Surface Water Management Plan

City of Carver, MN

December 2018

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Certification

Surface Water Management Plan

for the

City of Carver, MN

C16.115530

December 2018

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

By: _____

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Date: 12-27-2018

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Executive Summary

This Surface Water Management Plan (SWMP) has been developed to serve as a comprehensive planning document to guide the city of Carver in conserving, protecting, and managing its surface water resources and to comply with the Metropolitan Surface Water Management Act, Minnesota Rules 8410, and the requirements of the local Watershed Management Organizations (WMOs) with jurisdiction within Carver. This document provides an inventory of water resource related information including the results of assessments conducted by other governmental units, both local and state. From this inventory and assessment, Carver sets forth its goals and policies and its implementation program.

The plan is organized as follows:

- **Section 1** offers an introduction to and purpose of the Plan, including the plan content requirements of the local WMOs.
- **Section 2** of this Plan provides an inventory of land and water resources within the City, including a description of the physical setting, available and pertinent water resources data, and land use maps.
- **Section 3** includes a comprehensive documentation of the regulatory agencies influencing the management of surface water resources in Carver.
- **Section 4** describes plans, studies, and rules related to surface water management in Carver.
- **Section 5** identifies the stormwater management agreements between Carver and other entities.
- **Section 6** provides a current assessment of surface water management in Carver, including the National Pollution Discharge Elimination System (NPDES) permitting process, Total Maximum Daily Load (TMDL) discussions, comparison of regulatory standards, and identification of issues and corrective actions.
- **Section 7** lists the goals and policies identified to address surface water management needs in the City.
- **Section 8** identifies implementation projects and activities to address assessment items from Section 6 and the goals and policies from Section 7.
- **Section 9** outlines the continued administration of this plan with respect to plan updates and amendments.

Note: all figures referenced throughout the document are included in Appendix A.

I. Purpose and Scope

A. Purpose

This Surface Water Management Plan (SWMP) will serve as a comprehensive planning document to guide the city of Carver (City) in conserving, protecting, and managing its surface water resources. This plan has been created to meet the requirements detailed in Minnesota Statutes 103B and Minnesota Rules 8410, administered by the Minnesota Board of Water and Soil Resources. Minnesota Statute 13B.201 states that the purposes of the water management programs are to:

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

This plan is also consistent with the goals and policies of the Metropolitan Council's Water Resources Management Policy Plan, and the two watershed management organizations having jurisdiction within the City: Carver County Watershed Management Organization (CCWMO) and Lower Minnesota River Watershed District (LMRWD). This plan shall be periodically amended to remain current with local practices and policies.

B. Scope

This SWMP serves multiple purposes including statutory and rule compliance. Minnesota statute 103B.235 defines content for local water management plans.

Minnesota Rules 8410, written for the Board of Water and Soil Resources, provide more detail on local plan content. Though the BWSR guidance applies specifically to watershed management organizations, this guidance has historically been used to frame expectations for municipal plans.

The Carver SWMP is structured to provide the information required by 8410 without holding strictly to the outline contained in the rules. Through this document the City provides signposts identifying where a statutory or rulemaking requirement might be addressed.

The SWMP must also satisfy Metropolitan Council requirements as contained in their 2040 Water Resources Management Policy Plan. These requirements build on those of Rules 8410.

Beyond state level requirements and those of Metropolitan Council, this plan must conform to the underlying Watershed Management Organization (WMO) Watershed Management Plans. WMOs often outline specific content for local plans that go beyond that required by statute and rule. For the WMOs with jurisdiction in Carver, the following local plan requirements pertain:

Carver County Watershed Management Organization (CCWMO)

Requirements of the CCWMO for local surface water management plans are included in Section 5.4.3 of the 2010 Carver County Water Plan are as follows:

The general standards for local water management plan content incorporating the requirements of Minnesota Statutes 103B.235, subdivision 2, and this Plan, are as follows:

1. *Describe the existing and proposed physical environment and land use.*
2. *Define drainage areas and the volumes, rates, and paths of stormwater runoff, including a map of the stormwater system.*
3. *Include a stormwater system map that shows ponds, streams, lakes and wetlands that are part of your system; structural pollution control devices (grit chambers, separators, etc.) that are part of your system; pipes and pipe sizes and other conveyances in your system; and outfalls and all other points of discharge from your system that are outlets.*
4. *Identify areas and elevations for stormwater storage adequate to meet performance standards established in the subwatershed plans.*
5. *Identify areas of known flooding. Local plans must assess whether the risk of occasional flooding is acceptable or should be addressed, and set forth a plan for making improvements as necessary.*
6. *Identify land-locked subwatershed units and basins and strategies to manage water volumes in those land-locked areas to minimize flooding.*
7. *Define water quality and water quality protection methods adequate to meet performance standards established in the WMO plan and ordinances.*
8. *Identify specific steps the LGU will take to achieve the load reductions based on adopted TMDL's and implementation plans*
9. *Assess the consistency of the LGUs wetland regulation, including any wetland classification system and specific wetland classifications, with the management classifications, classification system and proposed regulation set forth in this Plan.*
10. *Set forth an implementation program, including a description of official controls and, as appropriate, a capital improvement program,*
11. *Describe the LGUs permitting process for land and wetland alteration work, including an assessment of the adequacy of current official controls and a plan and schedule for the amendment of those controls as necessary.*
12. *If the LGU is a designated MS4 community, describe the LGUs conformance with NPDES requirements for MS4s including TMDL and Nondegradation requirements. The local plan must include the LGU's Stormwater Pollution Prevent Plan (SWPPP) or a summary of its contents.*

Lower Minnesota River Watershed District (LMRWD)

Requirements of the LMRWD for local surface water management plans included in Section 5.1 of the 2018 - 2027 LMRWD Watershed Management Plan are as follows:

LGUs are required to develop a local water plan (LWP) with a coordinated system of managing the watershed on a regional or subwatershed basis consistent with this Plan. In accordance with MN Rules 8410.0160, each LWP must, at a minimum, meet the requirements fro LWPs in Minnesota Statues, section 103B.235, except as provided by the watershed management organization plan under part 8410.0110, subpart 3. This requirement allows for all or part of the Plan to be adopted by an LGU for all or part of its LWP within 18 months following approval of the District's amended Plan.

II. Land and Water Resources Inventory

A. Location

The City of Carver is located in the east-central part of Carver County on the banks of the Minnesota River, as shown in Figure 1. The City is approximately 4.2 square miles in size and is bounded on the north by Chaska and Chaska Township, on the east by the Minnesota River, on the south by San Francisco Township, and on the west by Dahlgren Township.

The City of Carver has been a long-standing rural community. As development has occurred in the metro area including the expansion of Highway 212, Carver has experienced an influx of new development, drawing suburban commuters to the area. Recent development has been occurring to the west of the downtown area toward County State Aid Highway 11 (CSAH 11) and north of Trunk Highway 212. Future development will continue in this direction as infrastructure is continually added to serve the undeveloped areas.

The total study area for this SWMP includes the City of Carver city limits plus additional areas west of city limits, for a total study area of approximately 14.3 square miles (see Figure 2). The study area was expanded to incorporate the entire 2040 Comprehensive Plan area.

B. Topography and Watersheds

The City of Carver is located within the bluffs of the Minnesota River Valley, creating a considerable amount of relief within the City. Land surface elevations range from roughly 1000 ft. in the west to 700 ft. at the Minnesota River, forming the eastern border of the City. The SWMP study area includes the City of Carver and parts of adjacent townships, and is located entirely within the Minnesota River Watershed. Drainage is generally from west to east.

A significant portion of the drainage within the study area is directed into either Carver Creek or Spring Creek which drain into the Minnesota River. The Carver Creek watershed incorporates the southern and western portions of the study area. The Spring Creek watershed incorporates the northeastern portion of the study area. The very northeast corner of Carver drains overland directly to the Minnesota River and the northwest portion of the study areas drains to West Chaska Creek.

The study area is jurisdictionally divided between two watershed entities, Carver County Water Management Organization (regulated by Carver County) and the Lower Minnesota River Watershed District. The boundary between these two watersheds divides the City of Carver in two. The jurisdictional boundary between these two watershed entities is shown on Figure 3.

Figure 4 presents the development constraints within the study area highlighting the natural barriers to development such as public waters (PWI), wetlands (NWI), steep slopes and the Minnesota River's floodplain.

C. Soils

A significant portion of the study area consists of loam type soils as identified in the Carver County Soil Survey. These soils are generally classified as Natural Resources Conservation Service (NRCS) Hydrologic Soil Group (HSG) B soils. HSG B soils typically yield a moderate runoff potential. Figure 5 presents the soils within the study area classified by their hydrologic soil group.

The HSG B soil is represented by three main soil series within the study area: the Lester loam, Hayden loam, and Kasota loam soil series. The Hayden and Lester loam soil series are generally found in the undulating to steep regions, while the Kasota loam is typically found in

the nearly level to gently sloping areas. All three of these soil series can be classified as well-drained and are identified extensively throughout the county.

Pockets of poorly drained soils appear primarily within existing depressions and upland drainageways. This type of silty clay loam soil typically yields low infiltration rates. Unless these areas are drained, periodic ponding of water following storm events will occur. Because this soil type is generally found in existing depression areas, many of the proposed stormwater detention areas utilizing these depressions will likely have low rates of infiltration.

D. Climate

Table 2.1 presents average precipitation data over a 30-year period from a rain gauge station in Chaska, Minnesota, which is in the vicinity of Carver.

Table 2.1: Average Monthly Precipitation: 1981-2010

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Inches	0.93	0.73	1.83	3.10	3.70	4.29	3.95	5.16	3.53	2.59	1.74	1.18	32.73

Source: U.S. Climate Normals 1981-2010. National Climatic Data Center

Rainfall frequency and depth estimates are used as design tools in water resource projects. The National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 8 publication contains precipitation frequency estimates for the Midwest region, including Minnesota. Table 2.2 lists NOAA Atlas 14 rainfall depths from the station nearest Carver.

Table 2.2: 24-Hour Rainfall Depth and Frequency

Recurrence Interval (years)	NOAA Atlas 14 24-hr Rainfall Depth (inches)*
2	2.85
5	3.55
10	4.23
25	5.31
50	6.25
100	7.29

*NOAA Atlas 14 Volume 8 rainfall depths from Station Name: CHASKA 2NW (Site ID: 21-1468) in Chaska, MN

For purposes of this SWMP, any reference to a “2-year storm”, “5-year storm”, “10-year storm”, “25-year storm”, “50-year storm” or “100-year storm” describes the rainfall depths included in Table 2.2, unless otherwise noted.

E. Land Use

The City’s existing Land Use Map is presented in Figure 6. The City’s 2040 Land Use Map, consistent with the 2040 Comprehensive Plan, is presented in Figure 7 – Future Land Use. The downtown area of Carver is located adjacent to the Minnesota River establishing the eastern border of the City. This downtown area is a mixture of light commercial and residential properties and has been established for some time. The remaining portions of the City have been developed within the last 15-years progressing from the downtown area, northeast and southwest along CSAH 40 and west along 6th Street. The most recent developments have been primarily located above the bluffs surrounding downtown Carver along CSAH 11 and TH 212.

According to the 2040 Land Use Map (Figure 7), future development will be primarily commercial and industrial along TH 212 and along CSAH 11, north of the TH 212 intersection. The remaining portions of the study area will consist mainly of low and medium

density residential development. Figure 8 presents the Minnesota Land Cover Classification Map for the City of Carver.

F. Key Water Resources

1. Wetlands

The study area contains a diverse mix of wetlands, and many of these remain in moderate to good condition (see Figure 9). Most of the wetlands identified within the study area show some alterations due to the agricultural practices. However, a number of sites have retained a diversity of native plant species and high-quality habitat. The wetlands that have been more heavily altered tend to be much less diverse. These impacted wetland sites are less susceptible to further degradation and can provide mitigation and banking opportunities.

A complete inventory and assessment of the wetlands within a large portion of the study area was completed in 2002. For detailed information regarding the location and quality of wetlands within the study area, refer to Appendix F where the Wetland Inventory and Assessment completed in March 2002, by Bonestroo, Rosene, Anderlik and Associates can be found.

2. Minnesota River

The City of Carver was built on the banks of the Minnesota River in the 1850's in an ideal location as a steamboat and barge terminal. During low river levels steamboats could travel upstream only a short distance beyond Carver, thus steamboat cargo would have to be offloaded in Carver and reloaded for continuing trips in either direction.

As the City of Carver is located on the banks of the river where river flooding occurs frequently, certain measures have been taken to protect the City from the seasonal flooding. The City has constructed a levee to protect the City during times of high floodwaters. Behind the levee, stormwater runoff from downtown Carver is discharged to the river during low river levels via numerous storm sewer pipes through the levee. When the Minnesota River level is high, the gate well structures on these pipes are closed and stormwater is pumped over the levee via lift stations. A project, slated to be completed in 2019, has begun to replace the existing Main Street storm sewer lift station. Figure 10 presents the FEMA 100 Year and 500 Year Floodplains.

The Minnesota River has been vital to the development of this region of the state. As the development of this area has proceeded over the last century, water quality degradation in the Minnesota River has occurred due to significant changes in land use. Historically, these land use changes have included primarily the tilling of native prairie and hardwood forested areas for purposes of establishing agricultural practices. The City of Carver recognizes the regional value of the Minnesota River and seeks to protect, restore, and improve the water quality within the river as development proceeds within the City.

As it relates to the water quality within the Minnesota River, it should be noted that the stretch of the Minnesota River receiving discharge from the City of Carver is on the MPCA Impaired Waters 303(d) list. See Figure 11, Figure 12 and Table 6.2 for specific impairments. TMDLs for the other impairments are in various stages of completion. Section 8.E includes further discussions regarding how TMDL Implementation Plans impact stormwater management within Carver.

3. Creeks

Spring Creek, Carver Creek and their tributaries provide an efficient means to drain a large portion of the study area. Figure 9 identifies the location of these creeks within the SWMP study area. Because such a large portion of the study area drains to these creeks,

it is critical that the creeks be protected from the increase in runoff rates and volumes resulting from development.

Spring Creek drains through the study area from the northwest to the southeast, traveling through the center of the downtown area before discharging into the Minnesota River. This creek is very vulnerable to channel erosion. The City has taken measures to help protect Spring Creek in the fully developed downtown area and desires to do additional stream restoration work within the creek. To help maintain the integrity of Spring Creek, it is critical to provide both rate and volume control within new developments within the Spring Creek watershed.

Carver Creek drains through the western and southern portion of the study area prior to discharge into the Minnesota River. Carver Creek is a main means of conveyance for a large portion of the City's trunk stormwater service area and the SWMP includes funds to restore and protect sections of Carver Creek as necessary.

Timber Creek is a tributary of Carver Creek. The Timber Creek watershed includes primarily agricultural land uses atop the rolling hills and forested land uses within the steeper sloped ravine down to Timber Creek. Timber Creek is highly susceptible to erosion due to its relatively steep grade, well established tree canopy, and sparsely vegetated banks. City rate and volume control measures will help stabilize Timber Creek as development within the watershed proceeds. This SWMP also includes funds to restore portions of Timber Creek as necessary.

It should also be noted that Carver Creek and its tributary and Spring Creek are on the Minnesota Pollution Control Agency Impaired Waters 303(d) list (see Figure 12 and Table 6.2) for specific impairments. Of these impairments, a TMDL Study and Implementation Plan for the fecal coliform impairment of Carver Creek has been fully approved and adopted. TMDLs for the other impairments are in various stages of completion. Section 8.E includes further discussions regarding how TMDL Implementation Plans impact stormwater management within Carver.

III. Regulatory Setting

A. Overview

This section describes the City's current surface water resources management programs and practices and the agencies and organizations having roles in the City's management of these resources. Table 3.1 summarizes the City's and other agencies' respective regulatory controls related to water resources management and protection.

Table 3.1: Regulatory Control[1]

Official Control	Regulatory Responsibility	Mechanism
Erosion and Sediment Control	City, Carver County	• City code Chapter 50 - Article VII • MS4 SWPPP • Carver County Ordinance Chapter 153.55
Floodplain	City, Carver County	• City code Chapter 21 - Article II • Carver County Ordinance Chapter 153.59
Groundwater	City, MDH, Carver County	• MS4 SWPPP • Carver County Wellhead Protection Plan
Illicit Discharge and Illicit Connection	City	• City code Chapter 50 - Article VIII • MS4 SWPPP
Plan Review and Approval	City, Carver County	• City code Chapter 42 - Article II and Section 50-137 • MS4 SWPPP • Carver County Ordinance Chapter 153.11
Post Construction Runoff Control	City, Carver County	• City code Chapter 50 – Article VII • MS4 SWPPP • Carver County Ordinance Chapter 153.56
Wetlands and Public Waters	City, DNR, USACE, Carver County	• City code Chapter 50 – Article VII • MS4 SWPPP • DNR – Public Waters Work Permit • USACE – Section 404 of the Clean Water Act • Carver County Ordinance Chapter 153.57
Shoreland	City, DNR, Carver County	• No City official control • DNR shoreland regulations apply • Carver County Ordinance Chapter 153.58
Topsoil Management	Carver County	• Carver County Ordinance Chapter 153.60
*Acronyms are defined in Sections 3.B – 3.O of this Plan		

[1] The City has an existing agreement with the Lower Minnesota River Watershed District (LMRWD) to implement the water management policies, standards, and criteria of the LMRWD. Therefore, the City holds the regulatory responsibility on behalf of the LMRWD for areas within the jurisdiction of the LMRWD.

B. City Services

Residential streets, sewers, waterlines, stormwater management facilities, and park lands within Carver are maintained by the City. Municipal drinking water within Carver is supplied by a number of municipal wells within the City. Wastewater is collected in the City sewer system and is ultimately treated at the Metropolitan Council's Blue Lake Wastewater Treatment Facility.

The City will continue to act as the Local Government Unit (LGU) for the administration of Wetland Conservation Act (WCA) activities, coordinating this effort with Carver County and BWSR as necessary.

Carver will continue to coordinate water resource management issues and project reviews with Carver County and will continue to implement the water management policies, standards, and criteria of the LMRWD.

C. Watershed Management Organizations

Carver is located within the jurisdictional boundaries of two watershed districts: The Carver County Watershed Management Organization and the Lower Minnesota River Watershed District. See Figure 3 for the jurisdiction boundary of these WMOs in Carver.

1. Carver County Watershed Management Organization (CCWMO)

   The CCWMO's tasks include planning, funding regulating, monitoring, and implementation the Water Management Plan, in the following watersheds: Bevens Creek, Carver Creek, East and West Chaska Creek, Pioneer Sarah and the Crow River[2]. The Carver SWMP study area is split between the Carver Creek, Chaska Creek and Bevens Creek watersheds. They accomplish this through their Comprehensive Water Resources Management Plan and their Chapter 153 Water Management Rules. A copy of CCWMO's Chapter 153 Rules can be found in Appendix D.

2. Lower Minnesota River Watershed District (LMRWD)

   The Lower Minnesota River Watershed District is located in the southwest part of the Twin Cities area of Minneapolis-St. Paul, Minnesota. The LMRWD 64 mi^2 boundary includes the Minnesota River Valley from Carver, Minnesota, at the west, to the confluence with the Mississippi River at historic Fort Snelling, near the airport, at the east. The District boundaries adjoin five other watershed districts, four water management organizations, and portions of fifteen communities in four metropolitan counties.

   The LMRWD is charged with the following:

   1. Protecting groundwater and surface water systems
   2. Improving water quality
   3. Establishing governmental policies to manage water resources
   4. Preventing erosion into surface waters
   5. Working with the Army Corps of Engineers to maintain the river for commercial barge navigation
   6. Protecting fish and wildlife habitat, and
   7. Affording recreational opportunities[3]

[2] From Carver County Water Management website: https://www.co.carver.mn.us/departments/public-services/planning-water-management/water-management
[3] Excerpts from the LMRWD website: http://lowermnriverwd.org/

The current LMRWD Watershed Management Plan was approved by the watershed board on October 24, 2018.

D. Metropolitan Council

Established by the Minnesota Legislature in 1967, the Metropolitan Council is the regional planning organization for the Twin Cities, seven-county area. The Council manages public transit, housing programs, wastewater collection and treatment, regional parks and regional water resources[4]. Council members are appointed by the Minnesota Governor.

