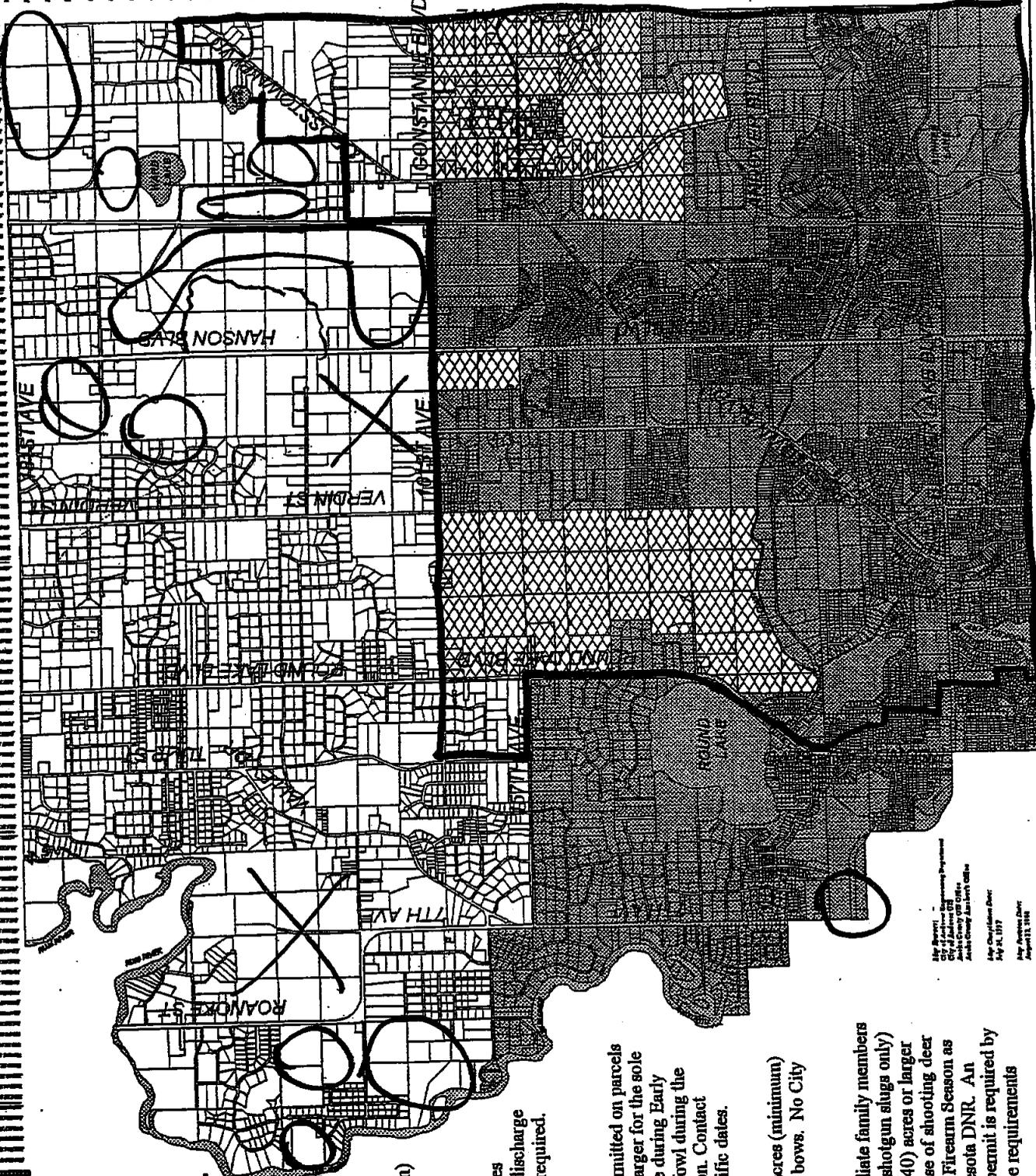
* Two and a half (2.5) Acres (minimum) required for discharge of bow. No City permit required.

RESTRICTED ZONE

* Discharge of firearms permitted on parcels of land ten (10) acres or larger for the sole purpose of shooting geese during Early Goose Season and waterfowl during the Regular Waterfowl Season. Contact Minnesota DNR for specific dates. No City permit required.

* Two and one half (2.5) acres (minimum) required for discharge of bows. No City permit required.

* Land owners and immediate family members may discharge firearms (shotgun slugs only) on parcels of land forty (40) acres or larger in size for the sole purpose of shooting deer during the Regular Deer Firearm Season as established by the Minnesota DNR. An individual deer hunting permit is required by the City and all ordinance requirements shall be met.



City of Anderson, Minnesota
Engineering Department
City of Anderson, MN
Anderson, MN 55003
July 11, 2017
Map Checked By: [Name]
Prepared By: [Name]

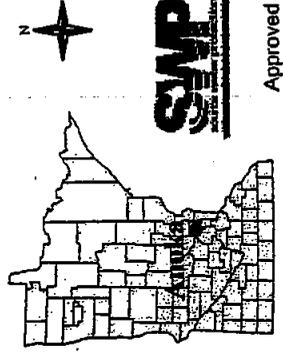
Andover Central

*Drinking Water Supply
Management Area
(DWSMA) MN-00378
10 year Time of Travel*

- Public Water Supply Well
- Primary
- Emergency Response Area
- Wellhead Protection Area (WHPA)
- DWSMA
- DWSMA Vulnerability Boundary

- H = High Vulnerability
- M = Moderate Vulnerability
- L = Low Vulnerability

0.2 0 0.2 Miles



Approved March 14, 2006

R 24 W

R 24 W

T 32 N

T 32 N



Appendix H
Minnesota State History/Architecture/Archeological Inventory

History/Architecture Inventory

PROPERTY NAME	ADDRESS	Twp	Range	Sec	Quarters	USGS	Report	NRHP	CEF	DOE	Inventory Number
COUNTY: Anoka											
CITY/TOWNSHIP: Andover											
St. Patrick's Church	xxx 181st Ave.	32	24	5	NW-NW-NE	Cedar					AN-ANC-001
J. C. Clark House		32	24	3	NE-NE-NW	Cedar					AN-ANC-002
Constance Historic District	off Co. Hwy. 18, Co. Hwy. 20 & Co. Hwy. 60	32	24	13		Cedar					AN-ANC-003
Constance Historic District		32	24	14		Cedar					AN-ANC-003
Porter Kelsey House	14853 7th Ave. N.	32	24	30	NW-NW-NE	Anoka		Y			AN-ANC-004
Eljiah Sabin Rogers House	off Co. Hwy. 9	32	24	29	NE-SE-SW	Coon Rapids					AN-ANC-005
District No. 8 School	off Co. Hwy. 16	32	24	26	SW-SW-NE	Coon Rapids					AN-ANC-006
M.R. Eaters' House and Store		32	24	26	SE-SW-NE	Coon Rapids					AN-ANC-007
P.M. Gory House	off Twp. Rd.	32	24	25	NW-SE-SW	Coon Rapids					AN-ANC-008
Adolphson Round Barn	off Co. Hwy. 116 & Co. Hwy. 16	32	24	32	SW-SE-NE	Coon Rapids					AN-ANC-009
Constance School	off Co. Hwy. 18 & Co. Hwy. 20 & Co. Hwy. 60	32	24	14	SE-SE-NE	Cedar					AN-ANC-011
Constance Post Office		32	24	13	SW-SW-NW	Cedar					AN-ANC-012
Constance Church	off Co. Hwy. 18, Co. Hwy. 20 & Co. Hwy. 60	32	24	14	NE-NE-SE	Cedar					AN-ANC-013
CITY/TOWNSHIP: Anoka											
First State Asylum for the Insane Historic District	3300 4th Ave. N.	32	24	31	S-SW	Anoka					AN-AKC-047

Archaeological Site Locations

Site Number	Site Name	Twp.	Range	Sec.	Quarter Sections	Acres	Phase	Site Description	Tradition	Context	Reports	NR	CEF	DOE
21AN0006		32	24	20	SW-SW	0	1,2	EW, CEM	W-2		AN-92-02			
21AN0099		32	24	28	SE-SW-SW-NE	1	1	LS						
21AN0101		32	24	28	NE-SE-NE-SE, NW-SW-NW-SW	2	1	AS						
21AN0147	Rum River Terrace	32	24	29		2	1	AS						
21AN0148	Pratt	32	25	13	NW-SE-NW	2.5	1	AS	W-1		MULT-98-13			
21ANa		32	25	13	SE-SW-NE, NE-NW- SE	0.5	1	SR, AS			MULT-98-13			
		32	24	26	S	0	1	EW, CEM	W-2					
		32	24	26	S	0	1	EW, CEM	W-2					

Minnesota SHPO Architecture-History Database

This list describes the variables in the SHPO's *Architecture-History Database*

Table – Historic Inventory

INVENTORY NUMBER [Inventnum] - Character Field, 12 characters

The inventory number is a trinomial code identifying the county, civil subdivision, and the individual property number. The county code consists of two letters representing the county. The civil subdivision code consists of three characters that identify the city or township. The final part of the code is the property number. Each property within a particular civil subdivision receives a unique number. Numbers begin with 001 and are numbered sequentially as they are inventoried. In a few of the larger cities in Minnesota, a block of numbers has been reserved for particular city districts. All individual properties, including historic districts must have inventory numbers.

This field is designated as the **key field** for this dataset. The Inventory Number field is used as the primary link for all other tables which make up the Minnesota SHPO Architecture-History Database.

COUNTY [County] - Character Field, 20 characters

This information refers to the name of the county in which the property is located. If a property extends across more than one county, choose the name of the county where the property has a street address or where the property is centrally located. The name that appears in this category must match the two-letter reference initials in the inventory number.

PIN NUMBER [PIN] - Character Field, 35 characters

The property identification number is assigned by county recorders' offices, and is the unique identifier used by local government to track land information records. Cities and townships often have this information available, but prior to ca. 1990, contractors rarely recorded a PIN on SHPO Inventory Forms. Since 1990 contractors have been encouraged to record this information in order that building information can be more easily accessed by phone and computer.

PROPERTY NAME [Propname] - Character Field, 65 characters

The property name refers to the historic name of the property. Generally, the name will reflect the building's historic use, significance, or original owner. If the historic name of the property is unknown, a simple functional name can be used to name the property (e.g. house, commercial building, depot, or warehouse). If a property has been razed, indicate by adding (razed) after the property name.

ADDRESS [Address] - Character Field, 63 characters

This is the address of the property. Place the property's street number and name, followed by abbreviations for north, south, east, and west (e.g., 595 Girard Ave. N.) in this field. Abbreviations for northeast, southeast, northwest, and southwest are not followed by a period (e.g., 675 Johnson St. SE). For a property with a street name but no number, use xxx or 2xx for the number then the appropriate street name. For small towns and rural properties that do not have a street number, include the name of the nearby road. Identify roads as they are marked on plat maps. The address of a bridge should identify the spanned feature (e.g., Mn. Hwy. 23 over Kanaranzi Creek). Be as specific as possible. See examples below:

1. 5xx Girard Ave. N.
2. NE corner Johnson St. & Girard Ave. N.

Examples of commonly abbreviated properties:

I-35W = interstate highway

Mn. Hwy. = state, trunk highway

Pkwy. = parkway

Ave. = avenue

Dr. = drive

U.S. Hwy. = national, trunk highway

Co. Rd. = county road

Bld. = boulevard

St. = street

Rd. = road

PROPERTY CATEGORY [Propcat] - Character Field, 35 characters

PROPERTY TYPE [Proptype] - Character Field, 25 characters

PROPCAT refers to the property's thematic category (see choices below), while PROPTYPE refers more

to the function of property. "PROPTYPE" refers to the property type categories identified in the SHPO's historic context documents. General terms were used when ever possible. In a few cases, certain terms (e.g., barn and bridge) may be qualified with a descriptive term in parentheses, e.g. barn (round) or bridge (steel truss). A property that does not clearly fit into an identified proptype will be listed as "property". For instance, a "custom house" will be listed as propcat = "government" and proptype= "property". Always use the most descriptive property type term when it is available. Specific property types can occur in multiple property categories (e.g. warden's residence will be list as propcat = "government" and proptype= "residence").

<u>Property Category</u>	<u>Property Type</u>
Domestic	<ul style="list-style-type: none"> property single dwelling <ul style="list-style-type: none"> row house residence multiple dwelling <ul style="list-style-type: none"> duplex apartment outbuilding public housing institutional housing <ul style="list-style-type: none"> poor house orphanage
Commerce	<ul style="list-style-type: none"> property office building professional building organizational building financial institution <ul style="list-style-type: none"> bank commercial building <ul style="list-style-type: none"> lumber yard blacksmith shop department store general store trading post hotel <ul style="list-style-type: none"> motel inn restaurant <ul style="list-style-type: none"> bar warehouse

Property Category

Property Type

Industry

property
manufacturing facility
 lumber mill
 factory
extractive facility
 quarry
 mine
research building
waterworks
 water tower
 dam
energy facility
 power plant
communications facility

Social

property
meeting hall
clubhouse
civic

Government

property
capitol
city hall
 township hall
correctional facility
 police station
 jail
fire station
governmental office
post office
public works
courthouse

Education

property
school
college/university
 library
 classroom
 dormitory
 gymnasium

Religion

property
church
chapel
synagogue
mosque
shrine
parsonage (including rectory)
convent

Funerary

property
cemetery
mortuary

Transportation

property
rail related
 railroad
 train depot
air related
 airplane hangar
 airport
water related
 lighthouse
 boat
 ship
 shipwreck
 shipyard
 pier
 dock
 dam/lock
road related
 military road
 bus depot
 trail
 parkway
 highway
 parking lot
 service station
 garage
stage related
bridge

HISTORIC CONTEXT [Histcontxt] - Character Field, 60 characters
List the SHPO's historic context of the property.

Initial U.S. Presence	1819-1837
Early Agriculture	1840-1870
St. Croix Lumbering	1830's-1900's
Indian Communities	1837-1934
Railroads & Agriculture	1870-1940
Northern Lumbering	1870-1930
Iron Ore Industry	1880's-1945
Tourism & Recreation	1870-1945
Urban Centers	1870-1940

NRHP [NRHP] - Character Field, 1 character

This variable refers to whether or not a property is listed on the National Register of Historic Places (NRHP). Answer "Y" for yes or leave blank.

CEF [CEF] - Character Field, 1 character

This variable refers to whether or not a property is considered eligible for the NRHP. Answer "Y" for yes or leave blank.

SEF [SEF] - Character Field, 1 character

This variable refers to whether or not a property is a staff eligible for the NRHP. Answer "Y" for yes or leave blank.

DOE [DOE] - Character Field, 1 character

This variable refers to whether or not a property has been determined eligible for the NRPH by the National Register staff. Answer "Y" for yes or leave blank.

SURVEY DATE [DATESURVEY] - Date Field

Indicate the month, day, and year of the first time the property was surveyed and inventoried. If only the month and year are provided, the default day will be recorded as the first of the month. If only a year is indicated, 01/01/xx will be used for a Winter picture and 07/01/xx will be used for a summer picture.

LOCATION CONFIDENCE [Locconf] - Character Field, 1 character

The following codes should be used to gauge the confidence in locating the property on a USGS map:

- 1 - specific location on USGS map
- 2 - location description to 1/4, 1/4-level in rural areas or block-level in urban areas
(unsure of exact location)
- 3 - located within 1/4, 1/4-level, but best guess of several alternatives
- 4 - partial legal description or landmark description
- 5 - no legal description, but informant reporting/rumor/hearsay

ACRES [Acres] - Numeric Field, 8 characters, 1 decimal

Record the number of acres associated with the property. This value should be recorded to one decimal place (e.g., 1.5 acres) if possible. For properties less than one acre, use the following arbitrary standards:

- 0.2 ac. for a house
- 0.4 ac. for a double lot
- 2 ac. for a farmstead; larger farmsteads will have larger acreage

PHOTOS [Photos] - Character Field, 75 Characters

Indicate MHS all photo numbers associated with the property, from all surveys. Only photo numbers from the MHS Audio-Visual Library are used.

ENTRY DATE [Entry_DT] - Date Field

Indicate the month, day, and year of the first time the property was first entered into the database.

UPDATE DATE [Update_DT] - Date Field

Indicate the month, day, and year of the information was last updated.

AWAITING FORM [Need_Form] - Yes/No Field

Properties for which inventory numbers have been assigned but SHPO is waiting to receive an inventory form.

CONTACT [Contact] - Character Field, 50 characters

Person requesting inventory number prior to submitting form.

CONTACT COMPANY [ContComp] - Character Field, 50 characters

Firm requesting inventory number prior to submitting form.

DATE REQUESTED [Date_Req] - Date Field

Date of request for inventory number.

TABLE - CITY/TOWNSHIP

INVENTORY NUMBER [Inventnum] - Character Field, 12 characters

The inventory number is a trinomial code identifying the county, civil subdivision, and the individual property number. The county code consists of two letters representing the county. The civil subdivision code consists of three characters that identify the city or township. The final part of the code is the property number. Each property within a particular civil subdivision receives a unique number. Numbers begin with 001 and are numbered sequentially as they are inventoried. In a few of the larger cities in Minnesota, a block of numbers has been reserved for particular city districts. All individual properties, including historic districts must have inventory numbers.

CITY/TOWNSHIP [CityTwp] - Character Field, 40 characters

This refers to a civil subdivision, such as an incorporated city or township. If the property is located within an incorporated city, use the name of the city. If the property is located outside an incorporated city or village, the name of the township in which the property is located should appear. Project areas located in unincorporated areas should be cited as "Unorganized Territory."

TABLE – ARCHITECTURAL STYLE

INVENTORY NUMBER [Inventnum] - Character Field, 12 characters

The inventory number is a trinomial code identifying the county, civil subdivision, and the individual property number. The county code consists of two letters representing the county. The civil subdivision code consists of three characters that identify the city or township. The final part of the code is the property number. Each property within a particular civil subdivision receives a unique number. Numbers begin with 001 and are numbered sequentially as they are inventoried. In a few of the larger cities in Minnesota, a block of numbers has been reserved for particular city districts. All individual properties, including historic districts must have inventory numbers.

STYLE [Style] - Character Field , 50 characters

Indicate the each style of the property. Use the following nomenclature derived from Bulletin 16A (How to Complete National Register Documentation Forms, pp. 25-26):

Log	Beaux Arts
Subsistence (all non-log early settlement structures)	Colonial Revival
Federal	Classical Revival
Georgian Revival	Tudor Revival
Greek Revival	Spanish Colonial Revival/Mission
Gothic Revival	Italian Renaissance
Italianate	Prairie School
Italian Villa	American Four-Square
Exotic Revival	Bungalow
Octagon Mode	NPS Rustic Architecture
	Craftsman
French Second Empire	Moderne
Eastlake	Art Deco
Stick	Rustic (field stone, log)
Shingle	NPS Rustic Architecture
Queen Anne	International
Romanesque Revival	
Richardsonian Romanesque	

PRIMARY [Primary] – Yes/No Field

Indicates the primary style of the property.

SECONDARY [Secondary] – Yes/No Field

Indicates the secondary style of the property if present.

ELEMENT [Element] – Yes/No Field

Indicates the presence of a style element which is neither primary nor secondary the property.

TABLE – ARCHITECT/BUILDER/ENGINEER

INVENTORY NUMBER [Inventum] - Character Field, 12 characters

The inventory number is a trinomial code identifying the county, civil subdivision, and the individual property number. The county code consists of two letters representing the county. The civil subdivision code consists of three characters that identify the city or township. The final part of the code is the property number. Each property within a particular civil subdivision receives a unique number. Numbers begin with 001 and are numbered sequentially as they are inventoried. In a few of the larger cities in Minnesota, a block of numbers has been reserved for particular city districts. All individual properties, including historic districts must have inventory numbers.

ARCHBUILDENG [ArchBuildEng Name] - Character Field, 72 characters

This variable refers to architect/designer, engineer, or builder of the property. If the property was created from an institutional or firm effort (e.g., WPA, DNR or Northern Pacific), use the institution or firm name.

ARCHITECT [Architect] – Yes/No Field

Enter a Y if the name entered in the **ARCHBUILDENG FIELD** refers to an architect or architectural firm.

BUILDER [Builder] – Yes/No Field

Enter a Y if the name entered in the **ARCHBUILDENG FIELD** refers to a builder or builder firm.

ENGINEER [Engineer] – Yes/No Field

Enter a Y if the name entered in the **ARCHBUILDENG FIELD** refers to an engineer or engineering firm.

TABLE – DATES

INVENTORY NUMBER [Inventnum] - Character Field, 12 characters

The inventory number is a trinomial code identifying the county, civil subdivision, and the individual property number. The county code consists of two letters representing the county. The civil subdivision code consists of three characters that identify the city or township. The final part of the code is the property number. Each property within a particular civil subdivision receives a unique number. Numbers begin with 001 and are numbered sequentially as they are inventoried. In a few of the larger cities in Minnesota, a block of numbers has been reserved for particular city districts. All individual properties, including historic districts must have inventory numbers.

PROPERTY DATE [Property Date] - Numeric Field

Indicate the year of the event.

CIRCA [Circa] – Yes/No Field

Enter Y if the event date is a circa date.

PRE [Pre] – Yes/No Field

Enter Y if the event date is known to pre-date the event but no absolute or circa date is known.

POST [Post] – Yes/No Field

Enter Y if the event date is known to post-date the event but no absolute or circa date is known.

CONSTRUCTION [Construction] – Yes/No Field

Enter Y if the event refers to the construction of the property.

DEMOLITION [Demolition] – Yes/No Field

Enter Y if the event refers to the demolition or destruction of the property.

ADDITION [Addition] – Yes/No Field

Enter Y if the event refers to the construction of an addition to the property.

MOVE [Move] – Yes/No Field

Enter Y if the event refers to the moving of the structure.

MAJOR ALTERATION [Alteration] – Yes/No Field

Enter Y if the event refers to a major alteration to the property.

DATE BUILT [DATEBUILT] - Character Field, 20 characters

Indicate the year the building was constructed or developed (e.g., 1870). This is the original coded field for the database. The above date and date description fields replaces this original field. Dates have not been converted for most previously coded properties at this time. The following entry styles were used in the original coding use:

1872 = absolute date

ca. 1870 = approximate dates

1870s = approximate decade

year built/major construction = major reconstruction on a building

first year-last year" = complex properties with multiple buildings

TABLE – TOWNSHIP/RANGE/SECTION/USGS QUADRANGLE

INVENTORY NUMBER [Inventnum] - Character Field, 12 characters

The inventory number is a trinomial code identifying the county, civil subdivision, and the individual property number. The county code consists of two letters representing the county. The civil subdivision code consists of three characters that identify the city or township. The final part of the code is the property number. Each property within a particular civil subdivision receives a unique number. Numbers begin with 001 and are numbered sequentially as they are inventoried. In a few of the larger cities in Minnesota, a block of numbers has been reserved for particular city districts. All individual properties, including historic districts must have inventory numbers.

TOWNSHIP [Township] - Numeric Field

RANGE [Range] - Numeric Field

EASTWEST [Eastwest] - Character Field, 1 character

This information locates a property spatially and must be filled out for each inventoried property. A Township is identified by a number *and* direction, such as T108N. In Minnesota, all townships are north, so only the number will be input (e.g., "108"). Range is identified by a number *and* direction, such as R25W. An east-west designation is critical for Range in Minnesota. Enter only the number (e.g., "25") in the "RANGE" field and either "E" or "W" in the "EASTWEST" field to indicate east or west, respectively.

SECTION [Section] - Numeric Field

Listed by section number the location of each property (e.g., "15"). For properties located in multiple sections, (i.e. landscape features, historic trails, state parks etc.) list each section occurrence as a separate record. For instance, if a geographic feature is located in three sections, there will be three records for that property. To indicate that a property has multiple records, place the designation (1/3, 2/3 or 3/3) in the property name field to indicate which record it represents. For example, a landscape feature in Sections 15 & 16 would be referred to in two separate records as "T120N, R25W, Section 15" *and* "T120N, R25W, Section 16.

QUARTER SECTIONS [Quarters] - Character Field, 18 characters

This category refers to the portion of a Section in which a property is located. Be as specific as possible to the 1/4, 1/4, 1/4-level. For example, a small property (e.g., a building) may be "NE-NE-NE" (i.e., NE 1/4 of the NE 1/4 of the NE 1/4), whereas a large property (e.g., a farmstead) only may be "NE-NE." The smallest quarter designation must encompass the entire property. Since oddly shaped sections occur, one of the following methods should be employed:

- (1) align the template at the SE corner, if the section resembles a 1 x 1 mile square
- (2) otherwise, manually subdivide the oddly shaped section into quarters and estimate to the finest level possible

QTR-QTR-QTR [QRTQRTQRT]- Character Field, 9 characters

QTR-QTR [QRTQRT] - Character field, 9 characters

QTR [QTR] - Character Field, 9 characters

For purposes of data retrieval the quarters variable is divided into 10, 40 and 160 acre cells. The QTR field refers to the 160 acre cell the property is located in, the QTRQTR field refers to the 40 cell, and the QTRQTRQTR field represents the 10 acre cell where the property is located.

USGS QUAD [USGS]- Character Field, 20 characters

The USGS 7.5 quadrangle map(s) where the property is located. For properties located on multiple USGS maps, identify the map where the UTM is located.

TABLE - UTM

INVENTORY NUMBER [Inventnum] - Character Field, 12 characters

The inventory number is a trinomial code identifying the county, civil subdivision, and the individual property number. The county code consists of two letters representing the county. The civil subdivision code consists of three characters that identify the city or township. The final part of the code is the property number. Each property within a particular civil subdivision receives a unique number. Numbers begin with 001 and are numbered sequentially as they are inventoried. In a few of the larger cities in Minnesota, a block of numbers has been reserved for particular city districts. All individual properties, including historic districts must have inventory numbers.

UTM ZONE [UTMzone] - Numeric Field

EASTING [Easting] - Numeric Field

NORTHING [Northing] - Numeric Field

These variables refer to the Universal Transverse Mercator (UTM) coordinate system for locating points on a map. UTM's must be determined for each inventoried property. Instructions for determining a UTM can be obtained by referring to National Register Bulletin 16A, How to Complete the National Register Documentation Forms, pp. 80-81.

XEASTING [XEasting] - Numeric Field

XNORTHING [XNorthing] - Numeric Field

These two variables are used to plot the location of individual properties within Geographic Information Systems (GIS). Since Minnesota is located with UTM Zones 14, 15 and 16, the convention is to process Zones 14 and 16 locations into Extended Zone 15 so the properties can be more easily plotted.

DATUM [Datum] - Character Field, 4characters

This four-digit number refers to the date when the US Geological Survey (USGS) UTM grid-datum was established. This number is either 1927 or 1983 and is found in the lower left corner of the map. All UTM's determined by hand will use the 1927 grid. When digitizing from a USGS map most maps use the 1927 grid, but a few new maps have both the 1927 and 1983 grids. If a GPS (Global Positioning System) is used, they are calibrated to the 1983 grid.

TABLE -- REPORTS

INVENTORY NUMBER [Inventnum] - Character Field, 12 characters

The inventory number is a trinomial code identifying the county, civil subdivision, and the individual property number. The county code consists of two letters representing the county. The civil subdivision code consists of three characters that identify the city or township. The final part of the code is the property number. Each property within a particular civil subdivision receives a unique number. Numbers begin with 001 and are numbered sequentially as they are inventoried. In a few of the larger cities in Minnesota, a block of numbers has been reserved for particular city districts. All individual properties, including historic districts must have inventory numbers.

REPORT NUMBER [Reportnum] - Character Field, 28 characters

This variable refers to the report number given to the report where the property was identified or evaluated. The number begins with a two-letter county code, followed by the last two digits of the report year. The final number is assigned sequentially and is based on the number of reports filed for a particular county in a particular year. An H is added to the end to indicate that the report is a history/architecture report. A report that discusses properties in multiple counties (e.g., pipeline, highway, or thematic survey projects) is given an "xx" designation in the county code.

TABLE – REVIEW AND COMPLIANCE

INVENTORY NUMBER [Inventnum] - Character Field, 12 characters

The inventory number is a trinomial code identifying the county, civil subdivision, and the individual property number. The county code consists of two letters representing the county. The civil subdivision code consists of three characters that identify the city or township. The final part of the code is the property number. Each property within a particular civil subdivision receives a unique number. Numbers begin with 001 and are numbered sequentially as they are inventoried. In a few of the larger cities in Minnesota, a block of numbers has been reserved for particular city districts. All individual properties, including historic districts must have inventory numbers.

RC NUMBER [RCnumber] - Character Field, 10 characters

The review and compliance number refers to a review conducted by the SHPO office. This number also has been called the MHS Referral File Number, or SHPO Number (e.g. A-xxx, DD-xxx, 1990-xxxx). This reference number is given in the SHPO office when a federal, state, or local review is initiated.

Minnesota SHPO Archaeological Database

This list describes all variables in the SHPO's archaeological database by Microsoft Access Database tables.

MAIN TABLE (ARCHAEOLOGY)

COUNTY [COUNTY] - Character Field, 20 characters

This information refers to the name of the county in which the site is located. If a single site extends across more than one county, the site will be listed in the database under both counties; however, the SITENUM (see below) will correspond to the county in which the majority of the site lies. (Therefore the "county" need not match that of the site number).

SITE NUMBER [SITENUM] - Character Field, 8 characters

The SITENUM refers to the Smithsonian Institution's trinomial designation and is currently assigned in Minnesota by the Office of the State Archaeologist. All Minnesota sites start with the numerical code "21", followed by a two-letter county code (see attachment for county codes), followed by a number. The number reflects the order of the site in the site file. For example, 21AK0007 is the seventh site assigned in Aitkin County. The convention in Minnesota is to use a four-digit number for each site. The SHPO Archaeological Database also contains site leads that have not been verified by a professional archaeologist. These possible sites use the state and county codes as discussed above followed by an alphabetic designation beginning with the letter a. Each site lead will receive a designation a through z, followed by aa, ab, ac, etc.

SITE NAME [SITENAME] - Character Field, 80 characters

The archaeologist responsible for its identification usually designates SITENAME. It is standard procedure to use the landowner's last name, but if it is a common name (e.g., Peterson), a first name is also used. Sites are also named for a local topographic feature, unusual feature, etc. An entry for this category is not mandatory, but used when available. The word "site" is not used in the name in the database, i.e. the Joseph Peterson Site will be listed simply as "Joseph Peterson". If a site has more than one record (i.e., if the site is located in more than one section), the site name should be followed with the record number as follows: (1/3), (2/3), (3/3), etc. If the "site" has been determined to be noncultural, write (NOT A SITE) in this field.

FIRST DATE [FIRSTDATE] - Character Field, 4 characters

This field refers to the year the site was initially recorded.

DATE of SURVEY [DATESURVEY] - Date Field, 8 characters

This field refers to the last date of fieldwork by a professional archaeologist. If the exact date is not known, list it as first day of the month; if only the year is known, list as 01/01/xx.

FIELD NUMBER [FIELDNUM] - Character Field, 38 characters

Archaeologists frequently assign field numbers in the field to designate sites before an official state site number is assigned. The FIELDNUM will appear in the database exactly as it is recorded by the archaeologist. List all field numbers that apply.

ACRES [ACRES] - Numeric Field

The estimated area of the site to the nearest 0.1 acre. Single artifact finds are coded as 0.1 acre. If a rough estimation, then round to the nearest 0.5 acre. Each record for a site will reflect the area of the entire site.

SITE TYPE DESCRIPTION [DESCRIPT] - Character Field, 25 characters

This field is a short description of site type. Select all that apply (i.e. an earthwork with a documented human burial is listed as **EW, CEM**):

- SA** - Single Artifact ("findspot")
- AS** - Artifact Scatter (any site with more than one artifact type)
- LS** - Lithic Scatter (a site with only lithic materials, i.e. tools, flakes, fire-cracked rock, etc.)
- EW** - Earthwork (includes mounds, fortifications, ricing pits, etc.)
- SR** - Structural Ruin
- RALN** - Rock Alignment
- RART** - Rock Art (includes pictographs, petroglyphs)
- CEM** - Cemetery, Burial (non-mound)
- HD** - Historic Documentation (ghost town and trading posts found in the literature, etc.)
- SHIP** - Shipwreck
- SM** - Shell Midden
- TR** - Trail/Road
- FEAT** - Feature (e.g., pit, depression)
- STR** - Standing Structure

SITE FUNCTION [FUNCTION] - Character Field, 40 characters

Use this space to describe a site function (e.g., an artifact scatter may be a habitation site, a camp site, or butcher site, etc.) Typically, only sites that have been well documented will be given a functional designation. Once the contexts have been fully developed, the functional categories listed below will more closely correspond to the property type descriptions in the contexts.

- | | |
|---|--------------------------------|
| TCamp - Temporary Camp | TPost - Trading Post |
| BCamp - Base Camp | Miss - Mission |
| Gather - Gathering | Agency - Indian Agency |
| Quarry - Quarry | SMill - Saw Mill |
| Wshop - Lithic Workshop | FMill - Flour Mill |
| Cache - Cache | Fac - Factory |
| Kill - Large Mammal Kill | LogCamp - Logging Camp |
| Butcher - Butchering Site | LogDam - Logging Dam |
| Fish - Fishing | CCC - CCC Camp |
| Rice - Ricing | Trans - Transportation |
| Sugar - Maple Sugaring | Stage - Stage Stop |
| Garden - Gardening | Wcraft - Watercraft |
| Mort - Mortuary | Portage - Portage |
| BMound - Burial Mound | Battle - Battleground |
| Bone - Bone Bed | Fort - Fort |
| Pglyph - Petroglyph | Home - Homestead |
| Picto - Pictograph | GT - Ghost Town |
| Hab - Habitation | Farm - Farmstead |
| Mine - Mining | Portage - Portage Trail |
| Oth - If none of the above, write Oth - and write out function if known. | |

MOUNDS [MOUNDS] - Numeric Field, 3 characters

The number of earthworks contained in a particular site.

BURIAL AUTHENTICATED [BURIALAUTH] - Character Field, 1 character

If a site is a burial authenticated by the state archaeologist, a **Y** is placed in this field (otherwise leave blank).

DEGREE OF DISTURBANCE [DISTURB] - Character Field, 1 character

Refers to the degree of disturbance to the site. This is coded on a scale from 0 to 5.

- 0 - Unknown
- 1 - The site is virtually undisturbed.
- 2 - The site has been minimally disturbed.
- 3 - The site is moderately disturbed. Includes plow zones.
- 4 - The site is heavily disturbed.
- 5 - The site has been virtually destroyed.

TEMPORAL PERIOD [PERIOD] - Character Field, 15 characters

PERIOD refers to the general temporal period of the site.

- P - Precontact (10,000 B.C. - A.D. 1680)
- C - Contact (A.D. 1680 - 1837)
- R - PostContact (Recent 1837 - present)

TRADITION [TRADITION] - Character Field, 30 characters

TRADITION refers to the traditional divisions of Minnesota prehistory, i.e. PaleoIndian, Archaic, Woodland, Mississippian, and Plains Village. (See below)

CONTEXT [CONTEXT] - Character Field, 60 characters

CONTEXT refers to the specific prehistoric/historic context of the site as listed in the Minnesota SHPO Historic Contexts. (see below)

For the fields PERIOD, TRADITION, and CONTEXT be as specific as possible. Use only the terms provided below. Complete as many fields as possible with the information existing on a particular site. It may be possible to complete only the first field; for example, a lithic scatter with no diagnostic artifacts should be cited as simply a "precontact site"; a site containing ceramics but no specific types might be cited as "precontact" and "Woodland", etc. Each determination is then followed with a number corresponding to the confidence of the determination, as below:

Confidence Level

- 1 - Confirmed
- 2 - Suspected

If more than one term applies to a site in a particular field, list all terms, with commas to separate. List in chronological order. For example, a site containing a Folsom projectile point and a Blackduck potsherd and a suspected Archaic component would be cataloged as the following:

PERIOD: P-1
TRADITION: PL-1, A-2, W-1
CONTEXT: Fo-1, Bd-1.

Precontact Period - P

Paleoindian Tradition - PL (11,500-8000 B.P.)

Clovis - CI

Folsom - Fo

Eastern Fluted - EF

Lanceolate Point/Plano - PI

Archaic Tradition - A (8000-2500 B.P.)

Prairie Archaic - AP

Riverine Archaic - AR

Lake Forest Archaic - AL

Shield Archaic - AS

Woodland Tradition - **W** (2500-300 B.P.)
Early Woodland - **EW**
Middle Woodland - **MW**
Fox Lake - **FL**
Havana Related (Malmo, Howard Lake, Sorg) - **HR**
Laurel - **La**
Brainerd - **Br**
Transitional Woodland (St. Croix, Onamia) - **SO**
Lake Benton - **LB**
Southeastern Minnesota Late Woodland - **SELW**
Kathio - **Ka**
Blackduck - **Bd**
Psinomani (Sandy Lake, Wanikan, Ogechie) - **Ps**
Unspecified Late Woodland - **LW**

Plains Village Tradition - **PV** (1000-500 B.P.)
Great Oasis - **GO**
Cambria - **Ca**
Big Stone - **BS**

Mississippian Tradition - **M** (1000-800 B.P.)
Silvernale - **Sn**

Oneota Tradition - **O** (1000-300 B.P.)
Blue Earth - **BE**
Orr - **Or**

Contact Period - C

Western Dakota - **WD**
Eastern Dakota - **ED**
Chiwere Siouan - **CS**
Ojibwe - **Oj**
French - **Fr**
English - **En**
Initial U.S. - **US**

PostContact Period - R (Recent)

Indian Communities and Reservations - **IC**
St. Croix Triangle Lumbering - **SC**
Early Agriculture and River Settlement - **EA**
Railroad and Agricultural Development - **RA**
Northern Minnesota Lumbering - **NL**
Iron Range and North Shore Settlement - **IR**
Tourism and Recreation - **TR**
Urban - **Ur**

DATING METHOD [DATEMETHOD] - Character Field, 15 characters

DATEMETHOD refers to the method used to determine the time period of the site. Choose all that apply:

rc - radiocarbon dating
style - artifact style/cross-dating
hist - historic accounts
oth- other (e.g., thermoluminescence, obsidian hydration, stratigraphy)

CERAMICS [CERAMIC] - Character Field, 35 characters
(see below)

LITHICS [LITHIC] - Character Field, 40 characters
(see below)

BIOLOGICAL [BIOLOGICAL] - Character Field, 35 characters
(see below)

OTHER [OTHER] - Character Field, 35 characters

The above four fields are used to give a more detailed summary of materials recovered from a site. Fields are completed only if the material type exists at a particular site. Be as specific as possible in each field. Use the terms below or the name given on a site report for a specific type. An unidentified projectile point would be cited as simply a projectile point. A Folsom point would be listed as **Fo**.

CERAMICS: **Ab** - Aboriginal
 EA - Euro-American

Use these more specific terms if possible (others may be used if necessary):

Bd - Blackduck	Lm - La Moille Thick
BE - Blue Earth	Ma - Malmo
Br - Brainerd	Og - Ogechie
Ca - Cambria	On - Onamia
CR - Clam River	Or - Orr
FL - Fox Lake	SC - St. Croix
GO - Great Oasis	Sg - Sorg
HL - Howard Lake	Sk - Selkirk
Ka - Kathio	Oa - Oneota
LB - Lake Benton	SL - Sandy Lake
La - Laurel	Sn - Silvernale

LITHICS

pp - projectile point	ground - ground/pecked stone
tool - other flaked stone tool	fcr - fire-cracked rock
deb - debitage	lithic - unspecified lithic material

Use these specific types of projectile points if possible: (others may be used if necessary)

CI - Clovis	fl - fluted	HG - Hell Gap
Fo - Folsom	Ed - Eden	AB - Agate Basin
BV - Browns Valley	Mid - Midland	Sb - Scottsbluff
Ang - Angostura	Pla - Plainview	Fred - Fredrick
Al - Alberta	Ic - lanceolate	PI - Plano
DI - Dalton	Ms - Meserve	Hol - Holcomb
Rd - Raddatz	Steuben - Steuben	Oxbow - Oxbow
Par - Parkdale-eared	st - stemmed	cr - corner-notched
sn - side-notched	tr - triangular unnotched	bi - bifurcate

BIOLOGICAL:

an - animal remains	shell - shell
human - human remains	floral - seeds, plant remains, charcoal, etc.
unid - unidentified bone	

OTHER:

ochre
glass
metal
beads
mhist - miscellaneous historic
gf - gunflint
pipe - pipe
cupp - copper projectile point
cutool - copper tool
cuorn - copper ornament
shorn - shell ornament
shtool - shell tool
btool - bone tool
born - bone ornament

EXOTIC MATERIALS [EXOTIC] - Character Field, 20 characters

This field is completed when a material not native to Minnesota or found rarely in Minnesota is recovered from a site.

Cp - Copper
Ob - Obsidian
Cat - Catlinite (pipestone)
Hxt - Hixton quartzite
BurC - Burlington Chert
KRF - Knife River Flint
oth - Other

MAJOR DRAINAGE BASIN [DRAINAGE] - Character Field, 5 characters

The DRAINAGE field is based on the Minnesota DNR classification system and denotes the location of the site within a major drainage basin. Note: the distinction between the "Lower" and "Upper Mississippi River" categories occurs in the Twin Cities at the mouth of the Minnesota River. Also note, the Rock River in southwestern Minnesota is part of the "Missouri River" drainage system.

LS - Lake Superior	Red - Red River
RR - Rainy River	SCR - St. Croix River
LMR - Lower Mississippi River	CR - Cedar River
UMR - Upper Mississippi River	DMR - Des Moines River
MnR - Minnesota River	MR - Missouri River

PHYSIOGRAPHIC SETTING [SETTING] - Character Field, 60 characters

PHYSIOGRAPHIC SETTING refers to the general landscape of the site area. Choose only the most predominate landscape element.

Hill - Hilltop	Lacustrine - General Lake Area
Upland - Undifferentiated Upland	Lakeshore - Lakeshore
Marsh - Marsh, Swamp, Fen, Bog	Island - Island
Bluff - Bluff Edge	Pen - Peninsula
Alluvial - Alluvial Fan	Cove/Bay - Cove or Bay
Stream - Intermittent Stream	In/Out - Inlet/Outlet
Junction - Confluence of Streams/Rivers	Isthmus - Isthmus
River - General Riverine	Glacial - Glacial Beach Ridge
Terrace - Terrace	Cave - Cave/Rockshelter
Flood - Floodplain	

OWNER TYPE [OWNERTYPE] - Character Field, 15 characters

Refers to the type of ownership of the property on which the site lies. List all that apply.

- Fed** - Federal
- Chip** - Chippewa National Forest
- Sup** - Superior National Forest
- St** - State
- Loc** - Local
- Tribe** - Tribal
- Priv** - Private
- Unk** - Unknown

WORK TYPE [WORKTYPE] - Character Field, 10 characters

This refers to the level of archaeological investigation. Enter as many of the following codes as appropriate.

- 0** = Pre-field preparation
- 1** = Phase I (reconnaissance survey)
- 2** = Phase II (evaluation/informal testing)
- 3** = Phase III (mitigation/data recovery)
- 4** = Culture Resource Management Plan
(e.g., long-term management plan for resources within a specific project area)
- 5** = Collections & Other Non-Field Studies
(e.g., a study of projectile points from a collection)
- 6** = Research Design
(independent document)
- 7** = Other, Non-Archaeological Studies
(e.g., oral history, paleoenvironmental study, HABS/HAER)
- 8** = Phase I & II
- 9** = Phase II & III

NATIONAL REGISTER [NRHP] - Character Field, 1 character

If a site is listed on the National Register of Historic Places or within a listed historic district, the box is checked in this category (otherwise leave blank).

CERTIFIED ELIGIBLE FINDING [CEF] - Character Field, 1 character

If a site has been determined to be eligible by the SHPO for listing on the NRHP, but has not been actually listed, the box is checked in this category (otherwise leave blank).

DETERMINATION of ELIGIBILITY FINDING [DOE] - Character Field, 1 character

If a site has been determined to be eligible by the National Park Service for listing on the NRHP, but has not been actually listed, the box is checked in this category (otherwise leave blank).

STATE REGISTER [StReg] - Character Field, 1 character

If a site is listed on the State Register of Historic Places, the box is checked in this category (otherwise leave blank).

REFERENCE [REFERENCE] - Character Field, 65 characters

Record the major bibliographic references to the site not listed in the REPORTS.

- Andreas** - 1874 Andreas Atlas
- GeolSurv** - Geological Survey (Winchell, Upham)
- Brower Nx** - J.V. Brower notebook
- Brower xxxx** - J.V. Brower publication
- CHIP** - Chippewa National Forest Inventory
- Lewis xx** - T. Lewis notebook

MHS(CF) - MHS County Miscellaneous File
MHS(DB) - MHS Doug Birk
MHS(FTF) - MHS Fur Trade File
MHS(GTF) - MHS Ghost Town File
MHS(LP) - MHS Les Peterson
MHS(SA) - MHS Scott Anfinson
SAS - Statewide Archaeological Survey
Tryggxx - J.W. Trygg Map/Sheet Number
Wilford XXXX - L.A. Wilford/year, County File Notes
Winchell - N. Winchell (1911)

LOCATION CONFIDENCE [LOCCONF] - Character Field, 1 character

The LOCCONF field is based on a 1-5 scale and reflects the confidence in locating a site on a USGS map according to the information existing on a site. The numbers should be interpreted as follows:

- 1** - Very high: the site can be accurately and precisely delineated on one or more 7.5" USGS quadrangle maps and/or the site was examined and mapped by a professional archaeologist.
- 2** - High: the location of the site can be narrowed down to the quarter-quarter section level (if smaller than this) but no further and/or the site was given a cursory examination by a professional archaeologist.
- 3** - Moderate: the site was mapped according to the best guess of several alternatives, or within a quarter section and/or a reliable informant provided information on the site.
- 4** - Low: the mapper is skeptical of the location given for a site, or whether the site exists as described and/or the site was mapped using information provided by a local informant and not evaluated by a professional.
- 5** - Very Low: the mapper is highly skeptical of the location of a site or whether the site exists as described and/or the site information was based on rumor or hearsay. Any site receiving a confidence of 5 will not be mapped.

NOTE: If the site has been determined to be non-cultural by a professional archaeologist, an "N" will appear under the CHANGE field.

NOTES [NOTES] - Character Field, 10 characters

The NOTES field is used for archaeological terminology that is no longer used in Minnesota to denote temporal or cultural affiliation but is nonetheless useful research terms. Terms include Arvilla, Old Copper, etc.

OFFICE of STATE ARCHAEOLOGIST LICENSE NUMBER [STATEARCH] - Character Field, 20 characters. STATEARCH refers to the Office of the State Archaeologist license number given to the project.

INPUT DATE [INDATE] - Date Field, 8 characters

INDATE is the date the site is added to site inventory or database.

UPDATE DATE [UPDATE] - Date Field, 8 characters

UPDATE is the date the site information is updated in site inventory or database.

CHANGE [CHANGE] - Character Field, 5 characters

Note changes made to the site database that differ from information found in the site files or site forms.

- D - Description
- L - Location
 - T - Township, Range or Section
 - U - UTM
- R - Redundant (same location as another site)
- N - Non-cultural

City/Township Table

SITE NUMBER [SITENUM] - Character Field, 8 characters

The SITENUM refers to the Smithsonian Institution's trinomial designation and is currently assigned in Minnesota by the Office of the State Archaeologist. All Minnesota sites start with the numerical code "21", followed by a two-letter county code (see attachment for county codes), followed by a number. The number reflects the order of the site in the site file. For example, 21AK0007 is the seventh site assigned in Aitkin County. The convention in Minnesota is to use a four-digit number for each site. The SHPO Archaeological Database also contains site leads that have not been verified by a professional archaeologist. These possible sites use the state and county codes as discussed above followed by an alphabetic designation beginning with the letter a. Each site lead will receive a designation a through z, followed by aa, ab, ac, etc.

CITY/TOWNSHIP [CITYTWP] - Character Field, 40 characters

CITYTWP refers to the name of the minor civil subdivision in which the site lies. If the site is located within the boundaries of a township or incorporated city, use the name of the township or city. For example: Welch Twp., Cannon Falls Twp., Red Wing, or Cannon Falls. Sites located outside of organized townships should be cited as "Unorganized Territory".

Regions Table

SITE NUMBER [SITENUM] - Character Field, 8 characters

The SITENUM refers to the Smithsonian Institution's trinomial designation and is currently assigned in Minnesota by the Office of the State Archaeologist. All Minnesota sites start with the numerical code "21", followed by a two-letter county code (see attachment for county codes), followed by a number. The number reflects the order of the site in the site file. For example, 21AK0007 is the seventh site assigned in Aitkin County. The convention in Minnesota is to use a four-digit number for each site. The SHPO Archaeological Database also contains site leads that have not been verified by a professional archaeologist. These possible sites use the state and county codes as discussed above followed by an alphabetic designation beginning with the letter a. Each site lead will receive a designation a through z, followed by aa, ab, ac, etc.

REGION [REGION] - Character Field, 5 characters

List the SHPO archaeological research region in which the site is located. (see the attached map.)

- | | |
|------------------------------|---------------------------------------|
| 1 - Southwest Riverine | 5c - Central Lakes Coniferous Central |
| 2n - Prairie Lake North | 5n - Central Lakes Coniferous North |
| 2s - Prairie Lake South | 5s - Central Lakes Coniferous South |
| 2e - Prairie Lake East | 6n - Red River Valley North |
| 3e - Southeast Riverine East | 6s - Red River Valley South |
| 3w - Southeast Riverine West | 7w - Northern Bog West |

4w - Central Lakes Deciduous West
4e - Central Lakes Deciduous East
4s - Central Lakes Deciduous South
5w - Central Lakes Coniferous West
5e - Central Lakes Coniferous East

7e - Northern Bog East
8 - Border Lakes
9n - Lake Superior North
9s - Lake Superior South

UTM Table

SITE NUMBER [SITENUM] - Character Field, 8 characters

The SITENUM refers to the Smithsonian Institution's trinomial designation and is currently assigned in Minnesota by the Office of the State Archaeologist. All Minnesota sites start with the numerical code "21", followed by a two-letter county code (see attachment for county codes), followed by a number. The number reflects the order of the site in the site file. For example, 21AK0007 is the seventh site assigned in Aitkin County. The convention in Minnesota is to use a four-digit number for each site. The SHPO Archaeological Database also contains site leads that have not been verified by a professional archaeologist. These possible sites use the state and county codes as discussed above followed by an alphabetic designation beginning with the letter a. Each site lead will receive a designation a through z, followed by aa, ab, ac, etc.

UTM ZONE [UTMZONE] - Numeric Field, 2 characters

EASTING [EASTING] - Numeric Field, 6 characters

NORTHING [NORTHING] - Numeric Field, 7 characters

These numbers refer to the exact location of a site, based on the Universal Transverse Mercator (UTM) grid. There are three UTM zones in Minnesota: 14, 15, and 16. Most of the state is in Zone 15. For some GIS applications, zones 14 and 16 have been placed in an "extended" Zone 15. These extended zone coordinates are included as separate fields in the table (see XEASTING and XNORTHING).

One set of UTM site coordinates is recorded in the database for each site. This should be as close as possible to the central point of each site. For sites located in multiple sections only the first record number will have the UTM coordinates recorded.

Under EASTING, a "0" is entered if the record is not unique (i.e., a repeated reference to the same site) or if the site is not actually an archaeological site when an official state number has been assigned. A "1" is entered when exact location data for a site is unavailable. This coding allows for searches of the ARCH database to find actual numbers of sites that exhibit certain characteristics if the search command includes "EASTING <> 0".

XEASTING [XEASTING] - Numeric Field, 6 characters

XNORTHING [XNORTHING] - Numeric Field, 7 characters

These two variables are used to plot the location of individual properties within Geographic Information Systems (GIS). Since Minnesota is located within UTM Zones 14, 15 and 16, the convention is to process Zones 14 and 16 locations into Extended Zone 15 so the properties can be more easily plotted.

DATUM [DATUM] - Character Field, 4 characters

The DATUM field is a four-digit number referring to the year when the U.S. Geological Survey UTM grid datum was established. This year is either 1927 or 1983.

Township/Range/Section and USGS Quadrangle Table

SITE NUMBER [SITENUM] - Character Field, 8 characters

The SITENUM refers to the Smithsonian Institution's trinomial designation and is currently assigned in Minnesota by the Office of the State Archaeologist. All Minnesota sites start with the numerical code "21", followed by a two-letter county code (see attachment for county codes), followed by a number. The number reflects the order of the site in the site file. For example, 21AK0007 is the seventh site assigned in Aitkin County. The convention in Minnesota is to use a four-digit number for each site. The SHPO Archaeological Database also contains site leads that have not been verified by a professional archaeologist. These possible sites use the state and county codes as discussed above followed by an alphabetic designation beginning with the letter a. Each site lead will receive a designation a through z, followed by aa, ab, ac, etc.

TOWNSHIP [TOWNSHIP] - Numeric Field, 3 characters

RANGE [RANGE] - Numeric Field, 2 characters

EAST/WEST] EASTWEST - Character Field, 1 character

SECTION [SECTION] - Numeric Field, 2 characters

The TOWNSHIP field is a two or three-digit number referring to the vertical grid number assigned to the township where the site is located. In Minnesota, all townships are "North"; therefore only the number is given. RANGE is a two-digit number referring to the horizontal grid number. Ranges in Minnesota may be either "East" or "West", and the EASTWEST field is entered as E or W. SECTION is a one or two-digit number, 1 through 36, corresponding to a square mile within a township/range coordinate. If a site extends through more than one section, each section will be given an individual record. This is necessary to enable database searches by location. The section in which the majority of the site lies will be entered in the first record, with the record number (1/3) written in the SITENAME field.

QUARTER SECTIONS [XQUARTERS] - Character Field, 35 characters

This field will list the entire quarter section description of site location as one field. This description of site location is more precise than the following fields, but cannot be used in database searches.

¼ OF ¼ OF ¼ SECTION [QTRQTRQTR] - Character Field, 2 characters

¼ OF ¼ SECTION [QTRQTR] - Character Field, 2 characters

¼ SECTION [QTR] - Character Field, 2 characters

These fields indicate the portion of a section in which a property is located and must be used together. The smallest quarter description must encompass the entire site. The QTR field is used to describe a 160-acre cell within a section, followed by the QTRQTR field that designates the 40-acre cell. The QTRQTRQTR field is used to describe the 10-acre cell where the site is located. The size of a particular site will determine how many of the three fields are filled. It may be possible only to say that a site is located in the NE quarter. Half-sections and centers can be used also if necessary (e.g., "C-S" is the center of the southern half of a section; in this case the cell areas are 20-acre, 80-acre, and 320-acre, respectively). Use only the largest area that includes the entire site. These will be completed for each section in which the property is located.

USGS QUADRANGLE [USGS] - Character Field, 50 characters

USGS refers to the name of the USGS 7.5' quadrangle map where the site is located. Write the map name as it appears on the map, including spacing. Exclude the state or province name; i.e. the Redwood Falls, Minn. map is written as "Redwood Falls". Two quadrangle names may be input.

Repository Table

SITE NUMBER [SITENUM] - Character Field, 8 characters

The SITENUM refers to the Smithsonian Institution's trinomial designation and is currently assigned in Minnesota by the Office of the State Archaeologist. All Minnesota sites start with the numerical code "21", followed by a two-letter county code (see attachment for county codes), followed by a number. The number reflects the order of the site in the site file. For example, 21AK0007 is the seventh site assigned in Aitkin County. The convention in Minnesota is to use a four-digit number for each site. The SHPO Archaeological Database also contains site leads that have not been verified by a professional archaeologist. These possible sites use the state and county codes as discussed above followed by an alphabetic designation beginning with the letter a. Each site lead will receive a designation a through z, followed by aa, ab, ac, etc.

REPOSITORY [REPOSITORY] - Character Field, 25 characters

ACCESSION NUMBER (S) [ACCNUMBER] - Character Field, 60 characters

These fields provide the location of the site's collection, any field notes, and the accession numbers of materials. Repositories are as follows:

- MHS** - Minnesota Historical Society
- UM** - University of Minnesota, Minneapolis
- UMD** - University of Minnesota, Duluth
- BSU** - Bemidji State University
- MDSU** - Moorhead State University
- MKSU** - Mankato State University
- SCSU** - St. Cloud State University
- IMA** - Institute for Minnesota Archaeology
- HU** - Hamline University
- SMM** - Science Museum of Minnesota
- UND** - University of North Dakota
- MWAC** - Midwest Archaeological Center
- AC** - Augustana College
- LLHS** - Leech Lake Heritage Sites Program
- Co.** - County Historical Society
- Priv.** - Private collection

Archaeological Reports Table

SITE NUMBER [SITENUM] - Character Field, 8 characters

The SITENUM refers to the Smithsonian Institution's trinomial designation and is currently assigned in Minnesota by the Office of the State Archaeologist. All Minnesota sites start with the numerical code "21", followed by a two-letter county code (see attachment for county codes), followed by a number. The number reflects the order of the site in the site file. For example, 21AK0007 is the seventh site assigned in Aitkin County. The convention in Minnesota is to use a four-digit number for each site. The SHPO Archaeological Database also contains site leads that have not been verified by a professional archaeologist. These possible sites use the state and county codes as discussed above followed by an alphabetic designation beginning with the letter a. Each site lead will receive a designation a through z, followed by aa, ab, ac, etc.

REPORTS [ArchReports] - Character Field, 40 characters

Record the number from the **ARCHREP** table pertaining to the most recent reports in which the site form is filed. Input as many reports numbers as necessary.

Review and Compliance Table

SITE NUMBER [SITENUM] - Character Field, 8 characters

The SITENUM refers to the Smithsonian Institution's trinomial designation and is currently assigned in Minnesota by the Office of the State Archaeologist. All Minnesota sites start with the numerical code "21", followed by a two-letter county code (see attachment for county codes), followed by a number. The number reflects the order of the site in the site file. For example, 21AK0007 is the seventh site assigned in Aitkin County. The convention in Minnesota is to use a four-digit number for each site. The SHPO Archaeological Database also contains site leads that have not been verified by a professional archaeologist. These possible sites use the state and county codes as discussed above followed by an alphabetic designation beginning with the letter a. Each site lead will receive a designation a through z, followed by aa, ab, ac, etc.

REVIEW AND COMPLIANCE NUMBER [RCNUMBER] - Character Field, 29 characters

RCNUMBER refers to SHPO Review and Compliance File Number. Many archaeological projects in Minnesota are initiated through the Review and Compliance process.

Appendix I
Stormwater System Maintenance Plan

STORM WATER SYSTEM MAINTENANCE PLAN

The Storm Water System Maintenance Plan has been developed to assure that the City's system of storm water retention/treatment basins and storm water conveyance systems are adequately inspected and maintained to assure that they meet their design functions. Outlined below please find a description of the various inspection and maintenance activities the City intends to undertake in regard to achieving these goals:

1. Storm water **retention and treatment basins** and outlets shall be inspected every 5 years to determine if the basin's retention and treatment characteristics are adequate to meet its design function. Based on this inspection, retention basins that are identified for maintenance will be prioritized on a cost benefit and basin maintenance will be performed as funds become available.
2. Portions of the City's **storm sewer** will be inspected on a rotating basis. During these inspections, debris present at trash grates and catch basins grates will be removed so as to provide reasonable assurances that the system will operate in an unobstructed manner during rainfall events.
3. Storm **sewer outfalls** will be inspected on a rotating basis every 5 years. Inspection shall include evidence of scouring or the presence of significant deposition of silt at the storm sewer outfall. Scouring problem areas will be noted and stabilized. In areas where silt deposition is evident which is indicative of significant erosion upstream, an inspection will be made of the upstream watershed to identify the source of erosion. Suitable corrective measures will then be undertaken to correct the erosion problem.
4. **Manholes and catch basins** shall be inspected every 5 years on a rotating basis.
5. The City will **sweep the streets** twice annually and more frequently in sensitive areas.
6. On an annual basis, the City will prepare an inspection report that indicates the areas inspected and the maintenance activities completed on the storm water system. This inspection report will be added to the City's water resources library and submitted to the MPCA as part of the NPDES Program.

Appendix J
City Parks Map

ELEMENTS
 PLUMMER ST. NW
 BIRCH ST. NW
 HUNTERS HILL ST. NW
 COOK ST. NW
 BARKER ST. NW
 ARBON ST. NW
 RUM ST. NW
 YACHT ST. NW
 XERO ST. NW
 VACO ST. NW
 VENTER ST. NW
 UTR ST. NW
 TOMTO ST. NW
 LAUREL ST. NW
 NO. 22ND ST. NW
 QUAPAY ST. NW
 POT. 22ND ST. NW
 ONDIA ST. NW
 NARAD ST. NW
 MALAH ST. NW
 LIPAY ST. NW
 EOWAY ST. NW
 JIFAO ST. NW
 INCA ST. NW
 HOPPE ST. NW
 QUARANT ST. NW
 FOX ST. NW
 BLOKADO ST. NW
 BAKOTA ST. NW
 CABR ST. NW
 BLACKFOOT ST. NW
 ATIC ST. NW
 TEL ST. NW
 YUCCA ST. NW
 SONIA ST. NW
 WOODLAND ST. NW
 VENTURA ST. NW
 UNDERCLIFF ST. NW
 TUMPT ST. NW
 LUNARAD ST. NW
 ROSE ST. NW
 QUAY ST. NW
 POPPY ST. NW
 ONCHD ST. NW
 MARSHALL ST. NW
 MARSHALL ST. NW
 LEE ST. NW
 KEAR ST. NW
 JOSEPH ST. NW
 STWOOD ST. NW
 HECHER ST. NW
 GLENDALE ST. NW
 VIOLET ST. NW
 KENNEDY ST. NW
 LAMILL ST. NW
 CROCI ST. NW
 NITREWAY ST. NW
 ARROWHEAD ST. NW
 STAN ST. NW
 YUEN ST. NW
 GEM ST. NW
 WARD ST. NW
 VERDIN ST. NW
 UNLONER ST. NW
 THOMAS ST. NW
 WALLOW ST. NW
 APER ST. NW
 QUINN ST. NW
 PARKSIDE ST. NW
 OLIVE ST. NW
 NASHVILLE ST. NW
 MARTIN ST. NW
 ANDER ST. NW
 KILLBEE ST. NW
 JAC ST. NW
 JES ST. NW
 BELMONT ST. NW
 BRUCE ST. NW
 BLEDING ST. NW
 KABLE ST. NW
 BLAKE ST. NW
 CLARE ST. NW
 BLUNDER ST. NW
 BRUCE ST. NW
 BELLA ST. NW
 YELLOW PINE ST. NW
 ISON ST. NW
 WINTERKENT ST. NW
 YALE ST. NW
 VUITY ST. NW
 TAMARACK ST. NW
 WYCAMER ST. NW
 KENNOD ST. NW
 QUINCY ST. NW
 PALM ST. NW
 OLIVE ST. NW
 HORSLEY ST. NW
 MARINILLA ST. NW
 LARCH ST. NW
 KUNIGAT ST. NW
 JONDER ST. NW
 HENRY ST. NW
 HOLLY ST. NW
 GOLDENROD ST. NW
 FLEETWOOD ST. NW
 WINTERBURN ST. NW
 DOWOOD ST. NW
 COTTONWOOD ST. NW
 BUTTERNUT ST. NW
 ALDER ST. NW
 WINDMILL AVE. NW

LEGEND
 Parks
 Water Features
 Street Centerlines
 Trails
 bituminous
 sidewalk
 gravel
 wood chip
 on-street
 bike route
 county

City Map Key for Parks & City Features

Park #	Park Name	Park Address	Acres
1	BIRCH RIDGE	1450 181ST AVE. NW	13.39
2	HAWK RIDGE	18001 VERDIN ST. NW	13.48
3	FOREST MEADOWS	1010 179TH AVE. NW	6.78
4	TIMBER TRAILS	17761 AZTEC ST. NW	7.05
5	LANGSETH	3341 174TH LANE NW	1.72
6	CEDAR CREST ESTATE	3909 174TH AVE. NW	0.87
7	CEDAR CREST	3680 173RD LANE NW	2.77
8	GROW OAK VIEW	17101 NAVALO ST. NW	12.77
9	WHITE OAKS	2740 172ND AVE. NW	9.30
10	WOODLAND MEADOWS	2139 172ND AVE. NW	0.88
11	VALLEY VIEW	3929 169TH AVE. NW	8.74
12	LINDS NORTH	2640 166TH AVE. NW	3.89
13	TULIP PARK	16229 TULIP ST. NW	1.85
14	PINE HILLS	3537 161ST AVE. NW	4.97
15	OAK HOLLOW	465 159TH AVE. NW	5.62
16	FOX MEADOWS	16000 FOX ST. NW	12.76
17	MOORES ESTATES	905 CROSSLAND BLVD. NW	0.83
18	LANDLOCKED PARK	15543 PRAIRIE RD	2.25
19	NORDBENS	15535 JUNIPER ST. NW	136.10
20	KELSEY ROUND LAKE	WEST END - 3939 149TH AVE. NW	10.97
21	STROOMANN PARK	4575 154TH AVE. NW	0.84
22	CITY HALL PARK COMPLEX #1	1685 CROSSLAND BLVD. NW	35.29
23	SUNSHINE PARK	1900 CROSSLAND BLVD. NW	36.31
24	RYVER TRAILS	4635 147TH LANE NW	11.41
25	PRAIRIE KNOLL	14800 PRAIRIE ROAD NW	20.37
26	MEADOWOOD NORTH	4519 148TH AVE. NW	0.98
27	ROUND LAKE BOAT LANDING	14604 ROUND LAKE BLVD. NW	1.71
28	OAK BLUFF	14757 BLUEBIRD ST. NW	3.63
29	MEADOWOOD SOUTH	4568 147TH LANE NW	0.45
30	PLEASANT OAKS	14300 XENIA ST. NW	14.75
31	MEADOWS OF ROUND LAKE	4040 146TH LANE NW	0.58
32	HARTFIELD	HANSON BLVD. & ANDOVER BLVD.	1.47
33	DEHN'S	14482 GUARANI ST. NW	2.23
34	SHADY KNOLL	2365 UPLANDER ST. NW	1.41
35	THE OAKS	1441 CROSSLAND BLVD. NW	1.47
36	CREEKRIDGE	3216 SOUTH COON CREEK DRIVE	2.21
37	GREEN VIEW CROSSING	14271 YELLOW PINE ST.	0.65
38	GREEN ACRES	14141 IYWOOD ST. NW	1.29
39	ROSE PARK	14057 ROSE ST. NW	5.06
40	RED OAKS WEST	14058 RAVEN ST. NW	2.84
41	HILLS OF BUNKER LAKE EAST	14035 YOKON ST. NW	2.17
42	RED OAKS EAST	14002 CRANE ST. NW	6.43
43	NORTH WOODS WEST	14045 NIGHTINGALE ST. NW	3.64
44	REDWOOD PARK	7721 140TH LANE NW	3.67
45	WILD ISLS	1977 BLUEBIRD ST. NW	5.59
46	SHADOWBROOK WEST PARK	BUNKER LAKE RD. & GOLDENROD ST	11.34
47	HIDDEN CREEK NORTH	2604 138TH AVE. NW	0.34
48	HIDDEN CREEK SOUTH	2620 BUNKER LAKE BLVD. NW	8.25
49	CROOKED LAKE BOAT LANDING	2980 BUNKER LAKE BLVD. NW	2.11
50	HIDDEN CREEK EAST	2156 135TH LANE NW	2.72
51	HIDDEN CREEK WEST	13415 HIDDEN CREEK DR.	0.36
52	COON CREEK PARK	EAST OF HANSON BLVD. ON COON CREEK	37.66
53	TERRACE PARK	BUNKER LAKE BLVD. & SYCAMORE ST.	18.92
54	SHADOWBROOK EAST PARK	13535 POPPY ST. NW	7.52
55	ANDOVER LIONS	BUNKER LAKE BLVD. & BUTTERNUT ST.	2.83
56	TIMBER RIVERS PARK	16980 BARTUM ST.	7.08
57	CHESTERTON COMMONS PARK	1414 153TH AVE	7.08
58	EVEL AND HIELDS	2275 ANDOVER BLVD. NW	0.60
59	WOODLAND ESTATES PARK	2369 152ND LANE NW	7.07
60			0.26

City Features:

- A Fire Station #1
- B Fire Station #2
- C Fire Station #3
- D Fire Station #4
- E Fire Station #5
- F Fire Station #6
- G Fire Station #7
- H Fire Station #8
- I Fire Station #9
- J Fire Station #10
- K Fire Station #11
- L Fire Station #12
- M Fire Station #13
- N Fire Station #14
- O Fire Station #15
- P Fire Station #16
- Q Fire Station #17
- R Fire Station #18
- S Fire Station #19
- T Fire Station #20
- U Fire Station #21
- V Fire Station #22
- W Fire Station #23
- X Fire Station #24
- Y Fire Station #25
- Z Fire Station #26
- AA Fire Station #27
- AB Fire Station #28
- AC Fire Station #29
- AD Fire Station #30
- AE Fire Station #31
- AF Fire Station #32
- AG Fire Station #33
- AH Fire Station #34
- AI Fire Station #35
- AJ Fire Station #36
- AK Fire Station #37
- AL Fire Station #38
- AM Fire Station #39
- AN Fire Station #40
- AO Fire Station #41
- AP Fire Station #42
- AQ Fire Station #43
- AR Fire Station #44
- AS Fire Station #45
- AT Fire Station #46
- AU Fire Station #47
- AV Fire Station #48
- AW Fire Station #49
- AX Fire Station #50
- AY Fire Station #51
- AZ Fire Station #52
- BA Fire Station #53
- BB Fire Station #54
- BC Fire Station #55
- BD Fire Station #56
- BE Fire Station #57
- BF Fire Station #58
- BG Fire Station #59
- BH Fire Station #60
- BI Fire Station #61
- BJ Fire Station #62
- BK Fire Station #63
- BL Fire Station #64
- BM Fire Station #65
- BN Fire Station #66
- BO Fire Station #67
- BP Fire Station #68
- BQ Fire Station #69
- BR Fire Station #70
- BS Fire Station #71
- BT Fire Station #72
- BU Fire Station #73
- BV Fire Station #74
- BW Fire Station #75
- BX Fire Station #76
- BY Fire Station #77
- BZ Fire Station #78
- CA Fire Station #79
- CB Fire Station #80
- CC Fire Station #81
- CD Fire Station #82
- CE Fire Station #83
- CF Fire Station #84
- CG Fire Station #85
- CH Fire Station #86
- CI Fire Station #87
- CJ Fire Station #88
- CK Fire Station #89
- CL Fire Station #90
- CM Fire Station #91
- CN Fire Station #92
- CO Fire Station #93
- CP Fire Station #94
- CQ Fire Station #95
- CR Fire Station #96
- CS Fire Station #97
- CT Fire Station #98
- CU Fire Station #99
- CV Fire Station #100
- CW Fire Station #101
- CX Fire Station #102
- CY Fire Station #103
- CZ Fire Station #104
- CA Fire Station #105
- CB Fire Station #106
- CC Fire Station #107
- CD Fire Station #108
- CE Fire Station #109
- CF Fire Station #110
- CG Fire Station #111
- CH Fire Station #112
- CI Fire Station #113
- CJ Fire Station #114
- CK Fire Station #115
- CL Fire Station #116
- CM Fire Station #117
- CN Fire Station #118
- CO Fire Station #119
- CP Fire Station #120
- CQ Fire Station #121
- CR Fire Station #122
- CS Fire Station #123
- CT Fire Station #124
- CU Fire Station #125
- CV Fire Station #126
- CW Fire Station #127
- CX Fire Station #128
- CY Fire Station #129
- CZ Fire Station #130
- DA Fire Station #131
- DB Fire Station #132
- DC Fire Station #133
- DD Fire Station #134
- DE Fire Station #135
- DF Fire Station #136
- DG Fire Station #137
- DH Fire Station #138
- DI Fire Station #139
- DJ Fire Station #140
- DK Fire Station #141
- DL Fire Station #142
- DM Fire Station #143
- DN Fire Station #144
- DO Fire Station #145
- DP Fire Station #146
- DQ Fire Station #147
- DR Fire Station #148
- DS Fire Station #149
- DT Fire Station #150
- DU Fire Station #151
- DV Fire Station #152
- DW Fire Station #153
- DX Fire Station #154
- DY Fire Station #155
- DZ Fire Station #156
- EA Fire Station #157
- EB Fire Station #158
- EC Fire Station #159
- ED Fire Station #160
- EE Fire Station #161
- EF Fire Station #162
- EG Fire Station #163
- EH Fire Station #164
- EI Fire Station #165
- EJ Fire Station #166
- EK Fire Station #167
- EL Fire Station #168
- EM Fire Station #169
- EN Fire Station #170
- EO Fire Station #171
- EP Fire Station #172
- EQ Fire Station #173
- ER Fire Station #174
- ES Fire Station #175
- ET Fire Station #176
- EU Fire Station #177
- EV Fire Station #178
- EW Fire Station #179
- EX Fire Station #180
- EY Fire Station #181
- EZ Fire Station #182
- FA Fire Station #183
- FB Fire Station #184
- FC Fire Station #185
- FD Fire Station #186
- FE Fire Station #187
- FF Fire Station #188
- FG Fire Station #189
- FH Fire Station #190
- FI Fire Station #191
- FJ Fire Station #192
- FK Fire Station #193
- FL Fire Station #194
- FM Fire Station #195
- FN Fire Station #196
- FO Fire Station #197
- FP Fire Station #198
- FQ Fire Station #199
- FR Fire Station #200
- FS Fire Station #201
- FT Fire Station #202
- FU Fire Station #203
- FV Fire Station #204
- FW Fire Station #205
- FX Fire Station #206
- FY Fire Station #207
- FZ Fire Station #208
- GA Fire Station #209
- GB Fire Station #210
- GC Fire Station #211
- GD Fire Station #212
- GE Fire Station #213
- GF Fire Station #214
- GG Fire Station #215
- GH Fire Station #216
- GI Fire Station #217
- GJ Fire Station #218
- GK Fire Station #219
- GL Fire Station #220
- GM Fire Station #221
- GN Fire Station #222
- GO Fire Station #223
- GP Fire Station #224
- GQ Fire Station #225
- GR Fire Station #226
- GS Fire Station #227
- GT Fire Station #228
- GU Fire Station #229
- GV Fire Station #230
- GW Fire Station #231
- GX Fire Station #232
- GY Fire Station #233
- GZ Fire Station #234
- HA Fire Station #235
- HB Fire Station #236
- HC Fire Station #237
- HD Fire Station #238
- HE Fire Station #239
- HF Fire Station #240
- HG Fire Station #241
- HH Fire Station #242
- HI Fire Station #243
- HJ Fire Station #244
- HK Fire Station #245
- HL Fire Station #246
- HM Fire Station #247
- HN Fire Station #248
- HO Fire Station #249
- HP Fire Station #250
- HQ Fire Station #251
- HR Fire Station #252
- HS Fire Station #253
- HT Fire Station #254
- HU Fire Station #255
- HV Fire Station #256
- HW Fire Station #257
- HX Fire Station #258
- HY Fire Station #259
- HZ Fire Station #260
- IA Fire Station #261
- IB Fire Station #262
- IC Fire Station #263
- ID Fire Station #264
- IE Fire Station #265
- IF Fire Station #266
- IG Fire Station #267
- IH Fire Station #268
- II Fire Station #269
- IJ Fire Station #270
- IK Fire Station #271
- IL Fire Station #272
- IM Fire Station #273
- IN Fire Station #274
- IO Fire Station #275
- IP Fire Station #276
- IQ Fire Station #277
- IR Fire Station #278
- IS Fire Station #279
- IT Fire Station #280
- IU Fire Station #281
- IV Fire Station #282
- IW Fire Station #283
- IX Fire Station #284
- IY Fire Station #285
- IZ Fire Station #286
- JA Fire Station #287
- JB Fire Station #288
- JC Fire Station #289
- JD Fire Station #290
- JE Fire Station #291
- JF Fire Station #292
- JG Fire Station #293
- JH Fire Station #294
- JI Fire Station #295
- JI Fire Station #296
- JK Fire Station #297
- JL Fire Station #298
- JM Fire Station #299
- JN Fire Station #300
- JO Fire Station #301
- JP Fire Station #302
- JQ Fire Station #303
- JR Fire Station #304
- JS Fire Station #305
- JT Fire Station #306
- JU Fire Station #307
- JV Fire Station #308
- JW Fire Station #309
- JX Fire Station #310
- JY Fire Station #311
- JZ Fire Station #312
- KA Fire Station #313
- KB Fire Station #314
- KC Fire Station #315
- KD Fire Station #316
- KE Fire Station #317
- KF Fire Station #318
- KG Fire Station #319
- KH Fire Station #320
- KI Fire Station #321
- KJ Fire Station #322
- KK Fire Station #323
- KL Fire Station #324
- KM Fire Station #325
- KN Fire Station #326
- KO Fire Station #327
- KP Fire Station #328
- KQ Fire Station #329
- KR Fire Station #330
- KS Fire Station #331
- KT Fire Station #332
- KU Fire Station #333
- KV Fire Station #334
- KW Fire Station #335
- KX Fire Station #336
- KY Fire Station #337
- KZ Fire Station #338
- LA Fire Station #339
- LB Fire Station #340
- LC Fire Station #341
- LD Fire Station #342
- LE Fire Station #343
- LF Fire Station #344
- LG Fire Station #345
- LH Fire Station #346
- LI Fire Station #347
- LJ Fire Station #348
- LK Fire Station #349
- LL Fire Station #350
- LM Fire Station #351
- LN Fire Station #352
- LO Fire Station #353
- LP Fire Station #354
- LQ Fire Station #355
- LR Fire Station #356
- LS Fire Station #357
- LT Fire Station #358
- LU Fire Station #359
- LV Fire Station #360
- LW Fire Station #361
- LX Fire Station #362
- LY Fire Station #363
- LZ Fire Station #364
- MA Fire Station #365
- MB Fire Station #366
- MC Fire Station #367
- MD Fire Station #368
- ME Fire Station #369
- MF Fire Station #370
- MG Fire Station #371
- MH Fire Station #372
- MI Fire Station #373
- MJ Fire Station #374
- MK Fire Station #375
- ML Fire Station #376
- MM Fire Station #377
- MN Fire Station #378
- MO Fire Station #379
- MP Fire Station #380
- MQ Fire Station #381
- MR Fire Station #382
- MS Fire Station #383
- MT Fire Station #384
- MU Fire Station #385
- MV Fire Station #386
- MW Fire Station #387
- MX Fire Station #388
- MY Fire Station #389
- MZ Fire Station #390
- NA Fire Station #391
- NB Fire Station #392
- NC Fire Station #393
- ND Fire Station #394
- NE Fire Station #395
- NF Fire Station #396
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- NH Fire Station #398
- NI Fire Station #399
- NJ Fire Station #400
- NK Fire Station #401
- NL Fire Station #402
- NM Fire Station #403
- NO Fire Station #404
- NP Fire Station #405
- NQ Fire Station #406
- NR Fire Station #407
- NS Fire Station #408
- NT Fire Station #409
- NU Fire Station #410
- NV Fire Station #411
- NW Fire Station #412
- NX Fire Station #413
- NY Fire Station #414
- NZ Fire Station #415
- OA Fire Station #416
- OB Fire Station #417
- OC Fire Station #418
- OD Fire Station #419
- OE Fire Station #420
- OF Fire Station #421
- OG Fire Station #422
- OH Fire Station #423
- OI Fire Station #424
- OJ Fire Station #425
- OK Fire Station #426
- OL Fire Station #427
- OM Fire Station #428
- ON Fire Station #429
- OO Fire Station #430
- OP Fire Station #431
- OQ Fire Station #432
- OR Fire Station #433
- OS Fire Station #434
- OT Fire Station #435
- OU Fire Station #436
- OV Fire Station #437
- OW Fire Station #438
- OX Fire Station #439
- OY Fire Station #440
- OZ Fire Station #441
- PA Fire Station #442
- PB Fire Station #443
- PC Fire Station #444
- PD Fire Station #445
- PE Fire Station #446
- PF Fire Station #447
- PG Fire Station #448
- PH Fire Station #449
- PI Fire Station #450
- PJ Fire Station #451
- PK Fire Station #452
- PL Fire Station #453
- PM Fire Station #454
- PN Fire Station #455
- PO Fire Station #456
- PP Fire Station #457
- PQ Fire Station #458
- PR Fire Station #459
- PS Fire Station #460
- PT Fire Station #461
- PU Fire Station #462
- PV Fire Station #463
- PW Fire Station #464
- PX Fire Station #465
- PY Fire Station #466
- PZ Fire Station #467
- QA Fire Station #468
- QB Fire Station #469
- QC Fire Station #470
- QD Fire Station #471
- QE Fire Station #472
- QF Fire Station #473
- QG Fire Station #474
- QH Fire Station #475
- QI Fire Station #476
- QJ Fire Station #477
- QK Fire Station #478
- QL Fire Station #479
- QM Fire Station #480
- QN Fire Station #481
- QO Fire Station #482
- QP Fire Station #483
- QQ Fire Station #484
- QR Fire Station #485
- QS Fire Station #486
- QT Fire Station #487
- QU Fire Station #488
- QV Fire Station #489
- QW Fire Station #490
- QX Fire Station #491
- QY Fire Station #492
- QZ Fire Station #493
- RA Fire Station #494
- RB Fire Station #495
- RC Fire Station #496
- RD Fire Station #497
- RE Fire Station #498
- RF Fire Station #499
- RG Fire Station #500

Parks Inventory:

Park #	Park Name	Acres	Type	Basketball	Baseball Field	Skating	Skating with Warming House	Playground	Picnic Shelter	Soccer and/or Football Field	Sliding	Tennis	Volleyball	Canoe landing	Nature Trails/ Cross-Country Skiing
1	BIRCH RIDGE	13.39	UN												
2	HAWK RIDGE	13.48	N		Y		Y	Y	Y	Y					
3	FOREST MEADOWS	6.78	N					Y	Y	Y					
4	TIMBER TRAILS	7.05	N		Y			Y		Y					
5	LANGSETH	1.72	M					Y							
6	CEDAR CREST ESTATE	0.87	UM												
7	CEDAR CREST	2.77	UN												
8	GROW OAK VIEW	12.77	UN												
9	WHITE OAKS	9.30	UN												
10	WOODLAND MEADOWS	0.88	M					Y							
11	VALLEY VIEW	8.74	UN												
12	LUND'S NORTH	3.89	N		Y										
13	TULIP PARK	1.85	UM												
14	PINE HILLS	4.97	N		Y			Y							
15	OAK HOLLOW	5.62	UN												
16	FOX MEADOWS	12.76	N					Y	Y	Y	Y				
17	MOORES ESTATES	0.83	UN												
18	LANDLOCKED PARK	2.25	UN												
19	NORDEEN'S	0.84	M			Y		Y							
20	KELSEY ROUND LAKE	136.10	CPA												Y
21	STROOTMAN PARK	10.97	N		Y			Y	Y					Y	
22	CITY HALL PARK COMPLEX #1	35.29	CPL		Y		Y	Y	Y	Y		Y			
23	SUNSHINE PARK	36.31	CPL	Y	Y			Y	Y	Y			Y		
24	RIVER TRAILS	11.41	UN												
25	PRAIRIE KNOLL	20.37	N					Y		Y	Y				
26	MEADOWOOD NORTH	0.98	M					Y					Y		
27	ROUND LAKE BOAT LANDING	1.71	UM											Y	
28	OAK BLUFF	3.63	N					Y		Y					
29	MEADOWOOD SOUTH	0.45	UM												
30	PLEASANT OAKS	14.75	M			Y		Y		Y					
31	MEADOWS OF ROUND LAKE	0.58	M					Y							
32	HARTFIEL'S	1.47	UM												
33	DEHN'S	2.23	UM												
34	SHADY KNOLL	1.41	M	Y		Y			Y						
35	THE OAKS	1.47	UM												
36	CREEKRIDGE	2.21	M												
37	CREEK VIEW CROSSING	0.65	M	Y		Y		Y	Y						
38	GREEN ACRES	1.29	M	Y	Y			Y							
39	ROSE PARK	5.06	N		Y			Y	Y						
40	RED OAKS WEST	2.84	N	Y				Y		Y					
41	NORTH WOODS EAST	2.17	N		Y			Y							
42	HILLS OF BUNKER LAKE WEST	6.43	N		Y			Y							
43	RED OAKS EAST	3.64	N												
44	NORTH WOODS WEST	3.67	N							Y		Y			
45	REDWOOD PARK	5.59	UN												
46	WILD IRIS	11.31	N	Y	Y			Y	Y						
47	SHADOWBROOK WEST PARK	11.34	UN												
48	138TH AVE. PARK	0.34	M					Y							
49	HIDDEN CREEK NORTH	8.25	N	Y	Y	Y		Y		Y					
50	CROOKED LAKE BOAT LANDING	2.11	M						Y					Y	
51	HIDDEN CREEK EAST	2.72	N			Y		Y		Y					
52	HIDDEN CREEK SOUTH	0.36	M					Y							
53	COON CREEK PARK	37.66	CPA												Y
54	ANDOVER LIONS	18.92	N		Y			Y							
55	TERRACE PARK	7.62	N		Y	Y		Y	Y						
56	SHADOWBROOK EAST PARK	2.23	UN	Y	Y			Y							
57	TIMBER RIVERS PARK	7.08	N					Y	Y	Y				Y	
58	CHESTERTON COMMONS PARK	0.60	M					Y							
59	EVELAND FIELDS	7.07	CPL		Y										
60	WOODLAND ESTATES PARK	0.26	M												

KEY: CPA - Community Park U - Undeveloped Trail locations are shown on the map.
 CPL - Community Playfield N - Neighborhood Park
 M - Mini-Park

Updated: November, 2003

**Appendix K
City Zoning Map**

CITY OF ANDOVER

ZONING MAP

Incorporated 1974
March 2004

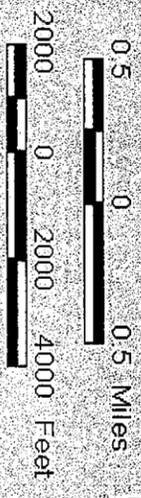
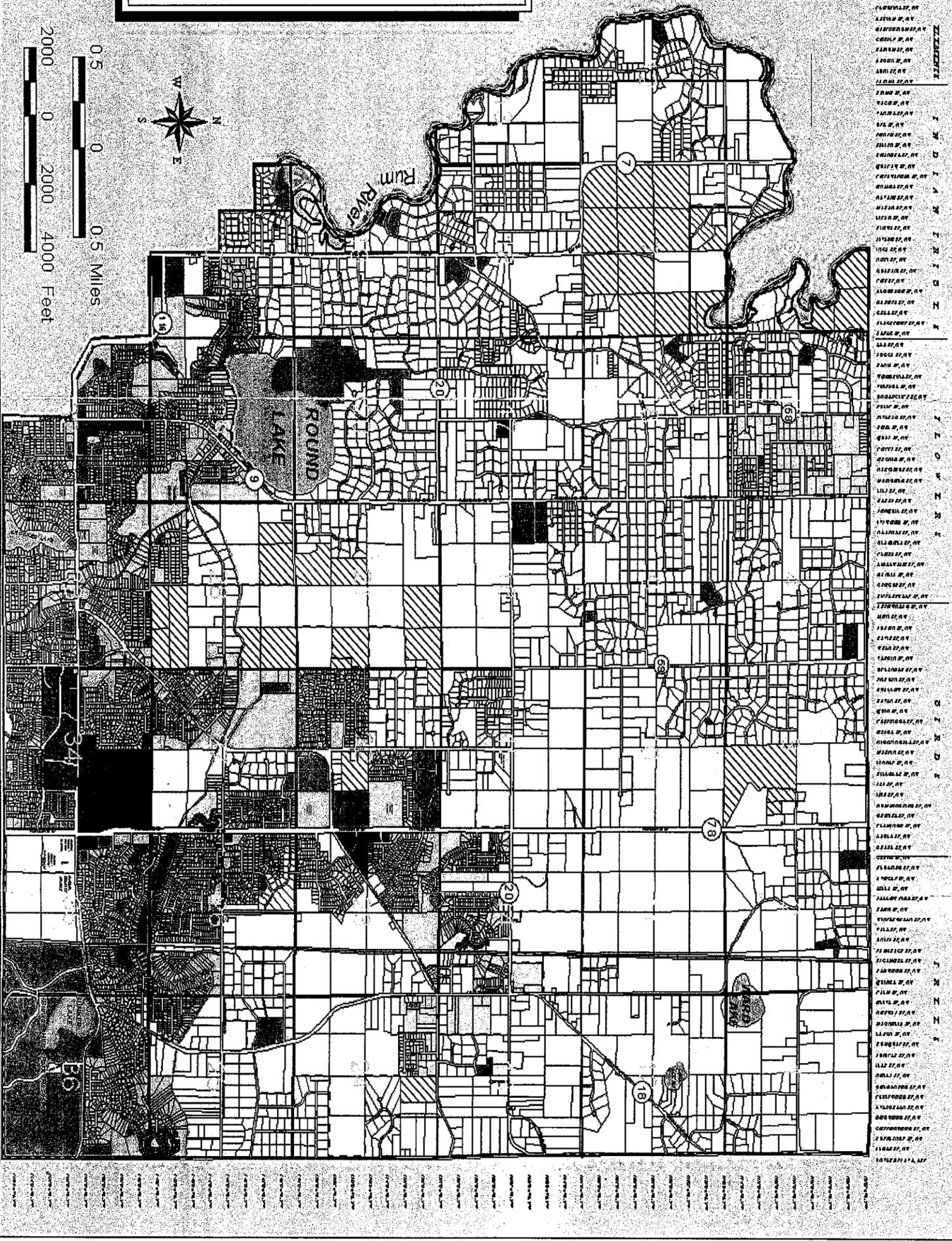
The information represented on this map displays the contents of the City of Andover Official Zoning Map. The Zoning Map is only a graphical depiction of the Zoning Districts. The Zoning Ordinance should be referenced for specific questions concerning the various Zoning designations.

Zoning designations are subject to change. For questions or comments please contact the City of Andover.

City of Andover - Planning Department
1685 Crosslow Blvd. NW
Andover, MN 55304
(763) 755-5100

Zoning Classifications:	Acres:	Percent:
Residential:		
R-1 - Single Family-Rural	13,239.64	59.19%
R-1A - Manufactured Housing	33.82	0.15%
R-2 - Single Family-Estate	1444.30	6.46%
R-3 - Single Family-Suburban	810.78	2.73%
R-4 - Single Family-Urban	3,448.90	15.42%
M-1 - Multiple Dwelling Low Density	84.27	0.38%
M-2 - Multiple Dwelling	108.25	0.48%
Commercial:		
LB - Limited Business	172	0.01%
NB - Neighborhood Business	148.30	0.66%
SC - Shopping Center	50.82	0.23%
GB - General Business	264.54	1.18%
Arts & Crafts:		
I - Industrial	86.72	0.39%
Other:		
Water	729.03	3.26%
GR - General Recreation	32.43	0.14%
Right-of-Way	2015.01	9.01%
Rail	87.79	0.39%
Totals	22,366.32	100%
Location of City Parks (on various zoning districts)	933.25 Acres	4.2%
Agricultural Preserve Overlay District		
Scenic River Overlay District		
-- 2020 MUSA Boundary		

Map Sources:
Andover Planning
Andover GIS
Anoka County GIS



Appendix L
MDNR Natural Heritage Database Information

1463-04



Minnesota Department of Natural Resources

Natural Heritage and Nongame Research Program, Box 25
500 Lafayette Road

St. Paul, Minnesota 55155-40__

Phone: (651) 296-7863 Fax: (651) 296-1811 E-mail: sarah.hoffmann@dnr.state.mn.us

April 16, 2004

Ryan Hughes
WSB & Associates, Inc.
4150 Olson Memorial Highway, Suite 300
Minneapolis, MN 55422

RECEIVED
APR 20 2004
WSB & ASSOCIATES

Re: Request for Natural Heritage information for the City of Andover Water Resource Management Plan, T32N R24W Sections 1-30, 32-36 and T32N R25W Sections 1, 12, 13, & 24, Anoka County
NHNRP Contact #: ERDB 20040677

Dear Mr. Hughes,

The Minnesota Natural Heritage database has been reviewed to determine if any rare plant or animal species or other significant natural features are known to occur within an approximate one-mile radius of the area indicated on the map enclosed with your information request. Based on this review, there are 64 known occurrences of rare species or natural communities in the area searched. Please see the enclosed database printouts for details. Please feel free to contact me if you have any questions regarding whether a particular activity might impact a rare feature.

The Natural Heritage database is maintained by the Natural Heritage and Nongame Research Program, a unit within the Division of Ecological Services, Department of Natural Resources. It is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, natural communities, and other natural features. Its purpose is to foster better understanding and protection of these features.

Because our information is not based on a comprehensive inventory, there may be rare or otherwise significant natural features in the state that are not represented in the database. A county-by-county survey of rare natural features is now underway, and has been completed for Anoka County. Our information about natural communities is, therefore, quite thorough for that county. However, because survey work for rare plants and animals is less exhaustive, and because there has not been an on-site survey of all areas of the county, ecologically significant features for which we have no records may exist on the project area.

The enclosed results of the database search are provided in two formats: index and full record. To control the release of locational information which might result in the damage or destruction of a rare element, both printout formats are copyrighted.

The index provides rare feature locations only to the nearest section, and may be reprinted, unaltered, in an Environmental Assessment Worksheet, municipal natural resource plan, or report compiled by your company for the project listed above. If you wish to reproduce the index for any other purpose, please contact me to request written permission. Copyright notice for the index should include the following disclaimer:

"Copyright (year) State of Minnesota, Department of Natural Resources. This index may be reprinted, unaltered, in Environmental Assessment Worksheets, municipal natural resource plans, and internal reports. For any other use, written permission is required."

The full-record printout includes more detailed locational information, and is for your personal use

DNR Information: 651-296-6157 • 1-888-646-6367 • TTY: 651-296-5484 • 1-800-657-3929



only. If you wish to reprint the full-record printouts for any purpose, please contact me to request written permission.

Please be aware that review by the Natural Heritage and Nongame Research Program focuses only on *rare natural features*. It does not constitute review or approval by the Department of Natural Resources as a whole. If you require further information on the environmental review process for other wildlife-related issues, you may contact your Regional Environmental Assessment Ecologist, Wayne Barstad, at (651)772-7940.

An invoice for the work completed is enclosed. You are being billed for map and database search and staff scientist review. Please forward this invoice to your Accounts Payable Department. Thank you for consulting us on this matter, and for your interest in preserving Minnesota's rare natural resources.

Sincerely,

M. Breera
for

Sarah D. Hoffmann
Endangered Species Environmental Review Coordinator

encl: Database search results
Invoice

Minnesota Natural Heritage Database
Element Occurrence Records

T32N R24W SECTION 1-30, 32-36, T32N R25W SEC. 1, 12-13, 24, ANOKA COUNTY
MnDNR, Natural Heritage and Nongame Research Program

15:46 Wednesday, APRIL 07, 2004
Copyright 2004 State of Minnesota DNR

TWP	RNG	PRIMARY SECTION	FED STATUS	MN STATUS	S RANK	ELEMENT	and OCCURRENCE NUMBER	MANAGED AREA
T032N	R24W	36	SPC			FIMBRISTYLIS AUTUMNALIS (AUTUMN FIMBRISTYLIS)	#8	BUNKER HILLS REGIONAL PARK
T032N	R24W	36	SPC			HETERODON NASICUS (WESTERN HOGNOSE SNAKE)	#31	BUNKER HILLS REGIONAL PARK
T032N	R24W	36	SPC			ORNOTHERA RHOMBIPETALA (RHOMBIC-PETALED EVENING PRIMROSE)	#12	BUNKER HILLS REGIONAL PARK
T032N	R24W	36	THR			ROTALA RAMOSIOR (TOOTH-CUP)	#4	
T032N	R24W	36		S4		TAMARACK SWAMP MINerotrophic SUBTYPE	#17	
T032N	R25W	01	SPC			BUTEO LINEATUS (RED-SHOULDERED HAWK)	#45	
T032N	R25W	02	THR			EMYDOIDEA BLANDINGII (BLANDING'S TURTLE)	#560	
T032N	R25W	02	THR			EMYDOIDEA BLANDINGII (BLANDING'S TURTLE)	#561	
T032N	R25W	02	THR			EMYDOIDEA BLANDINGII (BLANDING'S TURTLE)	#562	
T032N	R25W	23	THR			EMYDOIDEA BLANDINGII (BLANDING'S TURTLE)	#1020	
T032N	R25W	25	THR			EMYDOIDEA BLANDINGII (BLANDING'S TURTLE)	#1011	
T033N	R24W	31	THR			EMYDOIDEA BLANDINGII (BLANDING'S TURTLE)	#559	
T033N	R24W	33		S4		MIXED EMERGENT MARSH (FOREST)	#22	RUM RIVER CENTRAL REGIONAL PARK
T033N	R24W	33		S3		OAK FOREST (CENTRAL) DRY SUBTYPE	#26	
T033N	R24W	33		S4		TAMARACK SWAMP MINerotrophic SUBTYPE	#15	
T033N	R25W	36	THR			EMYDOIDEA BLANDINGII (BLANDING'S TURTLE)	#675	

Minnesota Natural Heritage Database
Element Occurrence Records

T32N R24W SECTION 1-30, 32-36, T32N R25W SEC. 1, 12-13, 24, ANOKA COUNTY
MnDNR, Natural Heritage and Nongame Research Program

15:46 Wednesday, APRIL 07, 2004
Copyright 2004 State of Minnesota DNR

TWP	RNG	PRIMARY SECTION	FED STATUS	MN STATUS	S RANK	ELEMENT and OCCURRENCE NUMBER	MANAGED AREA
T031N	R24W	01		SPC		HUDSONIA TOMENTOSA (BEACH-HEATHER) #25	
T031N	R24W	02		SPC		ARISTIDA TUBERCULOSA (SEA-BEACH NEEDLEGRASS) #17	BUNKER HILLS REGIONAL PARK
T031N	R24W	02		SPC		HETERODON NASICUS (WESTERN HOGNOSE SNAKE) #32	BUNKER HILLS REGIONAL PARK
T031N	R24W	02		NON		HIERACIUM LONGIPILUM (LONG-BEARDED HAWKWEED) #27	BUNKER HILLS REGIONAL PARK
T031N	R24W	02		SPC		TRIPPLASIS PURPUREA (PURPLE SAND-GRASS) #8	BUNKER HILLS REGIONAL PARK
T032N	R23W	07		SPC		HETERODON NASICUS (WESTERN HOGNOSE SNAKE) #29	BUNKER HILLS REGIONAL PARK
T032N	R24W	06		SPC		PITUOPHIS CATENIFER (GOPHER SNAKE) #30	
T032N	R24W	10		THR		EMYDOIDEA BLANDINGII (BLANDING'S TURTLE) #764	RUM RIVER CENTRAL REGIONAL PARK
T032N	R24W	10		SPC		PEROGNATHUS FLAVESCENS (PLAINS POCKET MOUSE) #17	
T032N	R24W	12		THR		EMYDOIDEA BLANDINGII (BLANDING'S TURTLE) #640	
T032N	R24W	14		SPC		PITUOPHIS CATENIFER (GOPHER SNAKE) #31	
T032N	R24W	15		SPC		HETERODON NASICUS (WESTERN HOGNOSE SNAKE) #17	
T032N	R24W	17		THR		EMYDOIDEA BLANDINGII (BLANDING'S TURTLE) #285	
T032N	R24W	20		THR		EMYDOIDEA BLANDINGII (BLANDING'S TURTLE) #280	
T032N	R24W	20		THR		EMYDOIDEA BLANDINGII (BLANDING'S TURTLE) #636	
T032N	R24W	23		SPC		ARISTIDA TUBERCULOSA (SEA-BEACH NEEDLEGRASS) #18	
T032N	R24W	23		S2		DRY OAK SAVANNA (CENTRAL) BARRENS SUBTYPE #25	
T032N	R24W	23		S2		DRY PRAIRIE (CENTRAL) SAND-GRAVEL SUBTYPE #78	
T032N	R24W	23		NON		HIERACIUM LONGIPILUM (LONG-BEARDED HAWKWEED) #29	
T032N	R24W	24		SPC		ORNOTHERA RHOMBIPETALA (RHOMBIC-PETALED EVENING PRIMROSE) #13	
T032N	R24W	25		THR		GRUS CANADENSIS (SANDHILL CRANE) #442	
T032N	R24W	26		THR		LANIUS LUDOVICIANUS (LOGGERHEAD SHRIKE) #8	
T032N	R24W	27		SPC		PITUOPHIS CATENIFER (GOPHER SNAKE) #32	
T032N	R24W	29		THR		EMYDOIDEA BLANDINGII (BLANDING'S TURTLE) #614	
T032N	R24W	29		THR		EMYDOIDEA BLANDINGII (BLANDING'S TURTLE) #126	
T032N	R24W	29		THR		EMYDOIDEA BLANDINGII (BLANDING'S TURTLE) #281	
T032N	R24W	29		THR		EMYDOIDEA BLANDINGII (BLANDING'S TURTLE) #511	
T032N	R24W	29		SPC	LT	HALIAETUS LEUCOCEPHALUS (BALD EAGLE) #2206	
T032N	R24W	29		SPC		HETERODON NASICUS (WESTERN HOGNOSE SNAKE) #7	
T032N	R24W	31		THR		EMYDOIDEA BLANDINGII (BLANDING'S TURTLE) #422	
T032N	R24W	31		THR		EMYDOIDEA BLANDINGII (BLANDING'S TURTLE) #488	
T032N	R24W	32		THR		EMYDOIDEA BLANDINGII (BLANDING'S TURTLE) #282	
T032N	R24W	34		THR		LANIUS LUDOVICIANUS (LOGGERHEAD SHRIKE) #10	
T032N	R24W	35		SPC		ARISTIDA TUBERCULOSA (SEA-BEACH NEEDLEGRASS) #15	BUNKER HILLS REGIONAL PARK
T032N	R24W	35		SPC		ARISTIDA TUBERCULOSA (SEA-BEACH NEEDLEGRASS) #16	BUNKER HILLS REGIONAL PARK
T032N	R24W	35		S2		DRY OAK SAVANNA (CENTRAL) BARRENS SUBTYPE #17	BUNKER HILLS REGIONAL PARK
T032N	R24W	35		S2		DRY PRAIRIE (CENTRAL) SAND-GRAVEL SUBTYPE #75	BUNKER HILLS REGIONAL PARK
T032N	R24W	35		THR		EMYDOIDEA BLANDINGII (BLANDING'S TURTLE) #863	
T032N	R24W	35		SPC		HESPERIA LEONARDUS LEONARDUS (LEONARD'S SKIPPER) #4	BUNKER HILLS REGIONAL PARK
T032N	R24W	35		NON		HIERACIUM LONGIPILUM (LONG-BEARDED HAWKWEED) #25	BUNKER HILLS REGIONAL PARK
T032N	R24W	35		NON		HIERACIUM LONGIPILUM (LONG-BEARDED HAWKWEED) #26	BUNKER HILLS REGIONAL PARK
T032N	R24W	35		NON		LINARIA CANADENSIS (OLD FIELD TOADFLAX) #18	BUNKER HILLS REGIONAL PARK
T032N	R24W	35		SPC		ORNOTHERA RHOMBIPETALA (RHOMBIC-PETALED EVENING PRIMROSE) #9	BUNKER HILLS REGIONAL PARK
T032N	R24W	35		SPC		ORNOTHERA RHOMBIPETALA (RHOMBIC-PETALED EVENING PRIMROSE) #11	BUNKER HILLS REGIONAL PARK
T032N	R24W	35		SPC		PEROGNATHUS FLAVESCENS (PLAINS POCKET MOUSE) #1	BUNKER HILLS REGIONAL PARK
T032N	R24W	35		END		SCLERIA TRIGLOMERATA (TALL NUT-RUSH) #8	BUNKER HILLS REGIONAL PARK
T032N	R24W	36		S5		CATTAIL MARSH #18	
T032N	R24W	36		S2		DRY PRAIRIE (CENTRAL) SAND-GRAVEL SUBTYPE #72	

Minnesota's Endangered Flora and Fauna

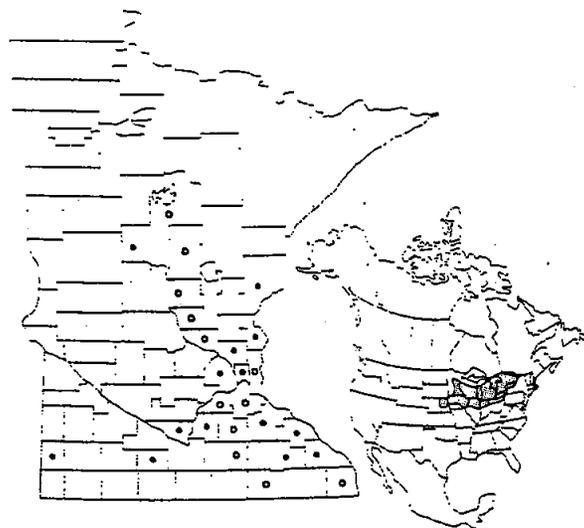
Edited by Barbara Coffin and Lee Pfannmuller

**Illustrated by Jan A. Janssens,
Nan Marie Kane, Kris A. Kohn,
Don Luce, James Tidwell, and Vera Ming Wong**

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Minnesota Department of Natural Resources**

BLANDING'S TURTLE

332 *Emydoidea blandingii* (Holbrook)



©1988, State of Minnesota, Vera Ming Wong

OFFICIAL STATUS: Threatened

BASIS FOR STATUS: Although formerly more widespread, the Blanding's turtle is now restricted to a small number of states and provinces in the Upper Midwest, stretching from Nebraska eastward to Michigan, Ontario, and Quebec. A smaller remnant population, spanning portions of a few New England states, as well as a number of scattered populations throughout the Northeast, testify to the turtle's more expanded range in earlier times. Minnesota lies on the northwest periphery of the species' range. An extensive area of sand dunes and marshes along the Mississippi River, south of the town of Kellogg, is recognized as a major concentration area for the turtle and may be one of the largest breeding populations in its entire range. Elsewhere in the state, the Blanding's turtle has a more spotty distribution, following the Mississippi and St. Croix rivers northward into east-central Minnesota and the Minnesota River westward into the south-central portions of the state. Two recent records from Pipestone County also confirm the species' presence in the Missouri River drainage of extreme southwestern Minnesota.

As a marsh inhabitant the recent destruction of wetland habitats by drainage and/or inundation for agricultural purposes, river channelization, and water impoundment has greatly decreased available habitat for the species. Like other turtles, the Blanding's turtle is also vulnerable to collecting as a desirable pet species (\$45 for a 15 to 20 centimeter turtle); it is easily collected in areas where it is abundant, especially during the nesting season. The species' life history also makes this turtle particularly susceptible to human disturbances, as evidenced by a long term and intensive study of the population inhabiting the Kellogg Dunes (Pappas, personal communication). Some features contributing to this susceptibility are late maturation, low reproductive potential (one clutch/season), long-lived adults, and high mortality of eggs and juveniles. Population and reproductive dynamics suggest viable populations of Blanding's turtles are dependent on large numbers of animals and adequate areas of undisturbed habitat.

PREFERRED HABITAT: The preferred habitat of the Blanding's turtle includes calm, shallow water, rich, aquatic vegetation and sandy uplands for nesting. Studies by Congdon et al. (1983) in Michigan and by Linck (personal communication) in Massachusetts have shown that nesting females may travel considerable distances (200 to 400 meters) to a nesting area, passing enroute what appears to be suitable nesting habitat immediately adjacent to the marsh in which they reside.

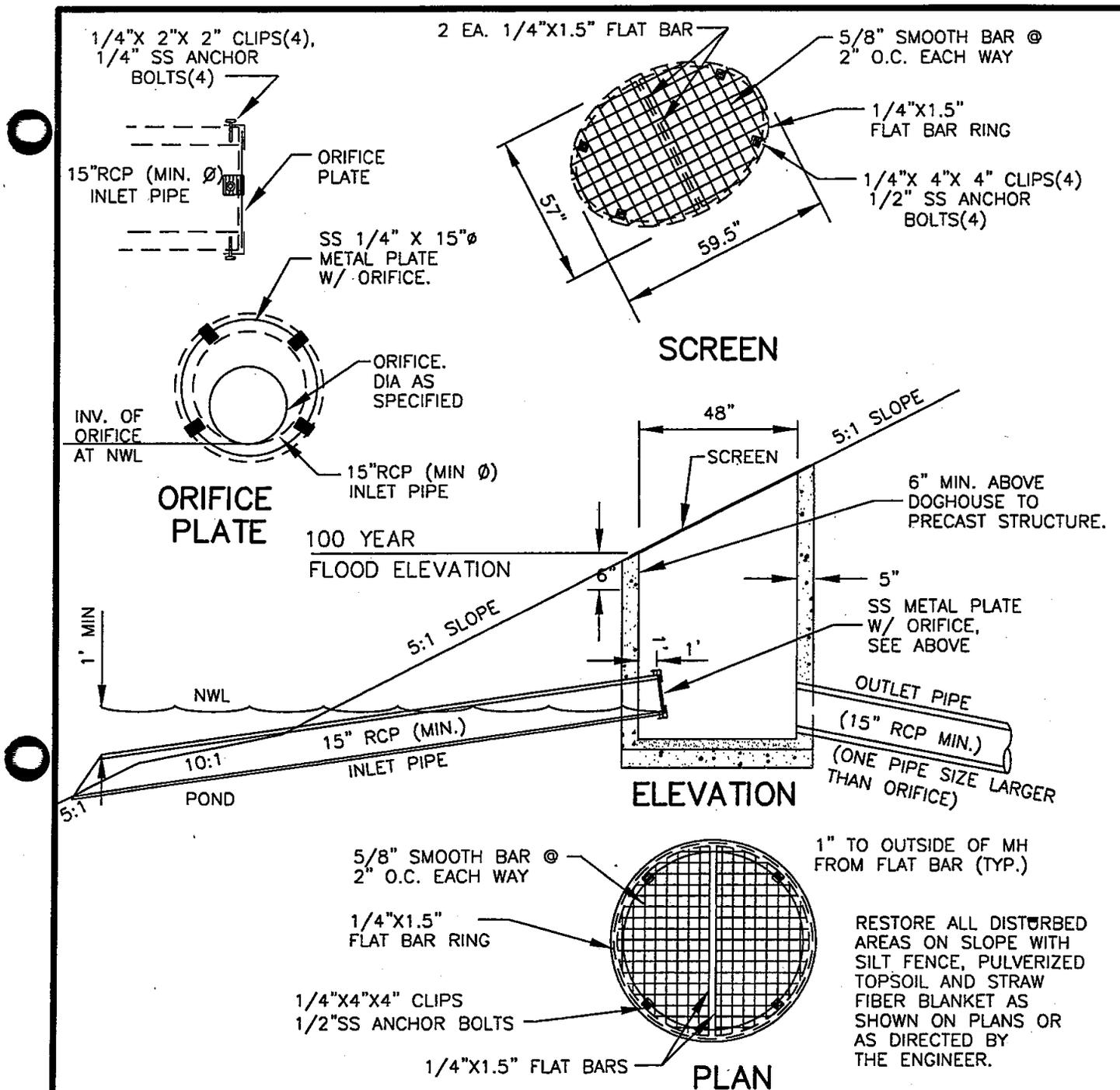
AID TO IDENTIFICATION: Blanding's turtle is medium-sized, averaging 15 to 25 centimeters in length. The species' most diagnostic field characteristics are its smooth, domed upper shell, or carapace, and its bright yellow neck, throat, and chin. The carapace usually appears bluish black, with numerous specks of yellow throughout. The lower shell, or plastron, is bright yellow with black patches on the outside margin. In general, the adult male can be distinguished from the female by its slightly indented plastron and longer tail. The most distinct feature of the plastron is the hinge, which allows the turtle to raise the plastron upward and provide more protection to the soft extremities that it has pulled inside the shell. For this reason the species is often referred to as a "semibox" turtle.