The Metropolitan Council reviews municipal comprehensive plans, including this local surface water management plan. The Council adopted the 2040 Water Resources Policy Plan May 20, 2015 and amended the plan on May 9, 2018, establishing the expectations to be met in local plans. The Council's goals focus on sustaining the Region by sustaining the Region's Waters through "integrating planning for wastewater, water supply, and surface water management."[5]

E. State Board of Water and Soil Resources (BWSR)

The Minnesota Board of Water and Soil Resources (BWSR) works through local government agencies to implement Minnesota's water and soil conservation policies. The BWSR is the administrative agency for soil and water conservation districts, watershed districts, watershed management organizations and county water managers. The BWSR is responsible for implementation of the Metropolitan Surface Water Management Act and the Wetland Conservation Act. Staff members are located in nine field offices throughout the state.[6]

First established in 1937 as the State Soil Conservation Committee, the agency became part of the University of Minnesota in the 1950's, transferred to the Department of Natural Resources in 1971, then transferred to the Department of Agriculture in 1982. In 1987 the State Legislature established the current Board of Water and Soil Resources. The Board consists of 17 members, appointed by the governor to four-year terms. Multiple state and local agencies are represented on the Board. In 1992, the BWSR adopted rules (Chapter 8410), establishing the required content for local surface water management plans[7]. On July 13, 2015 an amendment to the Chapter 8410 Rules became effective, the first time the original rules had been amended.[8]

F. Minnesota Pollution Control Agency (MPCA)

The MPCA is the state's lead environmental protection agency. Created by the State Legislature in 1967, the MPCA is responsible for monitoring environmental quality and enforcing environmental regulations to protect the land, air and water. The MPCA regulates the City's management of wastewater, stormwater and solid waste.

The MPCA is the permitting authority in Minnesota for the National Pollutant Discharge Elimination System (NPDES), the federal program administered by the Environmental Protection Agency to address polluted stormwater runoff. Carver was included on the list of cities required to obtain NPDES permit coverage in 2003 to discharge stormwater from the City's Municipal Separate Storm Sewer System (MS4). The MPCA regulates MS4 systems as mandated by the federal Clean Water Act with goal of improving water quality by

[4] Metropolitan Council website: https://metrocouncil.org/About-Us/What-We-Do/Departments.aspx
[5] Metropolitan Council, 2040 Water Resources Policy Plan
[6] Minnesota Board of Water & Soil Resources website: http://www.bwsr.state.mn.us/aboutbwsr/index.html
[7] Minnesota Board of Water & Soil Resources: https://www.bwsr.state.mn.us/planning/metro/MR_8410_July_13_2015.pdf
[8] Minnesota Board of Water & Soil Resources: https://www.bwsr.state.mn.us/planning/metro/Highlights_of_Changes_to_Minnesota_Rules.pdf

reducing pollutants in stormwater discharges[9]. The NPDES MS4 program requires the City to develop a Stormwater Pollution Prevention Program (SWPPP) to address six minimum control measures:

1) Public Education
2) Public Involvement
3) Illicit Discharge Detection and Elimination Operations
4) Construction Site Runoff Control
5) Post-Construction Runoff Control
6) Pollution Prevention in Municipal

In addition to the NPDES program, the MPCA is required to publish a list of all impaired waters (lakes and streams) in the state that are not meeting federal water quality standards. For each water body on the list, the MPCA is required to conduct a study to determine the allowable Total Maximum Daily Load (TMDL) for each pollutant that exceeds the standards. Local governments will be required to reference completed TMDL studies into their surface water management plans. Further discussion regarding the impaired waters receiving discharge from the City is included in Section 6.C.

In response to these multiple regulatory activities, the MPCA published the Minnesota Stormwater Manual[10], providing stormwater management tools and guidance. The Manual presents a unified statewide approach to stormwater practices.

G. Minnesota Department of Natural Resources (DNR)

Originally created in 1931 as the Department of Conservation, the DNR has regulatory authority over the natural resources of the state. DNR divisions specialize in waters, forestry, fish and wildlife, parks and recreation, land and minerals, and related services. The Division of Waters administers programs in lake management, shoreland management, dam safety, floodplain management, wild and scenic rivers, the Public Waters Inventory (PWI), and permitting of development activity within public waters.

H. Minnesota Department of Health (MDH)

The MDH manages programs to protect the public health, including implementation of the Safe Drinking Water Act. The MDH has regulatory authority for monitoring water supply facilities such as water wells, surface water intakes, water treatment, and water distribution systems. The MDH also is responsible for the development and implementation of the wellhead protection program.

I. Minnesota Environmental Quality Board (EQB)

The EQB is comprised of eight citizen members and the heads of nine state agencies that play an important role in Minnesota's environment and development. The EQB develops policy, creates long-range plans and reviews proposed projects that may significantly influence Minnesota's environment.

J. Minnesota Department of Transportation (MNDOT)

Within the City, MnDOT administers several state highway systems. MnDOT approval is required for any construction activity within state right-of-ways. MnDOT also administers a substantial amount of funding for transportation projects completed in the City. Anticipated activities of MnDOT are periodically published in their State Transportation Improvement Plan.

[9] Minnesota Pollution Control Agency website: https://www.pca.state.mn.us/water/citizens-guide-stormwater
[10] The current Minnesota Stormwater Manual can be found here: https://stormwater.pca.state.mn.us/index.php?title=Main_Page

K. U.S. Environmental Protection Agency (EPA)

The EPA develops and enforces the regulations that implement environmental laws enacted by Congress; however the MPCA bears responsibility for implementing many of the resulting programs within Minnesota. The NPDES program and the List of Impaired Waters are both the result of the Clean Water Act, administered by the EPA.

L. U.S. Army Corp Of Engineers (USACE)

Under Section 404 of the Clean Water Act, including subsequent modifications, the EPA and the USACE regulate the placement of fill into all wetlands of the U.S. In 1993, there was a modification of the definition of "discharge of dredged material" to include incidental discharges associated with excavation. This modification meant that any excavation done within a wetland required the applicant to go through Section 404 permitting procedures. In 1998, however, this decision was modified so that excavation in wetlands is now regulated by the USACE only when it is associated with a fill action.

M. Federal Emergency Management Agency (FEMA)

FEMA manages federal disaster mitigation and relief programs, including the National Flood Insurance Program (NFIP). The NFIP includes floodplain management requirements, and incorporates flood hazard mapping information.

N. Natural Resources Conservation Service (NRCS)

The Natural Resources Conservation Service (NRCS) is a division of the U.S. Department of Agriculture. Formerly named the Soil Conservation Service (SCS), the NRCS provides technical advice and engineering design services to local conservation districts across the nation. The official soil survey for Carver County was published by the Soil Conservation Service. The SCS also developed hydrologic calculation methods that are widely used in water resources design.

O. U.S. Geological Survey (USGS)

The USGS provides mapping and scientific study of the nation's landscape and natural resources. USGS maps provide the basis for many local resource management efforts.

IV. Related Plans and Studies

A. Carver 2002 Wetland Inventory and Assessment

The City's 2002 Wetland Inventory and Assessment Report provides the City with a framework for wetland management within the majority of the SWMP study area. A copy of this report is included in Appendix F for reference. The purpose of this report is to provide the City with a functions and values assessment for the wetlands within the study area, to help guide future growth within the study area. In addition to the functions and values assessment, the report includes stormwater pretreatment standards, water quality and quantity protections requirements, and buffer standards for all wetlands based on wetland classification.

B. LMRWD 2006 Gully Inventory

The LMRWD 2006 Gully Inventory provides the District with a guide document for prioritizing gully erosion throughout the watershed. For areas identified in the District's gully inventory as having severe erosion, the District has set aside a contingency fund to construct bluff stabilization projects with cooperating partners in those areas identified. A number of gully areas are identified in the study areas, and some of these areas are identified as having severe erosion.

C. City of Carver 2008 Surface Water Management Plan

The City of Carver adopted their current SWMP in August 2008 and adopted an update to the plan on January 2014. This current plan outlines how the City will manage surface waters in Carver. Per MN statute 103B.231, and due to updates to the CCWMO Comprehensive Watershed Management Plan (2016), LMRWD Watershed Management Plan (2018), and the Metropolitan Council's 2040 Water Resources Policy Plan (2018), Carver's 2008 SWMP must be updated. With the adoption of this 2018 Carver SWMP, the 2008 SWMP will be superseded.

D. CCWMO 2010 WMP

The CCWMO Comprehensive Water Resources Management Plan (WRMP) is required under MN statute 103B.231 for Watershed Management Organizations (WMOs) within the metropolitan area. Carver County assumed control as the WMO authority in 1996 and subsequently adopted the first water management plan in 2001. The 2010 WMP was adopted by the County Board on Oct. 26th, 2010 and updated January 2016. The CCWMO 2010 WMP is intended to be a ten-year planning document to guide WMO activities. The Plan is divided into the chapters listed below[11].

- Land and Water Resources Inventory
- Major Issues
- Implementation Program
- Administration
- Appendices

Requirements for Local Water Plans are identified in Section 5.4.3 of the CCWMO WRMP. These requirements have been incorporated into this SWMP.

E. CCWMO 2012 Rules

The CCWMO Water Management Rules (Carver County Ordinance Chapter 153) were adopted by the board June 26, 2012 with an effective date of August 1, 2012 and updated October 15, 2016. The overall purpose of the Rules is to protect, preserve and manage natural surface and groundwater systems within the Carver County WMO in the face of urban growth and intensive agricultural activity. The 2010 CCWMO Water Resources Management Plan cites the Rules as one of the tools to effectively:

- Meet the requirements outlined in adopted TMDLs within the WMO
- Provide uniform requirements across the WMO and in different jurisdictions
- Meet the MS4 permit requirements
- Implement the goals adopted as part of the CCWMO Water Resources Management Plan
- Prevent existing water management issues from becoming more problematic

A copy of the current CCWMO Rules is included in Appendix D for reference.

F. LMRWD 2012 WMP

The Lower Minnesota River Watershed District Watershed Management Plan (WMP) describes how the District will address water resources management over the next 10 years as required by M.S. 103B and 103D and Minnesota Rules (MN Rules) 8410. The purpose of this Plan is to protect, preserve, and manage the surface water resources (Minnesota River, lakes, streams, and wetlands) and groundwater within the District.

[11] CCWMO Comprehensive Water Resources Management Plan

The LMRWD WMP was approved by the watershed board on October 24, 2018. Requirements for Local Water Plans are identified in Section 5 of the LMRWD WMP. These requirements have been incorporated into this SWMP and can be found in Appendix E.

G. Carver County Planning Study of Ravine and Bluff Areas

This study identifies ravine and bluff areas within Carver County based on the physical and biological features of the landscape. By applying aggressive stormwater management standards for development discharging to the ravine and bluff areas, this SWMP seeks to work with Carver County to preserve and protect these areas within the City of Carver. A detailed assessment of the ravine and bluff areas, along with key management issues and stewardship strategies associated with these areas are included in the 2000 Carver County Planning Study of Ravine and Bluff Areas Along the Minnesota River.

V. Water Resource Related Agreements

A. Lower Minnesota River Watershed District

Carver has an existing agreement with the Lower Minnesota River Watershed District to implement the water management policies, standards, and criteria of the LMRWD. A copy of this agreement is included in Appendix C.

VI. System Assessment

The following section will summarize the assessment of the City's current surface water management system. The assessment includes surface water management issues identified by the City or the jurisdictional WMO.

Based on the assessment presented in this section, the City will develop effective surface water management goals and policies (Section 7) and with the coordination of the CCWMO and LMRWD, establish the implementation measures (Section 8) necessary to address surface water management issues and enact the goals and policies.

A. Surface Water System

The City of Carver was divided into 9 Drainage Districts, as shown in Figure 13. The Drainage District names and the abbreviation for each district are presented in Table 6.1.

Table 6.1: Drainage Districts

Major Drainage District	Abbreviation
Chaska Creek	CC
Lower Carver Creek	LCC
Minnesota River	MR
South Carver	SC
Southwest Carver	SwC
Spring Creek	SCr
Upper Carver Creek	UCC
Upper Spring Creek	USC
West Carver	WC

To analyze the existing drainage conditions, as well as develop guidance for future development, a hydrologic and hydraulic model of the study area was developed using Innovyze's XPSWMM 2018. For this study the 2-, 10- and 100-Year, 24-hour rainfall events were modeled using the NRCS MSE 3 rainfall distribution. Publicly available Light Detection and Ranging (LiDAR) digital terrain models were used to delineate watersheds.

The model was used to identify needs and to generate potential projects to address them. Figure 14, graphically presents the model. It includes labels for existing and proposed basins that will be referred to in later sections of the SWMP. Due to the considerable amount of elevation change across the city, Carver is fortunate to not have many issues with surcharged pipes. More of the challenges Carver faces are erosion issues in creeks and ditches due to those same steep grades that allow them to have a modestly sized storm sewer system.

B. Future Planning

The following section includes system design recommendations for future developments in Carver listed by Drainage District. Refer to Figure 14, for basin locations.

South Carver

- A proposed regional pond Pond SC-P6 (Refer to Figure 14) shall be sized to accommodate potential flows from landlocked depressions to the south. For it the areas south of SC-P6 were to develop, the contours indicate that those landlocked depressions would most likely be routed to SC-P6. To not adversely impact downstream developments, this regional pond should be sized to accommodate a restricted discharge rate not in excess of 6 cfs for the peak 100-Year storm.
- For future ponds located immediately adjacent to CSAH 40, they shall be designed to provide a minimum of 2 feet of freeboard between the 100-Year HWL and the road shoulder elevation.
- Proposed regional pond Pond SC-P11 is the final downstream landlocked depression providing the ultimate pipe outlet for all of the upstream depressions. An existing 24-inch pipe designed to provide a piped outlet from Pond SC-P11 runs beneath the existing Carver Bluffs 5th Addition Pond (LCC-P8) and is bulkheaded just south of Pond LCC-P8 (SC-N11.2). The normal water level of Pond SC-P11 should be set at or above 775.5 feet so as to connect to the existing bulkheaded pipe. So as not to adversely impact pond LCC-P8, SC-P11 should be designed to accommodate a restricted discharge rate of 13 cfs for the peak 100-Year storm.
- To service developments along the west side of CSAH 40, south of Carver Creek, it should be noted that a trunk storm sewer pipe that discharges to Carver Creek will need to be installed. There is an existing county storm sewer that runs parallel to and on the east side of CSAH 40, but it's sized to serve only areas east of CSAH 40.
- The remaining undeveloped drainage areas within the South Carver District are almost exclusively land-locked depressions that return all runoff generated within their watersheds back into the ground. This natural process recharges the groundwater and eliminates pollutant migration to surface waters. Any trunk storm sewer system throughout this district provides positive outlets for the land-locked basins that will allow for more developable land and greater flood protection for developments surrounding them. However, these outlets will also thereby redirect a portion of the runoff volume, and the pollutants it will carry, downstream to surface waters. Therefore, it is critical all efforts are made to reduce impervious surface and infiltrate the majority of the smaller rain events.

Upper Carver Creek

- Proposed regional pond Pond UCC-P3 is located within a large, deep landlocked depression. Being roughly 30 feet deep, it is assumed that this depression does not discharge overland. For future developments in this district, it is recommended that this depression be used for ponding and a trunk storm sewer be installed to outlet the pond to the north, to Carver Creek.

West Carver

- The upper reaches of Timber Creek shall be avoided as a discharge point for any storm sewer. By discharging further downstream in the creek, where it becomes more stable and well defined, will protect those upper portions of the raving that are more susceptible to increase runoff from developed areas and reduce sediment loading downstream.

C. Impaired Waters and TMDLS

Three watercourses (Carver Creek, Spring Creek, and the Minnesota River) listed on the state impaired waters list receive discharge from the City of Carver. This list is known as the 303(d) list from the applicable section of the federal Clean Water Act, these waters do not currently meet their designated use due to the impact of a particular pollutant or stressor. If monitoring and assessment indicate that a waterbody is impaired by one or more pollutants, it is placed on the list.

Responsibility for implementing the requirements of the federal Clean Water Act falls to the U.S. Environmental Protection Agency. In Minnesota, the EPA delegates much of the program responsibility to the state Pollution Control Agency. Information on the MPCA program can be obtained at the following web address: https://www.pca.state.mn.us/water/total-maximum-daily-load-tmdl-projects.

Information for impaired waters receiving discharge from Carver is identified in Table 6.2 below. The absence of a waterbody from the 303(d) list does not necessarily mean the waterbody is meeting its designated uses. It may be that it has either not been sampled or there is not enough data to make an impairment determination.

At some point a strategy would be developed that would lead to attainment of the applicable water quality standard. The process of developing this strategy is commonly known as the Total Maximum Daily Load (TMDL) process and involves the following phases:

1. Assessment and listing
2. TMDL study
3. Implementation plan development and implementation
4. Monitoring of the effectiveness of implementation efforts

Table 6.2 lists the impaired waters receiving discharge from the City of Carver and the 2014 approved 303(d) approved TMDLs. Figure 12 shows the location of the impaired waters with approved TMDLs.

Discussion regarding the directives for impaired waters and ultimately TMDL studies addressing the impairments for the waterbodies listed in Table 6.2 (and shown in Figure 12) is presented in the implementation section (Section 8) of this SWMP.

Table 6.2: Impaired Waters Receiving Discharge from Carver*

Waterbody / Watercourse	AUID#	Listed Pollutant	Impaired Use	TMDL Approved / Year
Carver Creek	07020012-806	Fecal Coliform	Aquatic Recreation	Yes / 2007
		Turbidity	Aquatic Life	Yes / 2012
		Nutrient / Eutrophication	Aquatic Life	No
Unnamed Creek (Spring Creek)	07020012-528	Fecal Coliform	Aquatic Recreation	No

Table 6.2: Impaired Waters Receiving Discharge from Carver*				
Waterbody / Watercourse	**AUID#**	**Listed Pollutant**	**Impaired Use**	**TMDL Approved / Year**
Minnesota River (Bevens Creek to Sand Creek)	07020012-501	Turbidity	Aquatic Life	2008
		Mercury in Water Column	Aquatic Consumption	Yes / 2008
		Mercury in Fish Tissue	Aquatic Consumption	Yes / 2008
		PCB in Fish Tissue	Aquatic Consumption	No
		Fecal Coliform	Aquatic Recreation	No
Minnesota River (Sand Creek to Carver Creek)	07020012-532	Mercury in Water Column	Aquatic Consumption	Yes / 2008
		Mercury in Fish Tissue	Aquatic Consumption	Yes / 2008
		PCB in Fish Tissue	Aquatic Consumption	No
Minnesota River (Carver Creek to RM 22)	07020012-506	Turbidity	Aquatic Life	No
		Mercury in Water Column	Aquatic Consumption	Yes / 2008
		Mercury in Fish Tissue	Aquatic Consumption	Yes / 2008
		PCB in Fish Tissue	Aquatic Consumption	No

*Source: MPCA 2014 303(d) List

D. NPDES MS4 Permit Program

In 2003, the Minnesota Pollution Control Agency required the City to submit an NPDES Permit Application to minimize the discharge of stormwater runoff pollutants and authorize stormwater discharge from the City's Municipal Separate Storm Sewer System (MS4). Carver received initial permit coverage in 2003, and a coverage renewal again in 2006. The current NPDES MS4 permit is effective as of August 1, 2013. The City submitted the Stormwater Pollution Prevention Program (SWPPP) Application for Reauthorization and the SWPPP Document to the MPCA on December 20, 2013. Although the current MS4 General Permit expired on July 31, 2018, those covered under the current permit will be able to operate under it until the MPCA reissues the new permit. It is expected that the MS4 General Permit will be reissued in early 2019 at which point this document will need to be reviewed to ensure that does not contradict the revised MS4 permit.

Carver's current SWPPP includes BMPs in the following categories or Minimum Control Measures:

1. Public Education and Outreach
2. Public Participation and Involvement
3. Illicit Discharge Detection and Elimination
4. Construction Site Stormwater Runoff Control
5. Post-Construction Stormwater Management
6. Pollution Prevention/Good Housekeeping for Municipal Operations

The BMPs listed in the SWPPP are a legally enforceable part of the Permit. The City must complete the tasks and milestones to remain authorized to discharge stormwater into waters of the state.

Many of the goals and policies discussed in this SWMP are directly related to requirements listed in the NPDES program. As a result, the goals and policies section of this plan repeatedly references items listed in the City's SWPPP. Per the requirements of the MS4 Permit, the City will review their SWPPP and update as necessary on an annual basis. A copy of the City's current SWPPP can be viewed at City Hall.

D. Wetland Management

In 2002, the City completed a Wetland Inventory and Assessment detailing the wetland classification and management standards for wetlands within the majority of the Study Area. A copy of this report in included in Appendix F for reference. This 2002 report includes a functions and values assessment for the wetlands within the study area, as well as stormwater pretreatment standards, water quality and quantity protections requirements, and buffer standards for all wetlands based on wetland classification.

It is the City's intention to classify the remaining wetlands within the Study Area that are outside of the 2002 Wetland Inventory and Assessment study area as development within these areas proceeds. The stormwater pretreatment standards and buffer requirements found in the 2002 Wetland Inventory and Assessment will also be applied to these wetlands.

The City will continue to be responsible for Wetland Conservation Act (WCA) administration in the City. In addition, the City will continue to coordinate wetland management issues with Carver County as necessary.

E. Stormwater Management Issues and Possible Corrective Actions

The following list of items presented in Table 6.3 represent current stormwater management issues or concerns as identified by the documents included in Section 4 of this plan. It is not intended to be a comprehensive list, but a list of issues with possible corrective actions that directly affect the City. The implementation of the possible corrective actions will be addressed in the implementation section (Section 8).

Table 6.3: Stormwater Issues and Possible Corrective Actions

Sub-District ID	Stormwater Issue	Potential Funding Partners	Possible Corrective Actions
LCC-A17, MR-A5, SCr-A12, SCr-A20, SCr-A22, SCr-A23	Carver downtown area discharges directly to Carver Creek, Spring Creek, and the Minnesota River without water quality treatment	CCWMO, LMRWD	Add structural pollution control devices such as sumps, SAFL Baffles, tree boxes, pervious pavement to future reconstruction projects. Construct water quality (infiltration/filtration) retrofit BMPs in downtown area where feasible. Provide education to residents and businesses on proper lawncare practices and other good housekeeping practices
MR-A1	Pond MR-P1 not currently sized to accommodate future development	LMRWD	Expand the existing pond MR-P1 as adjacent development occurs. Include additional treatment for surrounding runoff not routed through treatment device

Table 6.3: Stormwater Issues and Possible Corrective Actions			
Sub-District ID	**Stormwater Issue**	**Potential Funding Partners**	**Possible Corrective Actions**
SCr-A12, SCr-A23, MR-A7	Channel degradation and instability in Spring Creek and Carver Creek near downtown Carver	CCWMO, LMRWD	Restore and stabilize the degraded sections of these creeks upstream of 4th Street.
SCr-A20	Stormwater runoff from the Lenzen's 1st and 2nd Additions discharges untreated to Spring Creek	LMRWD	Retrofit structural treatment devices into existing storm sewer systems in these developments
SCr-A22	Gully erosion issue (LMRWD Gully Study) in the ravine north of 4th St. and Elm Dr. intersection is contributing sediment to Spring Creek	LMRWD	Repair and stabilize the active gully erosion issues.
SCr-A22	Gully erosion issue (LMRWD Gully Study) downstream of the northeast end of Diedrich Dr. is contributing sediment to Spring Creek	LMRWD	Repair and stabilize the active gully erosion issues
SCr-A22	Erosion issues in the ditch sections adjacent to 6th Street are contributing sediment to Spring Creek	LMRWD	Stabilize existing ditch sections or replace with storm sewer conveyance
UCC-A6	Erosion issues downstream of existing culvert under County Road 43	CCWMO	When development occurs, construct a new discharge to Carver Creek to avoid the erosion area
LCC-A2, LCC-A3	Erosion issues and excess flow routed along surface of existing Dahlgren Road	CCWMO	Add additional stormwater management features to ensure runoff does not encroach onto Dahgren Road
City-wide	Multiple gully erosion issues located on private property in City, as identified in LMRWD Gully Study	LMRWD	Where gully erosion is located on private property, address specific issues as future development allows
City-wide	Degraded wetlands within the study area, as identified in the 2002 Wetland Inventory and Assessment	CCWMO, LMRWD	Restore priority wetlands identified as having medium or high restoration potential as development allows
City-wide	Development activities occurring in areas beyond the City's trunk stormwater conveyance system	CCWMO, LMRWD	Coordinate interim conveyance measures with the CCWMO to protect downstream properties. Construct the City's trunk conveyance system

*Sub-District ID refers to Figure 14.

VII. Goals and Policies

The following are the City's goals and policies for Surface Water Management. The goals and policies are consistent with Minnesota Rules 8410 and local watershed requirements and reflect a commitment by the City to protect its natural resources and sustain a high quality of life for its residents. They have been developed to avoid conflict with existing State, Regional, and County goals and policies, and to be generally consistent with the Lower Minnesota River Watershed District (LMRWD) plan. The City regulates erosion control, wetlands, floodplain alteration, and stormwater management for all land development within the City limits in accordance with City Ordinance, the NPDES Permit, and the Wetland Conservation Act. The City administers and enforces the rules of the Lower Minnesota River Watershed District within their regulatory area and relies on the Carver County Watershed Management Organization (CCWMO) to administer and enforce its rules.

It should be noted that the numbering system of the goals and policies does not imply ranking by priority.

A. Floodplain Management

Goal:

Provide adequate storage and conveyance of runoff and manage development in flood prone areas to protect the public safety and minimize property damage.

Policies:

1. Maintain or increase existing flood storage volume below the 100-year flood elevation on all waterbodies in the City of Carver as opportunities become available, per the City's policy of "no net loss of flood storage capacity" in designated stormwater basin areas, floodplain, and wetlands.
2. Require on-site mitigation for a loss in existing flood storage volume below the 100-year flood elevation, unless the 100-year floodplain boundary is fully contained on-site.
3. Periodically review and update as necessary the City's current floodplain ordinance.
4. The following stormwater basin freeboard requirements must be followed:
    a) The low opening elevation for all new or existing structures hydraulically connected to stormwater basins must be a minimum of 2 feet above the basin High Water Level (HWL) elevation for the critical 100-year recurrence interval precipitation event (i.e. either the 100-year 24-hour event or 100-year 10-day snowmelt event).
    b) The low floor elevation for all new or existing structures immediately adjacent to stormwater basins, street ponding areas, or rear yard swale depressions must be a minimum of 1 foot above the basin HWL elevation for the critical 100-year recurrence interval precipitation event.
    c) The low opening elevation for all new or existing structures hydraulically connected to stormwater basins must be a minimum of 1 foot above the overland Emergency Overflow (EOF) elevation of any immediately adjacent surface waterbody, wetland or stormwater basin.
    d) In situations where an overland EOF is not feasible, a piped EOF should be provided and the low opening for all new or existing structures hydraulically connected to stormwater basins must be a minimum of 2 feet above a back-to-back 100-year critical recurrence interval precipitation event.
    e) The City Engineer may modify this freeboard requirement to be more restrictive at their own discretion based on specific site conditions.

B. **Water Quality**

Goal:

To maintain or improve water quality of surface waters throughout the City by reducing sediment and nutrient loading.

Policies:

1. As an MS4 community, the City has developed a Storm Water Pollution Prevention Plan (SWPPP) outlining many of the municipal BMPs and associated actions being taken by the City. The SWPPP is referenced here and contains additional information on many of the following topics.
2. In the design and construction of new and redevelopment, treatment of stormwater runoff is required prior to discharge to a surface water or wetland. Treatment shall meet the requirements listed in the City Stormwater Design Standards, which is included in Appendix B. The City will continue to review and approve construction plans for conformance with the requirements of NPDES permitting.
3. The City will administer the rules and regulations of the Lower Minnesota River Watershed District regarding water quality.
4. The City will rely on CCWMO to administer their rules and regulations regarding water quality and will require verification that District permit requirements are met.
5. The City will continually evaluate opportunities to reduce the phosphorus load to the area surface waters. Additionally, the City contributes runoff to multiple public waters currently on the State's 303(d) list of impaired waters for excessive nutrient concentrations. Therefore, the City will implement nutrient reduction BMPs as necessary to meet waste load allowances approved. Additional information regarding TMDL requirements and tracking can be found in the City's SWPPP, which can be obtained at City Hall.
6. The City will make water resource protection a priority for city property, including: parks, open space, and other recreational areas. Areas are swept as needed and buffer establishment or other retrofit treatment techniques may be incorporated into future projects within these areas, when feasible.
7. The City annually inspects and maintains its public stormwater management facilities to ensure their continued effectiveness. When feasible, the City may require stormwater management measures to be contained within outlots; however, many facilities will remain private and maintenance agreements will be required for stormwater management facilities used to meet governmental requirements from the appropriate entity responsible for overall property maintenance.
8. The City will continue to implement Best Management Practices (BMPs) on city-owned land as necessary to retain and prevent pollutants from leaving the site.
9. The City requires the preparation and implementation of water resources management and erosion and sediment control plans for construction and land development activities in accordance with NPDES requirements.
10. The City will disperse public education information to foster responsible water quality management practices by city residents and businesses. The public information will include proper lawn fertilizing and other lawn chemical use, disposal of lawn waste and solid, liquid, and household hazardous waste products, as well as many other surface water enhancement educational items.

11. If full compliance with the treatment by a stormwater treatment feature is not feasible for a new or re-development site, the City may require a cash dedication in lieu of treatment at the discretion of the City Engineer.
12. Illicit connections and discharges to the City of Carver's Municipal Separate Storm Sewer System (MS4) are prohibited. Refer to the City of Carver's City Code Chapter 50 – Article VIII – Illicit Discharge Detection and Elimination for further information.
13. The City will review and update City Code as necessary to reference the City's water quality standards identified above.

C. **Water Quantity**

Goal:

To minimize downstream impacts by maintaining peak runoff discharge rates and providing runoff volume reduction.

Policies:

1. The City requires that proposed stormwater discharge rates as a result of development be consistent with the requirements of NPDES permitting, City Stormwater Design Standards, and the Lower Minnesota River Watershed District. At a minimum, peak flow rates after development shall not exceed predevelopment peak flow rates for the 2-year, 10-year, and 100-year recurrence interval precipitation events.
2. In conformance with Carver County rules, extended detention must be provided for the runoff generated from the 2-year event for sites with direct discharges to streams. To demonstrate compliance with the extended detention requirement, calculations showing the 2-year storm discharge reduced by 50 percent of existing conditions shall be submitted.
3. The City will rely on CCWMO to administer their rules and regulations regarding peak runoff rates and volume control and will require verification that District permit requirements are met.
4. The City will review downstream stormwater-related impacts (within the community) of development proposals and proactively address water resource-related concerns.
5. The City recognizes the potential environmental impacts associated with constructing new outlets to existing landlocked areas; therefore, the outletting to landlocked areas shall be done only as a last resort and shall be coordinated with the LMRWD and CCWMO.
6. The design of new stormwater storage facilities will accommodate the 100-year storm event, providing the required freeboard and avoiding structure flooding. Storm sewers will be designed to pass the10-year rainfall event without the hydraulic grade line extending above the ground at any location, as long as downstream restrictions do not require a reduced-capacity design.
7. The City will encourage the use of natural drainageways for conveying stormwater where the drainageway can accommodate or be improved to accommodate proposed flows and volumes.
8. Enhanced infiltration practices will be encouraged, where feasible, in areas where the present or future land use does not have a significant potential to contaminate groundwater.
9. The City encourages the reduction of impervious surfaces resulting from new and re-development projects. This policy will help preserve existing natural areas and reduce

the total volume of runoff generated on a site, reducing the rate control burden on downstream regional detention basins.

10. The City will seek to retrofit volume control BMPs into existing developed areas as opportunities arise and funding is available.

D. **Erosion and Sediment Control**

Goal:

To prevent erosion and sedimentation to the maximum extent practical through construction site permitting, inspection and good municipal housekeeping.

Policy:

1. The City requires the preparation and implementation of erosion and sediment control plans and best management practices for construction and land development activities in accordance with NPDES permit requirements with the ultimate goal of eliminating sediment discharge from the site.
2. The City will enforce the erosion and sediment control plan and best management practices on construction sites through the review and inspection process. Areas adjacent to water bodies and wetlands may require additional BMPs due to their environmental sensitivity.
3. The City will continue to sweep paved public streets as identified in the SWPPP. Areas with direct discharge into lakes, wetlands, and streams will be given priority and areas requiring additional attention will be swept more on an as-needed basis.

E. **Wetlands**

Goal:

To protect wetland value and ensure conformance with the requirements of the Minnesota Wetlands Conservation Act (WCA), CCWMO & LMRWD Rules, and other State and Federal regulations.

Policy:

1. The City administers the review and approval duties associated with the Wetland Conservation Act (WCA). The city defers administrative responsibility to CCWMO & LMRWD for conformance with their wetland protection rules.
2. The City will notify parties proposing land disturbing activities (i.e.: altering, dredging, filling, and draining) to verify with CCWMO & LMRWD for their wetland protection rules requirements, as well as possible permit requirements from the MDNR and US Army Corps of Engineers (COE).
3. The city contains wetland areas that are critical to stormwater drainage throughout the city. The city manages the wetlands as necessary to minimize the potential for structure flooding and maximize public safety. As such, the city must occasionally remove sediment buildup from wetlands and, as in the past, will work with the appropriate agencies on a case-by-case basis.
4. The City will cooperate with interested private or governmental parties on wetland restoration projects and may participate in the State's wetland banking program.

F. **Public Ditch Systems**

Comments:

There are no known county or judicial public ditch systems within the City.

G. Groundwater

Goal:

To protect groundwater through prudent management of surface waters and areas of potential contamination.

Policy:

1. The City will cooperate as necessary with County and State agencies to inventory and seal abandoned wells and notify its residents of State standards on well abandonment.
2. The City will consider the significance of sensitive geologic areas when making land use decisions, when reviewing development proposals, or when proposing construction of stormwater facilities. Activities that may have significant contamination potential will be required to include groundwater protection measures.
3. The City will encourage the use of infiltration methods to promote groundwater recharge where groundwater will not be significantly impacted by the land use or stormwater runoff.
4. The City defers to the Goals and Policies identified in Section 3H (Groundwater Management) in the 2010 Carver County Water Management Plan. Future Wellhead Protection Plans may identify the need for water quality treatment beyond the City's current standards in certain areas and will be addressed as these plans are completed.

H. TMDL and Impaired Waters

Goal:

Address target pollutants identified for impaired waters and those in TMDL studies to improve water quality

Policy:

1. While the City will allow other entities to continue to take the lead on developing TMDL studies, the City will engage the TMDL Report and TMDL Implementation Plan development processes as appropriate to improve water quality.
2. Coordinate TMDL implementation efforts with the CCWMO or LMRWD to maximize the efficiency and effectiveness of improvements. The City will update the Stormwater System Implementation Projects and Activities (Table 8.3) table to reflect new implementation activities. TMDL implementation activities are discussed in more detail in Section 8.E.
3. Enforce the City's development standards for construction site stormwater runoff control and post-construction stormwater management as development proceeds to minimize the transport of pollutant loads to impaired waters.

I. Conservation Design

Goal:

Encourage development activities to incorporate conservation design approaches.

Policy:

1. The City is aware of the environmental benefits associated with LID and general natural area preservation and will work with development/redevelopment to implement these practices when feasible. These may include, but are not be limited to:
    a) Impervious area reduction
    b) Impervious area disconnection

c) Decentralized stormwater management
d) Street width reduction
e) Rural street sections
f) Reduced setbacks
g) Ecological/pedestrian corridors
h) Natural space preservation and incorporation into site design
i) Site disturbance minimization
j) Pervious pavement
k) Green Roofs
l) Increased stormwater abstraction (infiltration, filtration, irrigation reuse, etc.)

2. As part of the City's commitment to incorporating Conservation Design practices into new and redevelopment projects, prior to a formal submittal of plans, the City will require a pre-application meeting to discuss how the project will incorporate Conservation Design practices into the site layout.

J. **Resources Management**

Goal:

Protect the City's wetlands, lakes, streams, groundwater, and natural areas to preserve the functions and values of these resources.

Policy:

1. The City is committed to protecting and restoring degraded stream sections in the City to enhance these valuable resources for the future. Three stream sections have been identified for rehabilitation:
   a) Spring Creek
   b) Carver Creek
   c) Timber Creek
2. The City will protect wetlands in accordance with the goals and policies of this plan.
   a) The City acts as the Local Government Unit (LGU) for administration of the Wetland Conservation Act of 1991 and all subsequent amendments.
   b) Development runoff that discharges directly to a wetland must meet the wetland management standards as identified in the 2002 Wetland Inventory and Assessment.
   c) For development activities in areas outside the study area for the 2002 Wetland Inventory and Assessment, the developer will be responsible for classifying wetlands in accordance with City standards and the wetland standards in the 2002 Wetland Inventory and Assessment will apply.
   d) The City will encourage its residents to retain existing wetlands, vegetation buffers, and open spaces for the benefit of wildlife habitat.
3. The City defers the enforcement of the Carver County Feedlot Management Ordinance to Carver County for any newly annexed areas within the City. An appropriate agreement between the City of Carver and the County will need to be processed related to this enforcement.
4. The City recognizes the many benefits, including the water quality benefit, associated with tree cover in Carver. For more information regarding the benefit associated with tree cover, the City's tree ordinance can be found in the City Code.

K. Public Education and Outreach

Goal:

Provide educational and outreach opportunities for City residents and business owners, elected officials, City staff, and the development community that address stormwater management and water quality.

Policy:

1. The City is committed to partnering with the CCWMO and LMRWD to offer stormwater related public education and outreach activities in Carver.
2. The City will continue to promote best management practices for its residents. Public education will include topics such as: fertilizer use and the limited need for phosphorus in fertilizer; lawn care and lawn chemical use; solid, liquid and household hazardous waste disposal; illicit discharge detection; and natural water resource systems and protection methods.
3. The City will distribute educational information or notices regarding various water resources management and protection documents.
4. City staff is informed about the City's stormwater management efforts. The City will continue to present information to all City staff, especially those in the Public Works and Parks Departments, regarding the City's stormwater management initiatives/efforts and how they can help the City implement the policies outlined in this SWMP.

L. Municipal Housekeeping

Goal:

To conduct operations and maintenance of City facilities and infrastructure as necessary to keep systems operating adequately and limit potential for discharge of pollutants. Additional information regarding municipal housekeeping can be found in the City's MS4 Storm Water Pollution Prevention Plan (SWPPP).

Policy:

1. The City will continue to sweep all paved streets as outlined in the SWPPP, or at a minimum twice each year, once in the spring and once in the fall.
2. The City will continue to inspect stormwater management facilities, stockpiles, and material handling areas as outlined in the SWPPP.
3. The City will continue to document inspections and maintenance activities as outlined in the SWPPP.
   a) The City will continue to enforce City Code related to the proper design, construction, inspection, and maintenance of Individual Sewage Treatment Systems within the City and in areas newly annexed into the City.
4. The City requires Operation and Maintenance Plans for all stormwater management facilities used to meet governmental requirements. The plans are required to outline operation, maintenance, and inspection schedules and reporting requirements.
5. Regularly review the City's operation and maintenance program and SWPPP responsibilities to determine if City financial and staff resources are sufficient to adequately implement these programs.
6. All waste and unused building materials (including garbage debris, cleaning wastes, wastewater, toxic materials or hazardous materials) shall be properly disposed of off-site and not allowed to be carried by runoff into a receiving channel or storage sewer system.

7. The City has a spill response capability in place. The response program focuses on containing, neutralizing, and properly disposing of spilled material. This will be extended to include preventing the discharge of spilled toxic or hazardous materials into the storm drainage system. The Fire Department and the Public Works Department have a readily available supply of response materials, including containment booms and absorbent pads.

VIII. Implementation

A. General

This SWMP provides a plan for expanding and managing the City's surface water system, and protecting key water resources in the City. The real measure of success of the SWMP will be in its implementation. Implementation of the SWMP covers a number of aspects, including:

- Administering official controls and programs
- Operating and maintaining the surface water system
- Managing surface water as redevelopment and new development occur
- Implementing a public education program regarding stormwater management
- Constructing prioritized capital improvements
- Financing projects and programs

B. Official Controls

Codes and ordinances (official controls) are necessary tools to support the implementation of this surface water management plan. Over time, codes must be updated to remain consistent with City goals, policies and practices. To address the need to review and update City Code, certain goals and policies specifically reference city codes that exist or need to be created. In addition, the City's SWPPP identifies a set of ordinances required to comply with the MS4 permit requirements.