RECOMMENDATIONS: Efforts to identify, protect, and preserve preferred habitats of this species should be continued, particularly where populations are locally abundant. Additional information on the species' local distribution and abundance should also be collected to allow an accurate assessment of its current status and to aid in protection efforts.

SELECTED REFERENCES: Breckenridge 1944; Conant 1975; Congdon et al. 1983; Ewert 1982; Graham and Doyle 1977; McCoy 1977; Vogt 1981.

Blanding's Turtle: adult viewed from above (top) and below (bottom); side view shown in silhouette.

Appendix M
Skimmer Structure Details



POND	100 YEAR	NWL	ORIFICE Ø	INLET Ø	OUTLET Ø	OUTLET %

STRUCTURE TABLE

POND SKIMMER STRUCTURE

3/26/03



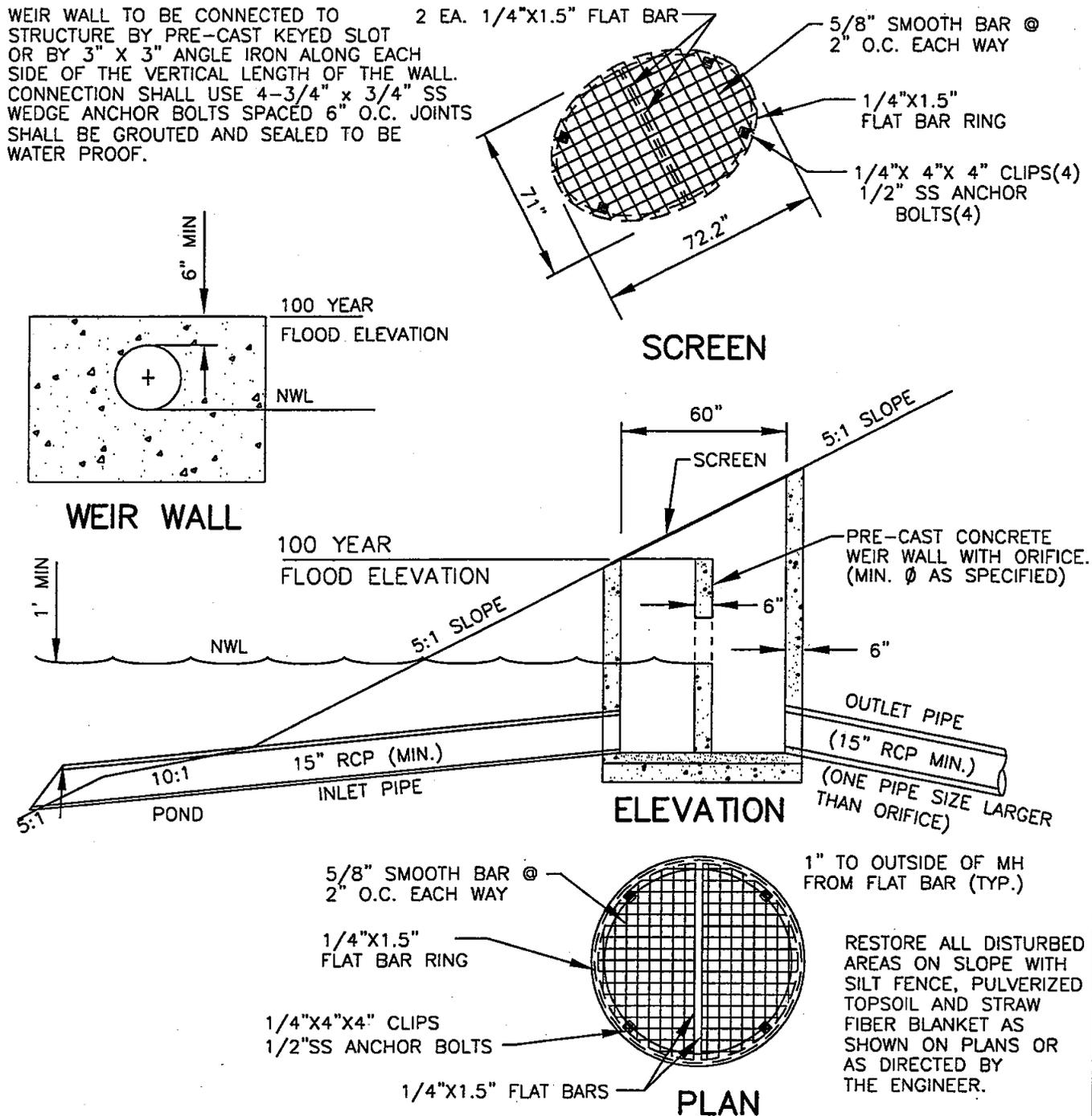
CITY OF ANDOVER

STANDARD DRAWING
NO.

417C

2004

WEIR WALL TO BE CONNECTED TO STRUCTURE BY PRE-CAST KEYED SLOT OR BY 3" X 3" ANGLE IRON ALONG EACH SIDE OF THE VERTICAL LENGTH OF THE WALL. CONNECTION SHALL USE 4-3/4" x 3/4" SS WEDGE ANCHOR BOLTS SPACED 6" O.C. JOINTS SHALL BE GROUTED AND SEALED TO BE WATER PROOF.



POND	100 YEAR	NWL	ORIFICE Ø	INLET Ø	OUTLET Ø	OUTLET %

STRUCTURE TABLE
POND SKIMMER STRUCTURE WITH WEIR WALL

6/3/03



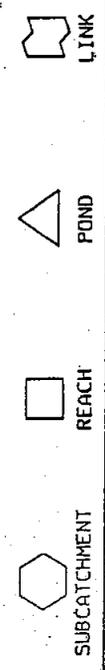
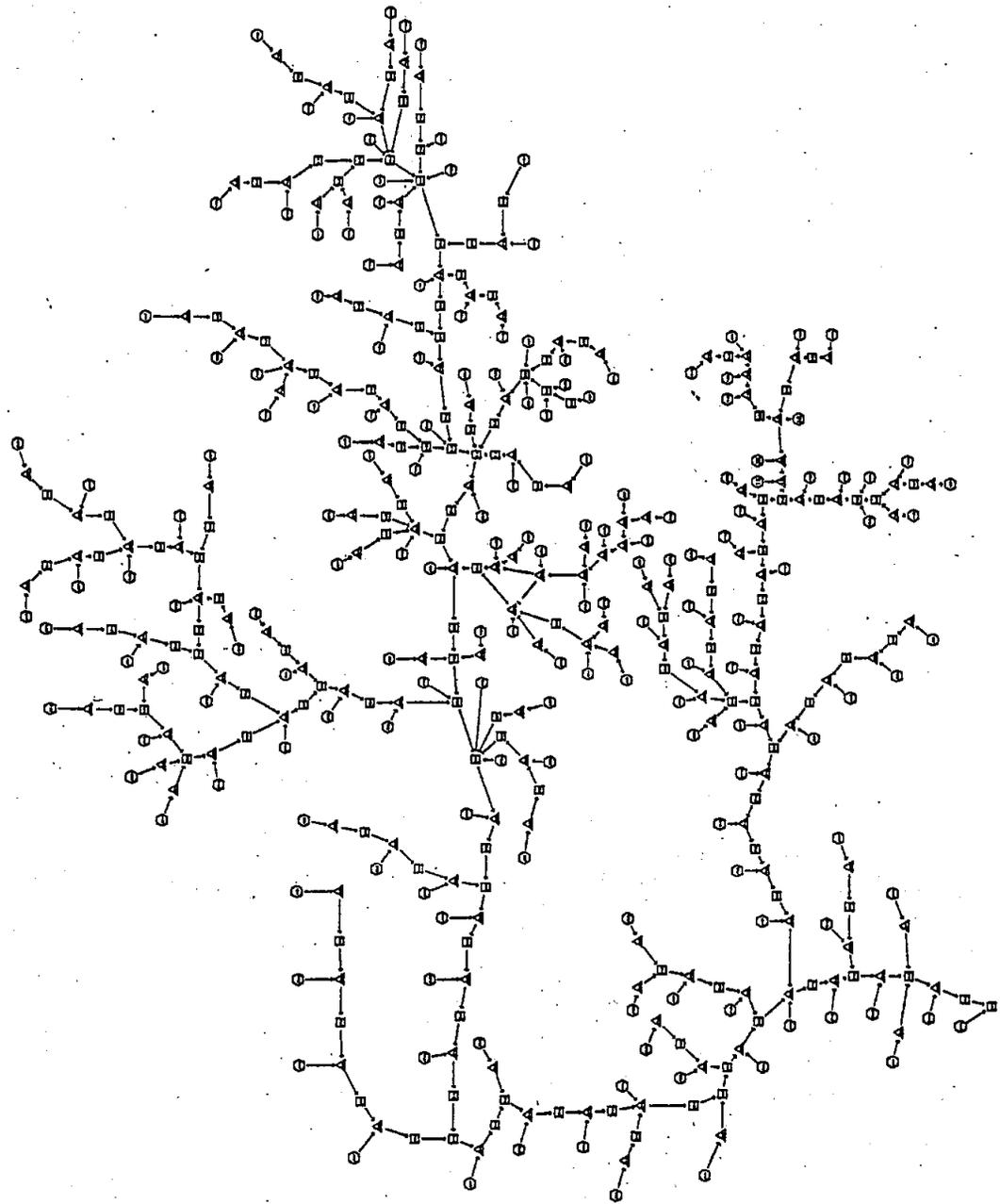
CITY OF ANDOVER
MINNESOTA

2004

STANDARD DRAWING
NO.

418C

Appendix N
Summary of Hydrologic Model (CCWD)



Drainage Diagram for Caon Creek Watershed District
 Prepared by Montgomery Watson
 HydroCAD 5.11 000606 (c) 1986-1999 Applied Microcomputer Systems
 13 Apr 01

RUNOFF BY SCS TR-20 METHOD: TYPE II 24-HOUR RAINFALL= 5.90 IN, SCS U.H.

RUNOFF SPAN = 10-65 HRS, dt= .20 HRS, 276 POINTS

SUBCAT NUMBER	AREA (ACRE)	Tc (MIN)	--GROUND COVERS (%CN)--	WGT'D CN	C	PEAK (CFS)	Tpeak (HRS)	VOL (AF)
10	35.19	15.0	100%87	87	-	171.5	11.98	12.28
20	59.00	12.0	100%84	84	-	268.0	11.95	19.37
60	62.45	15.0	100%77	77	-	241.5	11.99	17.38
140	10.00	15.0	100%73	73	-	34.36	11.99	2.49
150	139.00	18.0	100%69	69	-	392.0	12.02	30.49
220	15.24	18.0	100%79	79	-	59.08	12.01	4.47
1101	156.30	55.0	34%77 15%65 42%68 2%92 8%98	73	-	263.4	12.48	39.05
1102	988.50	267.0	10%77 44%65 1%68 37%68 2%65 6%98	69	-	426.8	15.45	217.02
1103	194.50	63.0	26%77 34%65 33%68 1%75 6%98	71	-	274.8	12.60	45.65
1104	185.90	92.0	23%77 33%65 40%68 3%98	70	-	191.2	12.99	42.22
1105	1204.40	337.0	21%77 52%65 23%68 4%98	70	-	446.2	16.11	273.59
1106	134.10	57.0	43%65 51%68 6%98	68	-	180.1	12.52	28.43
1107	98.70	87.0	28%77 72%65	68	-	97.93	12.91	20.93
1108	394.40	98.0	2%77 56%65 32%72 1%65 9%98	70	-	388.0	13.05	89.58
2001	118.20	50.0	0%65 96%68 4%98	69	-	183.5	12.43	25.95
2002	625.80	110.0	0%75 0%77 31%65 62%70 1%68 6%98	70	-	563.1	13.20	142.15
2003	592.50	128.0	10%98 11%77 27%65 49%68 0%88 3%65	71	-	491.2	13.43	139.14
2301	131.80	127.0	29%99 56%65 15%77 0%98	77	-	134.9	13.43	37.15
2302	690.20	300.0	19%72 1%98 0%92 73%65 7%98	69	-	270.8	15.67	151.53
3701	95.40	52.0	36%77 46%68 3%65 16%98	76	-	184.0	12.44	26.00

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3702	453.60	75.0	4%60 6%98	8%65	56%68	25%75	71	-	564.8	12.75	106.48
3703	384.70	70.0	7%77	63%68	23%75	7%98	72	-	525.5	12.67	93.24
3704	1351.00	317.0	2%75 3%88	13%77	56%65	22%70	70	-	526.5	15.87	306.89
3901	109.00	32.0	100%87				87	-	377.3	12.18	38.30
3902	252.60	44.0	100%77				77	-	552.8	12.34	70.68
3903	395.00	87.0	100%73				73	-	475.1	12.89	98.82
3904	442.20	61.0	100%74				74	-	708.6	12.56	113.89
4101	149.40	33.0	100%82				82	-	456.6	12.20	47.24
4102	90.70	36.0	100%92				92	-	324.2	12.22	34.79
4103	191.10	92.0	100%70				70	-	196.6	12.99	43.41
4104	682.30	137.0	100%73				73	-	576.0	13.57	170.84
4105	215.10	137.0	100%73				73	-	181.6	13.57	53.86
4106	402.30	173.0	100%78				78	-	333.4	13.99	116.79
4107	335.70	123.0	100%90				90	-	488.8	13.30	128.19
4108	407.90	180.0	100%73				73	-	279.4	14.10	102.15
4109	165.00	100.0	100%70				70	-	160.0	13.08	37.48
4110	135.90	93.0	100%70				70	-	139.1	12.98	30.87
4111	1253.40	300.0	100%75				75	-	612.3	15.62	333.88
4112	602.90	135.0	100%72				72	-	498.9	13.53	146.25
4113	71.60	42.0	100%76				76	-	155.8	12.30	19.49
4114	211.20	57.0	100%77				77	-	393.3	12.49	59.20
4115	121.10	45.0	100%70				70	-	207.6	12.37	27.49
4116	96.90	28.0	100%70				70	-	218.5	12.16	21.98
4117	371.10	71.0	100%72				72	-	501.8	12.69	89.94
4118	421.50	69.0	100%69				69	-	519.5	12.67	92.53
4119	243.00	49.0	100%70				70	-	397.5	12.42	55.17
4120	243.70	59.0	100%71				71	-	359.4	12.54	57.19

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4121	124.00	39.0	100%76					76	-	290.0	12.27	33.74
4401	1407.00	400.0	2%77 26%68 70%80 3%98					77	-	593.2	17.20	397.64
4402	118.90	110.0	92%80 8%98					81	-	152.9	13.16	37.22
4403	702.90	250.0	1%65 16%68 83%80 1%98					78	-	441.2	15.12	204.31
4404	265.00	143.0	96%80 4%98					81	-	278.7	13.61	83.19
4405	203.00	120.0	100%80 0%98					80	-	237.7	13.30	62.01
4406	1105.20	290.0	3%77 3%65 1%60 28%68 64%80 0%98					76	-	580.3	15.64	303.30
4407	1083.50	297.0	1%77 22%65 26%68 50%80					73	-	497.2	15.76	271.38
4408	144.70	107.0	99%65 1%80					65	-	107.4	13.22	27.48
4409	164.60	63.0	3%77 44%65 45%68 8%98					69	-	215.6	12.60	36.13
4410	187.90	55.0	1%77 33%65 62%68 4%98					68	-	262.7	12.49	39.84
4411	127.00	45.0	0%65 90%68 5%65 4%98					69	-	209.6	12.37	27.88
4412	150.40	127.0	19%77 60%65 21%68					68	-	111.9	13.48	31.89
4413	1535.40	430.0	10%77 9%65 22%68 0%92 53%80 1%72 5%98					76	-	591.2	17.58	421.42
4414	550.80	127.0	31%65 18%68 49%72 2%98					70	-	443.5	13.47	125.12
4415	183.50	72.0	4%65 83%68 13%98					72	-	245.5	12.70	44.48
4416	36.20	21.0	87%68 13%98					72	-	103.8	12.04	8.75
4417	713.70	110.0	14%77 50%65 35%68 1%98					68	-	593.2	13.21	151.31
4418	514.50	117.0	27%77 38%65 19%68 15%98					74	-	509.0	13.27	132.82
4419	235.80	120.0	14%77 5%65 76%68 1%65 5%98					70	-	198.5	13.34	53.56
4420	97.10	48.0	88%68 3%65 9%98					71	-	166.6	12.40	22.78
4421	449.80	183.0	6%77 78%65 14%68 2%98					67	-	242.7	14.29	92.01
4422	301.90	67.0	20%77 48%65 28%68 4%98					70	-	393.9	12.65	68.56
4423	347.20	98.0	11%68 11%77 48%65 27%68 1%92 3%98					69	-	328.5	13.05	76.22
4424	527.10	97.0	7%77 25%65 61%68 3%65 4%98					69	-	502.0	13.06	115.72

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5201	660.20	157.0	43%75 5%85	6%75 2%88	1%98 26%65	1%80 16%98	77	-	572.6	13.83	186.28
5401	887.90	167.0	12%65 8%92	36%75 8%88	0%75 12%65	0%85 24%98	80	-	800.9	13.91	272.03
5402	315.50	51.0	12%77 4%88	0%65 15%70	49%72 16%98	3%98	78	-	654.4	12.42	90.75
5403	196.30	37.0	16%65 1%85	46%75 0%92	0%75 7%65	13%98 16%98	80	-	534.6	12.24	59.25
5404	690.30	82.0	51%70 1%85	1%75 5%92	4%98 18%65	7%85 13%98	76	-	955.7	12.83	188.68
5405	324.90	183.0	5%70 41%65	2%98 6%98	45%88	1%88	78	-	258.7	14.18	94.35
5406	544.00	230.0	6%70 9%98	0%92	82%65	3%99	69	-	267.3	14.94	119.43
5407	353.60	100.0	38%75 38%65	1%75 3%72	6%98 15%98	0%92	76	-	422.6	13.06	96.76
5408	80.60	50.0	53%72 10%85	1%75 5%85	1%98 15%98	15%80	79	-	174.3	12.41	23.79
5409	68.40	37.0	14%75 2%92	16%85 51%72	1%85 13%98	3%92	79	-	181.2	12.24	20.14
5410	222.40	56.0	1%70 73%88	0%98 0%88	0%85 6%85	2%92 17%98	89	-	565.3	12.46	81.81
5411	475.50	102.0	53%75 0%92	0%75 25%65	0%85 17%98	4%92	77	-	577.9	13.08	133.85
5412	44.60	27.0	62%88	8%75	15%65	15%98	85	-	155.5	12.12	15.03
5413	662.30	96.0	4%72 11%85	31%75 5%92	2%75 14%72	1%80 32%98	84	-	1017.7	12.97	222.20
5414	665.80	86.0	11%92 3%85	39%75 15%65	1%75 1%88	1%98 28%98	83	-	1084.4	12.86	217.93
5415	415.20	60.0	38%75 9%88	1%98 7%72	21%85 1%65	1%92 23%98	84	-	893.8	12.52	138.26
5416	549.60	100.0	26%72 14%88	0%75 1%88	1%85 28%72	5%92 25%98	82	-	780.8	13.04	176.08
5701	453.40	122.0	1%77 13%92	68%70 17%98	0%75	1%85	78	-	491.9	13.33	131.35
5702	114.50	123.0	57%70	18%77	18%65	8%98	73	-	105.7	13.38	28.67

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5703	191.70	153.0	10%77 6%68	14%65 10%98	51%70	10%92	75	-	158.7	13.76	51.03
5704	351.50	200.0	45%72 0%88	1%75 5%60	5%98	32%92	82	-	293.1	14.31	113.57
5705	766.80	128.0	88%70 4%92	3%77 4%98	2%65	1%98	72	-	659.6	13.43	186.00
5706	39.30	22.0	99%70	1%98			70	-	101.4	12.05	8.91
5707	309.40	57.0	57%70	37%75	6%98		73	-	500.6	12.50	77.31
5708	408.60	82.0	11%72 27%65	2%77 16%98	13%65	32%75	74	-	530.2	12.84	105.36
5709	1114.10	157.0	0%77 23%65	16%65 14%98	45%75	2%92	75	-	906.8	13.84	296.58
5710	596.50	97.0	41%70 40%65	1%75 15%98	4%92	0%88	73	-	658.4	13.04	149.27
5711	652.70	160.0	7%75 7%98	16%77	42%65	28%70	71	-	457.9	13.91	153.28
5712	309.60	67.0	10%77 8%98	30%65	48%75	4%65	74	-	465.7	12.64	79.77
5713	779.80	127.0	0%65 26%92	53%72 5%88	1%75	1%85	82	-	920.0	13.41	250.64
5714	707.40	140.0	0%72 7%92	62%88 0%88	0%75 9%65	0%85	88	-	893.6	13.54	260.66
5715	509.20	83.0	0%70 8%92	2%65 8%65	43%72	2%85	83	-	852.8	12.82	166.58
5716	495.40	51.0	8%77 14%98	20%65	53%72	6%70	75	-	937.7	12.43	131.25
5801	497.50	207.0	11%77 0%65	40%65 1%68	5%68 8%98	34%70	71	-	283.2	14.45	116.84
5802	297.60	137.0	13%77 10%65	41%65 7%98	27%70	2%92	71	-	233.8	13.59	69.89
5803	89.90	65.0	68%68	9%92	23%98		77	-	152.4	12.60	25.22
5804	166.70	123.0	66%68 13%98	2%85	7%92	12%65	74	-	159.3	13.37	43.04
5805	315.50	183.0	4%77 1%65	1%65 6%70	75%68 9%98	3%92	72	-	206.5	14.24	76.54
5806	33.60	25.0	86%70	14%98			74	-	91.17	12.09	8.62

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5807	785.10	120.0	14%77 3%92	5%65 0%72	2%68 20%99	47%68 9%98	79	-	893.5	13.30	233.62
5808	84.40	38.0	20%77 17%98	28%65	8%68	27%92	81	-	231.9	12.25	26.10
5809	432.10	93.0	2%77 9%92	72%70 2%85	0%75 2%70	0%85 12%98	76	-	544.8	12.96	118.20
5810	107.20	45.0	70%68 0%92	2%77 1%88	9%65 7%85	1%92 10%98	72	-	197.5	12.36	25.95
5811	208.70	57.0	7%88 2%85	7%77 7%98	55%70	22%92	79	-	412.2	12.49	61.67
5812	390.70	112.0	1%77 17%85	47%65 2%92	30%68 3%98	0%75	71	-	359.2	13.22	91.74
5813	319.30	78.0	18%77 7%65	18%65 8%98	48%70	1%85	72	-	400.8	12.78	77.40
5814	100.50	38.0	20%65	76%68	4%98		69	-	187.9	12.26	22.06
5815	224.20	128.0	12%77 8%98	25%65	47%70	8%65	72	-	192.8	13.43	54.38
5816	261.30	88.0	2%77 5%98	14%65	72%68	7%65	69	-	266.5	12.92	57.37
5817	417.00	105.0	78%68 6%98	8%77	7%65	0%88	70	-	386.3	13.15	94.72
5818	123.00	98.0	6%77 9%98	24%65	59%68	2%65	70	-	121.0	13.05	27.94
5819	500.70	127.0	8%65 2%92	15%77 0%85	32%65 5%98	37%68	70	-	403.2	13.47	113.74
5820	112.60	48.0	8%65 12%98	51%68	29%92	0%85	78	-	242.4	12.39	32.37
5821	177.80	67.0	57%68	1%92	37%65	5%98	69	-	223.2	12.65	39.03
5822	404.80	105.0	10%77	4%65	79%68	7%98	71	-	389.4	13.15	95.05
5823	529.90	110.0	24%77 7%98	29%65	40%68	0%65	71	-	495.2	13.20	124.43
5901	127.80	43.0	99%68	1%98			68	-	207.6	12.34	27.09
5902	775.30	163.0	1%77 1%75	38%65 2%98	47%68	11%65	67	-	452.7	13.91	158.60
5903	342.20	171.0	15%77	40%65	43%68	3%98	69	-	211.1	14.10	75.13

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5904	127.50	60.0	0%77 44%65 51%68 4%98	0%65 68	-	166.1	12.56	27.03
5905	65.40	43.0	7%77 90%68 3%98	69	-	110.5	12.34	14.35
5906	223.50	73.0	3%77 1%65 92%68 4%98	70	-	273.1	12.72	50.76
5907	410.00	135.0	72%68 3%77 21%65 4%98	69	-	302.8	13.55	90.01
5908	524.60	152.0	66%68 6%77 24%65 3%98	69	-	353.9	13.82	115.17
5909	147.00	48.0	9%77 45%65 35%68 7%98	4%65 69	-	234.0	12.41	32.27
5910	61.60	40.0	93%68 3%85 4%98	70	-	115.1	12.29	13.98
5911	207.00	42.0	32%77 5%65 54%68 9%98	74	-	422.7	12.31	53.23
5912	244.20	180.0	54%68 1%77 37%65 8%98	69	-	144.0	14.14	53.61
5913	510.70	137.0	37%77 21%65 33%68 7%98	3%65 73	-	431.2	13.57	127.87
5917	797.40	133.0	8%77 21%65 6%68 23%72 0%85 10%92 8%98 23%99	81	-	887.1	13.49	250.14
5918	336.90	120.0	16%77 38%65 3%68 38%68 4%98	70	-	283.6	13.34	76.53
5919	115.60	37.0	17%77 23%65 48%72 12%98	74	-	263.2	12.25	29.71
5920	173.60	55.0	15%72 1%77 28%65 41%68 15%98	72	-	282.5	12.48	42.05
5921	620.40	98.0	6%92 13%77 10%65 56%68 0%75 1%65 2%72 11%98	74	-	704.7	13.03	160.08
5930	101.50	93.3	100%75	75	-	123.5	12.98	26.97
5931	25.30	73.3	100%75	75	-	36.62	12.71	6.72
5932	57.40	73.3	100%71	71	-	72.37	12.73	13.47
5933	57.40	56.7	100%75	75	-	101.1	12.49	15.22
5934	73.40	93.3	100%75	75	-	89.33	12.98	19.51
5935	78.10	85.0	100%72	72	-	91.87	12.88	18.94
5936	109.00	103.0	100%71	71	-	106.4	13.11	25.59
5937	35.60	20.0	100%75	75	-	116.3	12.03	9.39
5938	36.73	50.0	100%72	72	-	63.72	12.42	8.89
5939	70.00	77.0	100%76	76	-	101.4	12.76	19.13

5940	28.50	15.0	100%81	81	-	122.2	11.98	8.76
5941	21.60	20.0	100%78	78	-	77.17	12.03	6.18
5942	134.00	37.0	100%83	83	-	394.1	12.24	43.39
5943	58.50	55.0	100%71	71	-	91.84	12.48	13.73
6001	533.60	80.0	100%72	72	-	656.0	12.81	129.36
6002	260.50	112.0	100%74	74	-	266.4	13.21	67.24
6003	75.60	44.0	100%77	77	-	165.4	12.34	21.15
6004	828.00	113.0	100%72	72	-	787.1	13.26	200.83
6005	232.20	44.0	100%73	73	-	447.6	12.35	57.97
6006	196.50	55.0	100%81	81	-	421.9	12.46	61.00
6007	135.50	30.0	100%75	75	-	354.3	12.18	35.81
6008	246.00	57.0	100%70	70	-	357.3	12.51	55.86

REACH ROUTING BY STOR-IND+TRANS METHOD

REACH NO.	DIAM (IN)	BOTTOM WIDTH (FT)	DEPTH (FT)	SIDE SLOPES (FT/FT)		n	LENGTH (FT)	SLOPE (FT/FT)	PEAK VEL. (FPS)	TRAVEL TIME (MIN)	PEAK Qout (CFS)
123	-	7.0	9.0	.33 .33		.040	800	.0001	.9	14.3	198.5
234	-	6.0	8.0	.33 .33		.040	1600	.0003	.9	28.2	39.93
1102	-	13.0	10.0	.30 .30		.045	8000	.0013	1.0	128.0	16.38
1104	-	14.0	8.0	.30 .30		.045	2800	.0004	1.4	34.5	179.0
1105	-	15.0	9.0	.25 .25		.045	6650	.0006	1.5	73.2	182.8
1106	-	13.0	12.0	.50 .50		.045	1500	.0003	1.5	16.5	286.8
1181	-	12.0	6.5	1.00 1.00		.045	2700	.0007	1.4	31.4	59.77
1182	-	12.0	10.0	1.00 1.00		.045	1900	.0007	2.1	14.9	233.0
1183	-	12.0	10.0	1.00 1.00		.045	3500	.0007	2.6	22.7	478.9
2002	-	4.0	6.3	1.03 .90		.035	5300	.0006	1.5	57.5	35.60
2003	-	4.0	6.3	1.05 .99		.045	5400	.0020	2.7	33.3	119.8
2302	-	4.0	4.0	.52 .50		.055	5800	.0009	.4	248.6	0.00
3702	-	3.0	7.0	.94 1.17		.045	4200	.0013	1.6	42.9	30.23
3703	-	3.0	4.0	.74 .73		.045	3100	.0005	1.1	45.7	32.12
3704	-	4.0	6.0	.95 1.44		.045	11300	.0024	2.3	81.5	47.19
3705	-	5.0	8.0	.83 .69		.045	2900	.0009	2.4	20.0	275.1
3902	-	5.0	5.0	.50 .50		.035	4000	.0010	1.3	51.0	13.63
3903	-	5.0	5.0	.50 .50		.035	3500	.0006	1.7	34.6	70.55
3904	-	7.0	6.0	.50 .50		.050	3500	.0019	2.3	25.5	127.1
4103	-	4.0	5.0	.50 .50		.040	3800	.0008	.9	73.0	5.59
4104	-	4.0	5.0	.50 .50		.040	3000	.0008	1.6	32.2	49.81
4106	-	10.0	13.0	.50 .50		.040	4500	.0004	2.3	32.0	723.2
4107	-	6.0	8.0	.50 .50		.040	2600	.0007	2.2	19.4	261.5
4109	-	3.0	5.0	.50 .50		.040	2000	.0018	1.9	17.4	33.35
4111	-	4.0	6.0	.50 .50		.040	5500	.0012	1.6	57.6	29.68

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4114	-	8.0	10.0	.70	.70	.035	2700	.0004	2.3	20.0	349.8
4115	-	8.0	10.0	.60	.60	.040	2000	.0008	2.5	13.3	301.5
4116	-	8.0	12.0	.63	.63	.035	1600	.0002	1.7	16.1	291.4
4117	-	10.0	10.0	.50	.50	.060	2500	.0008	2.0	20.6	479.0
4118	-	10.0	11.0	.50	.50	.075	2800	.0025	2.9	15.9	762.1
4119	-	10.0	11.0	.50	.50	.070	4100	.0015	2.6	25.8	871.7
4120	-	10.0	11.0	.50	.50	.070	2500	.0018	2.8	14.7	852.6
4121	-	10.0	10.0	.50	.50	.075	2800	.0039	3.4	13.9	672.3
4198	-	6.0	12.0	.50	.50	.040	4400	.0004	2.2	34.1	516.7
4199	-	9.0	10.0	.50	.50	.040	2500	.0004	2.2	19.3	515.8
4402	-	6.0	5.5	.50	.50	.045	2000	.0010	1.0	33.8	10.16
4407	-	4.0	5.0	.50	.50	.045	5300	.0005	1.3	66.4	75.46
4408	-	9.0	10.0	.50	.50	.045	3100	.0005	2.1	24.3	494.2
4410	-	3.0	3.0	.50	.50	.045	3000	.0005	.8	60.6	11.40
4414	-	6.0	13.0	.50	.50	.045	5300	.0005	2.3	37.9	708.6
4416	-	3.0	5.0	.50	.50	.050	1500	.0005	1.1	22.0	55.50
4418	-	4.0	5.0	.50	.50	.045	3150	.0004	1.5	34.4	491.1
4420	-	3.0	3.5	.50	.50	.045	1550	.0005	.8	31.6	10.98
4423	-	4.0	4.0	.50	.50	.045	5350	.0003	.9	94.5	41.73
5403	-	17.0	5.4	.30	.30	.045	2600	.0002	1.0	43.0	159.8
5407	-	12.0	4.0	.20	.20	.045	2600	.0043	2.2	19.5	59.25
5408	-	8.0	3.9	.30	.30	.045	2900	.0066	1.9	25.4	14.71
5409	-	20.0	12.0	.41	.26	.045	2200	.0005	2.6	13.9	1706.1
5410	-	25.0	15.0	.27	.38	.065	3400	.0010	2.8	20.5	2194.2
5412	-	6.0	8.0	1.00	1.00	.090	950	.0078	3.6	4.4	389.1
5413	-	23.0	14.0	.49	.45	.065	4600	.0023	4.0	19.0	2193.9
5415	-	22.0	13.0	.49	.45	.065	4400	.0018	3.7	19.8	2202.7
5416	-	22.0	13.0	.49	.45	.065	8000	.0018	3.7	36.0	2195.2

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5707	-	15.0	13.0	.33	.30	.045	3100	.0004	2.4	21.9	1495.3
5709	-	16.0	14.0	.39	.51	.055	3800	.0006	2.6	24.4	1692.6
5710	-	20.0	14.0	.49	.38	.050	3300	.0005	2.6	21.1	1760.7
5714	-	20.0	13.0	.42	.31	.050	4000	.0006	2.7	24.3	1882.0
5802	-	5.0	5.0	.52	.54	.045	1500	.0004	1.1	21.8	58.02
5804	-	15.3	3.8	.25	.25	.045	1700	.0004	.8	34.7	33.51
5806	-	6.0	6.0	.72	.77	.045	1100	.0002	1.0	18.1	82.66
5811	-	11.0	4.0	.33	.33	.045	4200	.0007	1.4	49.6	88.04
5818	-	12.0	4.8	.50	.50	.045	2000	.0013	2.1	16.2	121.9
5821	-	8.0	15.0	1.00	1.00	.045	2800	.0001	.6	77.5	27.25
5823	-	6.5	4.6	.53	.41	.045	6300	.0015	2.4	44.6	154.3
5851	-	4.0	5.4	.72	.77	.045	1300	.0004	1.2	17.4	66.29
5852	-	4.0	5.4	.72	.77	.045	6500	.0004	1.2	87.2	65.23
5902	-	5.0	7.5	.41	.42	.065	3900	.0051	2.8	23.1	155.8
5904	-	6.0	8.0	.30	.30	.080	1600	.0051	3.3	8.1	722.1
5906	-	4.0	6.3	.49	.46	.045	4700	.0001	.5	143.0	25.55
5907	-	4.0	4.3	.53	.48	.045	6300	.0009	1.0	105.6	10.44
5908	-	7.0	9.0	.26	.23	.045	4300	.0009	2.7	26.2	990.0
5910	-	5.0	5.0	.58	.38	.045	2000	.0012	2.0	17.0	104.9
5912	-	12.0	9.0	.43	.41	.045	5000	.0005	2.0	41.2	470.1
5943	-	2.0	4.5	.35	.31	.065	2500	.0030	1.3	32.2	19.07
6003	-	1.0	12.0	1.00	1.00	.045	1250	.0013	2.7	7.6	251.3
6004	-	3.0	9.0	.50	.50	.035	3800	.0003	1.8	34.9	261.5
6006	-	4.0	8.0	.50	.50	.040	5000	.0010	1.7	48.2	53.26
6007	-	4.0	8.0	.50	.50	.040	2300	.0017	2.9	13.4	187.5
6017	-	5.0	11.0	.70	.70	.040	5800	.0012	2.8	34.0	246.2
6041	-	6.0	5.5	.50	.50	.045	4100	.0010	1.1	62.9	14.13
6042	-	6.0	5.5	.50	.50	.045	3650	.0010	1.0	61.3	10.35

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6131	-	6.0	5.5	.50	.50	.045	5500	.0005	1.1	86.3	32.21
6132	-	4.0	6.0	.50	.50	.050	3000	.0005	1.0	48.5	37.84
6133	-	6.0	7.0	.50	.50	.045	3200	.0005	1.3	41.1	69.92
6141	-	6.0	5.5	.50	.50	.045	6000	.0010	1.3	74.3	30.82
6211	-	10.0	14.0	.50	.50	.045	2700	.0005	2.7	17.0	1195.2
6212	-	4.0	6.0	.50	.50	.045	5200	.0004	1.3	67.1	93.92
6213	-	11.0	14.0	.50	.50	.045	1300	.0005	2.7	8.0	1283.6
6214	-	4.0	4.0	.50	.50	.045	1900	.0006	.8	41.8	6.66
6241	-	6.0	12.0	.50	.50	.045	4500	.0005	2.1	35.8	462.9
6242	-	4.0	6.0	.50	.50	.045	2000	.0003	1.0	34.1	47.02
6243	-	6.0	12.0	.50	.50	.045	1800	.0005	2.1	14.0	509.7
7091	-	4.0	5.0	1.00	1.00	.045	3700	.0007	1.5	40.9	55.56
7092	-	8.0	6.0	1.00	1.00	.045	3000	.0007	1.9	26.6	137.9
7093	-	4.0	3.3	1.00	1.00	.045	1800	.0012	1.4	20.9	21.04
7121	-	4.0	8.4	.71	.71	.045	2000	.0007	1.2	28.6	23.00
7122	-	4.0	8.4	.71	.73	.045	3200	.0007	1.8	30.4	112.6
7123	-	4.0	8.4	.71	.73	.045	5000	.0007	1.8	45.5	132.3
7151	-	8.0	4.6	.33	.33	.045	2500	.0004	.9	44.8	36.96
7152	-	8.0	4.6	.33	.33	.045	3500	.0004	1.0	56.1	56.22
7191	-	4.0	6.8	.43	.30	.045	2700	.0010	1.8	24.7	121.6
7192	-	4.0	6.8	.43	.30	.045	4650	.0010	1.8	42.5	122.4
7221	-	6.0	7.0	.36	.27	.045	4300	.0013	2.1	33.9	169.1
7222	-	6.0	7.0	.36	.27	.045	1750	.0013	2.2	13.1	203.8
8131	-	13.0	10.0	.43	.41	.045	2000	.0006	2.5	13.4	816.4
8132	-	2.0	4.0	.50	.50	.045	2400	.0006	.8	47.9	8.82
8133	-	6.0	5.5	.26	.23	.045	2000	.0006	1.6	21.0	205.6
8134	-	4.0	3.5	.58	.38	.045	2000	.0012	1.6	20.7	47.54
8135	-	16.0	11.0	.50	.47	.045	4500	.0005	2.5	30.3	959.3

9031	-	17.0	11.5	.41	.33	.045	2500	.0004	2.3	18.2	1182.2
9032	-	18.0	12.0	.41	.33	.045	2900	.0004	2.3	20.9	1242.6
9041	-	20.0	12.0	.30	.36	.040	2800	.0005	3.0	15.7	1846.8
9042	-	20.0	12.0	.30	.36	.040	3700	.0005	3.0	20.6	1948.6
9043	-	20.0	13.0	.30	.36	.040	1000	.0005	3.0	5.5	2042.6
9051	-	20.0	20.0	.43	.41	.045	4200	.0004	2.4	28.7	1405.4
9052	-	15.0	7.0	.43	.43	.045	5500	.0004	.7	135.7	13.74
9053	-	15.0	7.0	.43	.41	.050	4000	.0004	.8	88.3	25.28
9081	-	16.0	13.0	.36	.37	.045	2600	.0004	2.4	17.8	1511.4
9082	-	17.0	13.5	.36	.37	.045	3000	.0004	2.5	20.0	1673.3
9111	-	20.0	12.0	.35	.33	.050	6400	.0007	2.8	37.8	1745.3
9112	-	20.0	13.0	.35	.33	.050	2700	.0007	2.9	15.4	1987.9
9131	-	20.0	12.0	.37	.28	.045	3400	.0007	3.1	18.4	1882.4
9132	-	20.0	12.0	.37	.28	.045	1500	.0007	3.1	8.1	1883.1
9161	-	20.0	12.0	.29	.27	.055	4400	.0019	3.7	19.7	1881.2
9162	-	10.0	8.0	.43	.49	.045	3400	.0012	2.7	20.9	385.1
9201	-	9.0	9.0	.50	.50	.035	4000	.0005	.9	75.9	10.06
9202	-	9.0	9.0	.50	.50	.035	3300	.0005	1.5	37.8	58.57
9203	-	9.0	9.0	.50	.50	.035	2500	.0005	1.5	27.7	65.26
9211	-	4.0	6.0	.50	.50	.065	1100	.0032	2.0	9.3	68.29
9212	-	15.0	12.0	.50	.58	.045	3000	.0005	2.5	19.9	946.4
9213	-	15.0	11.0	.48	.38	.045	5000	.0005	2.5	33.6	1059.5
9999	-	-	-	-	-	-	-	-	0.0	0.0	2195.2 N

POND ROUTING BY STOR-IND METHOD

POND NO.	START ELEV. (FT)	FLOOD ELEV. (FT)	PEAK ELEV. (FT)	PEAK STORAGE (AF)	----- Q _{in} (CFS)	PEAK FLOW Q _{out} (CFS)	----- Q _{pri} (CFS)	----- Q _{sec} (CFS)	---Q _{out} --- ATTN. (%)	LAG (MIN)
10	887.6	895.5	889.9	37.79	231.4	230.1			1	128.0
20	888.2	896.0	892.7	82.28	284.4	231.4			19	876.9
60	888.4	895.8	893.1	30.37	244.9	241.2			1	614.8
140	888.6	895.8	892.7	3.45	198.6	198.6			0	12.0
150	888.8	895.8	892.9	10.90	392.1	197.8			50	424.6
220	889.0	896.0	891.9	2.36	59.08	5.86			90	54.2
1101	899.8	910.0	903.6	24.46	263.4	16.55			94	278.4
1102	892.1	900.0	896.9	156.90	435.9	179.6			59	228.2
1103	896.2	903.1	901.2	25.75	274.8	36.30			87	136.4
1104	892.1	902.0	900.0	38.54	218.3	182.9			16	703.9
1105	886.1	900.0	892.6	212.23	554.2	286.9			48	443.4
1106	884.8	900.0	892.4	63.92	293.4	233.0			21	425.0
1107	885.5	900.0	889.7	5.07	97.93	66.73			32	36.2
2001	891.9	900.0	895.9	10.03	183.5	36.31			80	76.2
2002	884.8	900.0	891.4	73.99	575.6	119.8			79	219.8
2003	873.6	890.0	882.4	105.61	561.9	184.5			67	283.7
2301	885.0	890.0	885.5	37.15	134.9	0.00			100	1038.3
2302	882.7	890.0	885.8	120.16	270.8	25.31			91	716.9
3701	896.5	904.0	900.4	12.78	184.0	30.56			83	68.0
3702	891.1	900.0	895.3	94.48	568.9	32.15			94	710.5
3703	889.8	900.0	893.0	90.08	536.5	48.18			91	714.5
3704	862.5	880.0	870.3	98.19	535.6	275.3			49	226.0
3901	897.8	902.0	900.4	27.01	377.3	13.65			96	273.1
3902	892.1	900.0	896.8	36.11	554.6	70.77			87	107.7
3903	889.8	900.0	896.5	54.88	515.2	127.2			75	204.4

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3904	883.3	893.2	890.4	44.62	724.7	236.9	67	98.6
4101	903.2	906.0	905.9	44.56	456.6	5.61	99	726.5
4102	900.0	910.0	904.4	16.89	324.2	40.91	87	68.8
4103	894.8	906.0	895.7	36.91	196.6	13.38	93	709.4
4106	890.0	900.0	894.7	167.81	1029.9	261.6	75	226.5
4107	887.8	900.0	895.1	34.30	627.4	375.9	40	100.8
4108	897.7	905.6	900.1	71.92	279.4	33.35	88	434.8
4109	893.4	903.0	899.2	23.06	160.1	39.93	75	709.6
4110	889.5	900.0	896.2	14.07	139.1	29.78	79	132.3
4111	888.6	903.1	894.9	179.06	640.0	189.2	70	362.1
4112	885.4	900.0	895.3	379.25	629.2	349.9	44	1227.8
4113	888.5	900.0	893.7	6.32	155.8	49.01	69	43.4
4114	884.6	900.0	893.7	218.99	420.9	301.5	28	2205.9
4115	883.1	900.0	891.5	60.77	301.5	291.4	3	499.0
4116	882.7	900.0	890.2	13.30	291.4	288.2	1	245.2
4117	880.3	890.0	884.5	20.41	578.9	526.6	9	134.1
4118	872.8	890.0	882.0	20.18	924.4	910.0	2	11.6
4119	867.2	880.0	875.6	42.11	914.7	853.7	7	109.1
4120	861.4	880.0	872.0	202.33	879.2	672.3	24	456.4
4121	851.2	870.0	861.5	49.99	678.6	677.7	0	14.8
4401	901.3	902.0	901.8	973.89	593.2	10.16	98	1007.4
4402	901.3	902.0	901.6	168.16	152.9	14.13	91	727.0
4403	900.2	901.5	900.5	832.21	441.2	10.35	98	817.7
4404	899.0	901.0	899.4	466.96	279.5	39.33	86	680.8
4405	898.8	901.0	899.1	41.01	237.7	31.47	87	236.2
4406	899.0	900.0	899.4	234.65	580.3	75.63	87	598.2
4409	899.1	904.3	901.9	25.28	215.6	11.40	95	439.4
4410	898.8	905.0	901.3	21.09	262.7	32.45	88	218.8

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4411	898.4	903.0	901.6	17.00	209.6	13.39	94	248.1
4412	898.1	903.5	901.2	14.94	111.9	24.50	78	184.4
4415	893.0	900.0	893.9	19.80	245.5	55.64	77	95.3
4416	893.0	897.8	896.0	24.32	113.4	47.82	58	499.3
4418	889.2	900.0	895.0	188.15	835.5	94.00	89	420.8
4419	892.1	900.0	894.8	41.36	198.5	10.98	94	693.3
4420	891.2	900.0	894.7	40.32	166.7	6.67	96	3155.9
4421	885.9	900.0	893.6	732.58	1346.4	463.0	66	672.1
4422	890.8	900.0	895.1	38.24	393.9	42.18	89	187.3
4423	888.5	900.0	892.9	61.57	328.6	47.02	86	750.1
4424	883.8	900.0	890.4	98.20	509.7	470.2	8	697.8
5201	841.7	860.0	848.6	66.51	572.6	448.7	22	51.0
5401	848.6	870.0	857.5	101.84	800.9	307.2	62	135.5
5402	849.1	860.0	855.8	34.32	654.4	161.9	75	60.7
5403	848.4	860.0	854.4	71.40	543.9	99.50	82	398.0
5404	848.4	860.0	859.4	1182.5	2084.8	1693.5	19	988.1
5405	876.9	890.0	880.7	59.27	258.7	48.91	81	273.2
5406	883.3	890.0	885.7	107.16	267.3	14.00	95	739.3
5407	869.9	880.0	876.9	183.01	422.7	14.71	97	2248.9
5408	856.6	870.0	859.8	9.63	174.3	68.11	61	40.1
5409	847.0	859.0	856.4	90.09	2194.9	2194.3	0	31.8
5410	840.8	860.0	849.4	39.74	2194.2	2194.0	0	21.9
5411	854.9	870.0	860.4	21.81	577.9	390.0	33	41.8
5412	845.7	867.0	852.8	10.91	400.4	382.5	4	36.8
5413	834.1	850.0	842.5	167.46	2193.9	2192.0	0	48.1
5414	842.8	860.0	853.8	46.58	1084.4	722.7	33	36.0
5415	825.3	850.0	842.1	534.81	2285.0	2195.4	4	1524.6
5701	874.0	890.0	881.2	91.06	491.9	37.67	92	434.5

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5702	879.2	890.0	884.4	9.70	105.7	42.59	60	96.7
5704	888.5	900.0	891.6	97.97	293.1	13.81	95	724.8
5707	869.3	890.0	876.1	9.92	1514.8	1514.7	0	2.9
5708	866.4	890.0	875.0	29.87	1698.5	1698.2	0	5.1
5709	864.6	880.0	871.7	23.35	1765.2	1764.8	0	5.6
5710	864.5	877.0	871.8	35.23	1795.1	1752.0	2	62.2
5711	860.0	880.0	866.6	242.06	2006.3	1883.3	6	146.5
5712	860.2	867.6	866.3	33.61	465.7	108.9	77	85.3
5713	855.5	870.0	863.2	33.70	1883.5	1883.3	0	4.9
5714	853.2	870.0	859.8	20.66	1882.3	1882.2	0	4.0
5715	861.6	870.0	862.1	952.33	852.8	390.6	54	54.7
5716	850.8	870.0	859.9	206.13	2069.6	1847.1	11	1044.2
5801	899.2	910.0	905.3	63.66	283.2	58.02	80	320.4
5802	900.6	910.0	904.5	59.33	258.2	65.32	75	723.8
5803	900.5	910.0	903.9	11.41	152.4	33.76	78	84.6
5804	899.5	905.0	904.0	22.73	180.8	66.32	63	168.6
5805	899.0	910.0	903.6	118.43	268.0	82.67	69	796.0
5806	898.7	910.0	903.2	1.29	91.19	82.66	9	979.4
5807	899.6	910.0	905.6	170.67	893.5	55.56	94	516.3
5808	898.8	910.0	901.4	13.49	231.9	21.05	91	106.4
5809	895.3	910.0	901.3	270.28	618.6	112.6	82	2670.5
5810	899.7	910.0	905.4	5.75	197.5	98.55	50	29.2
5811	896.9	910.0	901.5	62.68	413.3	23.00	94	522.3
5812	893.8	910.0	898.8	53.55	359.9	122.4	66	2866.9
5813	895.2	903.1	899.7	47.21	400.8	37.01	91	247.4
5814	896.7	902.2	899.0	11.13	187.9	20.61	89	103.7
5815	893.2	902.7	898.5	22.14	199.2	94.79	52	161.7
5816	897.5	905.4	899.9	39.74	266.5	18.64	93	432.1

Data for Coon Creek Watershed District
TYPE II 24-HOUR RAINFALL= 5.90 IN

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Prepared by Montgomery Watson

13 Apr 01

HydroCAD 5.11 000606 (c) 1986-1999 Applied Microcomputer Systems

5817	896.8	905.5	900.4	84.52	386.3	9.06	98	743.8		
5818	890.7	900.0	896.4	22.11	163.9	121.6	26	556.6		
5819	890.0	898.4	896.9	224.88	473.7	169.1	64	1409.4		
5820	891.0	900.0	892.3	23.04	242.4	28.49	88	106.6		
5821	891.0	900.0	896.4	20.11	224.0	42.48	81	341.9		
5822	883.4	900.0	890.1	203.84	426.8	154.4	64	3109.8		
5823	875.3	890.0	880.9	84.12	496.9	155.5	69	722.8		
5905	896.8	901.5	900.1	4.89	110.5	35.25	68	44.3		
5906	896.8	901.5	900.1	51.64	273.1	10.45	96	739.3		
5908	887.1	896.5	895.4	302.31	1277.9	205.6	84	386.6		
5909	889.6	900.0	896.2	8.65	234.0	106.0	55	34.7		
5910	887.3	900.0	891.1	18.74	126.1	47.62	62	138.2		
5911	890.7	900.0	893.7	43.62	422.7	8.82	98	719.9		
5913	879.0	890.0	883.3	66.07	1104.8	950.0	14	64.1		
5917	896.2	900.0	896.9	1011.5	887.1	10.08	99	787.2		
5918	888.5	900.0	894.3	37.56	283.6	58.60	79	179.4		
5919	888.5	900.0	895.8	10.99	263.2	65.99	75	46.0		
5920	882.0	900.0	888.9	31.97	293.5	127.2	57	243.4		
5921	875.1	890.0	882.3	37.40	1189.2	1185.6	0	16.9		
5930	896.7	910.0	900.5	31.21	123.5	7.45	94	460.7		
5931	896.1	900.0	898.1	6.31	39.75	8.86	78	672.6		
5932	894.8	900.0	898.4	6.52	73.42	17.39	76	149.2		
5933	893.3	897.0	895.9	59.92	108.4	4.03	96	2959.4		
5934	893.1	896.0	894.2	30.52	89.82	5.45	94	728.5		
5935	896.0	900.0	898.1	21.18	91.87	0.00	100	0.0		
5936	884.3	900.0	890.2	10.28	108.1	37.54	23.75	13.78	65	104.8
5937	892.5	898.0	896.1	5.95	116.3	4.81	96	209.0		
5938	883.0	900.0	890.0	13.99	75.65	23.92	68	528.6		

Data for Coon Creek Watershed District
TYPE II 24-HOUR RAINFALL= 5.90 IN

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HydroCAD 5.11 000606 (c) 1986-1999 Applied Microcomputer Systems

5939	892.4	900.0	897.2	5.89	101.4	41.39	59	59.1
5940	892.7	895.0	894.3	5.72	122.2	4.76	96	173.5
5941	889.4	900.0	891.9	17.24	92.50	19.29	79	322.7
5942	883.3	890.0	887.6	27.40	394.1	24.06	94	166.4
5943	880.6	890.0	885.5	17.76	114.1	44.37	61	505.4
6001	890.7	901.7	894.6	84.01	656.0	66.24	90	229.4
6002	888.7	901.0	897.5	7.48	266.4	195.7	27	39.5
6003	886.9	900.0	896.1	4.78	265.6	264.9	0	17.1
6004	886.0	900.0	890.1	283.80	891.0	71.18	92	782.3
6005	892.9	899.0	897.7	30.06	447.6	54.23	88	102.5
6006	887.7	900.0	894.1	16.60	426.2	187.7	56	41.8
6007	883.7	900.0	890.4	12.49	392.9	210.4	46	132.8
6008	886.8	900.0	888.3	50.27	357.3	7.05	98	729.5

POND 2001

20 @ 157th Ave NW

Qin = 183.5 CFS @ 12.43 HRS, VOLUME= 25.95 AF

Qout= 36.31 CFS @ 13.70 HRS, VOLUME= 25.95 AF, ATTEN= 80%, LAG= 76.2 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)
891.9	.04	0.00	0.00
895.5	.15	.34	.34
900.0	55.10	124.31	124.65

STOR-IND METHOD

PEAK STORAGE = 10.03 AF

PEAK ELEVATION= 895.9 FT

FLOOD ELEVATION= 900.0 FT

START ELEVATION= 891.9 FT

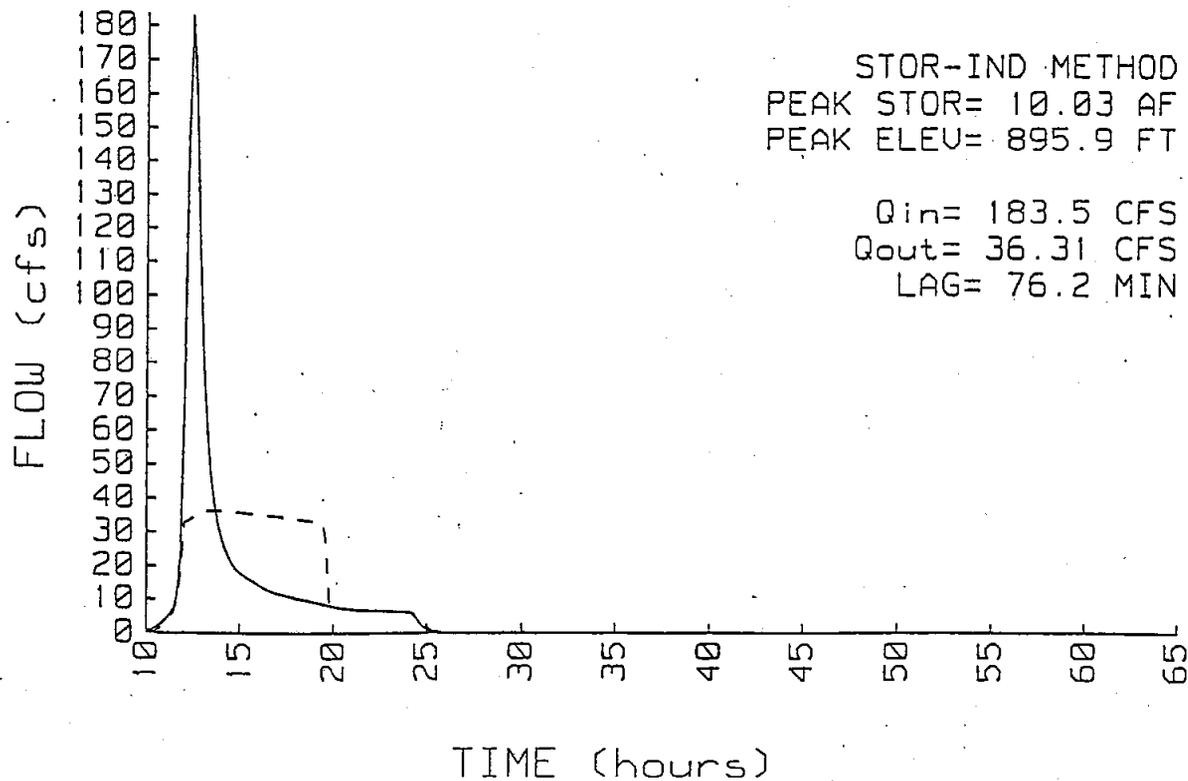
SPAN= 10-65 HRS, dt=.2 HRS

Tdet= 111.5 MIN (25.95 AF)

ROUTE INVERT OUTLET DEVICES

1 P 891.9' 30" CULVERT
n=.013 L=80' S=.0056'/1' Ke=.5 Cc=.9 Cd=.6

POND 2001 INFLOW & OUTFLOW
20 @ 157th Ave NW



Prepared by Montgomery Watson

13 Apr 01

HydroCAD 5.11 000606 (c) 1986-1999 Applied Microcomputer Systems

POND 2002

20 @ Prairie Road NW

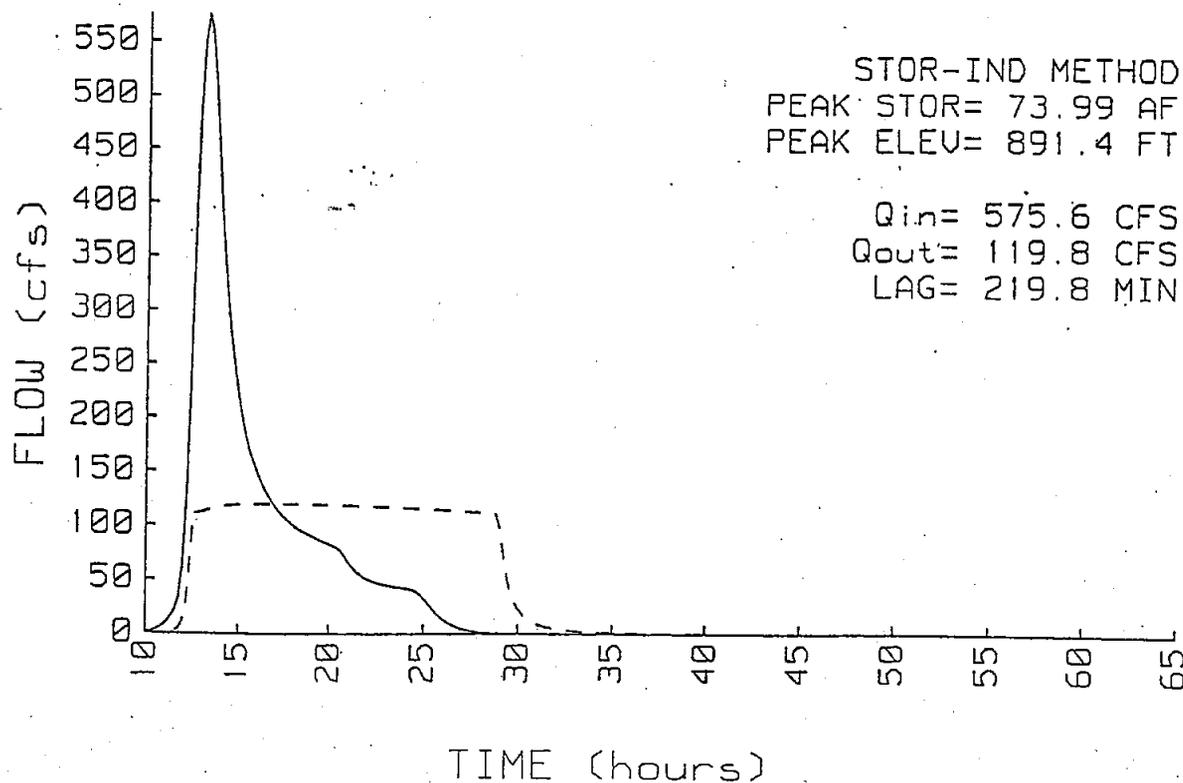
Qin = 575.6 CFS @ 13.23 HRS, VOLUME=168.09 AF

Qout= 119.8 CFS @ 16.89 HRS, VOLUME=167.97 AF, ATTEN= 79%, LAG= 219.8 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)	STOR-IND METHOD
884.8	.28	0.00	0.00	PEAK STORAGE = 73.99 AF
891.0	2.50	8.62	8.62	PEAK ELEVATION= 891.4 FT
900.0	340.80	1544.85	1553.47	FLOOD ELEVATION= 900.0 FT
				START ELEVATION= 884.8 FT
				SPAN= 10-65 HRS, dt=.2 HRS
				Tdet= 310.9 MIN (167.97 AF)

#	ROUTE	INVERT	OUTLET DEVICES
1	P	884.8'	54" CULVERT n=.024 L=100' S=.005'/' Ke=.5 Cc=.9 Cd=.6
2	P	892.8'	100' BROAD-CRESTED RECTANGULAR WEIR Q=C L H ^{1.5} C=3.25, 3.25, 3.25, 3.25, 0, 0, 0, 0

POND 2002 INFLOW & OUTFLOW
20 @ Prairie Road NW



POND 2003

20 @ 144th Ave NW

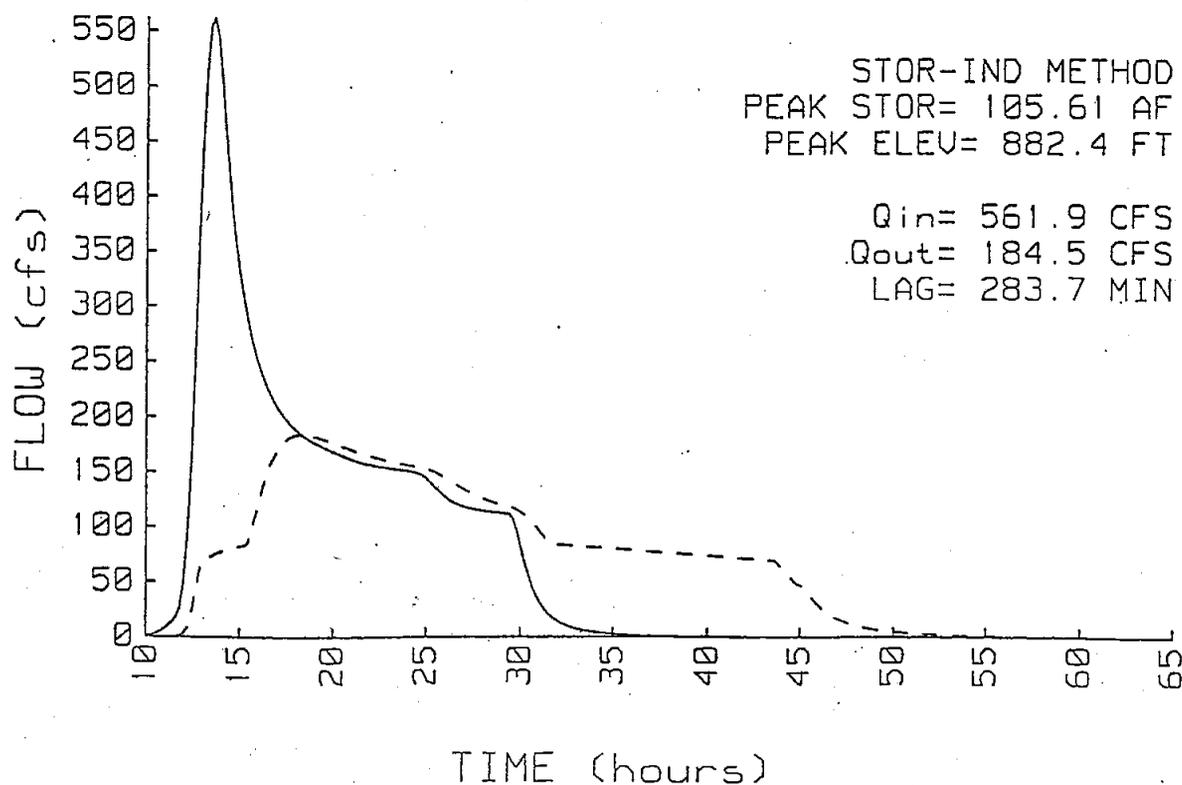
Qin = 561.9 CFS @ 13.56 HRS, VOLUME=307.10 AF

Qout= 184.5 CFS @ 18.29 HRS, VOLUME=306.48 AF, ATTEN= 67%, LAG= 283.7 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)	STOR-IND METHOD
873.6	.41	0.00	0.00	PEAK STORAGE = 105.61 AF
880.0	4.53	15.81	15.81	PEAK ELEVATION= 882.4 FT
890.0	68.90	367.15	382.96	FLOOD ELEVATION= 890.0 FT
				START ELEVATION= 873.6 FT
				SPAN= 10-65 HRS, dt=.2 HRS
				Tdet= 475.9 MIN (305.37 AF)

#	ROUTE	INVERT	OUTLET DEVICES
1	P	873.6'	36" CULVERT n=.024 L=60' S=.0175'/' Ke=.5 Cc=.9 Cd=.6
2	P	882.0'	100' BROAD-CRESTED RECTANGULAR WEIR Q=C L H ^{1.5} C=3.25, 3.25, 3.25, 3.25, 0, 0, 0, 0

POND 2003 INFLOW & OUTFLOW
20 @ 144th Ave NW



POND 2301 Bunker Lake (landlocked)

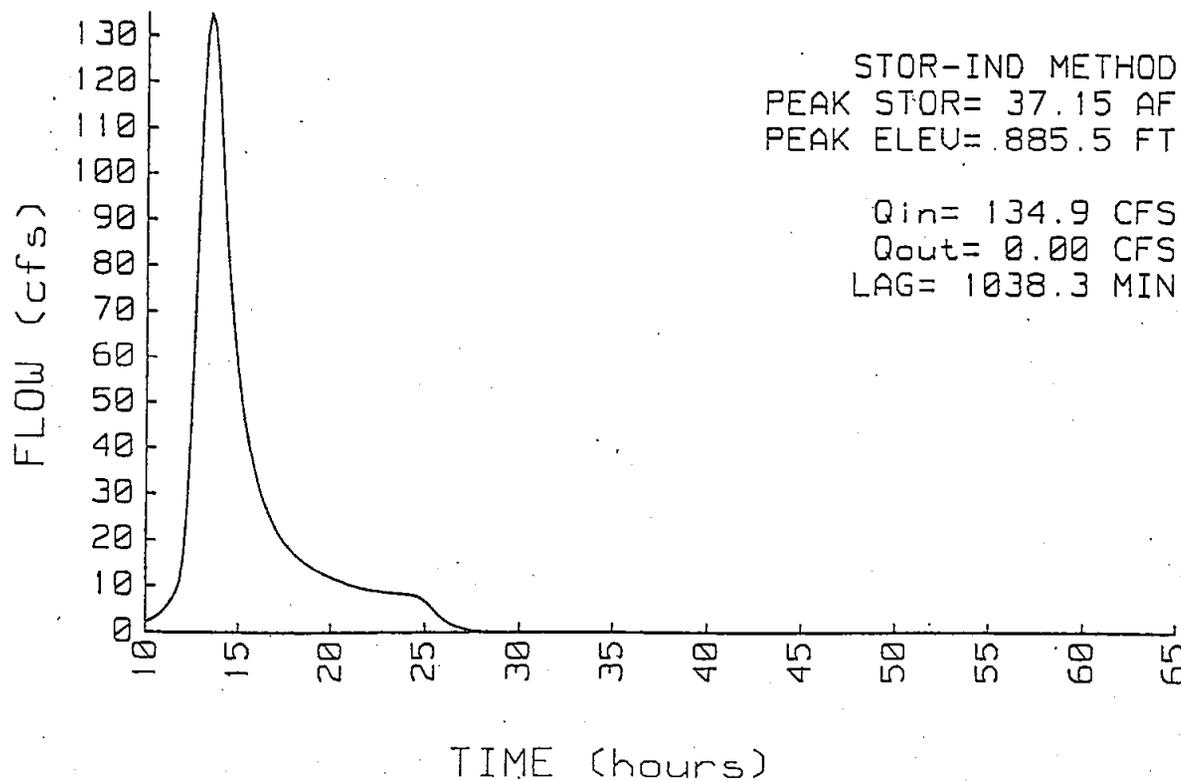
Qin = 134.9 CFS @ 13.43 HRS, VOLUME= 37.15 AF
Qout= 0.00 CFS @ 30.73 HRS, VOLUME= .01 AF, ATTEN=100%, LAG= 1038.3 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)	STOR-IND METHOD
885.0	56.90	0.00	0.00	PEAK STORAGE = 37.15 AF
890.0	84.50	353.50	353.50	PEAK ELEVATION= 885.5 FT

FLOOD ELEVATION= 890.0 FT
START ELEVATION= 885.0 FT
SPAN= 10-65 HRS, dt=.2 HRS
Tdet= 1808.8 MIN (.01 AF)

#	ROUTE	INVERT	OUTLET DEVICES
1	P	885.0'	EXFILTRATION V= 1.E-6 FPM over (SURFACE AREA - 56.9 AC)

POND 2301 INFLOW & OUTFLOW
Bunker Lake (landlocked)



POND 2302

23 @ Bunker Lake Blvd NE

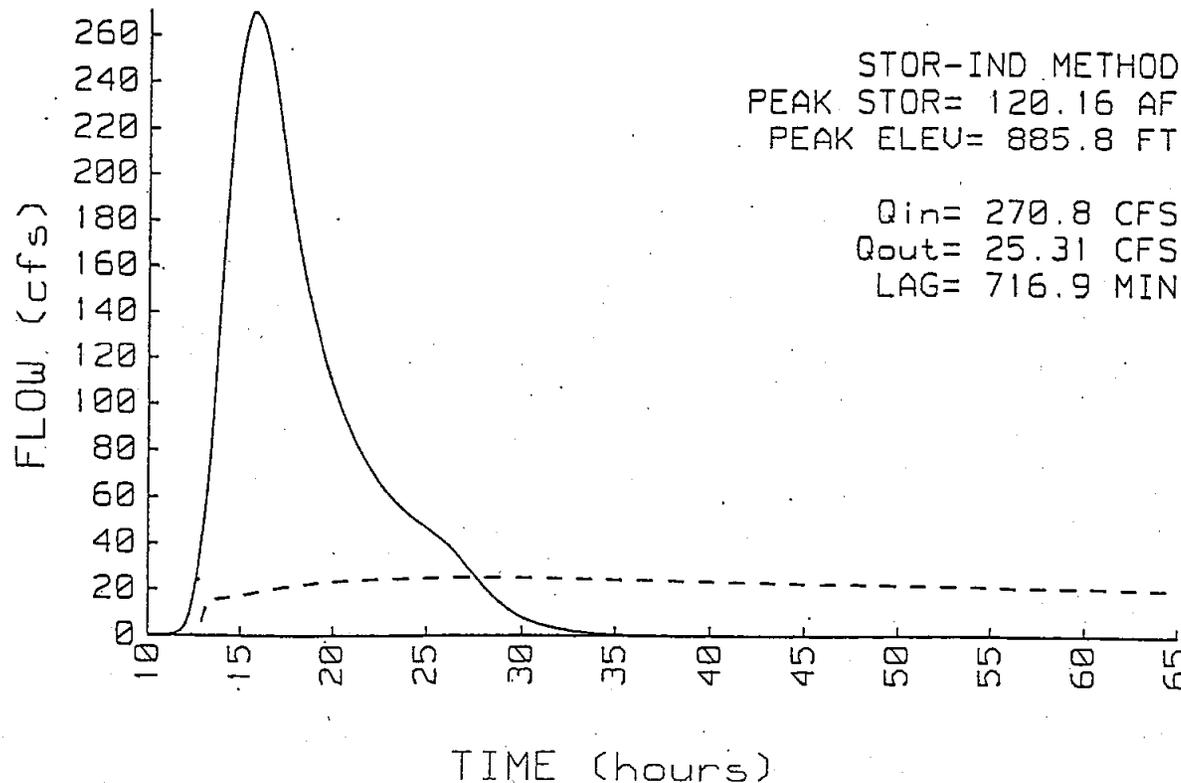
Q_{in} = 270.8 CFS @ 15.67 HRS, VOLUME=151.54 AF

Q_{out} = 25.31 CFS @ 27.62 HRS, VOLUME= 97.11 AF, ATTEN= 91%, LAG= 716.9 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)	STOR-IND METHOD
882.7	.27	0.00	0.00	PEAK STORAGE = 120.16 AF
885.0	1.73	2.30	2.30	PEAK ELEVATION= 885.8 FT
890.0	312.20	784.83	787.13	FLOOD ELEVATION= 890.0 FT
				START ELEVATION= 882.7 FT
				SPAN= 10-65 HRS, dt=.2 HRS
				Tdet= 1363.1 MIN (97.11 AF)

#	ROUTE	INVERT	OUTLET DEVICES
1	P	882.7'	36" CULVERT n=.024 L=57' S=.0001'/' Ke=.5 Cc=.9 Cd=.6

POND 2302 INFLOW & OUTFLOW
23 @ Bunker Lake Blvd NE



POND 3701

37 @ BNRR

Qin = 184.0 CFS @ 12.44 HRS, VOLUME= 26.00 AF

Qout= 30.56 CFS @ 13.57 HRS, VOLUME= 25.98 AF, ATTEN= 83%, LAG= 68.0 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)
896.5	.14	0.00	0.00
898.0	.55	.52	.52
900.0	8.26	8.81	9.33
904.0	8.40	33.32	42.65