After adoption of this SWMP, all applicable portions of city code will need to be updated to achieve consistency with local Watershed Management Plans. Per State statute, this implementation step must be completed within 180 days after adoption of this plan. In addition, periodically codes must be updated to remain consistent with city goals, policies, and practices. Table 8.1 presents an assessment of city codes related to surface water management as listed in Table 3.1 in Section 3.

Table 8.1: City Code Implementation Actions

Official Control	City Code Implementation Actions
Plan Review and Approval	Review and update Ch. 41 – Art. VIII and Sec. 50-137 as necessary
Erosion and Sediment Control	Review and update Ch. 50 – Art. VII as necessary
Illicit Discharge and Illicit Connection	Review and update Section Ch. 50 – Art. VIII as necessary
Post Construction Runoff Control	Review and update Ch. 50 – Art. VII as necessary
Wetlands and Public Waters	Review and update Ch. 50 – Art. VII as necessary
Shoreland	Develop a new ordinance

C. Stormwater System Operation and Maintenance

Carver's existing stormwater management system represents a major investment for the City. The ongoing inspection and maintenance of this system is critical to protecting this investment, as well as the water and natural resources the system is designed to manage. In accordance with the City's SWPPP, City stormwater system operation and maintenance responsibilities and schedule are provided in Table 8.2.

Table 8.2: Stormwater System Inspection and Maintenance Schedule

Responsibility	Schedule
Inspect and clean out catch basins, sumps, and structural pollution control devices	Twice Annually
Stormwater pond inspection, including pond slopes, accumulated sediment, inlets, outlets, and identifying illicit discharges	Twice annually, and after heavy rainfalls or large snow melt events
Trunk storm sewer inspection	Twice annually during catch basin inspection and clean out
Remove accumulated sediment in stormwater	5 to 25-year cycle, as needed
Street Sweeping	At least twice annually, or as needed
Repair channel erosion issues	As needed

As new development brings more trunk stormwater facilities for the City to operate and maintain, these duties will require more staff time and a larger maintenance budget. It is important to quantify the extent of this future commitment so that the funds necessary for system maintenance activities can be collected via the City's stormwater utility. Per Policy 5 in Section 7.L, it is recommended that the City regularly review the cost and staff commitment to stormwater system operation and maintenance and evaluate if the current structure needs to be adjusted to accommodate future development.

D. NPDES Implementation

The MPCA has designated Carver as an NPDES Phase II MS4 community (MN Rules 7090). Carver recently completed a partial audit by the MPCA of the current SWMPP and incorporated the necessary resolutions. The existing permit was extended in 2018 while the MPCA develops the new permit, which is expected to be released in 2019 at which time the City will be required to apply for. A copy of the City's current SWPPP can be viewed at City Hall. Modifications to the City's current SWPPP could include, but are not limited to the following:

- Ordinance updates, specifically the post construction, erosion and sediment control, and illicit discharge and connection ordinances
- Increased public education and public involvement efforts, likely to involve more partnerships with CCWMO and LMRWD
- Stormwater system mapping and inventory updates
- Municipal facilities inventory
- Stormwater system treatment effectiveness evaluation and field assessment

As the City moves through their current SWPPP evaluation process, specific SWPPP update tasks and associated costs will be identified. Until these tasks are identified, only general implementation actions are included in Table 8.3.

With the rising cost of the City's SWPPP implementation responsibilities, it is recommended the City regularly evaluate the cost of this implementation to determine if the current funding structure needs to be adjusted.

E. TMDL Implementation

The City recognizes that the responsibility for completion and implementation of the TMDL studies lies with the primary stakeholders contributing to the impairment. The City intends to cooperate with the watersheds in the development of the TMDL studies, acknowledging that the watersheds will take the lead on these studies. It is the intention of the City to fully implement the actions identified in future TMDL Implementation Plans, funding the implementation actions as necessary. The City also recognizes that as TMDL Implementation Plans to address impaired waters are developed the City's current stormwater management program may need to be revised to reflect the findings in the Implementation Plan.

To date, TMDL Implementation Plans for three of the impaired waters within Carver have been approved. These plans are as follows:

- Lower Minnesota River Dissolved Oxygen TMDL Implementation Plan - The TMDL implementation area for this TMDL does not include the City of Carver.
- Carver, Bevens, and Silver Creek Bacterial TMDL Implementation Plan - The TMDL implementation area for this TMDL includes the western portions of Carver. The City is willing to work with Carver County to work toward the goals identified in this TMDL Implementation Plan; however, no specific urban stormwater management implementation items are identified.
- Carver Creek Turbidity Implementation Plan – This implementation plan states the following:

  "Comparing [the current MS4 TSS Loadings – TMDL Implementation Plan Table 3.2] to allowable loadings ([TMDL Implementation Plan] Table 2.2) indicates that no reductions appear to be needed from MS4 areas. The regulated MS4 communities will need to maintain at least the existing level of treatment of their stormwater discharges to ensure continued compliance with the conditions of the MS4 general permit. At the time of permit application, permittees will indicate that a WLA was assigned to them in this TMDL project, they are currently meeting that WLA since no reductions were called for, and they will continue to maintain the current BMPs on the landscape to ensure compliance with their permit."

To comply with this statement, the City will implement the following:

- As development proceeds within the Carver Creek TMDL tributary area, the City will enforce our construction site stormwater runoff control ordinance to control sediment loading during construction.
- All development activities must meet the City's post-construction stormwater standards. City development standards require significant stormwater rate control, volume control/water quality measures, and the construction of a trunk conveyance system including a significant stormsewer network and ravine/stream restoration activities to minimize erosion and control sediment transport to Carver Creek.
- The City will maintain all current City owned and maintained BMPs in accordance with the requirements of the current MS4 permit and City SWPPP.

F. Project Review and Approval Process

The City has established and fully implemented both a preliminary and final platting process according to Article V of the City of Carver Code of Ordinances. The implementation of applicable Goals and Policies (see Section 7) and the City's design standards (see Appendix B) included in this SWMP is addressed throughout the project review and approval process.

The City will enforce its design standards while incorporating the following documents:

- The City will default to CCWMO Chapter 153 of Carver County Code of Ordinances (approved by County October 15, 2016) within in the CCWMO's jurisdictional boundary.
- Appendix K of the 2018-2027 Lower Minnesota River Watershed District Water Management Plan and the LMRWD Project Review Requirements.

Early on in the project review and approval process, typically the concept review stage, the City will coordinate with the jurisdictional watershed as follows:

Lower Minnesota River Watershed District

It has been the City's experience that the Lower Minnesota River Watershed District has made a concerted effort to encourage cities within their jurisdiction to adopt local SWMPs and assume the regulatory responsibility for stormwater management and other related issues. The City assumes that with the adoption of this SWMP, the primary regulatory responsibility will rest with the City.

An existing agreement between the Lower Minnesota River Watershed District and the City of Carver is already in place giving the City the authority to implement the stormwater goals and policies of the LMRWD for the LMRWD, unless otherwise described in the agreement. A copy of this agreement is included in Appendix C.

Carver County Watershed Management Organization

At this time, the City performs development review and approval activities side-by-side with the CCWMO, with both the City and watershed operating their own approval processes. With the adoption of this SWMP, Carver County will assess the ability of the City to implement this plan as it relates to regulatory responsibility. In the future the City may desire to take on principle responsibility for enforcement of the Counties rules. At that time, if the CCWMO deems that the City has performed adequately in implementing the County's rules, an individual agreement between the City and the County could be negotiated to determine principle review and enforcement responsibility. However, at this time, the City will not actively be pursuing this option.

G. Stormwater Education and Outreach

Stormwater education and outreach plays an important role in any effort to implement the City's stormwater management program, as outlined in this SWMP. The framework for the City's stormwater education and outreach program is provided in the NPDES MS4 permit, and the implementation plan for this program is presented in the City's SWPPP Document.

The objectives of the City's stormwater education and outreach program vary, depending on the target audience, which includes City staff, elected officials, City residents and business owners, and the development community. The program focus for each of these groups is described in the following sections.

A complete list of stormwater related education and outreach activities can be found in the City's SWPPP Document.

1. City Staff and Elected Officials

City staff and local government officials have a wide range of responsibilities for implementing this plan and the activities identified in the City's SWPPP Document. The City will implement education and outreach activities for City staff and elected officials, including the following:

- Annual stormwater public meeting – this meeting will take place at a City Council meeting and will provide the Council and City staff in attendance with a summary of the prior year's stormwater management program implementation efforts.

- Carver County WMO presentation – every 2-3 years, the City will invite Carver County WMO staff to a special meeting to educate City staff and elected officials on water resources issues with the County.
- Staff training – this City will conduct regular training for new/seasonal staff and on-going staff as is relevant to their job responsibilities. This training could include general all staff training sessions, staff specific training sessions, and the distribution of training materials to staff.
- SWMP Update presentations – Updates to the City's SWMP are presented to both the Planning Commission and City Council prior to adoption of the SWMP. This presentation covers the framework of the plan, plan contents, and the updates to the plan, and would occur on an as-needed basis.
- Periodic stormwater related presentations and training materials – As relevant stormwater related topics emerge (e.g. NOAA Atlas 14, MS4 Permit, Carver County Rule Updates, etc.), the City will take the appropriate measures (e.g. presentations, internal memos, etc.) to educate City staff and elected officials.

2. City Residents and Business Owners

   To meet the requirements of the MS4 permit and the City's goal of improving the quality of Carver water resources, the City will engage residents and business owners in stormwater related education and outreach. The City will implement education and outreach activities for residents and business owners, including the following:

   - Annual stormwater public meeting – this meeting provides an opportunity for residents and business owners to hear about the City's efforts to implement our stormwater program. This meeting also provides an opportunity for residents and business owners to provide feedback and input on the City's stormwater program.
   - Regular stormwater related publications – include stormwater related information in a minimum of 4 City publications (City newsletter, utility billing mailings, etc.) annually. The content will be derived from both internal City sources and partnerships with other entities, such as the CCWMO or LMRWD.
   - Coordination with CCWMO – starting in 2019, the City will seek to formalize an agreement to coordinate public education activities with CCWMO's Education Coordinator, based on the City's available budget. As part of this agreement, the City will provide the CCWMO with the following:
     - City staff contacts responsible for City media communication, along with information on the media communication methods available to the City.
     - A list of stormwater related issues of concern and topics about which the City would like to increase public awareness.
     - The City will annually review their public education and outreach program and determine a focus for the upcoming year. This review will be provided to the CCWMO to coordinate education and outreach opportunities.
   - Social media communications – use the City's social media outlets (City blog, Facebook, and Twitter) to notice upcoming stormwater related events, highlight stormwater related happenings in the area, or provide stormwater related educational materials. The City aims for a minimum of 4 stormwater related communications per year via the City's social media outlets.
   - Annual Spring cleanup day – City-wide annual curbside cleanup day accepting mixed solid waste and yard waste.

3. Development Community

The City seeks to engage the development and redevelopment applicants early in the project submittal process to help guide stormwater mitigation efforts for new and redevelopment projects. It is the City's expectation that potential developers will know what is required of them to appropriately assess the site from the beginning. The City will implement education and outreach activities for the development community, including the following:

- Pre-application meeting – The initial guidance related to stormwater mitigation efforts will be provided at the pre-application meeting with developers (see Policy 28). This meeting provides an opportunity to discuss how the project will incorporate Conservation Design practices into the site layout. The City is committed to working with developers to incorporate suitable Conservation Design techniques into site layouts.
- City website – The City makes ordinances and design standards available on our website for developers to review.
- Plan review process – Throughout the plan review process, the City is in communication with developers regarding the implementation of the City's stormwater related policies, stormwater system maintenance requirements, and general site layouts that promote water quality.

H. Stormwater System Implementation Projects and Activities

Based on the assessment of the City's current stormwater management program and the implementation items in the preceding sections, a list of recommended system improvement projects and activities has been identified. The system improvements identified range from those being driven by regulatory requirements, to others driven by the functionality of the City's stormwater system. Table 8.3 presents a summary of recommended stormwater and water resource management projects and activities, listed in no particular order. The budget amounts included in this table should be considered planning-level cost estimates, with more specific cost estimates to be determined as the project or activity approaches.

The items listed in Table 8.3 will be used as a reference when the City selects specific stormwater and water resources management projects and activities to be included in the capital improvement planning process. This planning process is updated periodically by city staff and reviewed and approved by the City Council.

Table 8.3: Stormwater System Implementation Projects and Activities

Item Number	Project	Description	Est. Start	Est. Cost ($)
1	6th St Drainage Study	Study best management practices that can be incorporated to provide water quality while managing increasing flow rates	2020	$650,000
2	Ravine stabilization – 4th St & Elm Drive	Repair and stabilize the active gully erosion at this location	2020	$250,000
3	Diedrich Dr & Kirche Hill Dr. Stormwater Improvements	Include structural BMPs including sumps, SAFL Baffle, etc. in the proposed storm sewer system.	2019	$25,000

Table 8.3: Stormwater System Implementation Projects and Activities				
Item Number	Project	Description	Est. Start	Est. Cost ($)
4	Downtown Water Quality Improvements	Continue to install structural BMPs such as sumps, SAFL Baffle, etc. as reconstruction projects occur	TBD	TBD
5	Spring, Carver, and Timber Creeks stream bank stabilization	As stream rehabilitation funds become available, restore and stabilize selected sections of Spring, Carver, and Timber Creeks.	TBD	TBD
6	6th Street Railroad Embankment Drainage Improvements	Restore functionality of outlet serving upstream drainage area	2019	$100,000
7	Community Park Drainage Improvements	Add BMPs to provide water quality and quantity improvements.	TBD	TBD
8	Dahlgren Road	Construct BMPs to provide water quality and quantity improvements along Dahlgren Road to prevent flooding during heavy rainfall events	TBD	TBD
9	Old Carver Road Stormwater Basin	Construct Stormwater Basin on Parcel #: 02393762, Provide water quality for Mount Hope Road Storm Sewer System	TBD	$200,000
10	Stormwater system inspection and maintenance	Inspection and maintenance of the City's stormwater system	Ongoing	Varies
11	Annual Street sweeping	Sweep streets at least twice annually	Ongoing	$15,000
12	Annual MS4 reporting	Prepare and submit MS4 annual report	Ongoing	Varies
13	Stormwater education and outreach	Stormwater education coordination, outreach events, staff training, website updates, mailings, etc.	Ongoing	Varies
14	Update city code	Review and update as necessary to address new MS4 permit requirements	2019	$10,000
15	Develop a Shoreland Ordinance	Prepare a shoreland ordinance compliant with DNR shoreland regulations	2019	$10,000

Note: The City may seek partnerships from the CCWMO or LMRWD, or financial assistance from outside sources to implement the activities.

I. Stormwater Area Charges

The City's proposed surface water system is presented in Figure 14. New surface water facilities will be constructed in conjunction with new development, redevelopment and street reconstruction. One of the basic objectives of this report was to lay out a surface water system to meet the needs of Carver moving forward and generate a cost for the construction of this system.

However, following the adoption of the 2008 SWMP, the City made the decision to base their stormwater area charge on the regional conveyance system cost amount only. The City assumes that all the costs associated with pond construction (regional pond construction cost)

and land cost for onsite ponding (pond land cost) are borne completely by the developer, as these ponding costs are necessary in order to meet the City's stormwater requirements.

Table 8.4 below identifies the regional conveyance system cost per developable acre broken up by major land use type. This is the cost the City is using for their stormwater area charge amount. Table 8.4 cost per developable acre by major land use applies a higher cost per acre value for land uses with more impervious surface than those with less. This is due to the fact that higher impervious land uses require larger, more expensive infrastructure.

The total system cost estimates presented in this report are based on 2013 construction costs and can be related to the value of the Engineering News Record (ENR) Index for Construction Costs of approximately 9,552 (July 2013). Future changes in this index are expected to fairly accurately describe cost changes in the proposed facilities. During interim periods between full evaluation of projected costs, capital recovery procedures can be related to this index. The system cost estimates are assumed to cover construction, legal, engineering, and administrative costs.

Table 8.4: Regional Conveyance System Cost per Developable Acre Summary

Land Use	Developable Acreage (acres)	Runoff Depth 10-yr, 24-hr Event [2] (inches)	Land Use Factor [3]	Equivalent Area [4] (acres)	Cost per Developable Acre [5] ($/acre)
Low Density Residential	3,926	1.75	1	3,926	$3,145
Medium Density Residential	554	2.05	1.2	665	$3,775
Mixed Use	334	2.05	1.2	401	$3,775
High Density Residential	149	2.92	1.7	253	$5,347
Commercial / Industrial[1]	825	3.11	1.8	1,485	$5,662
Total	**5,788**			**6,730**	
Total Regional Conveyance System Cost		$21,165,850			
Cost per Equivalent Acre		$3,145			

[1] Commercial/Industrial land use incorporates areas on Figure 6 & 7 identified as commercial, commercial/industrial, and mixed commercial/industrial.

[2] Runoff depth from a 10-year storm event used to weigh the amount of runoff generated by each land use (based on City storm sewer design event).

[3] Land use factor is calculated by dividing the 10-year runoff depth for the given land use by the 10-year runoff depth generated by LDR.

[4] Equivalent area calculated by multiplying the developable acreage for a given land use by associated land use factor.

[5] The cost per developable acre is calculated by multiplying the cost per equivalent acre by a specified land use factor.

J. Financing

Several methods of financing the implementation items identified in this SWMP are available to the City. Some of the financing methods are as follows:

- Area Charges: These are fees charged to developments on an area (cost per acre) basis. These charges are frequently used in developing communities to ensure that new development pays for facilities required to serve it. Charges could be levied against redevelopment in a similar manner. An area charge calculation could be based on methodologies similar to those presented in Table 8.4 above.
- Special Assessments: Assessments against benefiting or responsible properties can be used to finance surface water improvements.
- Stormwater Utility: This is a fee charged to existing properties based on an estimate of runoff generated and discharged to the City's system. The revenues collected are dedicated to the surface water system, frequently used to pay for operation and maintenance of the system.
- Grants: Though subject to budgetary constraints, a number of state and other grant programs are available for surface water management.

Typically, an area charge is the most effective way of financing new stormwater trunk system improvements driven by development.

The other financing mechanisms mentioned above are generally more appropriate for the retrofit improvements within developed portions of the City.

IX. Administration

A. Review and Adoption Process

Review and adoption of this Surface Water Management Plan will follow the procedure outlined in Minnesota Statutes 103B.235:

"After consideration but before adoption by the governing body, each local government unit shall submit its water management plan to the watershed management organization[s] for review for consistency with the watershed plan. The organization[s] shall have 60 days to complete its review."

"If the county or counties having territory within the local unit have a state-approved and locally adopted groundwater plan, the local unit shall submit its plan to the county or counties for review. The county or counties have 45 days to review and comment on the plan."

"Concurrently with its submission of its local water management plan to the watershed management organization, each local government unit shall submit its water management plan to the Metropolitan Council for review and comment. The council shall have 45 days to review and comment upon the local plan. The council's 45-day review period shall run concurrently with the 60-day review period by the watershed management organization. The Metropolitan Council shall submit its comments to the watershed management organization and shall send a copy of its comments to the local government unit."

"After approval of the local plan by the watershed management organization[s], the local government unit shall adopt and implement its plan within 120 days and shall amend its official controls accordingly within 180 days."

Copies of the documents referencing WMO approval and City adoption are included in Appendix C of this SWMP.

B. Plan Amendments and Future Updates

This Surface Water Management Plan will be incorporated into the City's current Comprehensive Plan. Periodic amendments to this SWMP may be required to incorporate changes in local practices or changes to either the LMRWD or CCWMO Watershed Management Plans. Plan amendments will be incorporated by following the review and adoption steps outlined above.

C. 2013 SWMP Evaluation

Table 9.1 presents an evaluation of the City's 2013 Surface Water Management Plan. This evaluation specifically addresses the City's progress toward addressing the implementation items in Section 8.3 of the 2013 SWMP.

Table 9.1: 2013 SWMP Implementation Evaluation

SWMP Section	Implementation Item	Status	Comments
8.3.1	Lime Street Storm Sewer flood improvements	Complete	2018 Storm Sewer Improvement Project will replace the existing lift station at the Lime Street Outfall and will include gate well
8.3.2	Stream Channel degradation and instability near downtown	Complete	Sections of Spring Creek have been stabilized from the Minnesota River to 4th Street.
8.3.3	Stream channel degradation and instability in Spring, Carver, and Timber Creeks	Ongoing	The city has not performed any stream restoration activities outside of the downtown area.
8.3.4	Untreated stormwater discharges from downtown	Ongoing	Sumps included in 2018 downtown storm sewer improvements. City will continue to pursue water quality improvements in the high developed area.
8.3.5	Gully erosion in ravine north of 4th St. and Elm Dr.	Not Complete	Ravine restoration at this location was not completed. Re-scheduled for 2020 or later.
8.3.6	Untreated stormwater discharge to Spring Creek at 6th St from upstream	Ongoing	City currently performing the 6th Street Drainage Study with the goal of developing water quality improvements along the corridor and plan to fund and implement.
8.3.7	6th St. ditch erosion	Ongoing	City currently performing the 6th Street Drainage Study with the goal of developing water quality improvements along the corridor and plan to fund and implement.
8.3.8	Stormwater system inspection and maintenance	Ongoing	Storm sewer maintenance is performed as necessary to ensure the system is functioning as intended
8.3.9	Annual Street Sweeping	Ongoing	Street sweeping occurs at least twice annually. City needs to improve record keeping to identify streets swept, amount of material swept, and date of sweeping.
8.3.10	Annual MS4 reporting	Ongoing	City to continue to comply with all of their MS4 requirements.

Table 9.1: 2013 SWMP Implementation Evaluation			
SWMP Section	**Implementation Item**	**Status**	**Comments**
8.3.11	Stormwater education and outreach	Ongoing	City to continue to coordinate stormwater education, staff training, website updates and mailings, etc.
8.3.14	Develop a shoreland ordinance	Not Complete	City to develop a shoreland ordinance within 1 year of adopting this SWMP

Appendix A: Figures

Appendix B: City of Carver Stormwater Design Standards

Appendix C: Stormwater Agreement between the City of Carver and the LMRWD

Appendix D: Carver County Chapter 153 Rules

Appendix E: LMRWD LWP Rules

Appendix F: 2002 Wetland Inventory and Assessment

Appendix G: SWMP Agency Approval and City Adoption Documentation

Services Provided:

Civil & Municipal Engineering
Water & Wastewater Engineering
Transportation Planning & Engineering
Structural Engineering
Aviation Services
Water Resources Engineering
Landscape Architecture
Land Surveying
Geographic Information System
Project Funding & Financing

Bolton-Menk.com

Design Carver

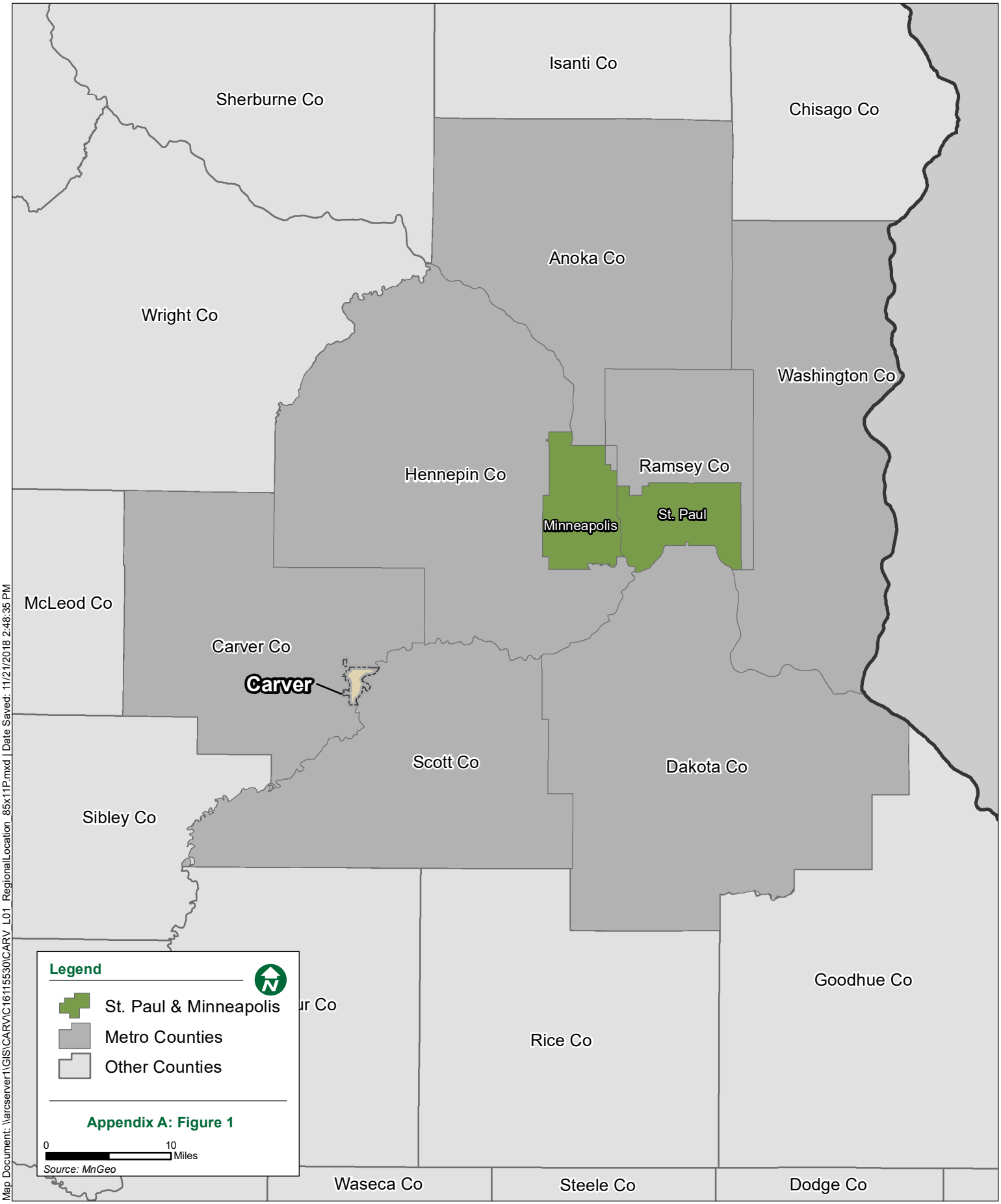
Surface Water Management Plan

Carver, MN

Regional Location Map

November 2018

BOLTON & MENK
Real People. Real Solutions.



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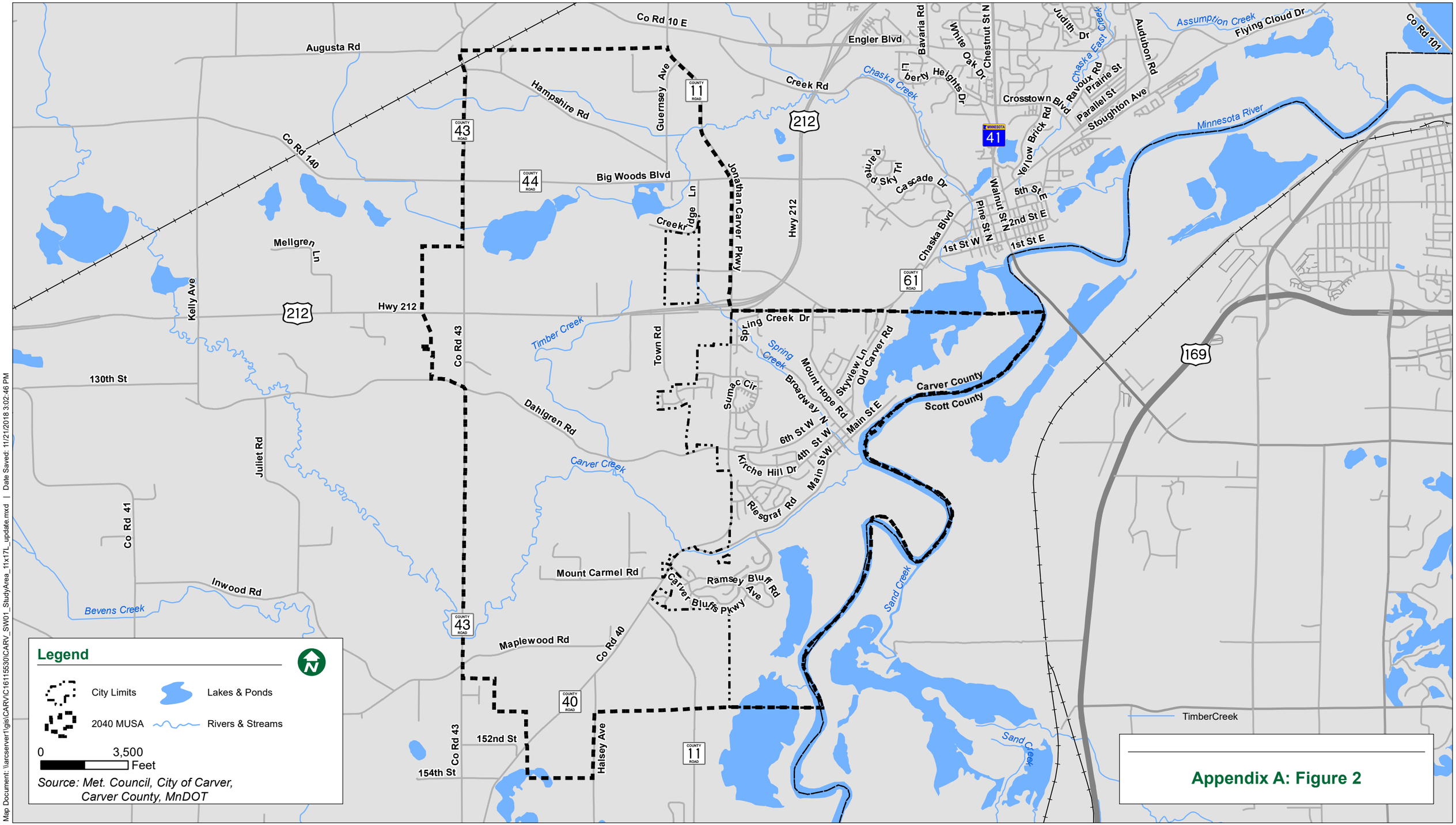

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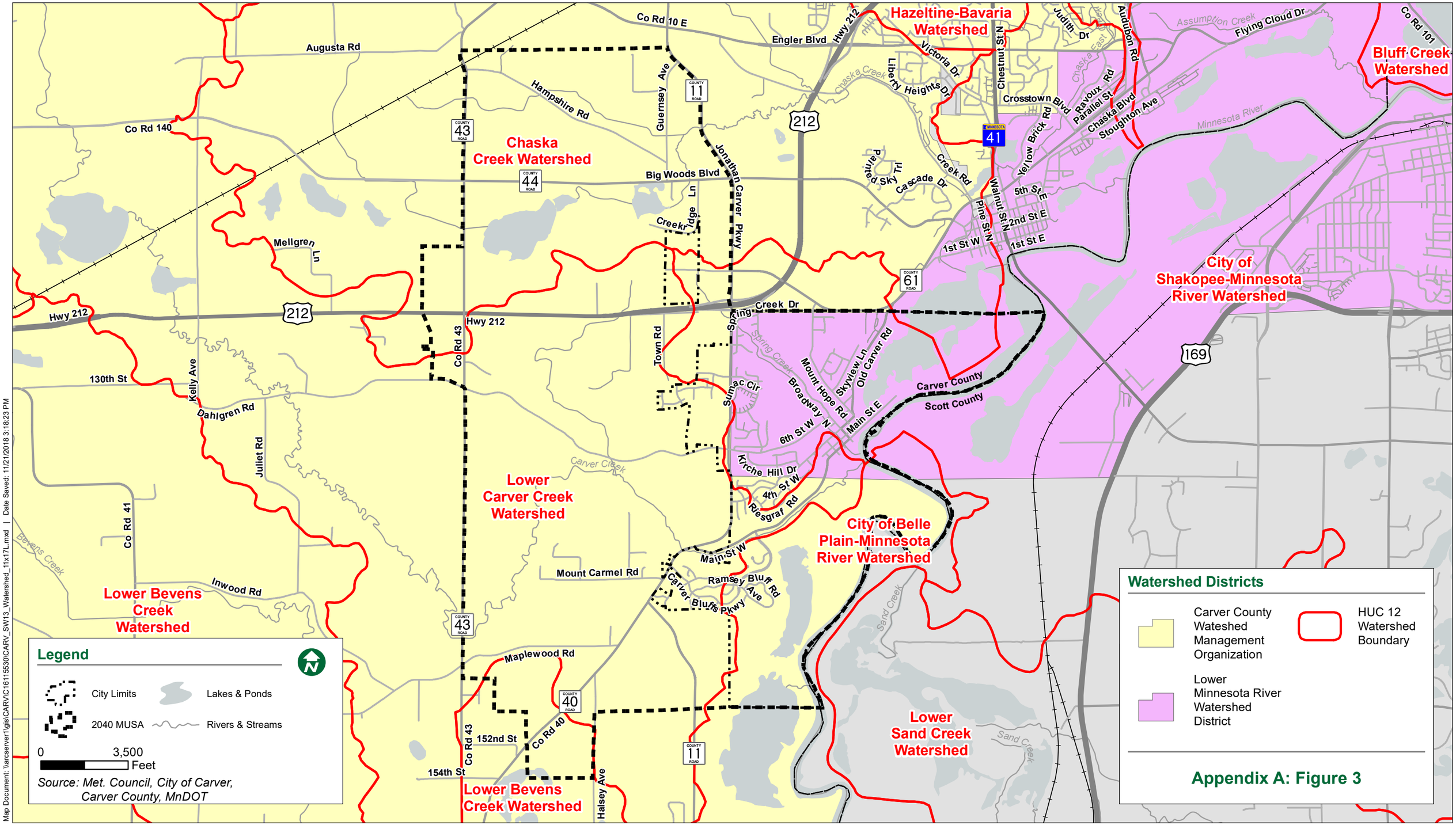
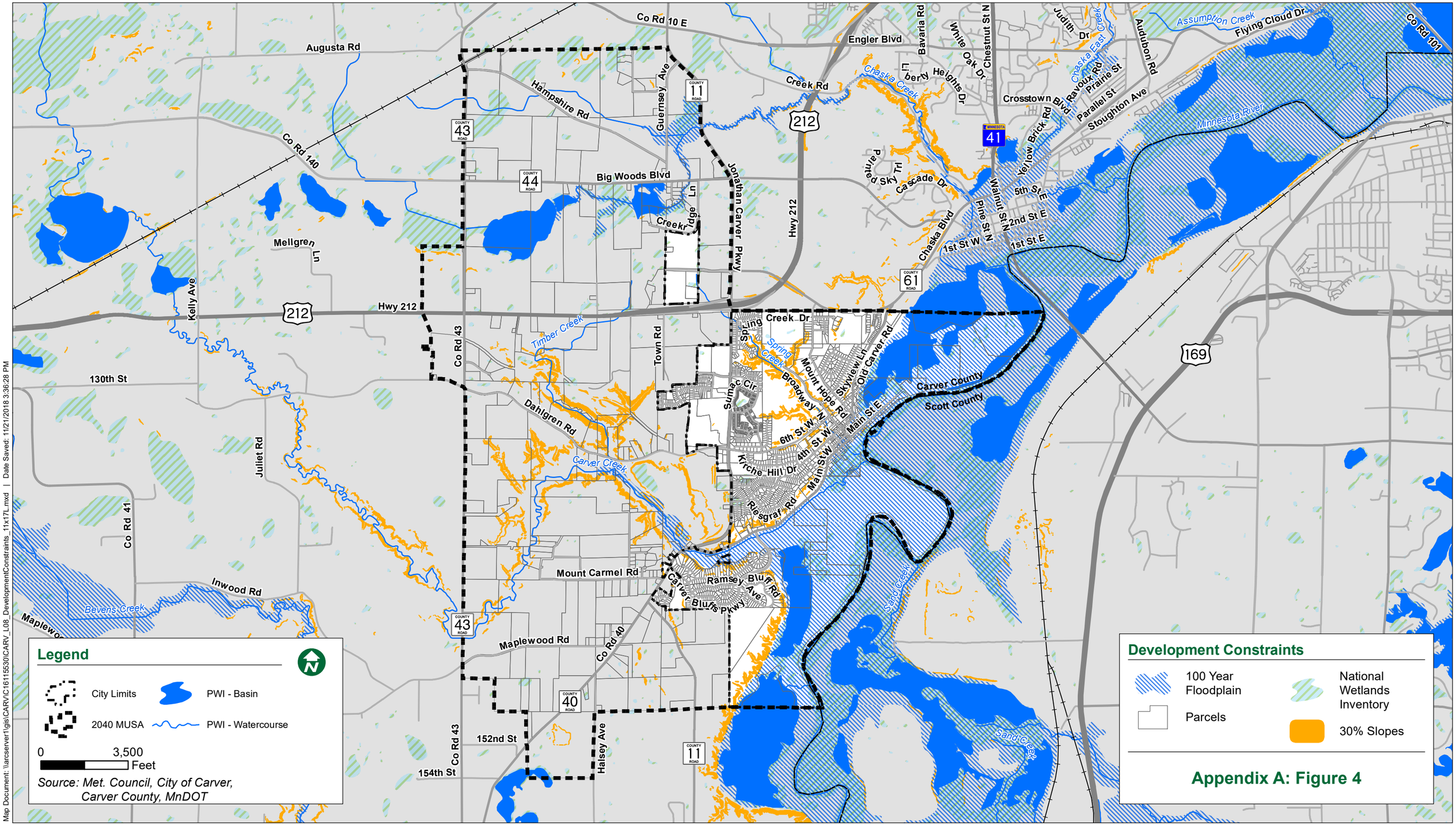
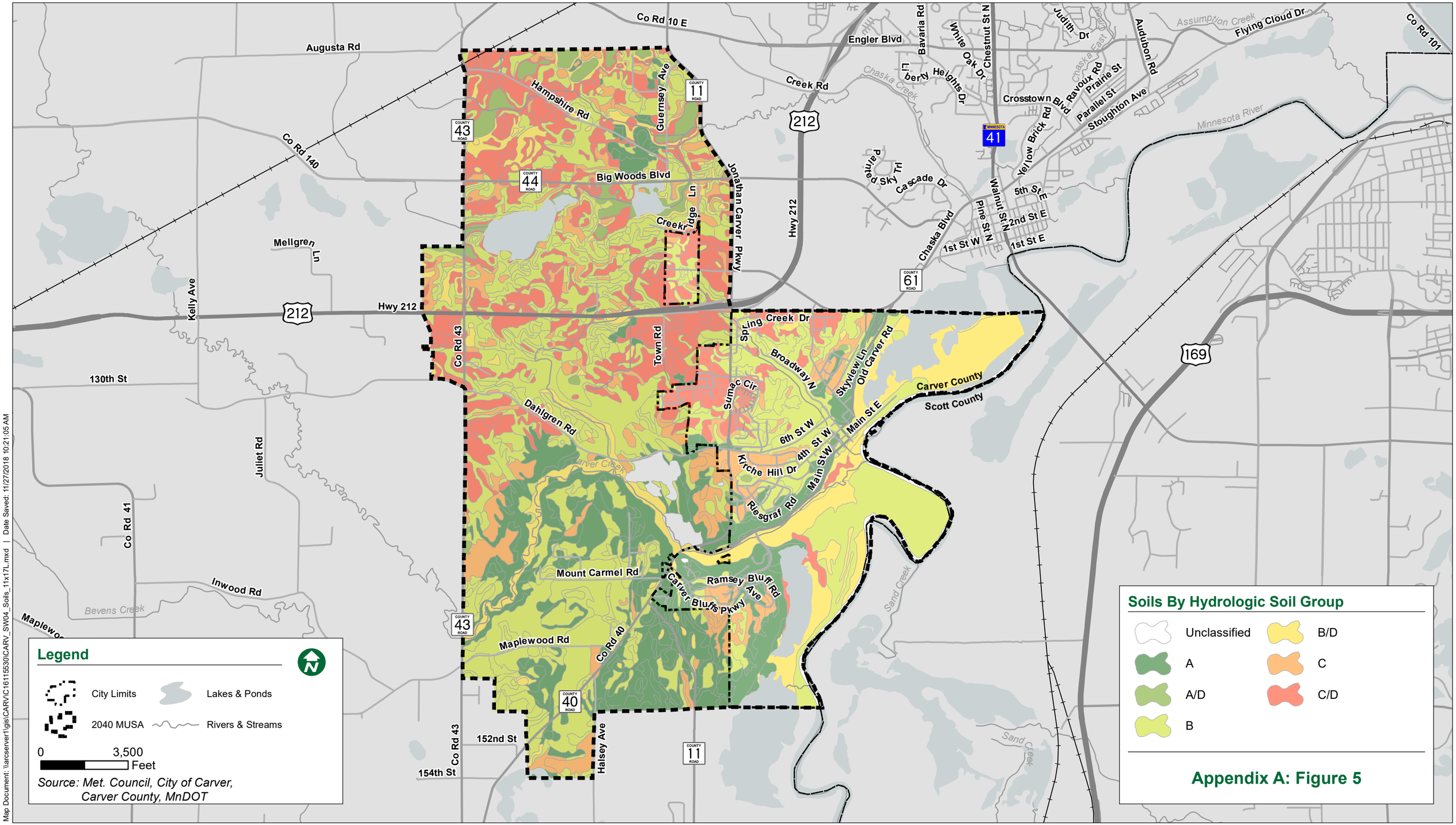