STOR-IND METHOD

PEAK STORAGE = 12.78 AF

PEAK ELEVATION= 900.4 FT

FLOOD ELEVATION= 904.0 FT

START ELEVATION= 896.5 FT

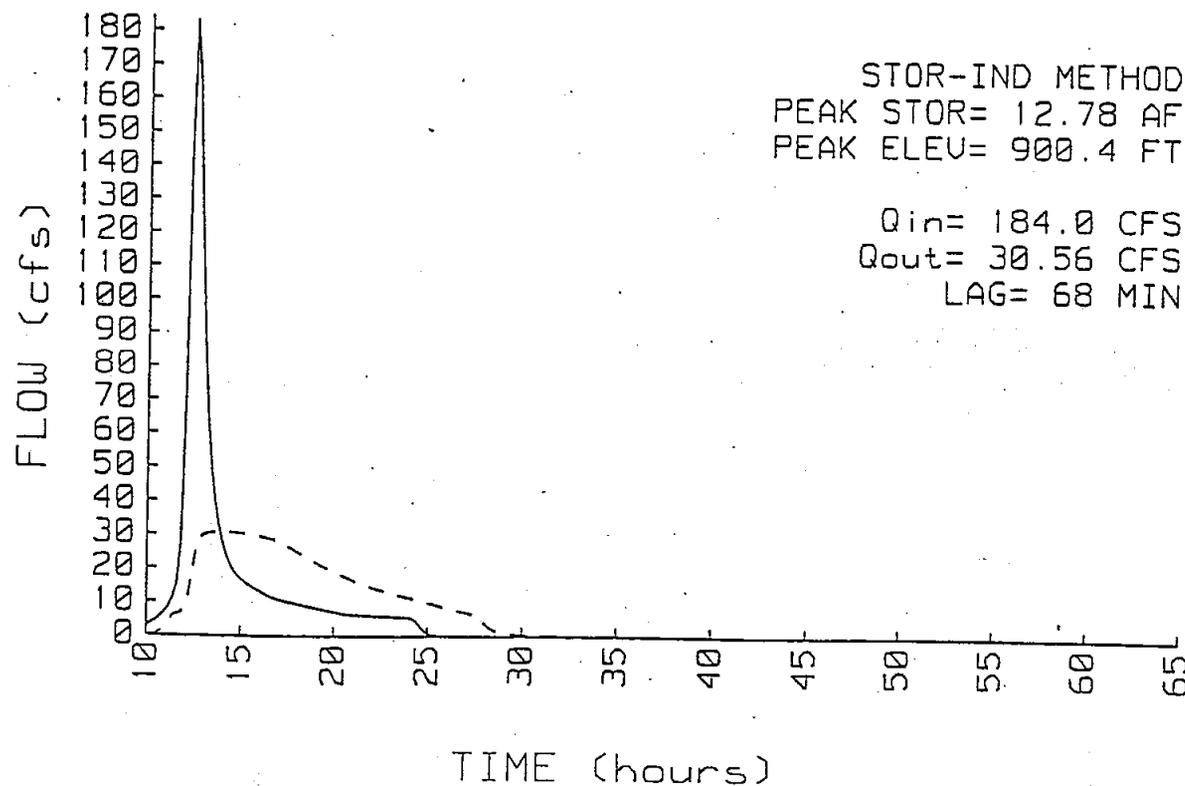
SPAN= 10-65 HRS, dt=.2 HRS

Tdet= 229 MIN (25.89 AF)

ROUTE INVERT OUTLET DEVICES

1 P 896.5' 36" CULVERT
 n=.024 L=100' S=.001'/' Ke=.5 Cc=.9 Cd=.6

POND 3701 INFLOW & OUTFLOW
 37 @ BNRR



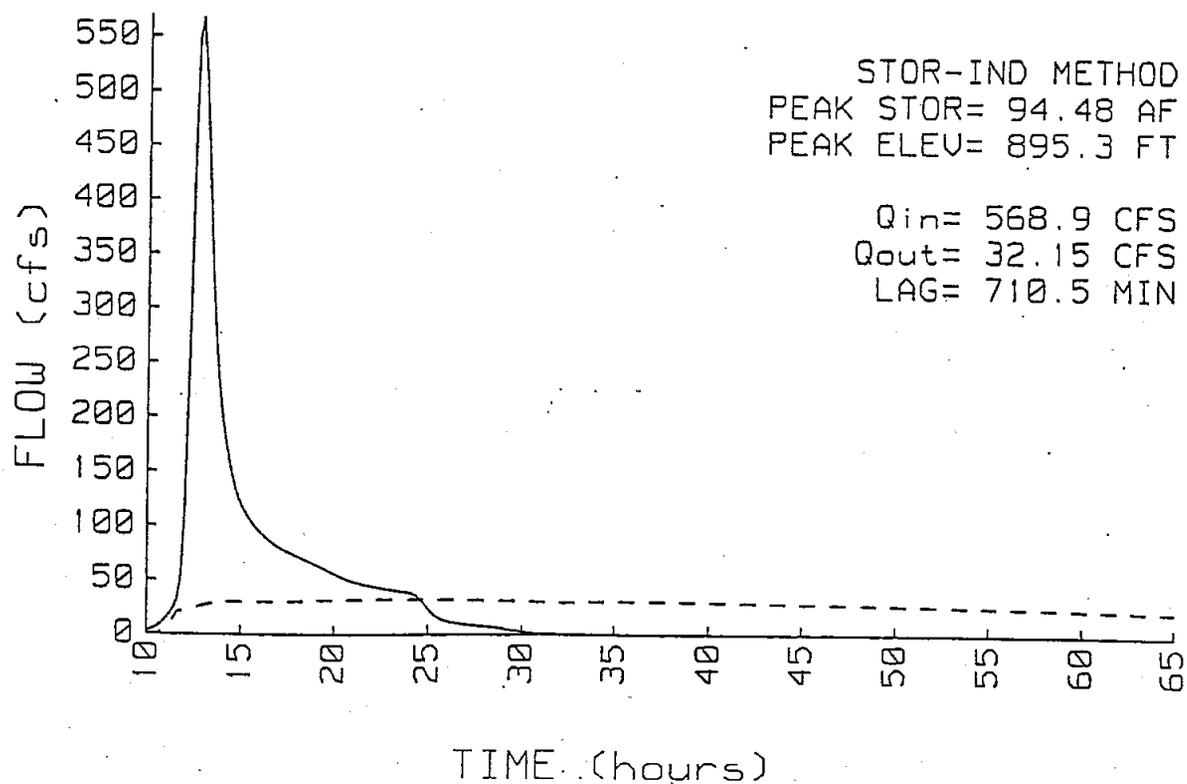
POND 3702 37 @ Hanson Blvd

Q_{in} = 568.9 CFS @ 12.75 HRS, VOLUME=132.46 AF
Q_{out} = 32.15 CFS @ 24.59 HRS, VOLUME=125.42 AF, ATTEN= 94%, LAG= 710.5 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)	STOR-IND METHOD
891.1	.10	0.00	0.00	PEAK STORAGE = 94.48 AF
894.0	.58	.99	.99	PEAK ELEVATION= 895.3 FT
900.0	143.30	431.64	432.63	FLOOD ELEVATION= 900.0 FT
				START ELEVATION= 891.1 FT
				SPAN= 10-65 HRS, dt=.2 HRS
				Tdet= 1308.6 MIN (125.42 AF)

#	ROUTE	INVERT	OUTLET DEVICES
1	P	891.1'	36" CULVERT n=.024 L=100' S=.0007'/' Ke=.5 Cc=.9 Cd=.6

POND 3702 INFLOW & OUTFLOW
37 @ Hanson Blvd



POND 3703

37 @ Nightingale St (Hwy 109)

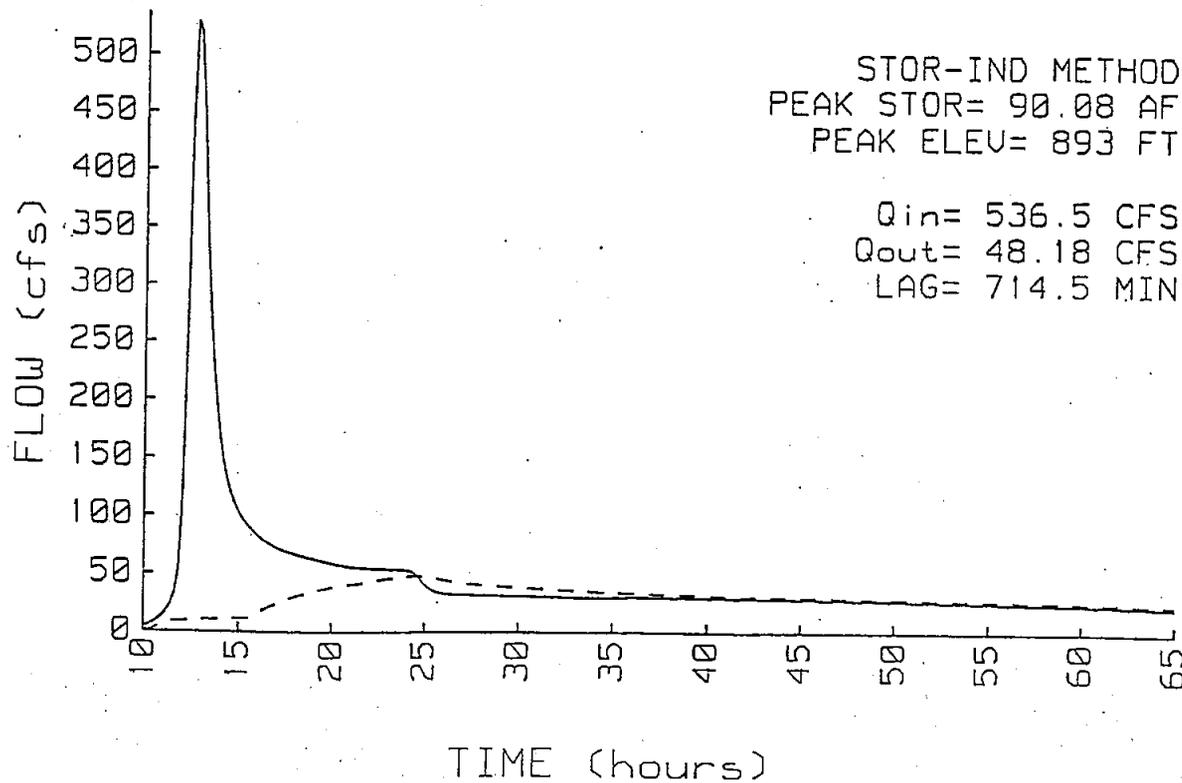
Qin = 536.5 CFS @ 12.68 HRS, VOLUME=215.70 AF

Qout= 48.18 CFS @ 24.59 HRS, VOLUME=137.65 AF, ATTEN= 91%, LAG= 714.5 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)	STOR-IND METHOD
889.8	.07	0.00	0.00	PEAK STORAGE = 90.08 AF
892.0	.43	.55	.55	PEAK ELEVATION= 893.0 FT
900.0	174.50	699.72	700.27	FLOOD ELEVATION= 900.0 FT
				START ELEVATION= 889.8 FT
				SPAN= 10-65 HRS, dt=.2 HRS
				Tdet= 1235.6 MIN (137.15 AF)

#	ROUTE	INVERT	OUTLET DEVICES
1	P	889.8'	24" CULVERT n=.024 L=100' S=.0026'/1' Ke=.5 Cc=.9 Cd=.6
2	P	892.8'	100' BROAD-CRESTED RECTANGULAR WEIR Q=C L H ^{1.5} C=3.25, 3.25, 3.25, 3.25, 3.25, 0, 0, 0

POND 3703 INFLOW & OUTFLOW
37 @ Nightingale St (Hwy 109)



POND 3704

37 @ 149th Ave

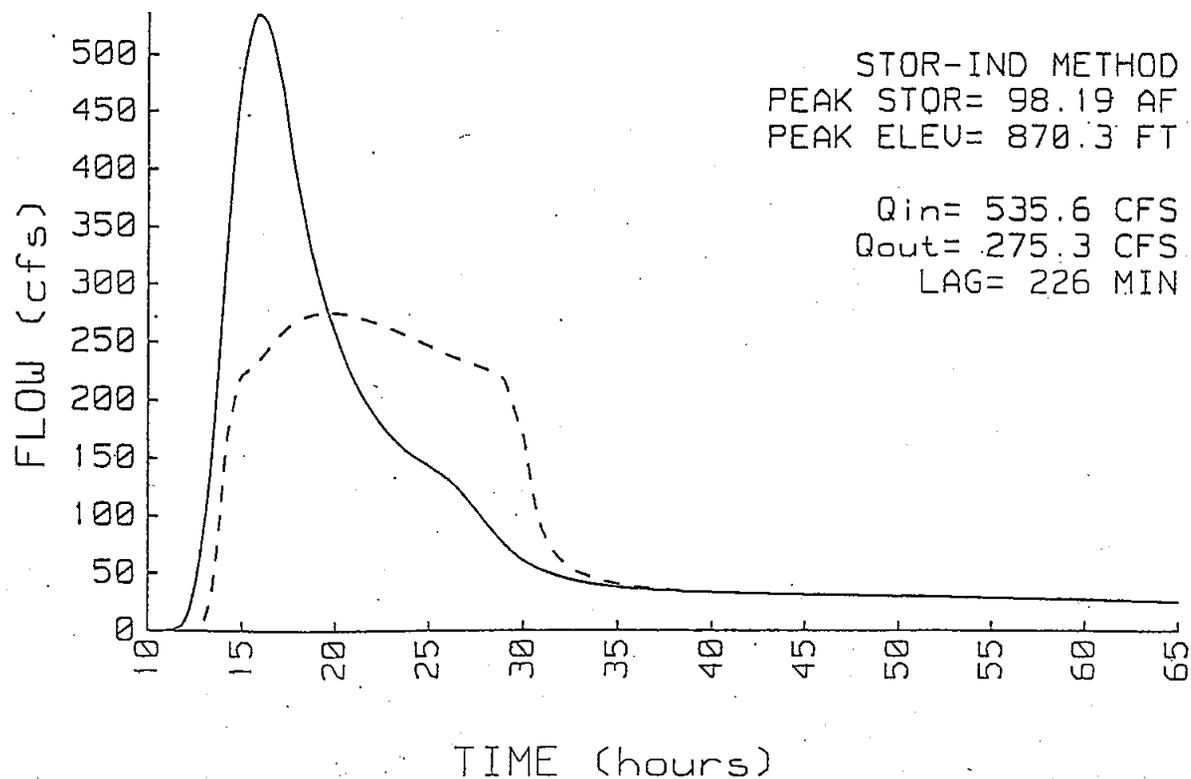
Qin = 535.6 CFS @ 15.88 HRS, VOLUME=438.38 AF

Qout= 275.3 CFS @ 19.65 HRS, VOLUME=432.58 AF, ATTEN= 49%, LAG= 226.0 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)	STOR-IND METHOD
862.5	1.04	0.00	0.00	PEAK STORAGE = 98.19 AF
868.5	4.15	15.57	15.57	PEAK ELEVATION= 870.3 FT
870.0	13.31	13.10	28.67	FLOOD ELEVATION= 880.0 FT
880.0	514.20	2637.55	2666.22	START ELEVATION= 862.5 FT
				SPAN= 10-65 HRS, dt=.2 HRS
				Tdet= 177.5 MIN (431.01 AF)

#	ROUTE	INVERT	OUTLET DEVICES
1	P	862.5'	72" CULVERT n=.024 L=43' S=.0001'/1' Ke=.5 Cc=.9 Cd=.6
2	P	870.0'	100' BROAD-CRESTED RECTANGULAR WEIR Q=C L H ^{1.5} C=3.25, 3.25, 3.25, 3.25, 0, 0, 0, 0

POND 3704 INFLOW & OUTFLOW
 37 @ 149th Ave



POND 5707

57 @ Prairie Blvd

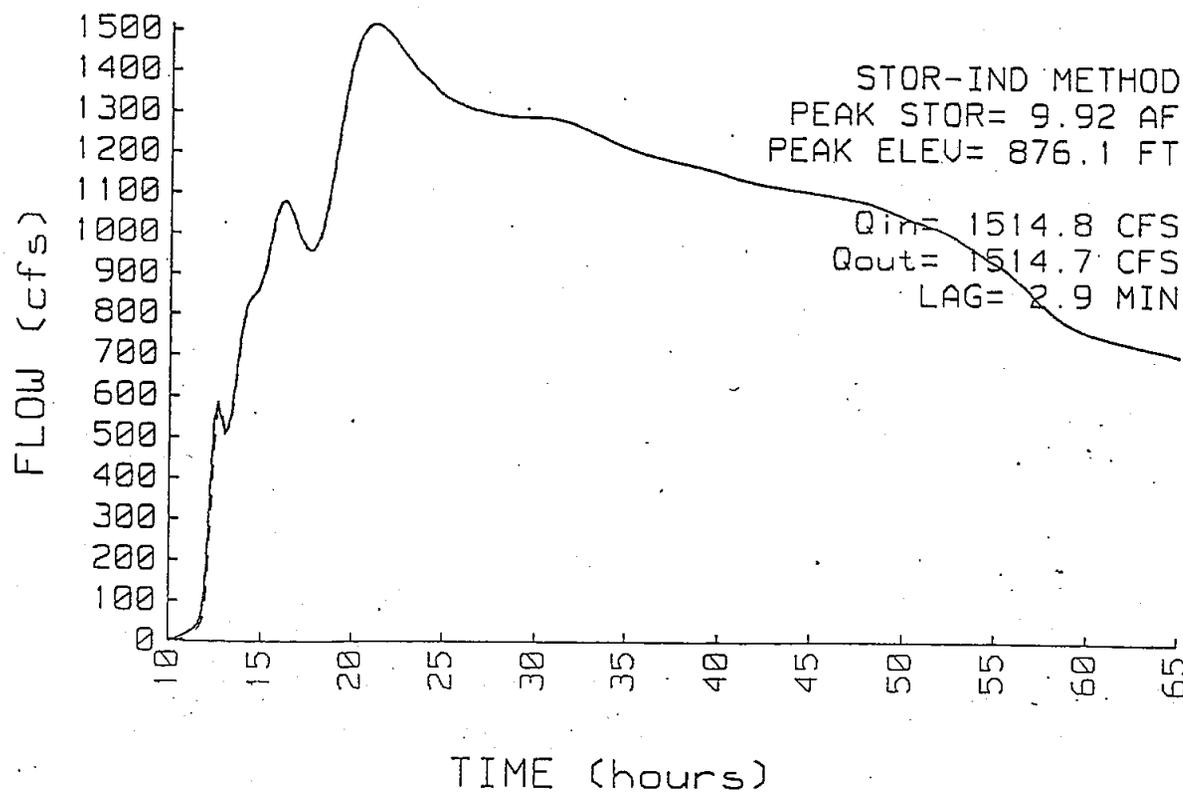
Qin =1514.8 CFS @ 21.13 HRS, VOLUME=4715.3 AF

Qout=1514.7 CFS @ 21.18 HRS, VOLUME=4708.8 AF, ATTEN= 0%, LAG= 2.9 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)	STOR-IND METHOD
869.3	.83	0.00	0.00	PEAK STORAGE = 9.92 AF
878.3	2.07	13.05	13.05	PEAK ELEVATION= 876.1 FT
880.0	32.10	29.04	42.09	FLOOD ELEVATION= 890.0 FT
890.0	122.10	771.00	813.09	START ELEVATION= 869.3 FT
				SPAN= 10-65 HRS, dt=.2 HRS
				Tdet= 5.5 MIN (4708.79 AF)

#	ROUTE	INVERT	OUTLET DEVICES
1	P	869.3'	28' x 11.7' CULVERT n=.025 L=46' S=.001'/' Ke=.5 Cc=.9 Cd=.6
2	P	876.7'	11' x 4.4' CULVERT n=.025 L=46' S=.001'/' Ke=.5 Cc=.9 Cd=.6
3	P	872.1'	17.2' x 4.4' CULVERT n=.025 L=46' S=.001'/' Ke=.5 Cc=.9 Cd=.6

POND 5707 INFLOW & OUTFLOW
 57 @ Prairie Blvd



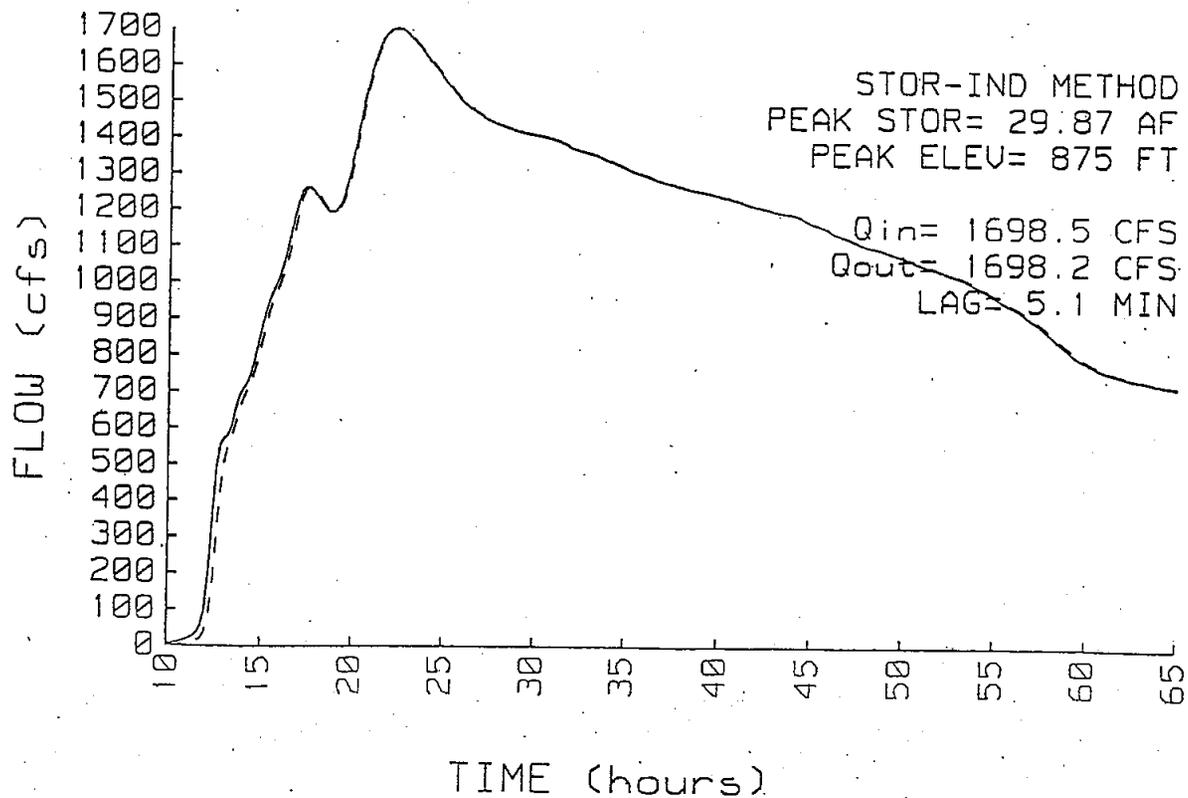
POND 5708 57 @ BNRR (walking path underneath)

Q_{in} =1698.5 CFS @ 22.29 HRS, VOLUME=5038.3 AF
 Q_{out}=1698.2 CFS @ 22.37 HRS, VOLUME=5019.7 AF, ATTEN= 0%, LAG= 5.1 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)	STOR-IND METHOD
866.4	2.31	0.00	0.00	PEAK STORAGE = 29.87 AF
875.4	4.63	31.23	31.23	PEAK ELEVATION= 875.0 FT
880.0	75.30	183.84	215.07	FLOOD ELEVATION= 890.0 FT
890.0	197.40	1363.50	1578.57	START ELEVATION= 866.4 FT
				SPAN= 10-65 HRS, dt=.2 HRS
				Tdet= 15.5 MIN (5019.71 AF)

#	ROUTE	INVERT	OUTLET DEVICES
1	P	866.4'	24' x 16.2' CULVERT n=.025 L=20' S=.001'/' Ke=.5 Cc=.9 Cd=.6
2	P	873.7'	48' x 8.9' CULVERT n=.025 L=20' S=.001'/' Ke=.5 Cc=.9 Cd=.6
3	P	873.7'	22.6' x 4.6' CULVERT n=.04 L=20' S=.001'/' Ke=.5 Cc=.9 Cd=.6

POND 5708 INFLOW & OUTFLOW
 57 @ BNRR (walking path underneath)



POND 5709

57 @ Hanson Blvd (Hwy 78)

Qin =1765.2 CFS @ 23.09 HRS, VOLUME=5262.0 AF

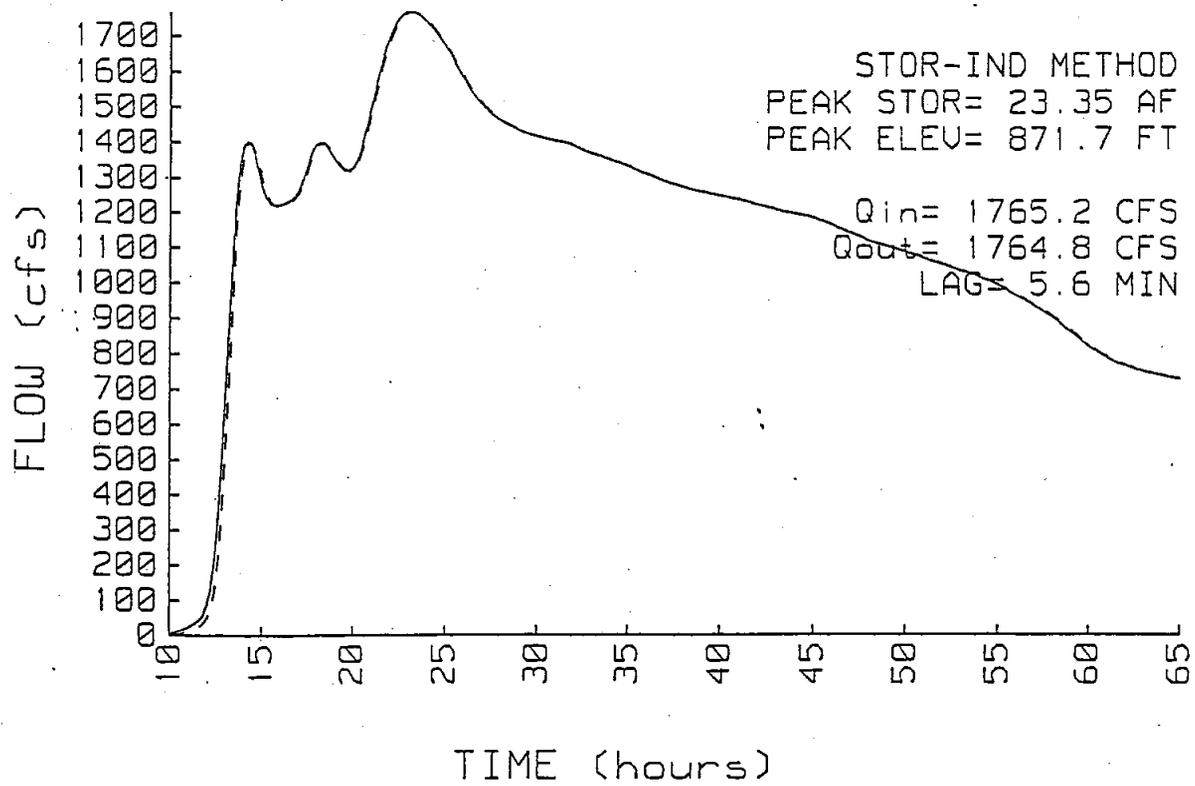
Qout=1764.8 CFS @ 23.18 HRS, VOLUME=5248.2 AF, ATTEN= 0%, LAG= 5.6 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)	STOR-IND METHOD
864.6	1.65	0.00	0.00	PEAK STORAGE = 23.35 AF
874.6	4.96	33.05	33.05	PEAK ELEVATION= 871.7 FT
880.0	51.00	151.09	184.14	FLOOD ELEVATION= 880.0 FT
				START ELEVATION= 864.6 FT
				SPAN= 10-65 HRS, dt=.2 HRS
				Tdet= 11.1 MIN (5248.23 AF)

ROUTE INVERT OUTLET DEVICES

#	ROUTE	INVERT	OUTLET DEVICES	HEAD(FT)	DISCH(CFS)
1	P	864.6'	Span Bridge w/ 0 piers	0.0	0.00
				.5	26.20
				1.0	75.70
				1.5	141.90
				2.0	222.70
				2.5	317.10
				3.0	424.70
				4.0	677.80
				5.0	980.80
				6.0	1333.50
				7.0	1735.90
				8.0	2189.00
				9.0	2693.00
				9.6	3031.00

POND 5709 INFLOW & OUTFLOW
57 @ Hanson Blvd. (Hwy 78)



POND 5710

57 @ Crosstown Blvd

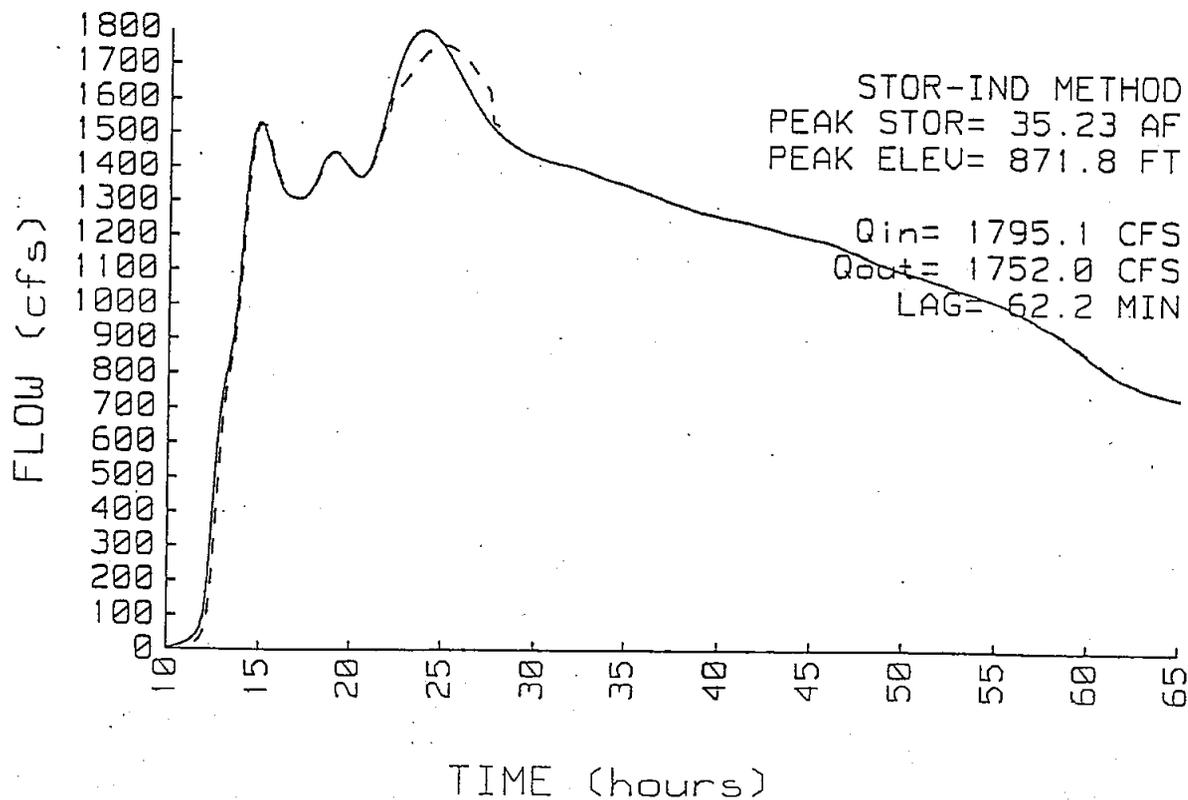
Qin =1795.1 CFS @ 23.82 HRS, VOLUME=5349.6 AF

Qout=1752.0 CFS @ 24.85 HRS, VOLUME=5336.5 AF, ATTEN= 2%, LAG= 62.2 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)	STOR-IND METHOD
864.5	1.52	0.00	0.00	PEAK STORAGE = 35.23 AF
871.5	4.55	21.25	21.25	PEAK ELEVATION= 871.8 FT
877.0	91.80	264.96	286.21	FLOOD ELEVATION= 877.0 FT
				START ELEVATION= 864.5 FT
				SPAN= 10-65 HRS, dt=.2 HRS
				Tdet= 10.9 MIN (5336.49 AF)

#	ROUTE	INVERT	OUTLET DEVICES
1	P	864.5'	35.5' x 5' CULVERT n=.025 L=72' S=.001'/' Ke=.5 Cc=.9 Cd=.6
2	P	869.5'	21.7' x 4.5' CULVERT n=.01 L=72' S=.001'/' Ke=.5 Cc=.9 Cd=.6

POND 5710 INFLOW & OUTFLOW
 57 @ Crosstown Blvd



13 Apr 01

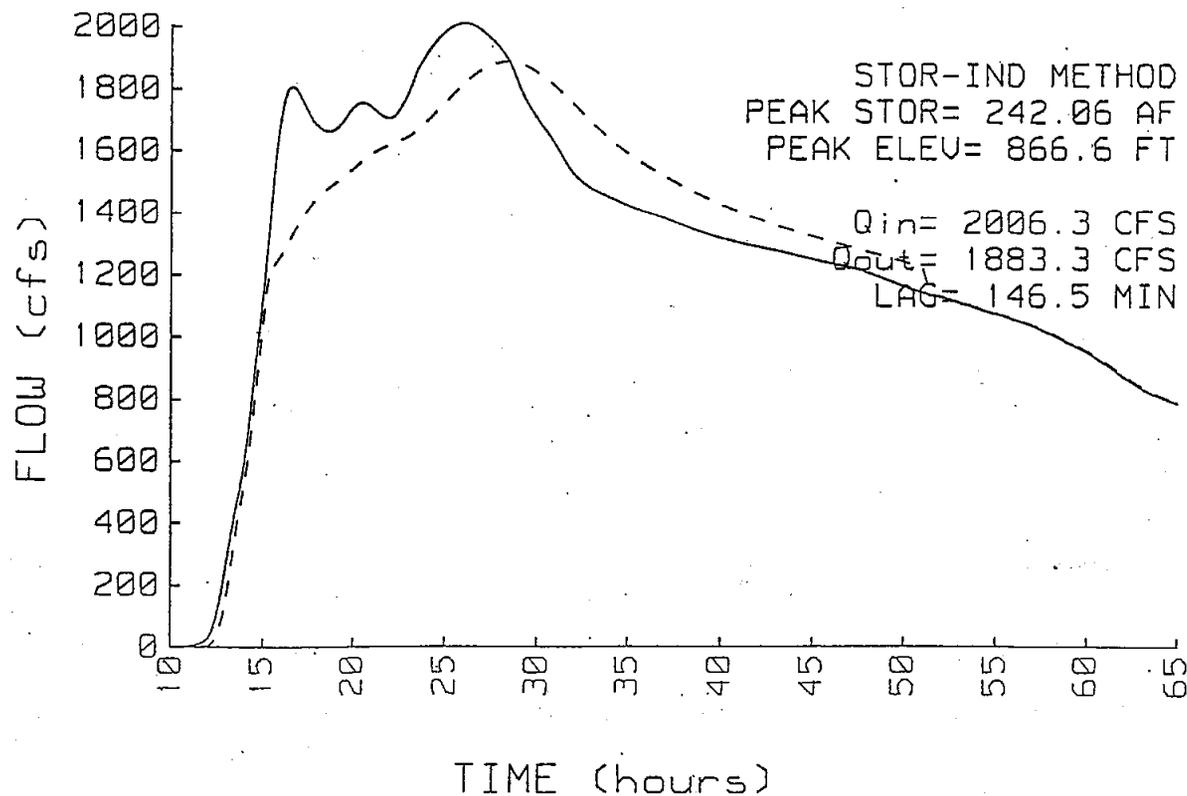
POND 5711 57 @ Coon Creek Dr NW

Qin =2006.3 CFS @ 26.00 HRS, VOLUME=5795.9 AF
 Qout=1883.3 CFS @ 28.44 HRS, VOLUME=5777.8 AF, ATTEN= 6%, LAG= 146.5 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)	STOR-IND METHOD
860.0	3.76	0.00	0.00	PEAK STORAGE = 242.06 AF
865.0	5.85	24.03	24.03	PEAK ELEVATION= 866.6 FT
870.0	270.90	691.88	715.90	FLOOD ELEVATION= 880.0 FT
880.0	440.80	3558.50	4274.40	START ELEVATION= 860.0 FT
				SPAN= 10-65 HRS, dt=.2 HRS
				Tdet= 51.4 MIN (5756.85 AF)

#	ROUTE	INVERT	OUTLET DEVICES
1	P	860.0'	46' x 9.1' CULVERT n=.025 L=46' S=.001'/' Ke=.5 Cc=.9 Cd=.6
2	P	865.3'	10.3' x 5.3' CULVERT n=.025 L=46' S=.001'/' Ke=.5 Cc=.9 Cd=.6
3	P	866.9'	11.8' x 4.6' CULVERT n=.025 L=46' S=.001'/' Ke=.5 Cc=.9 Cd=.6

POND 5711 INFLOW & OUTFLOW
 57 @ Coon Creek Dr NW



POND 5712

57-5 @ 141st Ave NW

Qin = 465.7 CFS @ 12.64 HRS, VOLUME= 79.77 AF

Qout= 108.9 CFS @ 14.06 HRS, VOLUME= 79.69 AF, ATTEN= 77%, LAG= 85.3 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)
860.2	.46	0.00	0.00
865.2	1.38	4.60	4.60
867.6	51.60	63.58	68.18

STOR-IND METHOD

PEAK STORAGE = 33.61 AF

PEAK ELEVATION= 866.3 FT

FLOOD ELEVATION= 867.6 FT

START ELEVATION= 860.2 FT

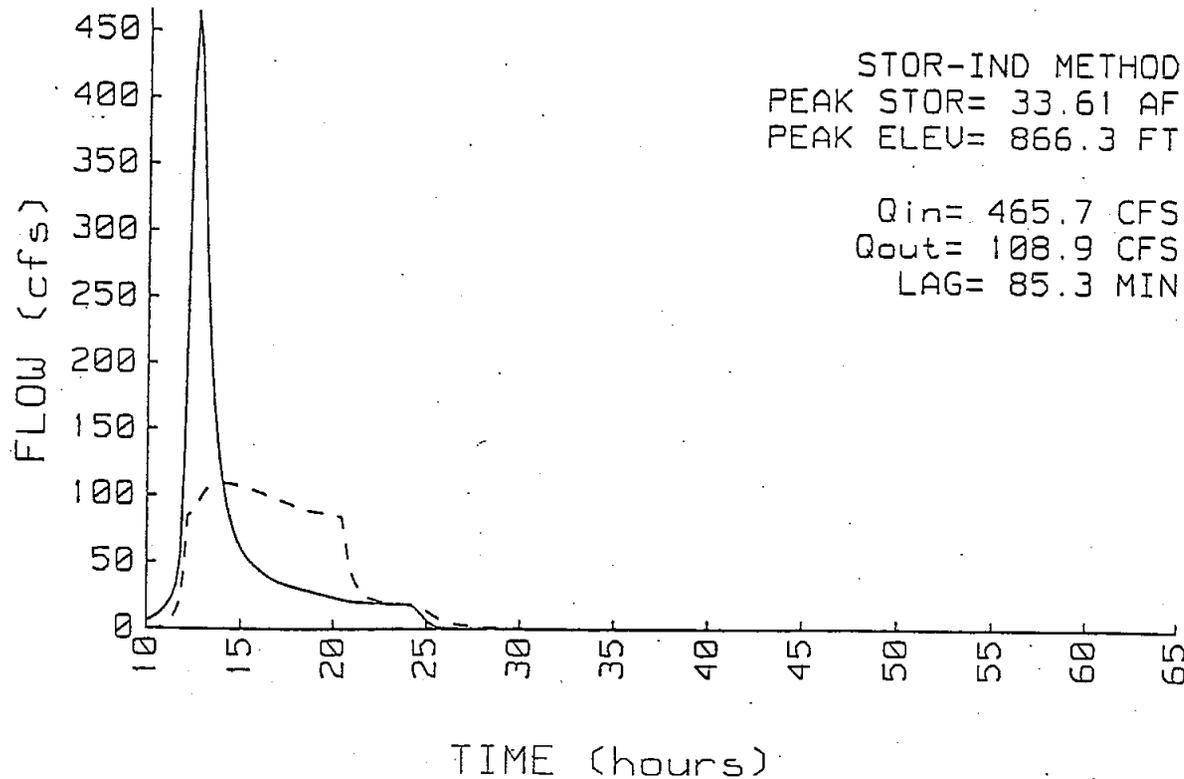
SPAN= 10-65 HRS, dt=.2 HRS

Tdet= 143.4 MIN (79.4 AF)

ROUTE INVERT OUTLET DEVICES

1 P 860.2' 48" CULVERT
n=.013 L=66' S=.0005'/ Ke=.5 Cc=.9 Cd=.6

POND 5712 INFLOW & OUTFLOW
57-5 @ 141st Ave NW



Prepared by Montgomery Watson

13 Apr 01

HydroCAD 5.11 000606 (c) 1986-1999 Applied Microcomputer Systems

POND 5712

57-5 @ 141st Ave NW

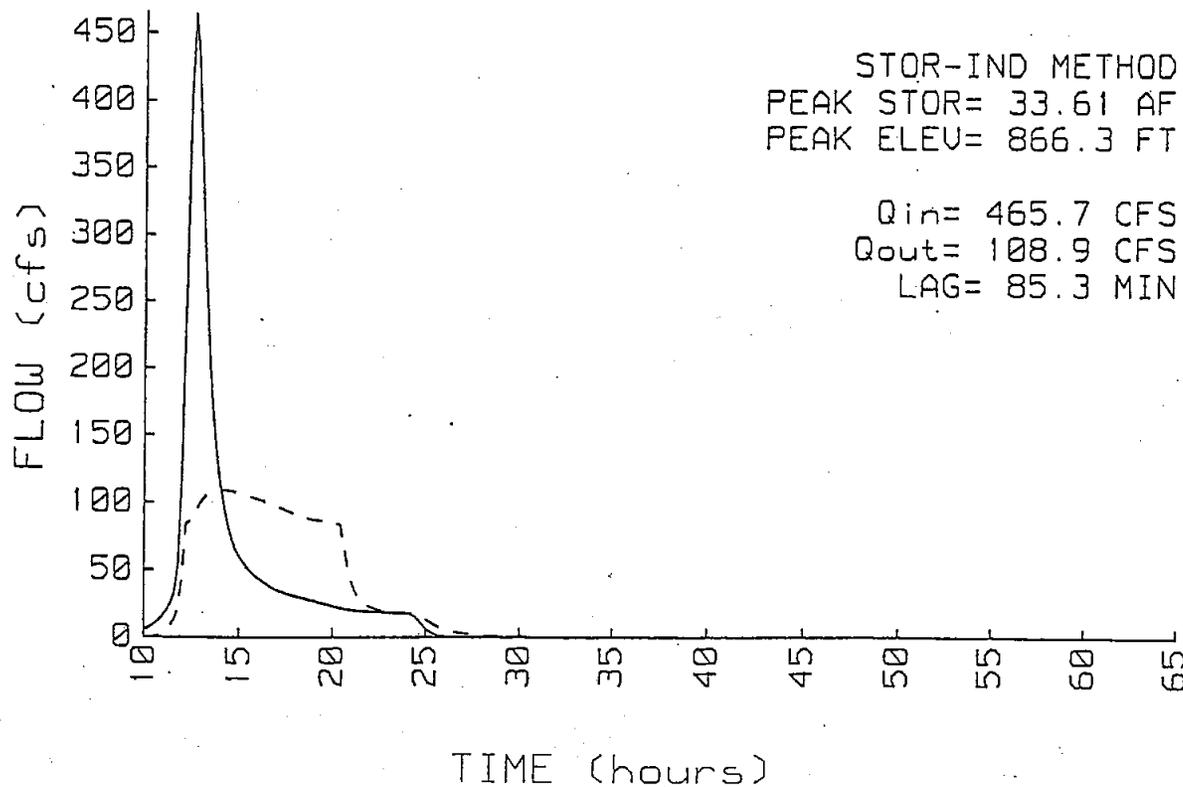
Qin = 465.7 CFS @ 12.64 HRS, VOLUME= 79.77 AF

Qout= 108.9 CFS @ 14.06 HRS, VOLUME= 79.69 AF, ATTEN= 77%, LAG= 85.3 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)	STOR-IND METHOD
860.2	.46	0.00	0.00	PEAK STORAGE = 33.61 AF
865.2	1.38	4.60	4.60	PEAK ELEVATION= 866.3 FT
867.6	51.60	63.58	68.18	FLOOD ELEVATION= 867.6 FT
				START ELEVATION= 860.2 FT
				SPAN= 10-65 HRS, dt=.2 HRS
				Tdet= 143.4 MIN (79.4 AF)

#	ROUTE	INVERT	OUTLET DEVICES
1	P	860.2'	48" CULVERT n=.013 L=66' S=.0005'/1' Ke=.5 Cc=.9 Cd=.6

POND 5712 INFLOW & OUTFLOW
57-5 @ 141st Ave NW



POND 5713

57 @ Bunker Lake Blvd (Hwy 116)

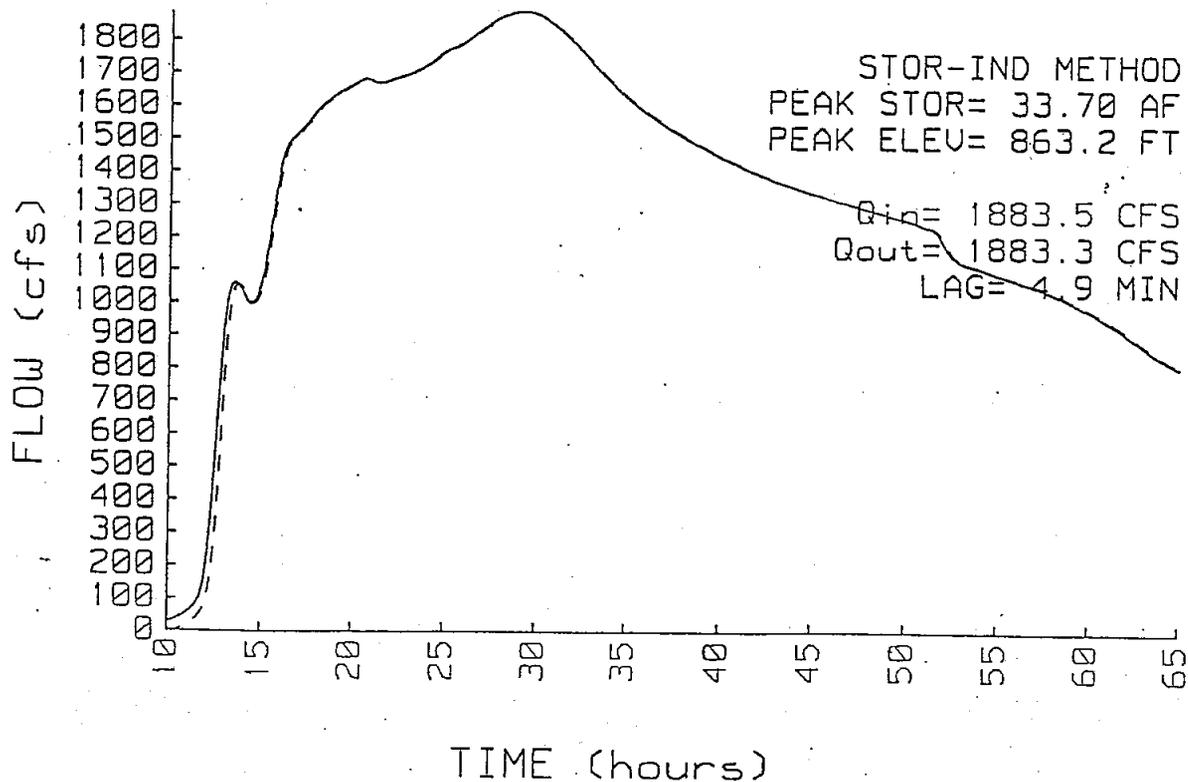
Qin =1883.5 CFS @ 29.16 HRS, VOLUME=6042.7 AF

Qout=1883.3 CFS @ 29.24 HRS, VOLUME=6019.1 AF, ATTEN= 0%, LAG= 4.9 MIN.

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)	STOR-IND METHOD
855.5	2.43	0.00	0.00	PEAK STORAGE = 33.70 AF
863.5	6.33	35.04	35.04	PEAK ELEVATION= 863.2 FT
870.0	137.70	468.10	503.14	FLOOD ELEVATION= 870.0 FT
				START ELEVATION= 855.5 FT
				SPAN= 10-65 HRS, dt=.2 HRS
				Tdet= 15.5 MIN (6019.13 AF)

#	ROUTE	INVERT	OUTLET DEVICES
1	P	855.5'	12.5' x 10' CULVERT n=.025 L=45' S=.001'/' Ke=.5 Cc=.9 Cd=.6
2	P	855.5'	138.9 DEG V-NOTCH WEIR Q=2.47 TAN(Theta/2) H^2.5
3	P	861.5'	32' x 4' CULVERT n=.01 L=45' S=.001'/' Ke=.5 Cc=.9 Cd=.6

POND 5713 INFLOW & OUTFLOW
 57 @ Bunker Lake Blvd (Hwy 116)



Prepared by Montgomery Watson

13 Apr 01

HydroCAD 5.11 000606 (c) 1986-1999 Applied Microcomputer Systems

POND 5714

57 @ 131st Ave NE

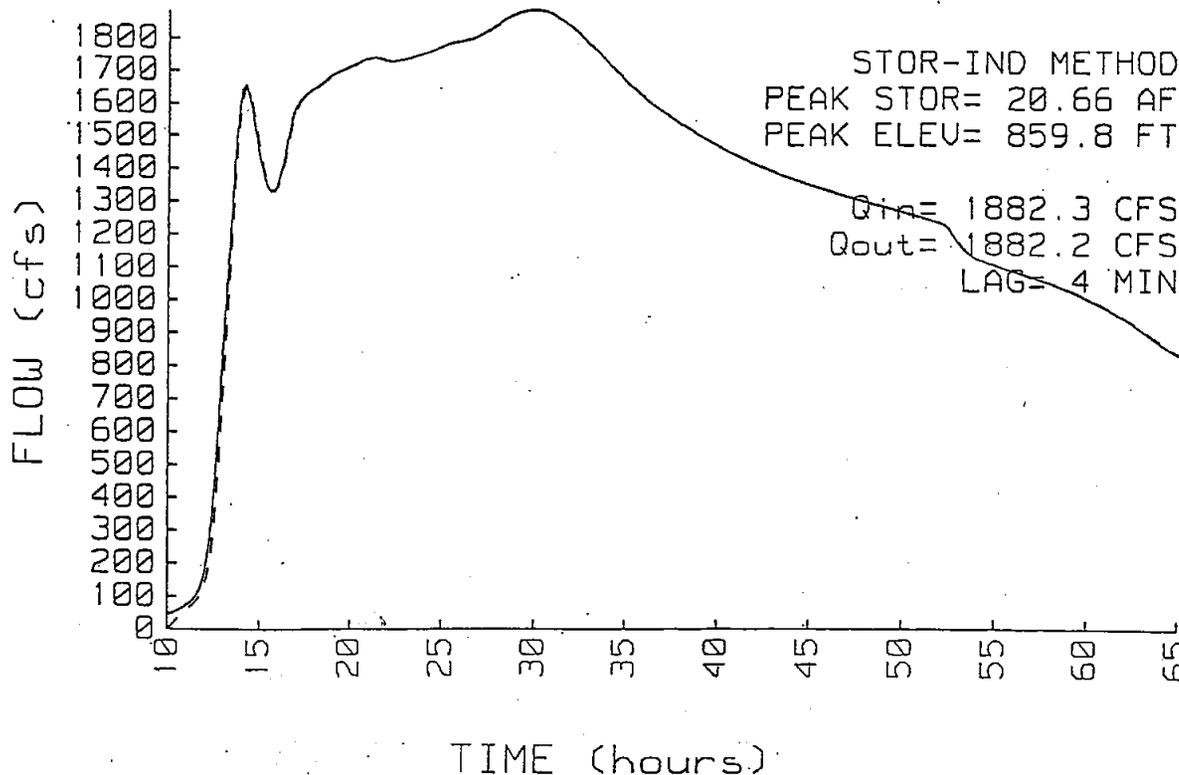
Qin =1882.3 CFS @ 29.92 HRS, VOLUME=6218.5 AF

Qout=1882.2 CFS @ 29.99 HRS, VOLUME=6205.3 AF, ATTEN= 0%, LAG= 4.0 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)	STOR-IND METHOD
853.2	1.65	0.00	0.00	PEAK STORAGE = 20.66 AF
861.2	4.59	24.96	24.96	PEAK ELEVATION= 859.8 FT
870.0	100.10	460.64	485.60	FLOOD ELEVATION= 870.0 FT
				START ELEVATION= 853.2 FT
				SPAN= 10-65 HRS, dt=.2 HRS
				Tdet= 9 MIN (6182.8 AF)

#	ROUTE	INVERT	OUTLET DEVICES
1	P	853.2'	41' x 904' CULVERT n=.025 L=60' S=.001'/ ' Ke=.5 Cc=.9 Cd=.6
2	P	857.5'	29.4' x 5' CULVERT n=.025 L=60' S=.001'/ ' Ke=.5 Cc=.9 Cd=.6

POND 5714 INFLOW & OUTFLOW
57 @ 131st Ave NE



POND 5816

58-7 @ Old Constance Blvd.

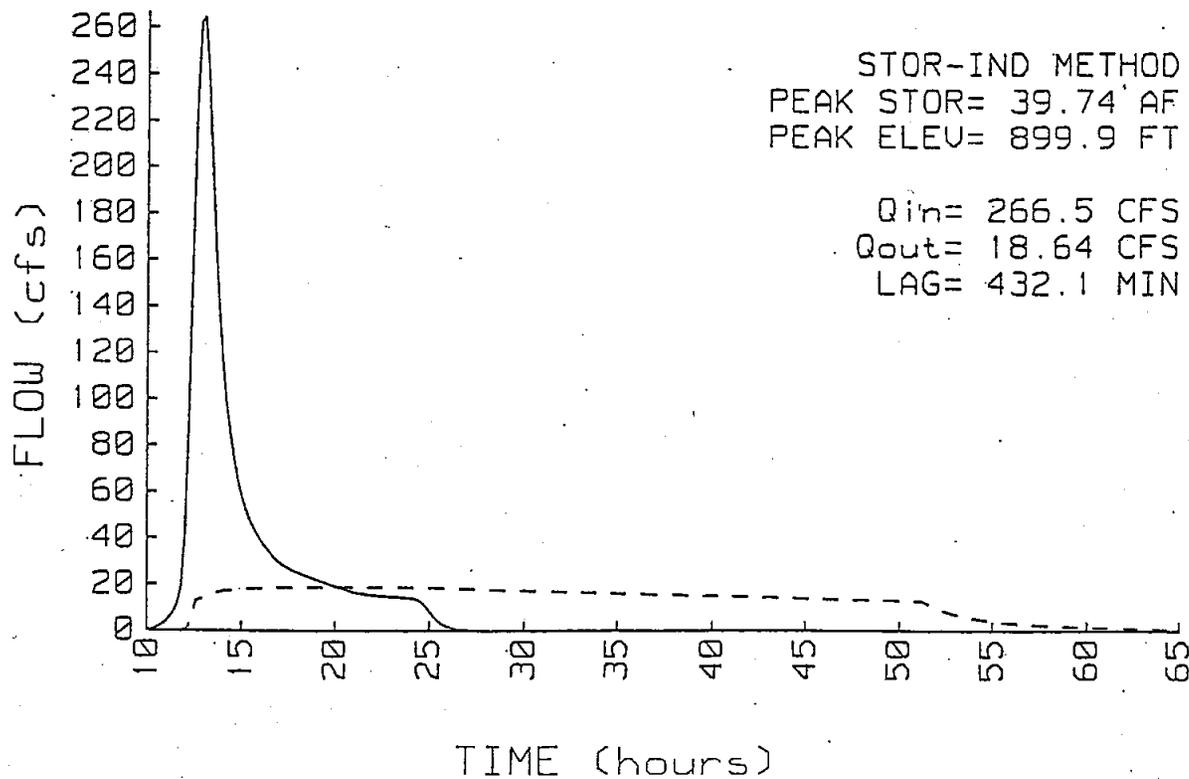
Qin = 266.5 CFS @ 12.92 HRS, VOLUME= 57.37 AF

Qout= 18.64 CFS @ 20.12 HRS, VOLUME= 55.65 AF, ATTEN= 93%, LAG= 432.1 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)	STOR-IND METHOD
897.5	.79	0.00	0.00	PEAK STORAGE = 39.74 AF
899.5	4.74	5.53	5.53	PEAK ELEVATION= 899.9 FT
900.0	155.50	40.06	45.59	FLOOD ELEVATION= 905.4 FT
905.4	201.20	963.09	1008.68	START ELEVATION= 897.5 FT
				SPAN= 10-65 HRS, dt=.2 HRS
				Tdet= 1049 MIN (55.65 AF)

#	ROUTE	INVERT	OUTLET DEVICES
1	P	897.5'	42" CULVERT n=.024 L=73' S=.0001'/1' Ke=.5 Cc=.9 Cd=.6

POND 5816 INFLOW & OUTFLOW
58-7 @ Old Constance Blvd.



POND 5817

58-7-3 @ Old Constance Blvd

Qin = 386.3 CFS @ 13.15 HRS, VOLUME= 94.72 AF

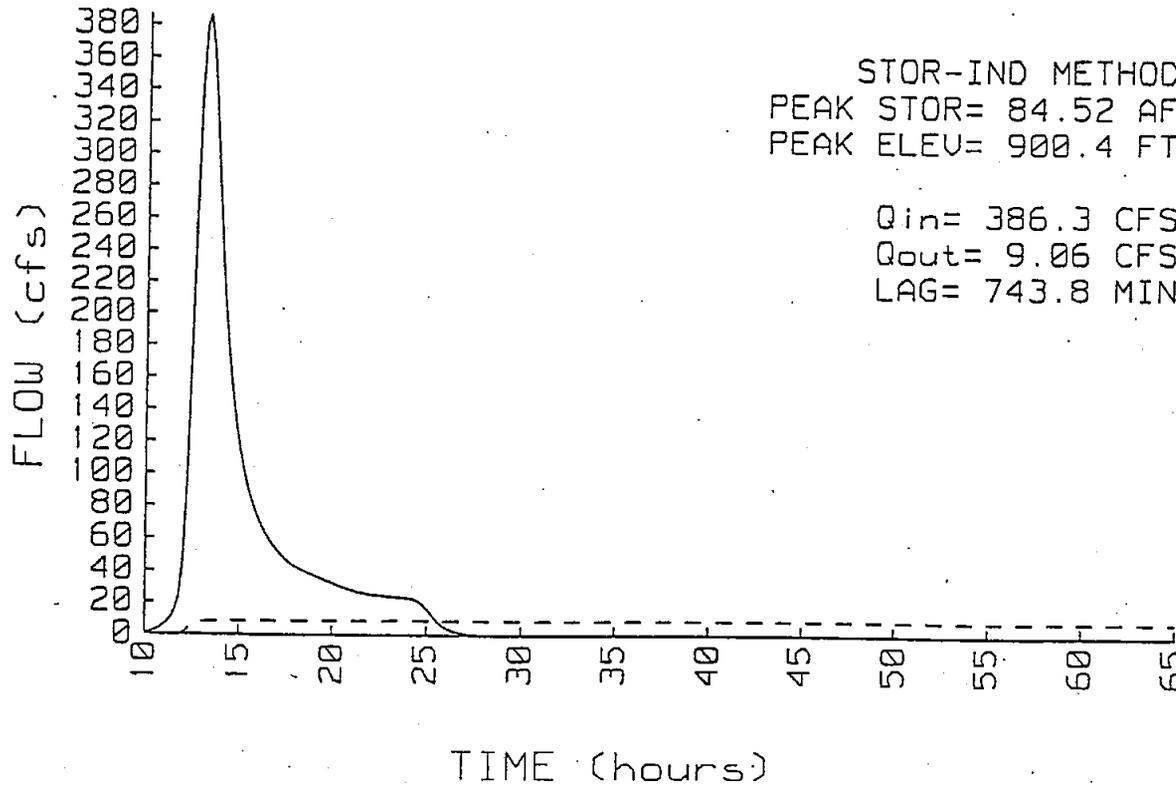
Qout= 9.06 CFS @ 25.55 HRS, VOLUME= 38.65 AF, ATTEN= 98%, LAG= 743.8 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)	STOR-IND METHOD
896.8	.78	0.00	0.00	PEAK STORAGE = 84.52 AF
899.8	3.64	6.63	6.63	PEAK ELEVATION= 900.4 FT
900.0	96.10	9.97	16.60	FLOOD ELEVATION= 905.5 FT
905.5	208.70	838.20	854.80	START ELEVATION= 896.8 FT
				SPAN= 10-65 HRS, dt=.2 HRS
				Tdet= 1541.6 MIN (38.65 AF)

ROUTE INVERT OUTLET DEVICES

1 P 896.8' 18" CULVERT
n=.024 L=61' S=.0001'/' Ke=.5 Cc=.9 Cd=.6

POND 5817 INFLOW & OUTFLOW
58-7-3 @ Old Constance Blvd



POND 5818

58-7 @ University Ave

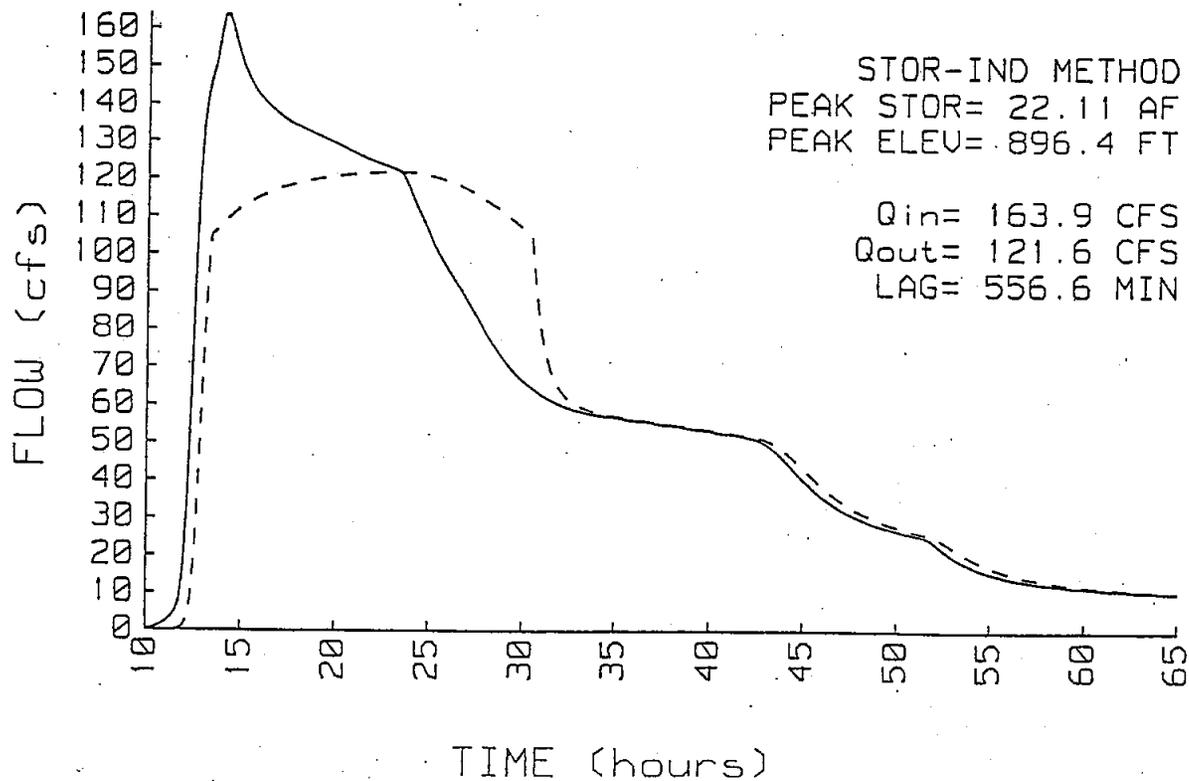
Qin = 163.9 CFS @ 14.13 HRS, VOLUME=273.60 AF

Qout= 121.6 CFS @ 23.41 HRS, VOLUME=271.78 AF, ATTEN= 26%, LAG= 556.6 MIN

ELEVATION (FT)	AREA (AC)	INC.STOR (AF)	CUM.STOR (AF)	STOR-IND METHOD
890.7	.74	0.00	0.00	PEAK STORAGE = 22.11 AF
895.7	1.98	6.80	6.80	PEAK ELEVATION= 896.4 FT
900.0	41.30	93.05	99.85	FLOOD ELEVATION= 900.0 FT
				START ELEVATION= 890.7 FT
				SPAN= 10-65 HRS, dt=.2 HRS
				Tdet= 91.8 MIN (271.78 AF)

#	ROUTE	INVERT	OUTLET DEVICES
1	P	890.7'	54" CULVERT n=.013 L=64' S=.0031'/' Ke=.5 Cc=.9 Cd=.6

POND 5818 INFLOW & OUTFLOW
58-7 @ University Ave



Appendix O
Developer's Handout

**CITY OF ANDOVER
WATER RESOURCE MANAGEMENT PLAN
DRAINAGE PLAN REVIEW**

DEVELOPER'S REQUIREMENTS

The City of Andover has developed a number of policies to address storm water management within the City. These policies have been developed as part of the Comprehensive Water Resource Management Plan (2005).

I. Design Criteria

A. Water Quantity

1. Activities such as placement of structures, fill, or other activities that will increase the flood stage of the 100-year or regional event are prohibited.
2. A hydrologic/hydraulic model must be submitted with all development plans. All hydrologic studies will be based on standard hydrologic criteria and ultimate or anticipated development of the entire tributary drainage area. The SCS unit hydrograph method is preferred; however other methods are available.
3. Drainage calculations for the 1-, 10-, and 100-year critical events must be submitted and approved as part of any development applications prior to the issuance of any building or grading permit.
4. Stormwater leaving a site must be routed to a public drainage system.
5. The post-development runoff rates from the site may not exceed predevelopment rates or rates for the 1-, 10-year, and 100-year event which would interfere with sensitive downstream uses.
6. Within Drainage Sensitive Uses Area, rate control calculations showing that the post-development 100-year peak flow rate shall not exceed predevelopment 25-year peak flow rate (by subwatershed). A Drainage Sensitive Use Area is defined as all those land uses that depend on subsurface drainage (i.e. local draining of the soil profile) for their continuation. For Non-Drainage Sensitive Uses Area, the post-development 100-year peak flow rate shall not exceed predevelopment 100-year peak flow rate.

7. The design storm events shall be defined as having the following Soil Conservation Service (SCS) Type II distributions:

<i>Event Frequency</i>	<i>Event Duration</i>	<i>Probability of Occurrence in Any Given Year</i>	<i>Rainfall Amount (inches)</i>
1 – Year	24- Hour	99%	2.3
10 – Year	24- Hour	10%	4.1
100 – Year	24- Hour	1%	5.9
100 – Year	10-Day Runoff	1%	7.2 (inches of runoff)
100-year back-to-back (landlocked basin)	48-hour	NA	11.8

8. The critical 1% probability event will be defined as the event that requires the greatest storm water storage volume in a storage facility. These facilities include lakes, ponds, and their outlets.
9. Major storm water facilities (i.e., ponds, pond outlet systems, and major conveyance systems) will be designed using a 100-year event.
10. All minor drainage systems and local storm water collection systems analyses and design will be based on a 10-year event unless otherwise specified.
11. Detention and storm water ponding facility design will include access for maintenance of the outlet structure and to the facility in general.
12. The design of storm water facilities will consider and identify location(s) of overflow(s) that prevent property damage to adjacent properties from extreme water levels.
13. Available storage volume of landlocked areas shall be established by estimating the water surface elevation resulting from a 100-year, 10-Day runoff event or a back-to-back 100-year, 24-hour events, whichever is greater.
14. Emergency overflows or outlets to drainage systems will be provided to any landlocked area if the available storm water storage capacity is inadequate to prevent flooding of residences and if the available downstream conveyance system capacity is adequate to accept additional flow.
15. Infiltration storm water runoff is encouraged in areas where the risk to groundwater is minimal, the land use is compatible, and soil is conducive to infiltration. For projects that use infiltration, the following policies apply:
- a. Pretreatment of storm water to NURP guidelines will be required prior to discharge to an infiltration basin.

- b. The infiltration basin will be sized to infiltrate the runoff from the impervious surface area from a 0.34 inch rainfall event in 72 hours.
- c. Infiltration rates of the soil shall be calculated using the following guidelines based on the soil's hydrologic group:

Hydrologic Soil Group	Infiltration Rate
A	0.50 in/hr
B	0.25 in/hr
C	0.10 in/hr
D	0.03 in/hr

- d. Actual infiltration data for the soils on the site obtained from percolation tests conducted by a qualified engineer or soils scientist can be used instead of the rates outlined in the policy above, if available.
- e. If infiltration is used as part of a development plan, calculations showing the infiltration basin meets the above requirements must be submitted.
16. The City will not maintain private infiltration areas on private property such as individual homeowner's rain gardens. Private infiltration areas will be maintained through the Homeowners Association or landowner.
17. If private infiltration basins are proposed, the City will require that the plan include procedures for maintenance and funding be submitted prior to approval.
18. Anti-seepage collars shall be used on culverts and shall be installed so as to increase the creep distance or seepage line along conduit by 15 percent under public streets when there is:
- Water and ponding structures with a pool depth of 2 feet and a 2-day duration.
 - 250-acre watershed or more.
 - Design head of 10 feet or more.
19. The **lowest floor elevation** for new or redevelopment will be 3 feet above the seasonal high water mark which is identified as the mottled soils or the highest anticipated water table or the lowest floor elevation will be 2 feet above the designated or designed 100-year flood elevation for the area, whichever is higher unless evidence is submitted and certified by a geotechnical engineer that shall be reviewed and certified by an independent geotechnical engineer hired by the City at the expense of the developer and approved by the City Council that a separation of less than 3 feet can be achieved and is warranted. See **Appendix P** for other possible variance criteria.
20. Any new development or redevelopment within the City will maintain a **minimum building opening** of 2 feet above the designated or designed one hundred year flood elevation. Building openings shall be defined as the bottom sill of an egress window or lowest walkout elevation, whichever is lower.
21. Where the construction of a formal outlet is not practical for landlocked areas, the minimum building elevation shall be the greatest of either 2 feet above the level resulting

from two concurrent 100-year, single event rainfall events or 2 feet above the 100-year, 10-day snowmelt.

22. A review and permit from the Coon Creek Watershed District or Lower Rum River Watershed Management Organization is required in conformance with the Watershed District or Watershed Management Organization standards.

B. Water Quality

1. New development or redevelopment must provide pretreatment of storm water runoff prior to discharge to Nationwide Urban Runoff Program (NURP) recommendations.
2. The following NURP design recommendations for the design of storm water treatment basins apply within the City:
 - 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 rainfall over the entire contributing drainage area assuming full development.
 - b. A permanent pool average depth (basin volume/basin area) which shall be \geq 3 feet, with a maximum depth of \leq 10 feet.
 - c. An emergency overflow (emergency outlet) adequate to control the one percent frequency/critical duration rainfall event.
 - d. Basin side slopes above the normal water level should be no steeper than 4:1, and preferably flatter. A basin shelf with a minimum width of 10 feet and one foot deep below the normal water level is recommended to enhance wildlife habitat, reduce potential safety hazards, and improve access for long-term maintenance.
 - e. To prevent short-circuiting, the distance between major inlets and the normal outlet shall be maximized.
 - f. A flood pool ("live storage") volume above the principal spillway shall be adequate so that the peak discharge rates from 1-year and 100-year, 24-hour events are no greater than pre-development basin watershed conditions.
 - g. No orifice smaller than 4" is allowed in the construction of ponds or outlets within the City.
 - g. Retardance of peak discharges for the more frequent storms can be achieved through a principal spillway design which may include a perforated vertical riser, small orifice retention outlet, or compound weir.
3. NURP ponds or pond networks must be designed with total phosphorus removal efficiency in the 65-70 percent range. Storm water treatment can be provided via a single pond, which meets the design and treatment criteria or an on-site network of

interconnected ponds. If an on-site pond network is used, the overall pollutant removal efficiency for the network must meet the criteria.

4. In areas where NURP treatment basins are not feasible to construct and a variance from the applicable Watershed Management Organization or Watershed District and City has been acquired, the MPCA NPDES requirements may be substituted. The MPCA requirements are as follows:
 - a. The basin's hydraulic volume (dead pool) shall be sufficient to capture a ½ inch of runoff from the new impervious watershed area. The basin's permanent volume must reach a minimum depth of at least 3 feet and must have no depth greater than 10 feet. Basin design should be such that scour or re-suspension of solids is minimized.
 - b. Basins shall also provide a minimum of 1800 ft³ of dead sediment storage volume below the basin's volume/impervious acre drained.
 - c. Basin outlets shall also be designed to prevent short circuiting and the discharge of floating debris and must include an energy dissipation device.
 - d. A sufficiently wide maintenance access (typically 10ft. wide) must be provided for future maintenance of the basin.
5. In areas of redevelopment where ponding is not feasible or available, in-line storm water treatment systems will be required to treat storm water runoff.
6. Permanent drainage, access, and maintenance easements shall be provided for all drainage facilities.
7. Skimmer design on stormwater ponds shall provide for skimmers that extend a minimum of 12 inches below the normal water level and minimize the velocities of water passing under the skimmer to less than 0.5 feet per second for a 1-year, 24-hour rainfall event. A typical skimmer design is shown in **Appendix M** of the Water Resource Management Plan.
8. City streets will consist of a 33-foot standard street width (back of curb to back to curb) for minor urban city streets, and 31-foot standard street width for minor rural city streets.
9. Future outlets to DNR Public Waters must first pass through a sediment pond / trap prior to discharging into the water body.

C. Public Ditch Systems

1. A Ditch Maintenance Permit from the Coon Creek Watershed District is required for work in all designated ditches within the Watershed District.

2. A permit is required from Anoka County for work in all designated ditches within the Lower Rum River Watershed Management Organization area.
3. The CCWD requires a 100-foot easement on either side of Coon Creek from the centerline for maintenance.
4. The CCWD requires a 50-foot easement on either side from the centerline for maintenance of all designated ditches within the Coon Creek Watershed.

D. Wetlands

1. The Lower Rum River WMO and Coon Creek Watershed District will act as the Local Government Unit (LGU) for the Wetland Conservation Act. Any activities that fill, drain, or excavate wetlands will require a permit from the LRRWMO or CCWD.
2. Prior to issuance of any city grading or building permits, all development and redevelopment activities must comply with the Wetland Conservation Act.
3. The City requires a 16.5 foot buffer strip during construction upon development or redevelopment for protection of wetlands and storm water ponds. For areas within the CCWD or LRRWMO, additional buffer requirements may be applicable. The developer will be required to work with the CCWD or LRRWMO to meet their buffer requirements, where applicable.