Hazeltine-Bavaria Watershed
Bluff Creek Watershed
Chaska Creek Watershed
City of Shakopee-Minnesota River Watershed
Lower Carver Creek Watershed
City of Belle Plain-Minnesota River Watershed
Lower Bevens Creek Watershed
Lower Sand Creek Watershed
Lower Bevens Creek Watershed
Carver County
Scott County
Co Rd 10 E
Engler Blvd
Hwy 212
Augusta Rd
Hampshire Rd
Guernsey Ave
Co Rd 140
Big Woods Blvd
Jonathan Carver Pkwy
Creekridge Ln
Mellgren Ln
Hwy 212
Co Rd 43
Town Rd
Spring Creek Dr
130th St
Kelly Ave
Dahlgren Rd
Juliet Rd
Co Rd 41
Bevens Creek
Inwood Rd
Carver Creek
Mount Carmel Rd
Maplewood Rd
152nd St
154th St
Co Rd 40
Halsey Ave
Victoria Dr
Liberty Heights Dr
Chaska Creek
Painted Sky Trl
Cascade Dr
Creek Rd
Chestnut St N
Judith Dr
Crosstown Blvd
Yellow Brick Rd
Walnut St N
Pine St N
5th St
2nd St E
1st St W
1st St E
Ravoux Rd
Parallel St
Chaska Blvd
Stoughton Ave
Audubon Rd
Assumption Creek
Flying Cloud Dr
Co Rd 101
Minnesota River
Sand Creek
Sumac Cir
Broadway N
Mount Hope Rd
Skyview Ln
Old Carver Rd
Main St E
6th St W
Kirche Hill Dr
4th St W
Riesgraf Rd
Main St W
Ramsey Bluff Rd
Carver Bluffs Pkwy
Legend
City Limits
Lakes & Ponds
2040 MUSA
Rivers & Streams
0
3,500
Feet
Source: Met. Council, City of Carver, Carver County, MnDOT
Watershed Districts
Carver County Wateshed Management Organization
HUC 12 Watershed Boundary
Lower Minnesota River Watershed District
Appendix A: Figure 3


Legend
City Limits
2040 MUSA
PWI - Basin
PWI - Watercourse
0
3,500
Feet
Source: Met. Council, City of Carver, Carver County, MnDOT
Development Constraints
100 Year Floodplain
Parcels
National Wetlands Inventory
30% Slopes
Appendix A: Figure 4
Augusta Rd
Co Rd 10 E
Engler Blvd
Hampshire Rd
Guernsey Ave
Creek Rd
Chaska Creek
Bavaria Rd
White Oak Dr
Chestnut St N
Judith Dr
Chaska East Creek
Audubon Rd
Assumption Creek
Flying Cloud Dr
Co Rd 101
Co Rd 140
Big Woods Blvd
Jonathan Carver Pkwy
Hwy 212
Painted Sky Trl
Cascade Dr
Crosstown Blvd
Ravoux Rd
Prairie St
Parallel St
Stoughton Ave
Minnesota River
Yellow Brick Rd
Walnut St N
5th St
2nd St E
Pine St N
1st St W
1st St E
Chaska Blvd
Mellgren Ln
Kelly Ave
Timber Creek
Town Rd
Spring Creek Dr
Spring Creek
Sumac Cir
Broadway N
Mount Hope Rd
Skyview Ln
Old Carver Rd
Carver County
Scott County
Main St E
6th St W
4th St W
Main St W
Kirche Hill Dr
Riesgraf Rd
Co Rd 43
130th St
Juliet Rd
Dahlgren Rd
Carver Creek
Co Rd 41
Mount Carmel Rd
Ramsey Ave
Bluff Rd
Carver Bluffs Pkwy
Sand Creek
Inwood Rd
Bevens Creek
Maplewood Rd
Co Rd 40
152nd St
154th St
Halsey Ave
169

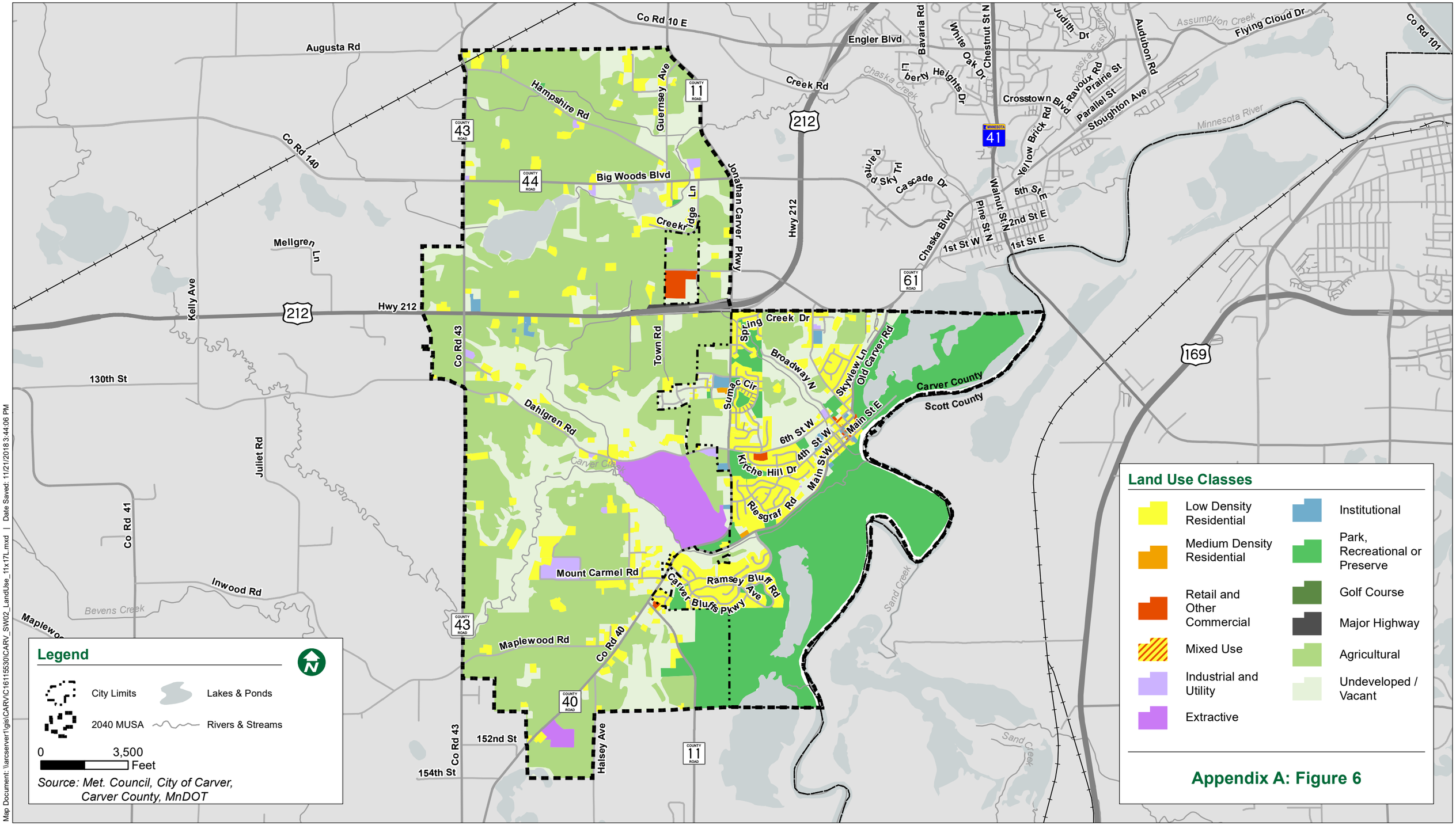


Appendix A: Figure 5

Map Document: \\arcserver1\gis\CARV\C16115530\CARV_SW04_Soils_11x17L.mxd | Date Saved: 11/27/2018 10:21:05 AM

Existing Land Use

December 2018

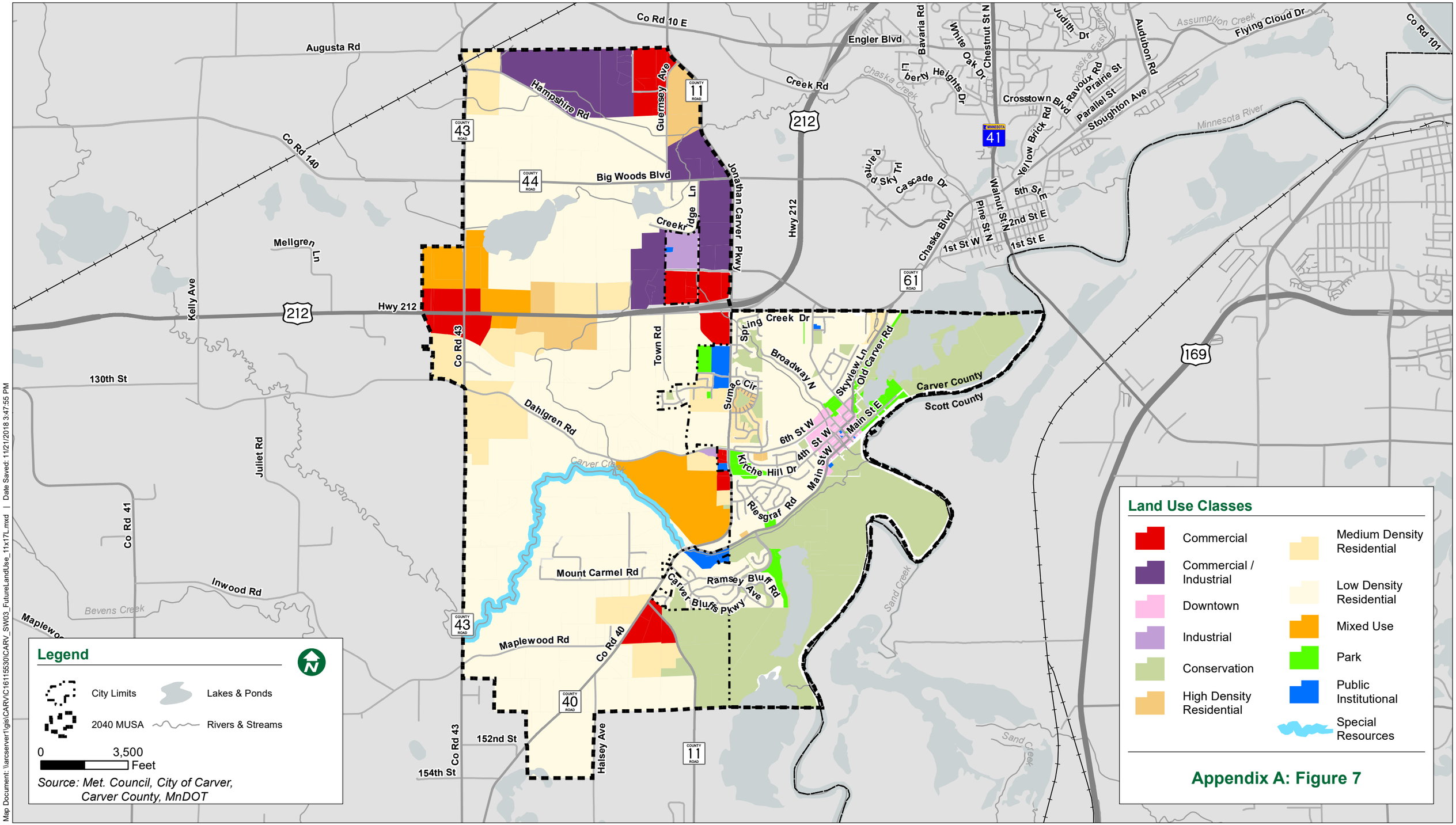


Appendix A: Figure 6

Map Document: \\arcserver1\gis\CARV\C16115530\CARV_SW02_LandUse_11x17L.mxd | Date Saved: 11/21/2018 3:44:06 PM