E. Erosion

1. The City requires the submission and approval of erosion control and grading plans prior to the issuance of any grading or building permits.
2. The City will require any development or redevelopment to comply with the erosion control and steep slope standards (**Appendix D** of the Water Resource Management Plan or on the City's website at <http://www.ci.andover.mn.us/>).
3. Soil erosion shall be prevented through the installation of erosion control practices in accordance with MPCA's Best Management Practices Handbook.
4. It shall be the responsibility of the developer / contractor to keep streets and property adjacent to construction areas free from sediment carried by construction traffic at site entrances and access points, and from site runoff and blowing dust.

F. Rum River Scenic River District

1. Land use, area lots, and the length of bluffland and water frontage suitable for building sites will be regulated through the bluffland ordinance (<http://www.ci.andover.mn.us/>).

2. Setbacks of structures and sanitary waste treatment facilities from bluff lines and shorelines to protect existing and/or natural scenic values, vegetation, soils, water quality, floodplain areas, and bedrock from disruption by manmade structures or facilities will be regulated as indicated in the shoreland and bluffland ordinances (<http://www.ci.andover.mn.us/>).
3. Alterations of the natural vegetation and topography within the Rum River Scenic River District will be regulated.

II. Submittal Criteria

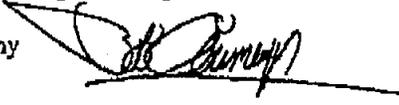
- A. Location map
- B. A site plat map containing the following data:
 1. A scale no greater than one inch equals two hundred feet (1"=200').
 2. The location of the site and the use of the adjacent land.
 3. Existing topography having a contour interval of no greater than two feet.
 4. Site grading plan having a contour interval of no greater than two feet.
 5. Delineation of all drainage areas, including off-site areas draining to the site, flow directions, proposed drainage facilities with sufficient detail drawings to ensure they are properly built. Stage, storage, and discharge information for all drainage and treatment facilities shall be presented on the site plan, as appropriate.
 6. Delineation of all easements, including permanent use, maintenance, and access, for all drainage facilities.
 7. Delineation and verification of all streams, water bodies, and wetlands, listing the Cowardin and Circular 39 wetland types, the Minnesota Department of Natural Resources Public Waters Classification and associated Ordinary High Water Level, water depth, Normal Water Level, 1-year, 10-year, and 100-year storm water elevations. Also identify downstream receiving waters and their classification.
 8. Location of all buildings, open spaces, recreation areas, utility service areas, access drives, parking areas, storage yard areas, proposed utility lines, existing utility lines and easements.
 9. Identify the first floor elevation, including basements, and low building openings for all buildings.
 10. Delineation of all lake and stream setbacks.
 11. Delineation of all areas to be paved or surfaced, including a description of the surfacing material to be used, and location and function of all yards.

12. The location of all drainage and treatment facilities needed for stormwater, along with sufficient detail drawings to allow for their proper installation.
 13. The location of all erosion and sediment control facilities, with sufficient detail drawings to allow for proper installation.
 14. Certified as being prepared by a professional engineer registered in the State of Minnesota.
- C. Design computations and implementation schedule for the proposed drainage facilities.
 - D. An erosion control plan and accompanying implementation schedule.
 - E. Drainage and erosion control plans certified as being prepared by a professional engineer registered with the State of Minnesota.
 - F. Certified as-built drawings of the completed drainage facilities.

Appendix P
LRRWMO Memo

Proposed Amendment**Lower Rum River Watershed Management Organization**to Low Floor Requirements
in regards
to Drainage
area ponding.**Andover—Anoka—Coon Rapids—Ramsey****2015 First Avenue • Anoka, MN 55303**

To: Lower Rum River Water Management Organization

From: Barr Engineering Company 

Date: June 18 2002

Re: Low Floor Elevation of Structures adjacent to Inundation Areas

There have been several permits recently that have structures proposed adjacent to back-yard inundation areas that provide water quantity storage during intense rain storm events. These are not open water areas but sodded rear yard depressions. An inundation area functions differently than an open water area because it will drain dry over a given time period. The LRRWMO criteria requires that the lowest floor elevation adjacent to a basin must be a minimum of two feet above the calculated 100-year frequency flood elevation. This has resulted in some what of a "hard-ship" with the structures adjacent to an inundation area either having to be changed to a slab on grade, raising the structures considerably or possibly modifying the design of storm water inlets to minimize the resultant head water elevation.

The concern is the impacts that surface and potential groundwater could have on a structure adjacent to this type of inundation area. The LRRWMO has asked us to look at a procedure that would provide a variance in this requirement, for inundation areas only. Attached is a copy of an internal memorandum that outlines information that could be submitted by a permit applicant for consideration of a variance in this requirement. At the end of the memo is a series of graphs that would be used by the LRRWMO in this variance determination. This would provide a uniform standard that would be used by all of the consultants in their design.

At your convenience, please review this information and call me if you have any questions, comments or request additional information, please give me a call.

Post-it® Fax Note	7671	Date	4/1/05	# of pages	13
To	Andi Moffatt	From	T. HARS		
Co./Dept.	WSB	Co.	ANDOVER		
Phone #		Phone #			
Fax #	541-1700	Fax #			

Memorandum

To: Bob Obermeyer
From: Ray Wuolo
Subject: Suggested Lowest Floor Level Guidance
Date: June 18, 2002
Project:
c:

Overview of Lowest Floor Issue

There seems to be two reasons for establishing a minimum lowest floor elevation in the vicinity of a pond – to prevent flooding of the structure by surface water and to prevent seepage or damage from uplift pressures that could result from a rise in the water table elevation. The first reason (direct flooding) can easily be established with knowledge of the maximum flood elevation of a pond (or the 100-year elevation, if this is used) and ground surface topography. The second reason (a rise in the water table due to increased pond elevations) is not so straight forward. This second area is the subject of this memo.

When a formerly dry pond becomes wet (or when a wet pond's water elevation increases) due to a storm event, downward seepage of the ponded water begins. The rate of seepage through the bottom of the pond is dependent upon:

- 1) The elevation of the water surface above the pond bottom
- 2) The soil type at the bottom of the pond (i.e. the pond bottom's thickness and permeability)
- 3) The type of soil underneath the pond (e.g., clay, silt, sand, gravel)
- 4) The degree of saturation of the soils beneath the pond
- 5) The depth to the water table

In general, higher seepage through the bottom of the pond will occur when the water surface elevation is high, the pond's bottom sediments are thin and/or sandy, the soils underneath the pond are permeable (such as sand or gravel), the soils underneath the pond have a high moisture content

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(i.e. they are at field capacity or higher), and the water table is well below the bottom of the pond (i.e. the soils are freely draining).

Higher seepage rates through the bottom of the pond will cause the water table elevation to rise by creating a "mounding condition" below the pond. How high and how widespread the water table mound becomes are contributing factors to whether or not basements will be affected. *However, the single most important factor that will determine if seepage from a pond will cause wet basement problems is the depth to the water table, below the basement.*

The magnitude and extent of the groundwater mounding conditions is also contingent upon the aquifer's transmissivity (aquifer permeability multiplied by aquifer thickness), the specific yield of the aquifer materials, and the duration of the high water levels in the pond. In general, thicker aquifers with higher permeability will experience less mounding than thinner aquifers of lower permeability. Perched aquifers (i.e. groundwater zones less than about 10 feet that overlie extensive clay layers) typically experience the greatest amount of mounding.

Overview of Variance Evaluation Method

All of the combinations of settings, pond configurations, aquifer parameters, and distances from ponds cannot be anticipated before hand in coming up with a method to quickly evaluate whether or not a variance to the minimum floor elevation ordinance should be considered. However, by making some generalities, the most commonly encountered situations can be evaluated. This is the approach taken here.

A groundwater flow model of a "typical" pond and aquifer setting was developed. Aquifer parameters and pond elevations were varied and the resulting water table mounding conditions were simulated. The following conditions were evaluated:

1. Pond elevation increases of 2 feet, 4 feet, and 6 feet above normal or dry conditions
2. Depth to the water table (before flooding) of 3 feet (to represent conditions of 3 feet or less) and 10 feet (to represent conditions where the depth to the water table is greater than 3 feet).
The purpose of simulating these two conditions is that with shallow water tables, the rate of infiltration is substantially reduced as the groundwater mound rises into the pond. For deeper aquifer conditions, the pond bottom is always above the water table and the depth to the water table has no bearing on the seepage rate.

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3. Three aquifer conditions: clay or perched aquifers (transmissivities of 7 ft²/day and specific yield values of 0.1); silt aquifers (transmissivity of 70 ft²/day and specific yield values of 0.2) and sand and gravel aquifers (transmissivities of 2000 ft²/day and specific yield values of 0.2).
4. Pond bottom sediment thickness of 1 feet and bottom sediment hydraulic conductivity of 1 ft/day.
5. Instantaneous occurrence of a flood condition in the pond, which lasts for 25 days, followed by instantaneous reduction to normal conditions. The purpose of using this condition is that the effects of aquifer storage (specific yield) are taken into account. A duration of 25 days was selected as being a reasonable time period of flood conditions.
6. Increases in the water table elevation were recorded at several distances between 5 feet and 200 feet from the pond. The maximum rise during the modeled period was selected for plotting.

The U.S. Geological Survey's groundwater modeling code, MODFLOW, was used for this analysis.

How to Determine if a Variance is Warranted

In order to determine if a proposed lowest floor elevation is acceptable, the following need to be known:

1. Depth to the water table and an estimation of the water table's seasonally high elevation.
2. Type of aquifer materials – e.g., clay, silt, sand, gravel
3. Information as to whether or not the water table is perched or is part of a deeper, thicker aquifer system.
4. An estimate of the flood elevation of the pond.
5. The distance of the proposed floor to the pond.

Depth to the water table and the type of aquifer material needs to be determined through the installation of soil borings. The other information should be estimated from other sources.

Once this information is obtained, the minimum depth to the water table from the bottom of the proposed floor slab can be determined from one of six plots, attached to this memorandum. Which of the six plots to use depends on the depth of the water table with respect to the pond's bottom and the type of aquifer material (e.g., clay, silt, sand, gravel). The following steps should be used:

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1. Determine the closest distance of the proposed floor to the pond (if the pond size increases during flooding, the distance should be from the flooded perimeter of the pond to the proposed floor).
2. Using Plot 1, determine the minimum permissible depth to the water table for the specified distance from the pond. If the actual depth to the water table (see discussion below for determining this) is greater than the value on Plot 1, no further evaluation is necessary - the floor is sufficiently high with respect to the water table that the water table will not reach the bottom of the slab, regardless of the soil type or transmissivity. If the depth to the water table is less than the value from Plot 1, further evaluation is necessary.
3. If the soil type of the aquifer, below the water table, is mostly clay OR if the aquifer is perched (a continuous clay layer is less than 5 feet below the water table), Plot 2 must be used. The appropriate pond level increase (2, 4, or 6 feet) for flood conditions must be used in Plot 2 to find the minimum permissible depth to the water table. If the depth to the water table from Plot 2 is less than the actual depth to the water table, the proposed floor elevation is too low and must be raised to equal the value from Plot 2.
4. If the soil type of the aquifer is mostly silt AND the pond bottom is 3 feet or less above the water table, Plot 3 should be used.
5. If the soil type of the aquifer is mostly sand or gravel AND the pond bottom is 3 feet or less above the water table, Plot 4 should be used.
6. If the soil type of the aquifer is mostly silt AND the pond bottom is 3 feet or more above the water table, Plot 5 should be used.
7. If the soil type of the aquifer is mostly sand or gravel AND the pond bottom is 3 feet or more above the water table, Plot 5 should be used.

The values from the plots are guidelines, based on typical conditions. If the plots indicate the proposed floor elevation is too low, additional analyses and data collection could be pursued by the applicant. These additional analyses could include additional soil borings, long-term monitoring of piezometers, or more sophisticated modeling.

Determining Depth to the Water Table

If a variance to a lowest floor elevation ordinance is to be considered, the depth to the water table at the location in question must be known. Without this knowledge, there cannot be a technical basis for

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approving a variance. Furthermore, the applicant should demonstrate that the measured water-table elevation is both representative of conditions over the entire floor area and is representative of values typical for seasonally high conditions (e.g. spring conditions). A suggested requirement for collecting this information is the following:

- 1) A minimum of two soil borings shall be installed at or near the perimeter of the lowest floor. At least one of these borings shall be where the floor is closest to the nearest pond.
- 2) Soil borings shall extend to a depth of at least 7 feet below the water table. The borings shall be left open for a time sufficient to determine the stabilized water level in the borehole. The water level shall be measured with reference to a known bench mark that can relate the water table elevation to the proposed floor elevation. Soils at or immediately below the water table shall be sampled and texturally classified using an approved classification method.

Water levels measured during dry summer months or during the winter may be lower than water levels during the spring. The applicant should be required to make an effort to determine the likely amount of seasonal fluctuation in the water table in the area. Water level records from wells completed in the area could be used. If information is unavailable, the applicant should be required to add a value to the measured water table elevation. One suggestion would be to assume 25% of the total annual precipitation (29 inches), divided by the average effective porosity for non-cohesive soils (0.3), which is:

$$(29 \text{ inches}/4) \times (1 \text{ foot}/12 \text{ inches})/0.3 = 2 \text{ feet}$$

If the seasonally adjusted maximum water-table elevation is eight (8) feet or below the bottom of the slab of the lowest floor, it is unlikely that temporary flood conditions in the pond will cause the water table to rise to the level of the floor.¹

Determining Soil Type at the Water Table

The textural classification from the soil borings will be necessary for determining the expected rise in the water table caused by an increase in pond elevation. At a minimum, the soil should be classified as one of the following:

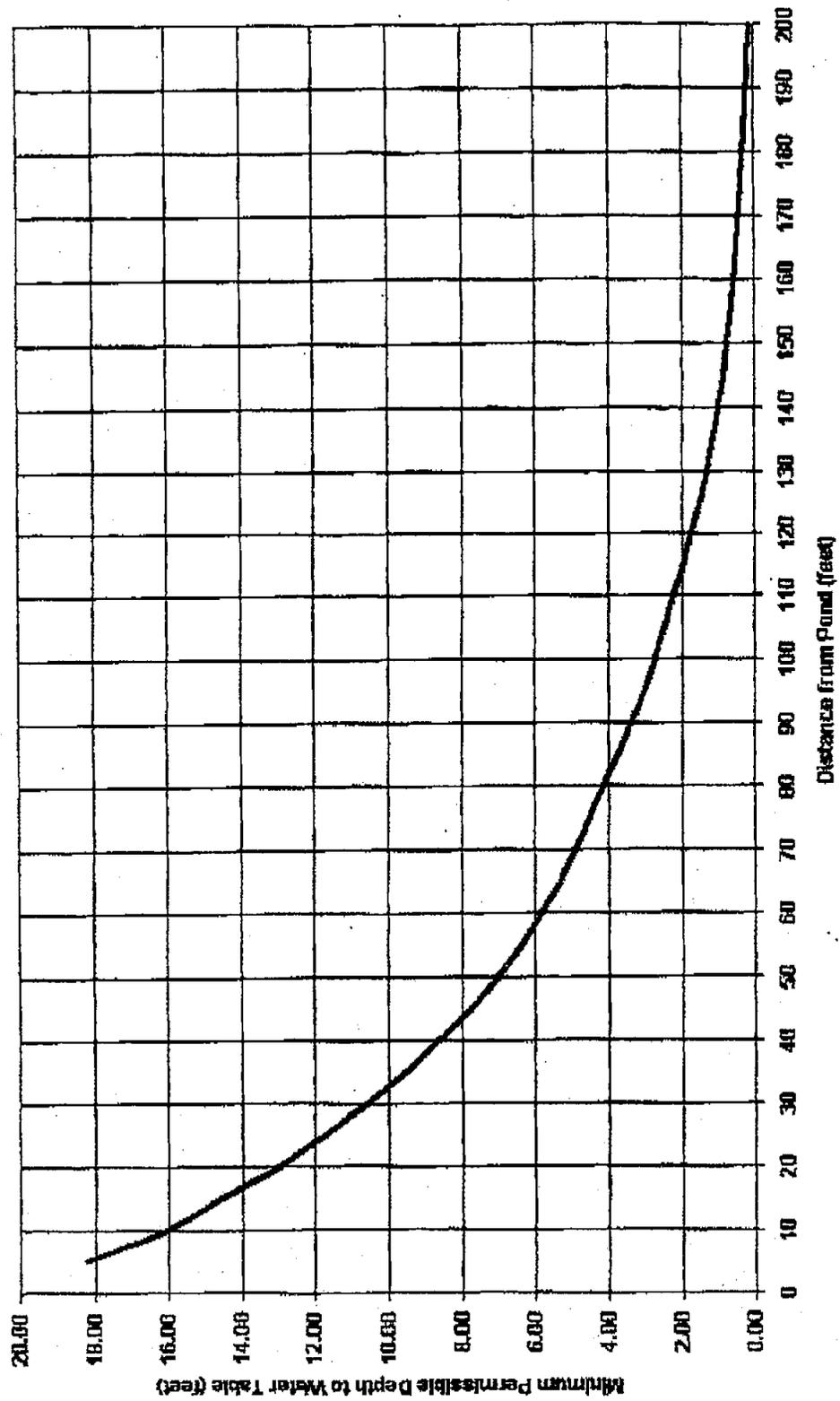
¹ This assumes that the pond level begins to return to normal within about 30 days and the pond level's increase is not greater than 6 feet.

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- 1) Sandy or gravelly soils – consisting of predominantly sand or gravel, with minor amounts of silt and clay
- 2) Silty soils – consisting predominantly of silt
- 3) Clayey soils – consisting predominantly of clay

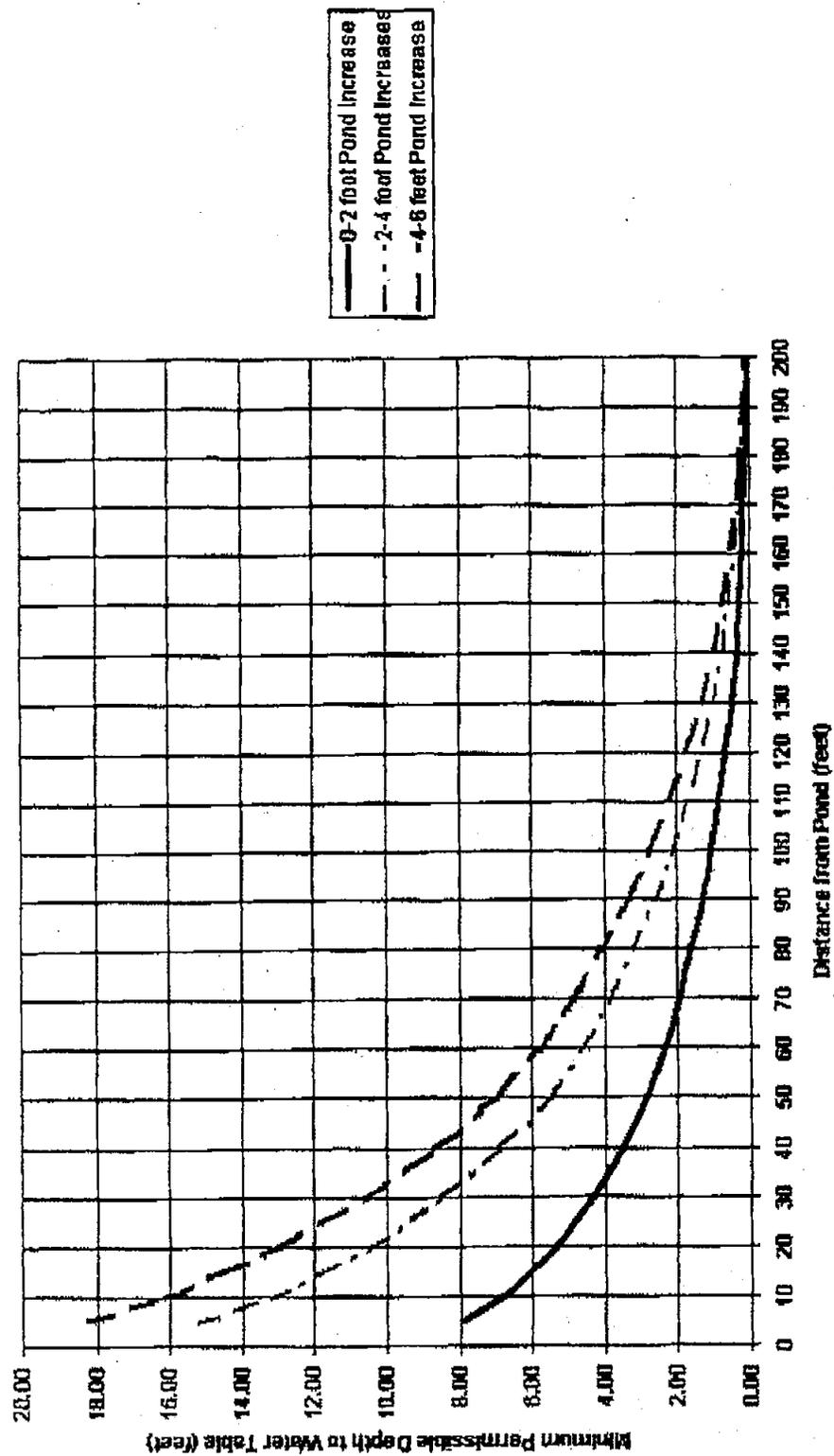
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PLOT 1: Minimum Depth to Water Table for No Further Evaluation



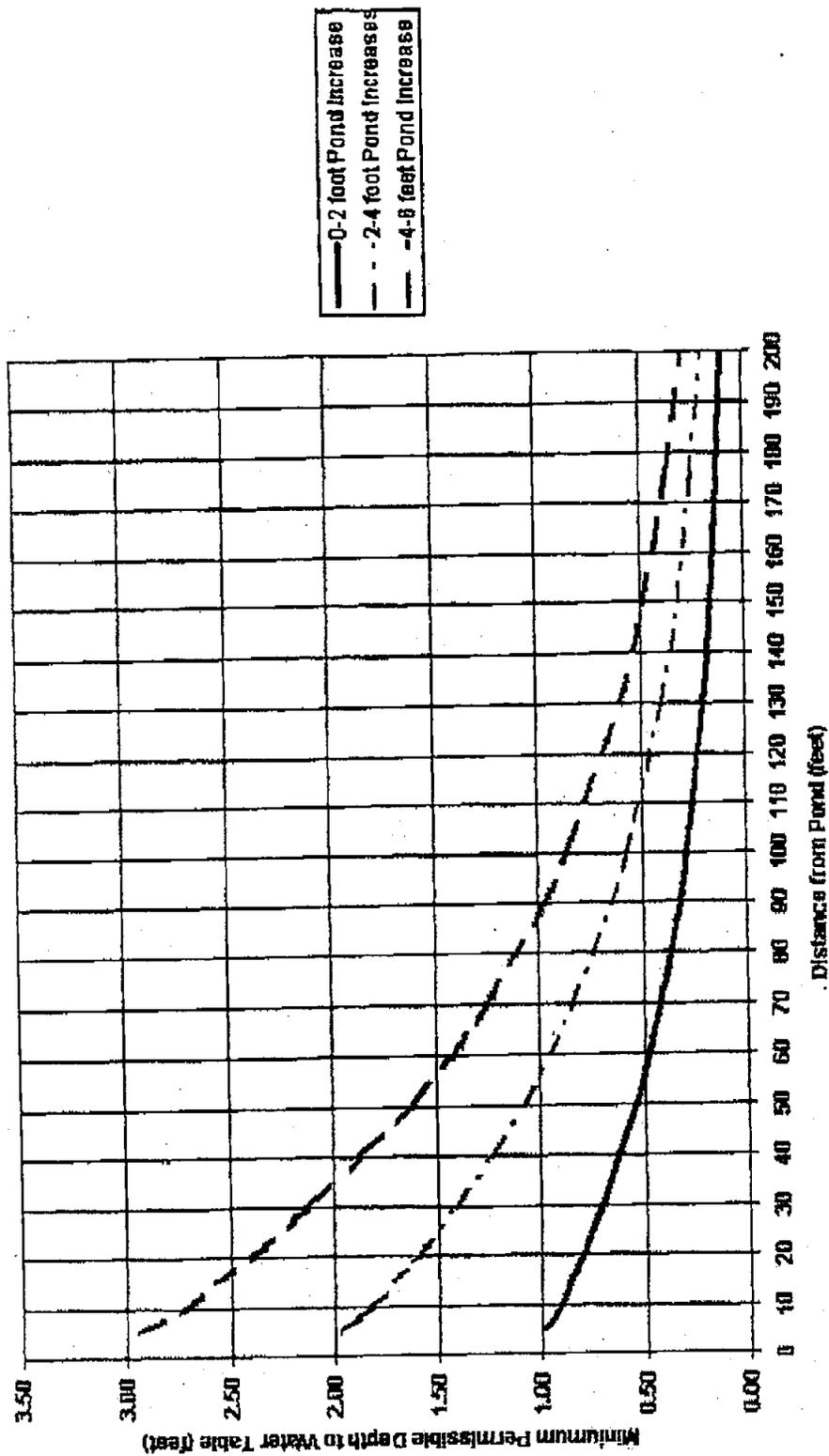
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**PLOT 2: Minimum Permissible Depth to Water Table - Clay or Perched Conditions
 (Perched Conditions = Water Table < 5 feet above a continuous clay layer)**



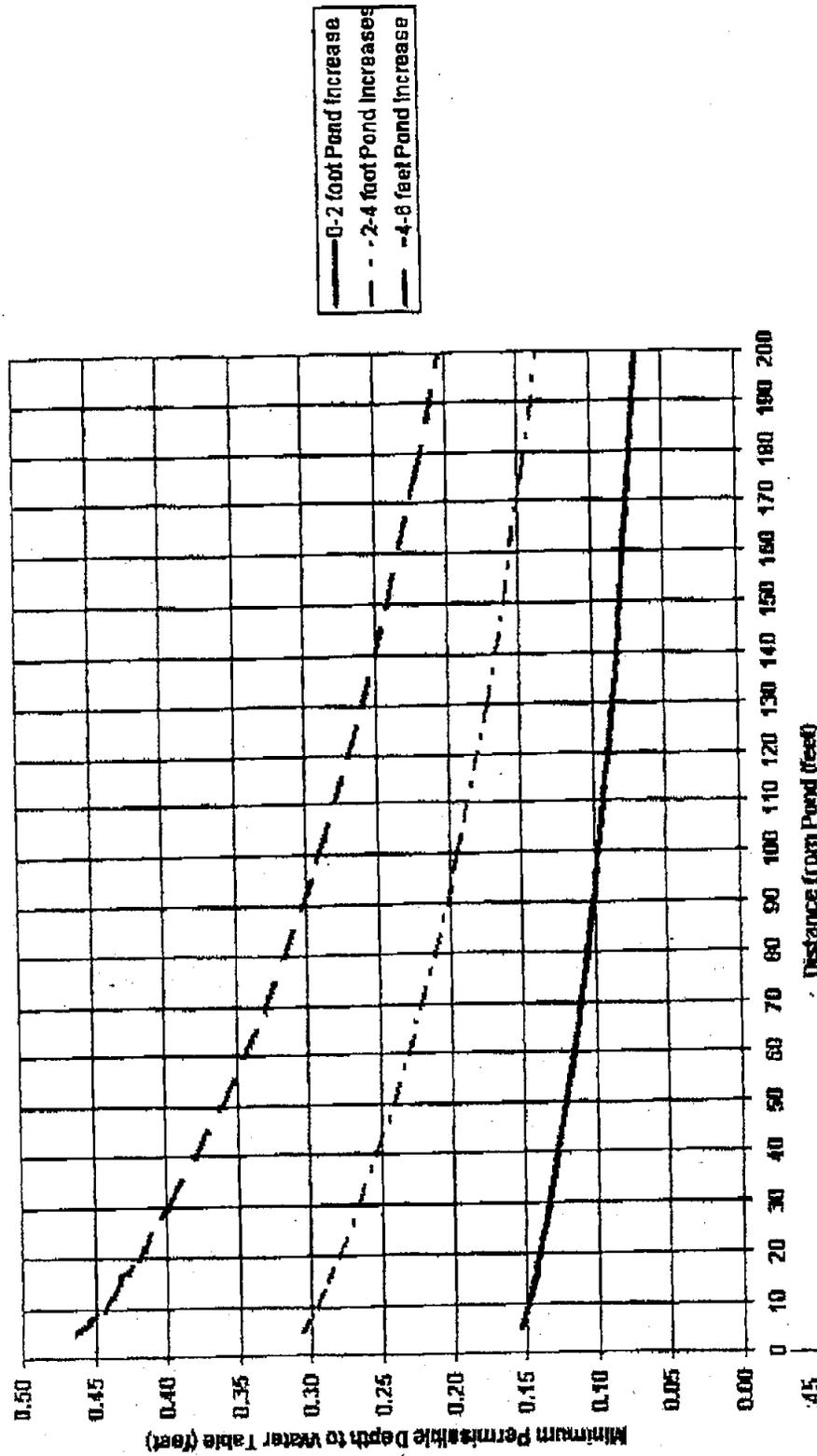
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PLOT 3: Minimum Permissible Depth to Water Table - Silt - Pond Bottom <3 feet above
Ambient Water Table



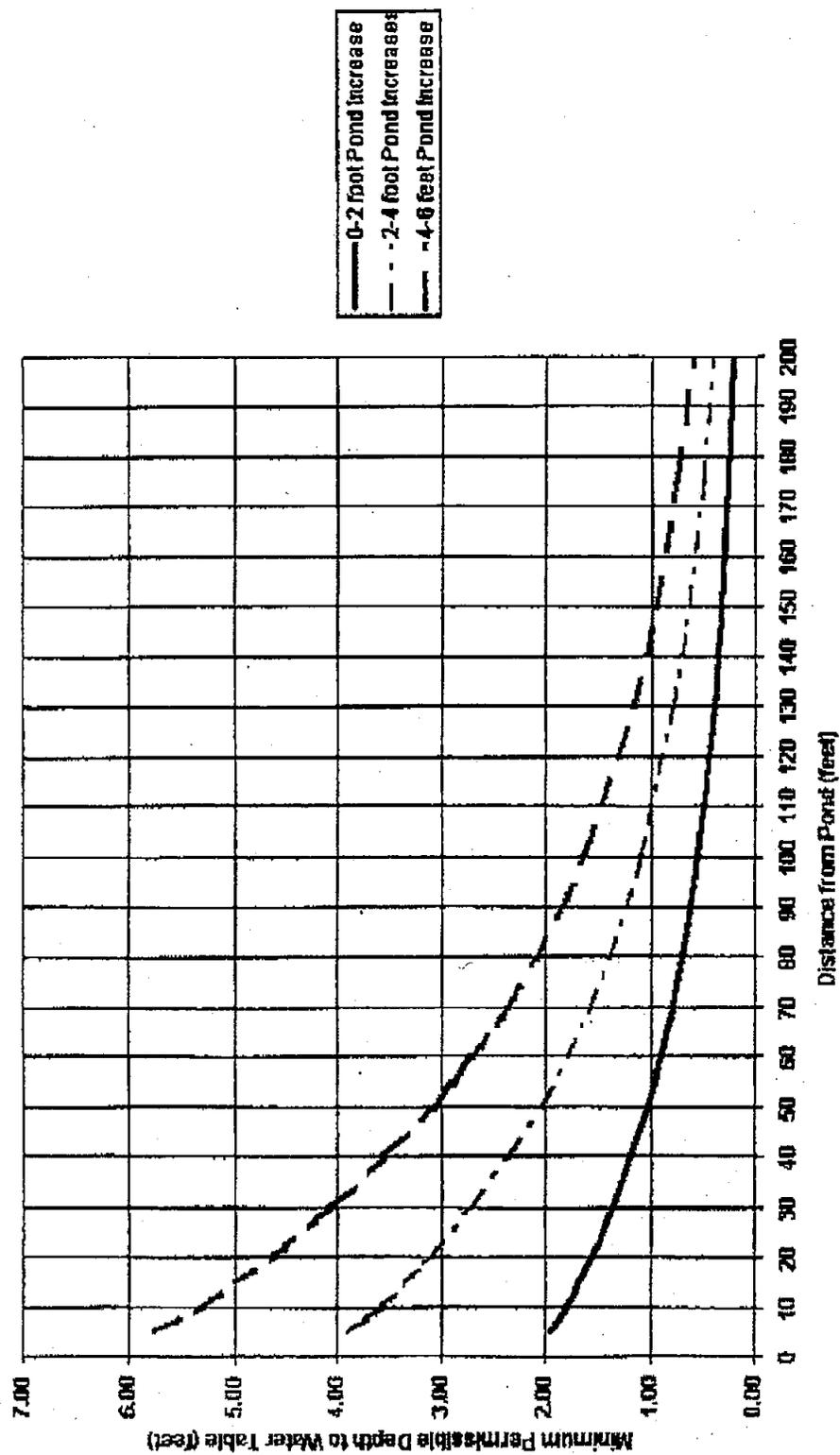
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PLOT 4: Minimum Permissible Depth to Water Table - Sand & Gravel - Pond Bottom < 3 feet
 above Ambient Water Table



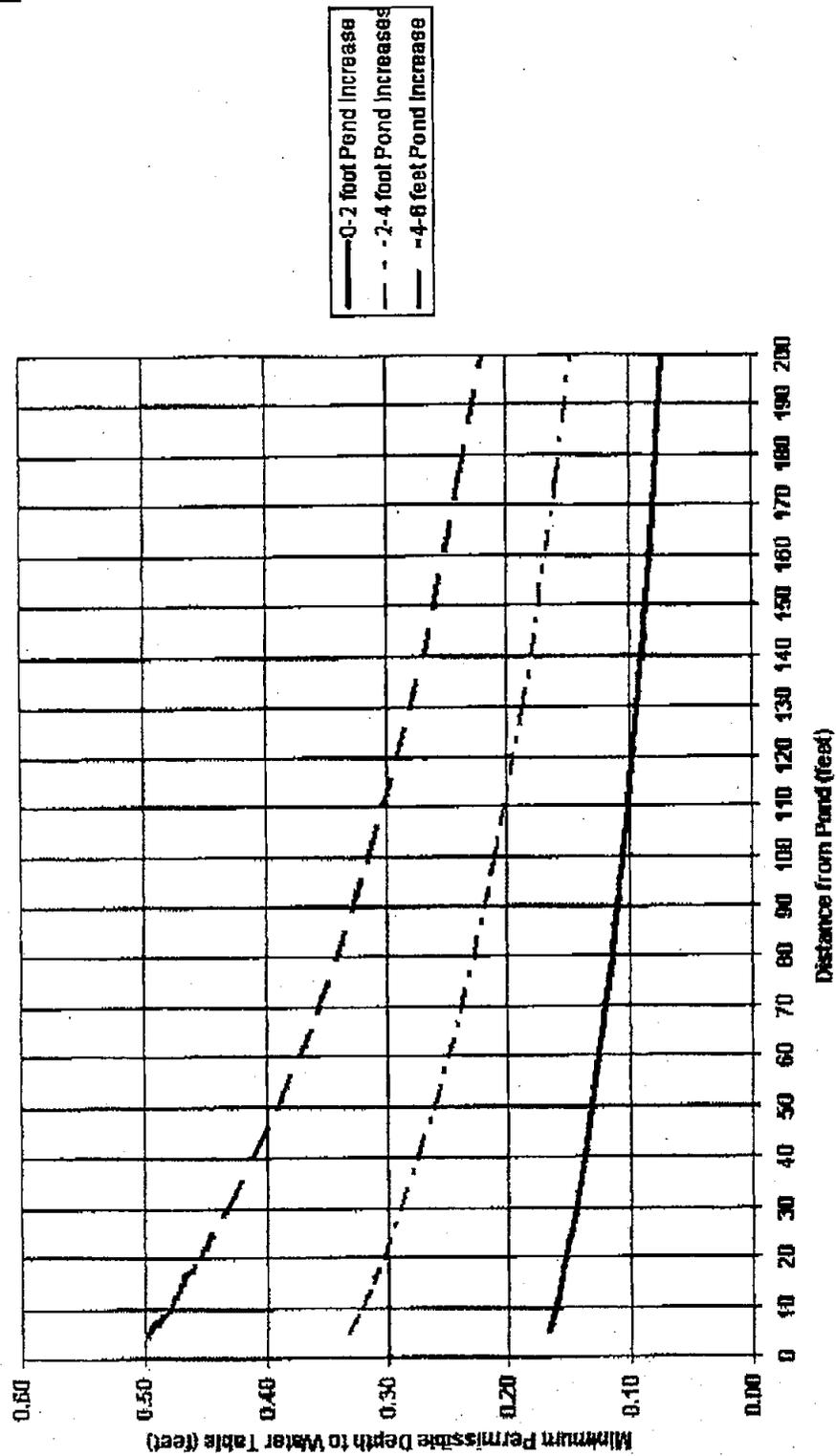
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PLOT 5: Minimum Permissible Depth to Water Table - Silt - Pond Bottom > 3 feet above Ambient Water Table



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PLOT 6: Minimum Permissible Depth to Water Table - Sand & Gravel - Pond Bottom > 3 feet
above Ambient Water Table



Comprehensive Water Plan

City of Andover, Minnesota

SEH No. A-ANDOV0703.00

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