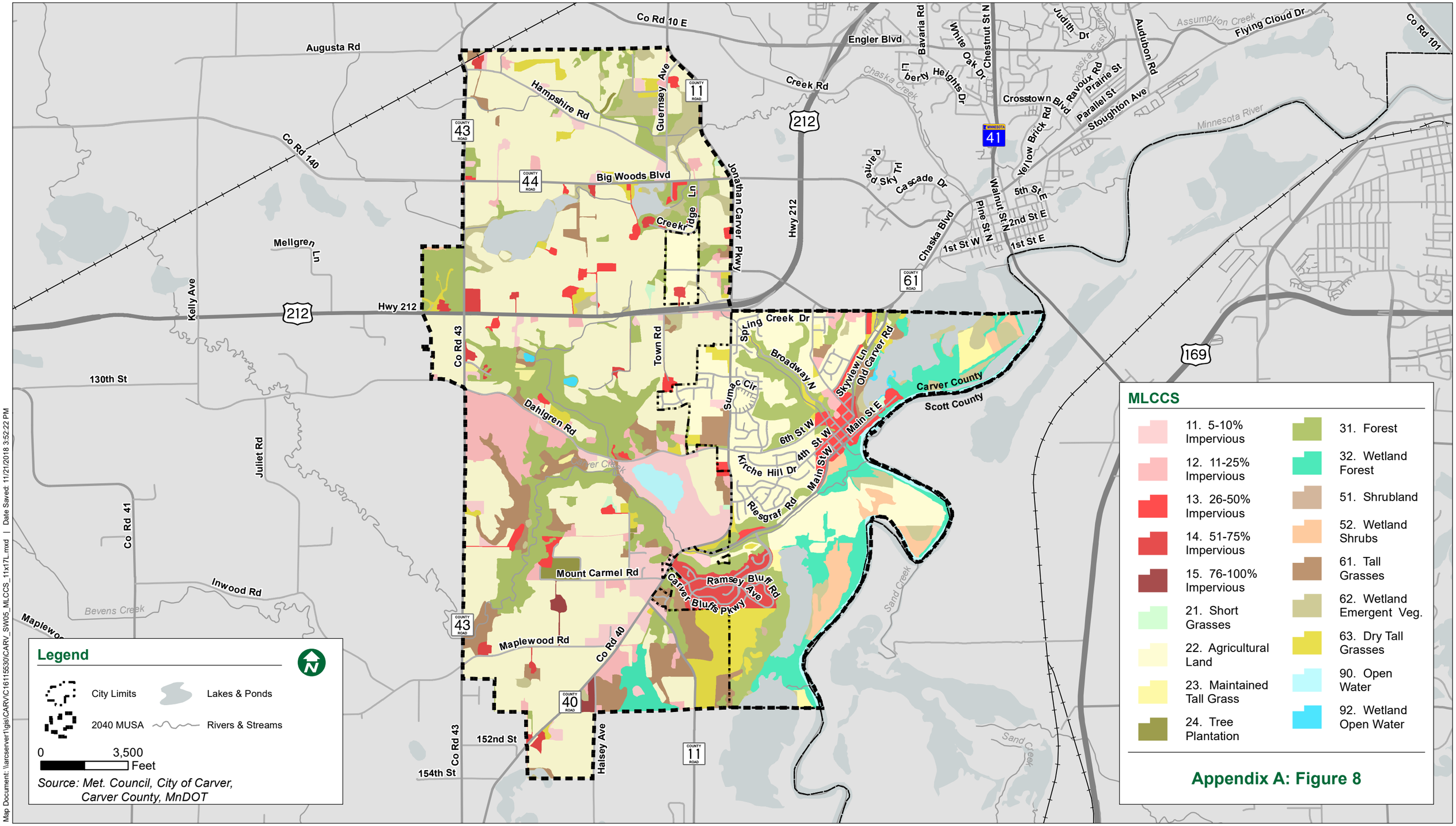
Future Land Use

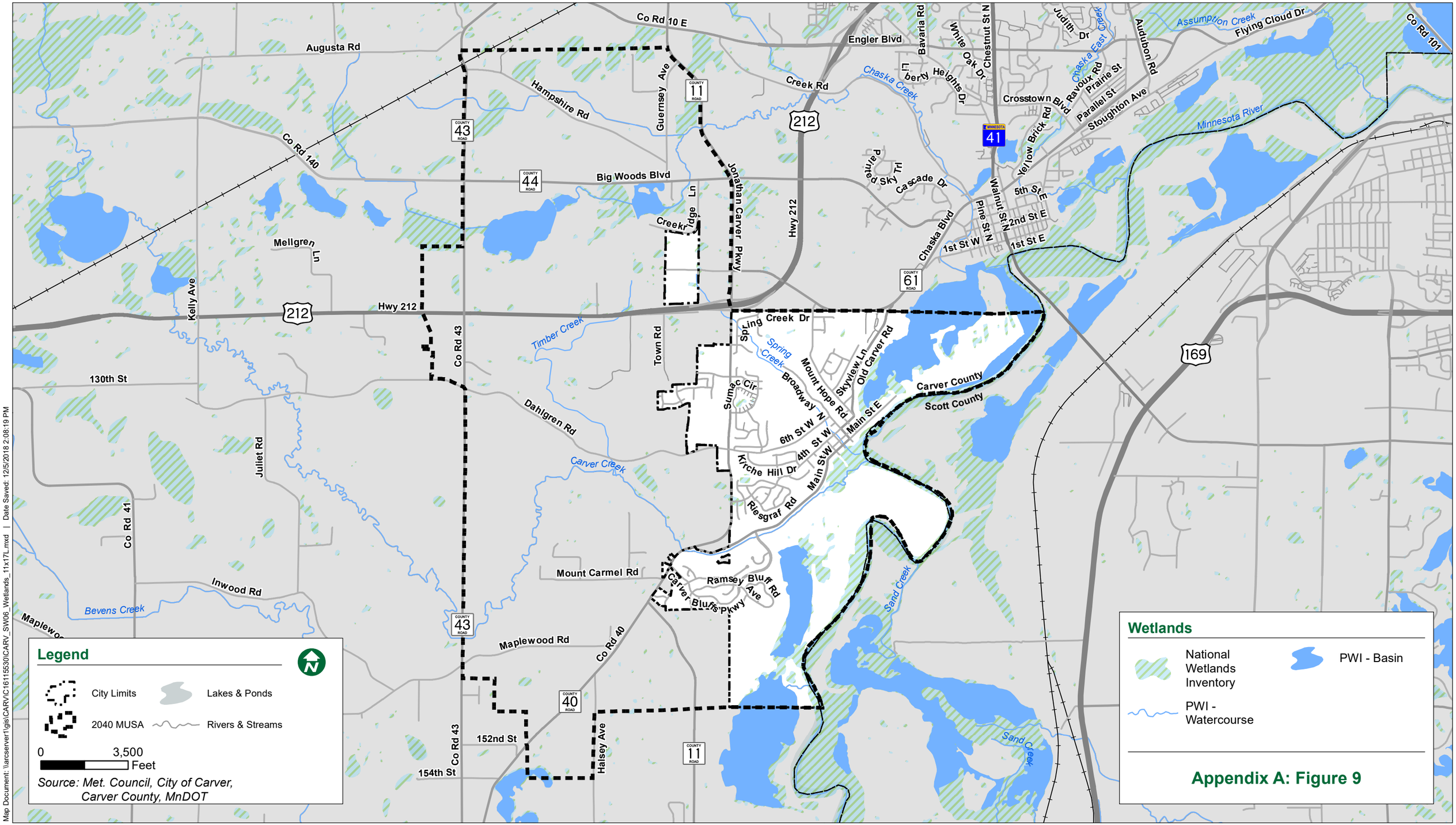
December 2018

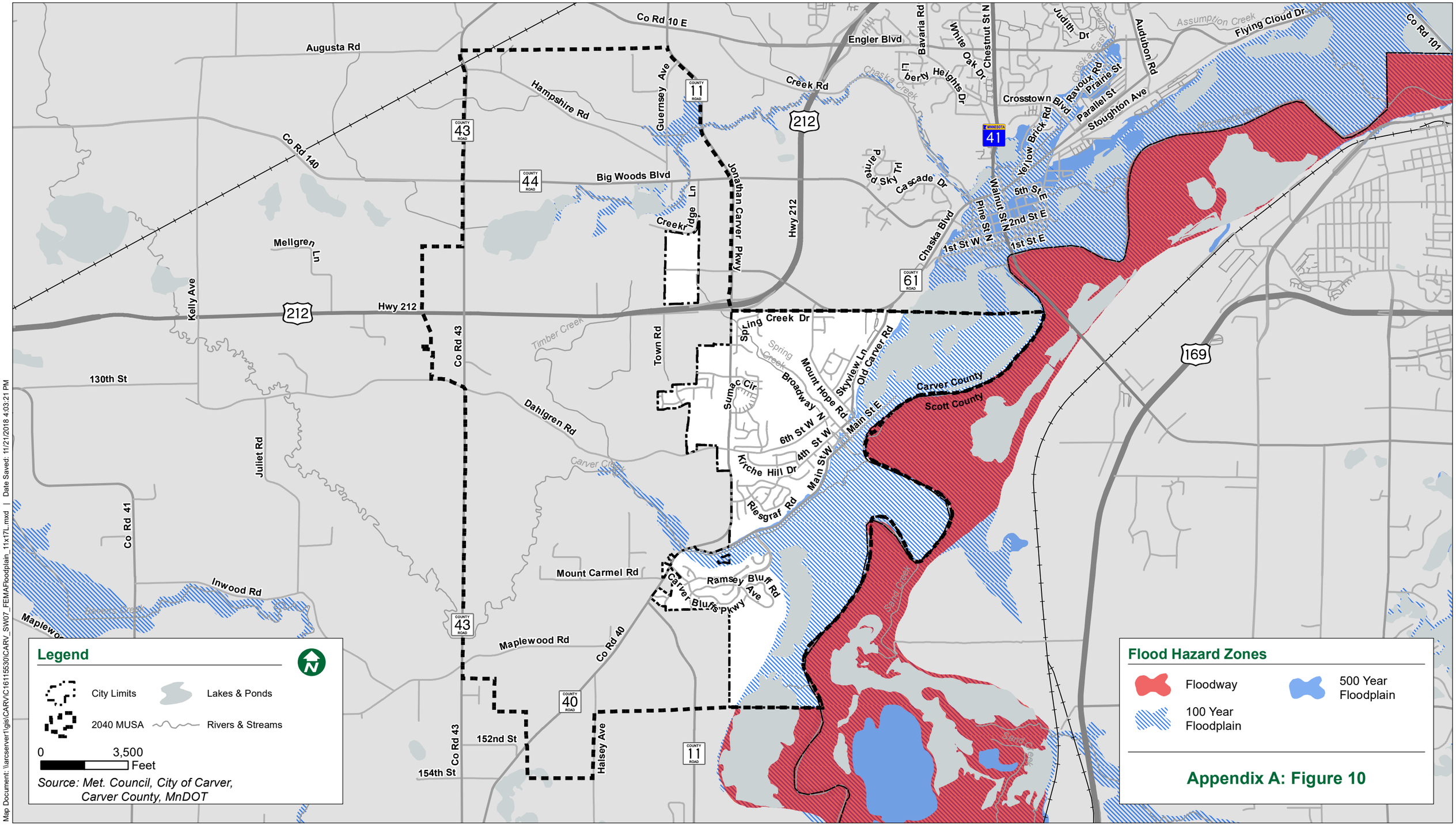


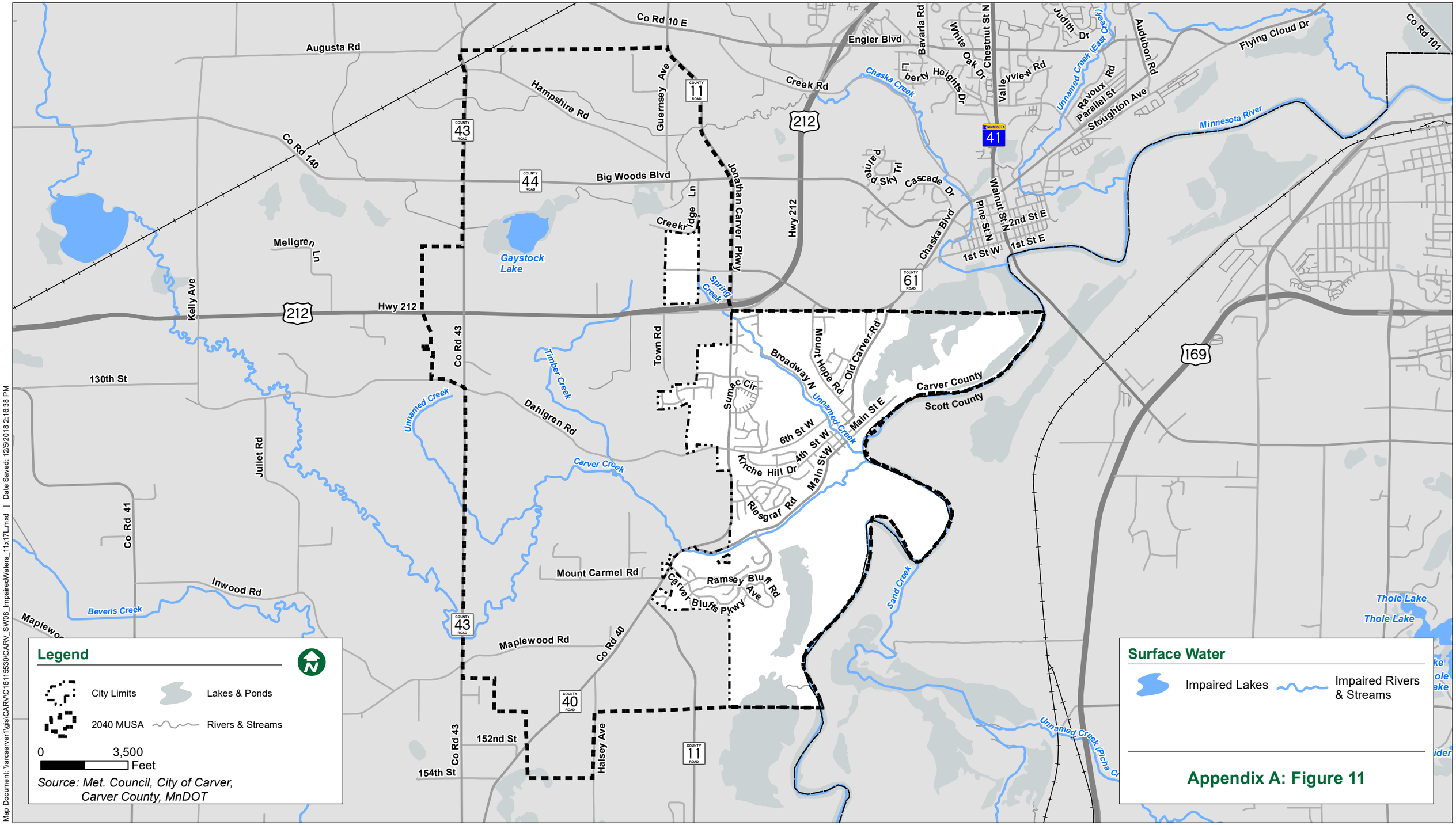
Appendix A: Figure 7

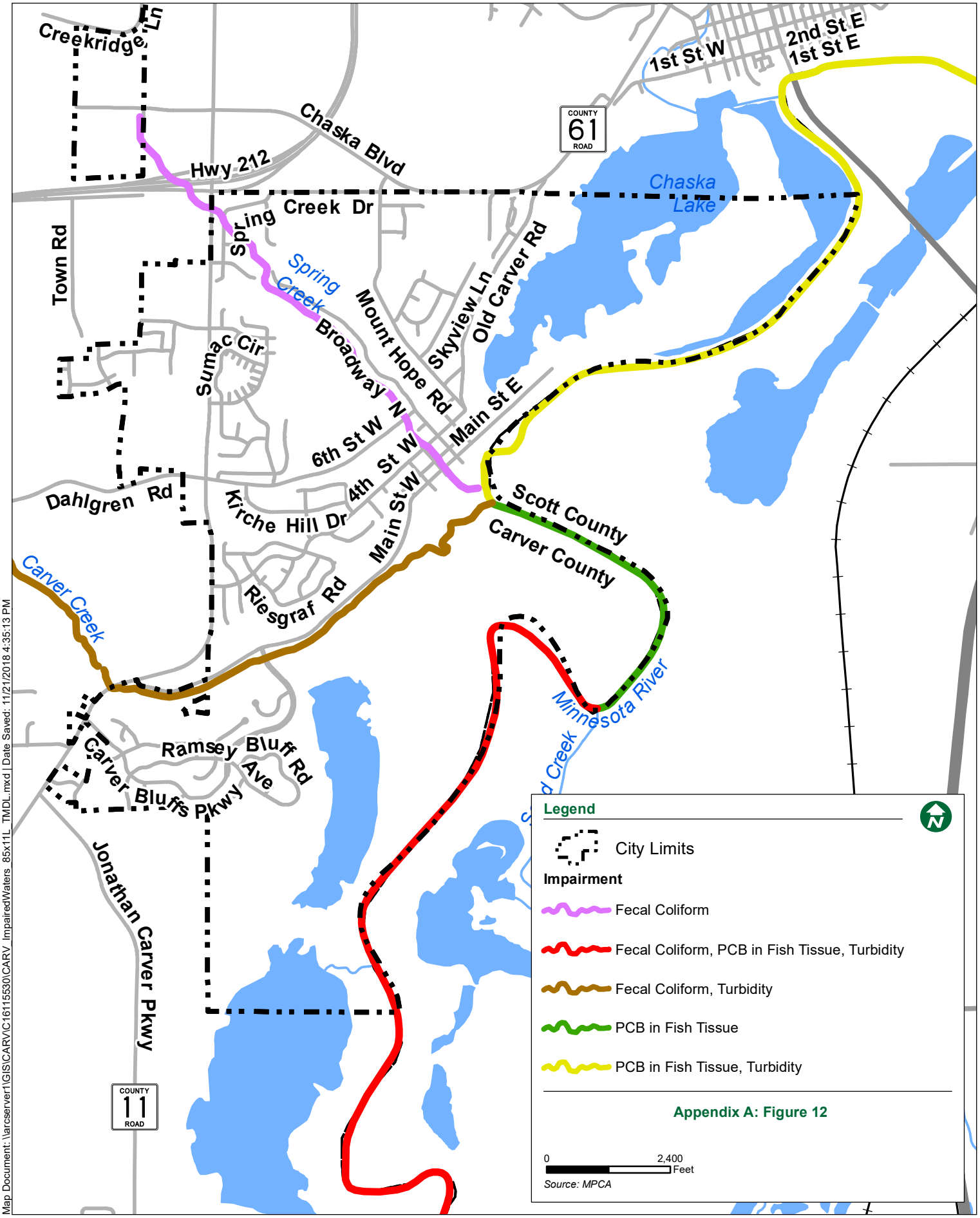
Map Document: \\arcserver1\gis\CARV\C16115530\CARV_SW03_FutureLandUse_11x17L.mxd | Date Saved: 11/21/2018 3:47:55 PM


Legend
City Limits
2040 MUSA
Lakes & Ponds
Rivers & Streams
0
3,500
Feet
Source: Met. Council, City of Carver, Carver County, MnDOT
MLCCS
11. 5-10% Impervious
12. 11-25% Impervious
13. 26-50% Impervious
14. 51-75% Impervious
15. 76-100% Impervious
21. Short Grasses
22. Agricultural Land
23. Maintained Tall Grass
24. Tree Plantation
31. Forest
32. Wetland Forest
51. Shrubland
52. Wetland Shrubs
61. Tall Grasses
62. Wetland Emergent Veg.
63. Dry Tall Grasses
90. Open Water
92. Wetland Open Water
Appendix A: Figure 8
Co Rd 10 E
Augusta Rd
Hampshire Rd
Guernsey Ave
Co Rd 140
Big Woods Blvd
Creekridge Ln
Jonathan Carver Pkwy
Hwy 212
Engler Blvd
Creek Rd
Chaska Creek
Bavaria Rd
White Oak Dr
Chestnut St N
Judith Dr
Chaska East Creek
Audubon Rd
Assumption Creek
Flying Cloud Dr
Co Rd 101
Liberty Heights Dr
Crosstown Blvd
Ravoux Rd
Prairie St
Parallel St
Stoughton Ave
Minnesota River
Painted Sky Trl
Cascade Dr
Yellow Brick Rd
Walnut St N
5th St
2nd St E
1st St E
1st St W
Pine St N
Chaska Blvd
Mellgren Ln
Kelly Ave
Co Rd 43
Town Rd
Spring Creek Dr
Broadway N
Sumac Cir
Skyview Ln
Old Carver Rd
Carver County
Scott County
Main St E
Main St W
6th St W
4th St W
Dahlgren Rd
Carver Creek
Krche Hill Dr
Riesgraf Rd
130th St
Juliet Rd
Co Rd 41
Inwood Rd
Bevens Creek
Mount Carmel Rd
Ramsey Bluff Rd
Carver Bluffs Pkwy
Sand Creek
Maplewood Rd
Co Rd 40
152nd St
154th St
Halsey Ave
Hwy 169
Hwy 41


Co Rd 10 E
Engler Blvd
Augusta Rd
Hampshire Rd
Guernsey Ave
Creek Rd
Chaska Creek
Bavaria Rd
White Oak Dr
Chestnut St N
Judith Dr
Chaska East Creek
Audubon Rd
Assumption Creek
Flying Cloud Dr
Co Rd 101
Liberty Heights Dr
Crosstown Blvd
Ravoux Rd
Prairie St
Parallel St
Stoughton Ave
Minnesota River
Co Rd 140
Big Woods Blvd
Jonathan Carver Pkwy
Hwy 212
Painted Sky Trl
Cascade Dr
Yellow Brick Rd
Walnut St N
5th St
Pine St N
2nd St E
1st St W
1st St E
Chaska Blvd
Creekridge Ln
Mellgren Ln
Kelly Ave
Hwy 212
Spring Creek Dr
Spring Creek
Timber Creek
Town Rd
Co Rd 43
Sumac Cir
Broadway N
Mount Hope Rd
Skyview Ln
Old Carver Rd
Main St E
Carver County
Scott County
169
130th St
Dahlgren Rd
6th St W
4th St W
Main St W
Krche Hill Dr
Riesgraf Rd
Carver Creek
Juliet Rd
Co Rd 41
Mount Carmel Rd
Ramsey Bluff Rd
Carver Bluffs Pkwy
Sand Creek
Inwood Rd
Bevens Creek
Maplewood Rd
Co Rd 40
152nd St
154th St
Halsey Ave
Legend
City Limits
Lakes & Ponds
2040 MUSA
Rivers & Streams
0
3,500
Feet
Source: Met. Council, City of Carver, Carver County, MnDOT
Wetlands
National Wetlands Inventory
PWI - Basin
PWI - Watercourse
Appendix A: Figure 9


Co Rd 10 E
Augusta Rd
Hampshire Rd
Guernsey Ave
Co Rd 140
Big Woods Blvd
Jonathan Carver Pkwy
Creekridge Ln
Hwy 212
Engler Blvd
Creek Rd
Chaska Creek
Bavaria Rd
White Oak Dr
Chestnut St N
Liberty Heights Dr
Judith Dr
Audubon Rd
Assumption Creek
Flying Cloud Dr
Co Rd 101
Crosstown Blvd
Ravoux Rd
Prairie St
Parallel St
Stoughton Ave
Yellow Brick Rd
Painted Sky Trl
Cascade Dr
Walnut St N
5th St
2nd St E
1st St E
1st St W
Pine St N
Chaska Blvd
Mellgren Ln
Kelly Ave
Hwy 212
Timber Creek
Co Rd 43
Town Rd
Spring Creek Dr
Spring Creek
Mount Hope Rd
Skyview Ln
Old Carver Rd
Broadway N
Sumac Cir
Carver County
Scott County
Main St E
6th St W
4th St W
Main St W
Kirche Hill Dr
Riesgraf Rd
130th St
Juliet Rd
Dahlgren Rd
Carver Creek
Co Rd 41
Inwood Rd
Mount Carmel Rd
Ramsey Bluff Rd
Carver Bluffs Pkwy
Ave
Maplewood Rd
Co Rd 40
152nd St
154th St
Halsey Ave
Sand Creek
Legend
City Limits
2040 MUSA
Lakes & Ponds
Rivers & Streams
0
3,500
Feet
Source: Met. Council, City of Carver, Carver County, MnDOT
Flood Hazard Zones
Floodway
100 Year Floodplain
500 Year Floodplain
Appendix A: Figure 10


Legend
City Limits
2040 MUSA
Lakes & Ponds
Rivers & Streams
0
3,500
Feet
Source: Met. Council, City of Carver, Carver County, MnDOT
Surface Water
Impaired Lakes
Impaired Rivers & Streams
Appendix A: Figure 11
Augusta Rd
Co Rd 10 E
Engler Blvd
Bavaria Rd
White Oak Dr
Chestnut St N
Judith Dr
Audubon Rd
Flying Cloud Dr
Co Rd 101
Hampshire Rd
Guernsey Ave
Creek Rd
Chaska Creek
Liberty Heights Dr
Valleyview Rd
Unnamed Creek (East Creek)
Ravoux Rd
Parallel St
Stoughton Ave
Minnesota River
Co Rd 140
Big Woods Blvd
Jonathan Carver Pkwy
Hwy 212
Painted Sky Trl
Cascade Dr
Walnut St N
Pine St N
2nd St E
1st St W
1st St E
Chaska Blvd
Creekridge Ln
Mellgren Ln
Gaystock Lake
Spring Creek
Kelly Ave
Hwy 212
Co Rd 43
Town Rd
Timber Creek
Broadway N
Mount Hope Rd
Old Carver Rd
Carver County
Scott County
169
130th St
Unnamed Creek
Dahlgren Rd
Sumac Cir
Unnamed Creek
Main St E
6th St W
4th St W
Main St W
Kirche Hill Dr
Riesgraf Rd
Carver Creek
Juliet Rd
Co Rd 41
Mount Carmel Rd
Ramsey Bluff Rd
Carver Bluffs Pkwy
Sand Creek
Inwood Rd
Bevens Creek
Maplewood Rd
Co Rd 40
Thole Lake
Thole Lake
152nd St
154th St
Halsey Ave
Unnamed Creek (Picha Cr


Creekridge Ln
Chaska Blvd
Hwy 212
Town Rd
Spring Creek Dr
Spring Creek
Sumac Cir
Broadway N
Mount Hope Rd
Skyview Ln
Old Carver Rd
Main St E
6th St W
4th St W
Main St W
Dahlgren Rd
Kirche Hill Dr
Riesgraf Rd
Carver Creek
Ramsey Bluff Rd
Carver Bluffs Pkwy
Ave
Jonathan Carver Pkwy
COUNTY 11 ROAD
COUNTY 61 ROAD
1st St W
2nd St E
1st St E
Chaska Lake
Scott County
Carver County
Minnesota River
Legend
City Limits
Impairment
Fecal Coliform
Fecal Coliform, PCB in Fish Tissue, Turbidity
Fecal Coliform, Turbidity
PCB in Fish Tissue
PCB in Fish Tissue, Turbidity
Appendix A: Figure 12
0
2,400
Feet
Source: MPCA

Design Carver

Surface Water Management Plan

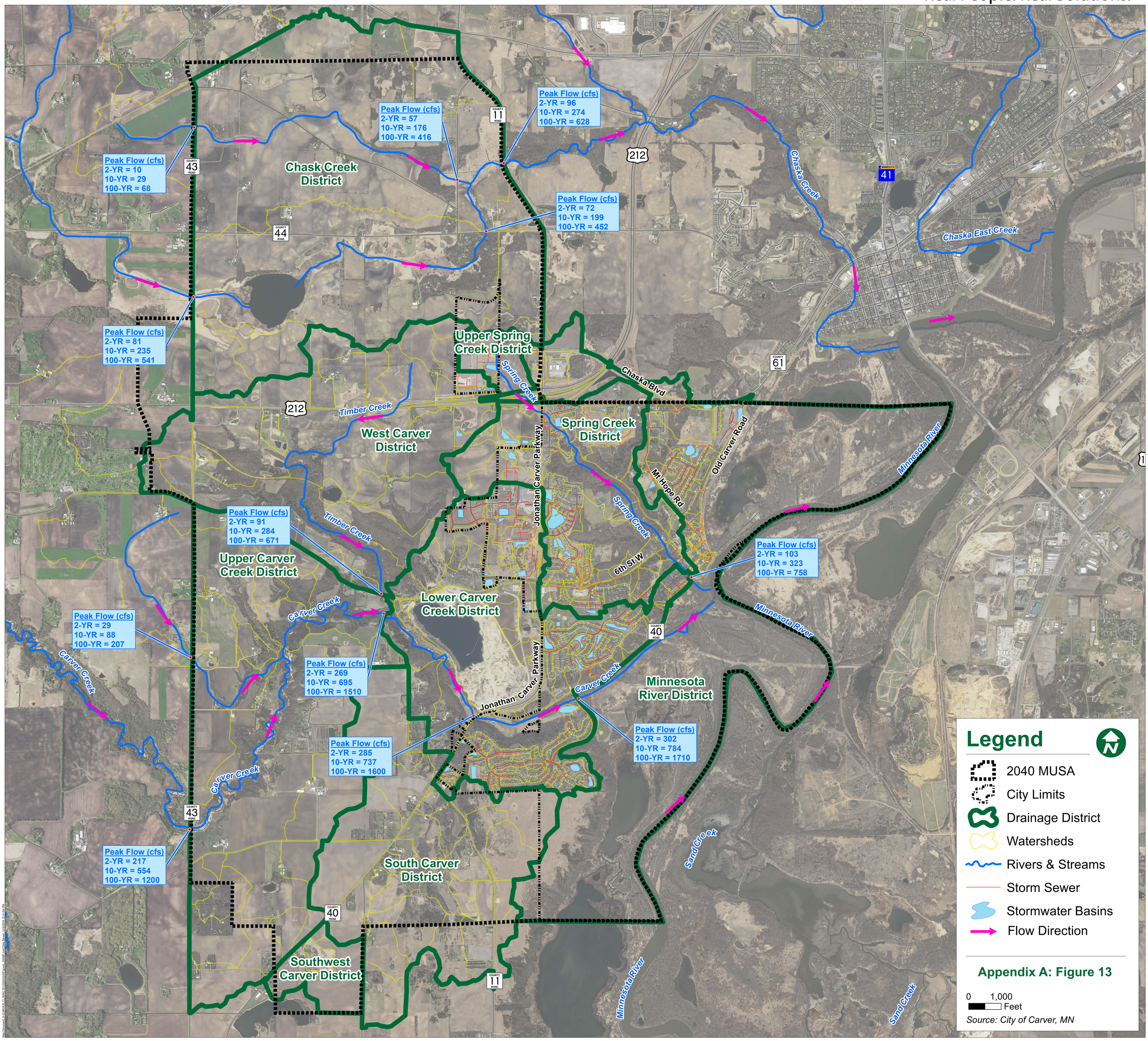
City of Carver, MN

Drainage Area Map

December, 2018

BOLTON & MENK

Real People. Real Solutions.



Design Carver

Surface Water Management Plan

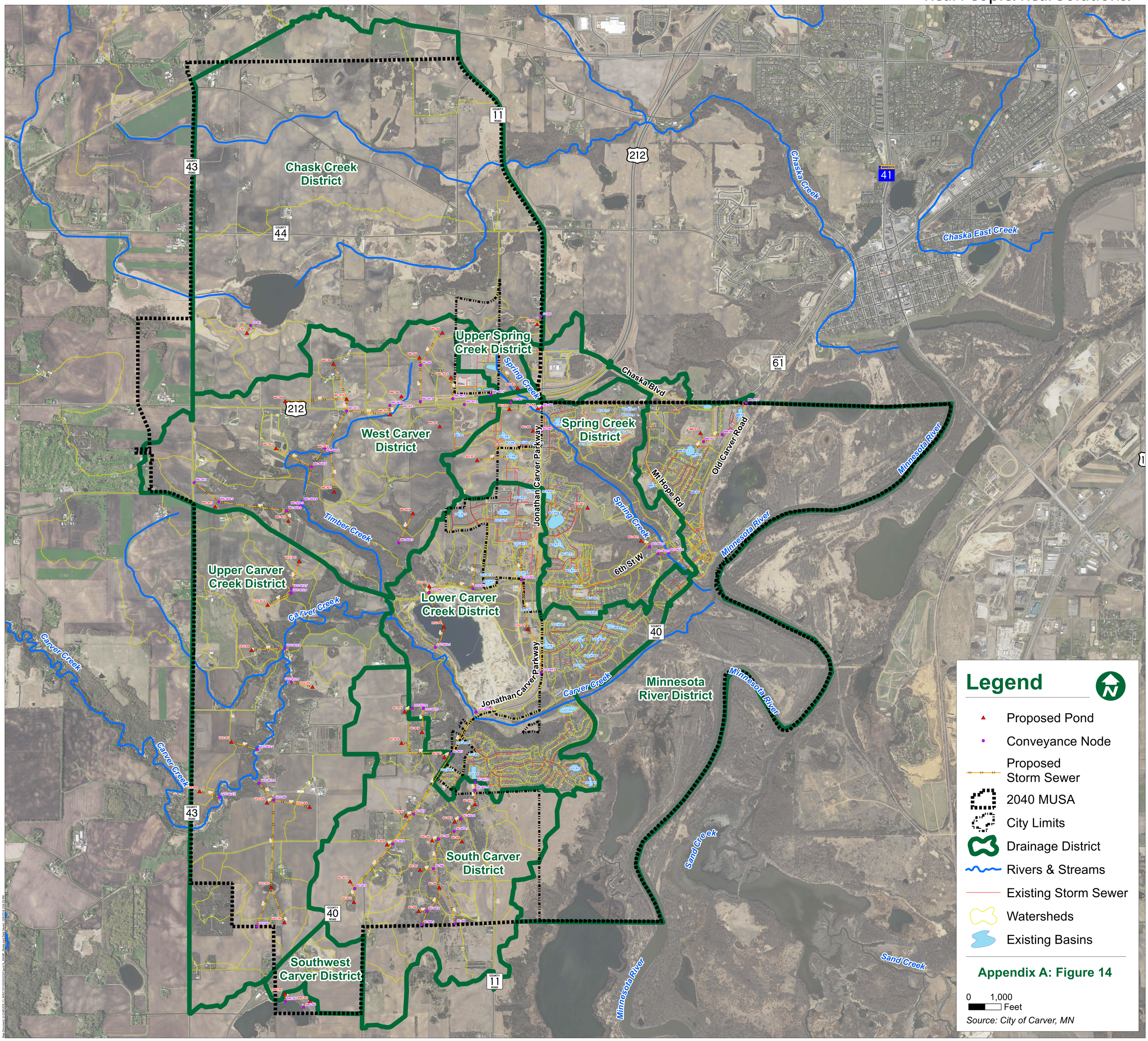
City of Carver, MN

Model

December, 2018

BOLTON & MENK

Real People. Real Solutions.



City of Carver Stormwater Design Standards

This document provides a summary of the City of Carver's stormwater design standards. This document is meant to be a working document that should be updated periodically to remain current with the City current standards.

Runoff Coefficients and Curve Numbers[1,2]

Land Use Type	Runoff Coefficient C[3] 10-Year	CN Value[4]
Bluff/Ravine	0.10 - 0.18	50 - 58
Public/Open Space	0.22	61
Pasture, Continuous Hay	0.22	61
Row Crop	0.26	64[5]
Low Density Residential	0.42	74
Medium Density Residential, Mixed Density Residential	0.49	78
High Density Residential	0.69	88
Commercial, Commercial/Industrial, Mixed Commercial Industrial	0.74	90
Ponds	1.0	100
Special	As required by the City Engineer	

[1]The developed CN values should be adjusted for specific site conditions, including the percentage of impervious surface and site soil conditions.

[2]The runoff coefficient and curve number values in the table above are based on uncompacted Hydrologic Soil Group B soils.

[3]These runoff coefficients provide guidance when designing storm sewer systems to meet the City standard 10-year rational design.

[4]These CN values provide guidance when designing stormwater ponding facilities for all storm events.

[5]The CN value for row crop reflects a normal peak growth condition for Hydrologic Sof Group B soils (NRCS National Engineering Handbook Chapter 10).

1. The runoff coefficients and CN values presented in the table above should be used as the basis for generating hydrology in all stormwater design calculations.
2. At the time of final design, the runoff coefficients and curve numbers selected should reflect the actual or estimated amount of impervious surface.
3. The pond design hydrology should be calculated using a 6.0-inch 24-hour rainfall event, using an SCS Type II rainfall distribution. Until such time as the Atlas 14 rainfall depths and distributions become the industry standard or are required by a permitting agency, the City may require a parallel analysis of a proposed facility using the Atlas 14 rainfall depths and distributions.

Storm Sewer Design

1. Storm sewers should be designed to a 10-year storm event based on the rational method using Intensity Duration Frequency (IDF) curves from the most current IDF curve guidance from MnDOT.
2. The minimum time of concentration value is 7 minutes.
3. Storm sewer capacity should be calculated using Manning's equation.
4. In cases where the storm sewer barrel capacity exceeds the pipe inlet capacity, the maximum pipe inlet capacity assuming no more than 1 foot of head shall govern the pipe size.
5. A Manning's roughness coefficient (n) of 0.011 should be used for PVC pipe, 0.013 for concrete storm sewer pipe, and 0.024 for corrugated metal pipe.
6. Storm sewer grades should maintain full-flow velocities between the self-cleaning velocity of 3 feet per second (fps) and a maximum of 10 fps.
7. The city's proposed trunk storm sewer system is designed to convey ponded flow only and where local flows are added to the system, the cost for upsizing the pipe should be borne by the area contributing the additional flows.
8. Trunk storm sewer should be designed to accommodate the 100-year ponded discharge plus the tributary 10-year rational flow to the next downstream stormwater basin.
9. Spacing of storm sewer manholes should be no greater than 400 feet between manholes.
10. Storm sewer inlets should be placed and located to eliminate overland flow in excess of 400 feet.
11. Storm sewer inlet design capacity should not exceed 3 cfs per inlet.
12. Overland drainage routes where velocities exceed 4 fps should be reviewed and approved by the City.
13. Unlined open channels and overland drainage routes should be designed to a slope no flatter than 2%.
14. Side slopes for open channels and overland drainage swale should be no steeper than 4:1 (horizontal to vertical) with gentler slopes being desirable.
15. Storm sewer manholes should normally be provided at all junction points and at points of abrupt alignment or grade changes.
16. The design of multiple low points on streets is desirable to reduce catch basin bypass and distribute street ponding.
17. The maximum depth of temporary street ponding should not exceed two feet at the deepest point, and the lowest exposed building elevation should be at least one foot above the high-water level.
18. Inlet and outlet pipes of stormwater ponds should be extended to the pond normal water
19. level whenever possible.
20. Storm sewer outfall velocities should not exceed 6 fps and should include a designed riprap

energy dissipation outlet.

21. In cases where outlet velocities cannot be kept below 6 fps, the method of outlet energy dissipation should be based on the unique site conditions present and must be approved by the City Engineer.
22. Sanitary sewer manholes that could be subject to temporary inundation should be equipped with watertight castings.
23. Sanitary manholes located near ponding areas should be raised above the 100-year High Water Level (HWL) and the adjacent areas filled when access is required at all times.
24. Future storm drainage construction should include provisions for improving the water-tightness of nearby sanitary sewer manholes.
25. All newly constructed sanitary manholes in the vicinity of ponding areas and open channels should be waterproof.

Pond Design

1. The location and size of the regional basins identified in the SWMP are conceptual in nature, and at the time of development the location and size of these basins can be modified as long as the necessary rate control is achieved and the City Engineer finds the design acceptable.
2. In situations where a drainage area is a portion of a larger drainage sub-district, or spans multiple drainage sub-districts, the rate control requirement should be calculated on a 100-year flow per acre (or cfs/acre) basis.
3. Splitting the rate control burden of a single basin into a series of smaller basins is an acceptable option to meet the City's rate control requirement.
4. Pond outlet orifices for rate control should be no smaller than 6-inches in diameter, unless approved by the City Engineer.
5. The maximum allowable pond bounce for the 100-year design is 10 feet, although less pond bounce is desirable to minimize pond slope vegetation inundation times.
6. Where feasible, local and regional water quality ponds should be designed "off-line" from the upstream watershed to prevent the flushing of water quality ponds prior to treatment of direct drainage.
7. Wet ponds should be designed with no less than a 3 foot average depth (average depth = pond volume/pond surface area at Normal Water Level — NWL.
8. Wet ponds should include a 10 foot wide safety/aquatic bench at a 10:1 slope starting at the pond NWL and extending around the entire pond.
9. Pond slopes below the safety/aquatic bench should be no steeper than 3:1.
10. A 10 foot wide maintenance bench at a 10:1 slope set 1 foot above the pond NWL should extend around the entire pond, unless and alternative design is approved by the City Engineer.
11. The maintenance bench should be tied into a 10-foot wide access path connecting to a street, parking lot, or other point of entry for maintenance vehicles.

12. Pond slopes above the maintenance bench should be no steeper than 4:1.
13. The City's standard outlet skimmer structure should be used, unless approved by the City Engineer.
14. Outlet skimmer structures should be installed on all storm water basins, unless otherwise directed by the City Engineer.
15. Outlet skimmer structures should be designed to skim floatables up to the 5-yr pond HWL.
16. If wetlands are proposed to be used for providing rate control, adjustments to the existing outlet elevation, maximum bounce, and inundation period must be in compliance with the standards established in the City's *2002 Wetland Inventory and Assessment.*
17. Provisions should be made to provide or preserve overland drainage routes for pond emergency overflows.
18. A pond as-built survey is required to determine if the constructed pond meets the approved design volumes. If the survey indicates that the pond volumes are less than the design volumes, the developer is required to regrade the pond per the design standards prior to the release of the letter of credit.

Soil Amendment

The City requires that following mass grading operations, the site should be deep ripped to a depth of 12-inches, with a maximum distance of two feet between rips. Note: Carver County Rules offer a volume control credit for soil amendment practices that include deep ripping.

Stormwater Best Management Practices

Stormwater Best Management Practices (BMPs) are techniques, methods, and measures that prevent or reduce water pollution in runoff. These practices may include regulations, structural features, and operation and maintenance procedures.

The protection of existing waterbodies and the correction of existing water quality problems require the use of appropriate planning principles and the consistent application of BMPs to new developments. In the context of this SWMP, the BMPs address the following issues:

- The control of urban non-point source pollutants,
- Site planning principles for the control of erosion, pollution, and sedimentation, and Surface water management practices for the control of water quality.

The City of Carver encourages the use of any number of structural BMPs to meet City water quality requirements, such as:

Bioretention — small vegetated depressional areas utilizing infiltration, filtration, and/or vegetative uptake to provide pollutant removal.

Filtration — basins, depressions, or buffers designed to improve water quality treatment by routing runoff through a filter media, typically located in areas where infiltration is not feasible.

Infiltration — basins, depressions, or buffers located in areas containing permeable soils designed to

capture runoff and allow it to percolate into the soil, reducing pollutant loads and runoff volumes.

Wet Ponding — detention basins designed to remove pollutants by means of physical settling and biological uptake.

Stormwater Wetlands — constructed basins designed to function like natural wetlands, removing pollutants by means of vegetative interaction and settling.

Structural Treatment Devices — specially designed tank units that use certain hydraulic principles to remove suspended particles in stormwater runoff. Typically, the types of devices are used in conjunction with other BMPs to meet City water quality requirements.

Further information regarding the BMPs mentioned above can be found in the MPCA's *Protecting Water Quality in Urban Areas* (2000), the Metropolitan Council's Minnesota Urban Small Sites BMP Manual (2001), and the *Minnesota Stormwater Manual* (2005). This SWMP supports the recommendations outlined in these and any future revisions to these documents, provided that future revisions to these documents are consistent with City policies and requirements at that time.

AGREEMENT
BETWEEN
THE LOWER MINNESOTA RIVER WATERSHED DISTRICT
AND
THE CITY OF CARVER

ORIGINAL

Agreement
Between Lower Minnesota River Watershed District
and
City of Carver

Whereas,

The Lower Minnesota River Watershed District (LMRWD) adopted and the Minnesota Board of Water and Soil Resources (BWSR) approved the LMRWD Water Management Plan (Plan), which was prepared in accordance with Minnesota Statutes 103D and 103B, and Minnesota Rules 8410; and

Whereas,

The LMRWD Managers envision the District will provide leadership, encompassing (in descending priority) the roles of information and data provider; project facilitator; project proposer; and regulator regarding Minnesota River issues; and

Whereas,

The LMRWD Managers believe that regulation is more properly performed by local governmental units, provided that regulation by the local governmental units is consistent with the goals and policies of the LMRWD Plan; and

Whereas,

The City of Carver is willing to perform review and permitting procedures necessary to implement the goals and policies of the LMRWD; and

Whereas,

Both parties wish to clearly define the respective roles of LMRWD and the City of Carver, prior to and through the interim period between LMRWD Plan approval by BWSR and local plan approval by the LMRWD, and thereafter as the parties may agree.

Therefore, be it resolved that the LMRWD and the City of Carver agree to the following processes:

The City of Carver agrees to :

1. Implement water management policies, standards and criteria at least as strict as those in the LMRWD Plan and its amendments on all City of Carver projects which are located within the boundaries of LMRWD.

2. The City of Carver shall submit project proposals for projects which are located within the boundaries of the LMRWD to LMRWD for review and comment whenever the project meets any of the following criteria:

    - The project is a residential development affecting five (5) or more acres of land;

- The project is a public/commercial/industrial development affecting one (1) or more acres of land;

- The project involves construction or reconstruction of runoff management infrastructure where the contributing watershed is five (5) acres or more;

- The project will result in diversion of surface water flows between defined subwatersheds;

- The project will change intercommunity flowrates;

- The project is located in the Minnesota River floodplain.

Where the LMRWD review identifies areas where the City of Carver permits are less strict than the standards in the LMRWD plan, the City of Carver shall incorporate the provisions of LMRWD comments into City of Carver permits as the City of Carver deems reasonably necessary to enforce the LMRWD water management standards. The City of Carver reserves the right to have the project proponent directly submit the project proposal to the LMRWD.

3. Submit amendments/revisions to city comprehensive plans to LMRWD for review and comment.

4. Inspect projects under construction and enforce in its reasonable discretion those City of Carver permit provisions intended to implement the policies, standards and criteria of the LMRWD pursuant to this agreement.

5. LMRWD will administer its Minnesota River Floodplain Regulations in the City of Carver until the City of Carver adopts either a) a DNR-approved floodplain ordinance, or b) a floodplain ordinance that conforms with the LMRWD's water management plan. After the City of Carver adopts such an ordinance, the City of Carver will regulate floodplain activities, unless the City of Carver gives the authority to LMRWD. The City of Carver will require landowners to obtain permits prior to making alterations in the Minnesota River floodplain.

6. Be the designated local government unit (LGU) for the Wetland Conservation Act (WCA) and rules, responsible for wetland regulation, including enforcement.

LMRWD agrees to:

1. Review project plans and amendments/revisions to city comprehensive plans for conformance with LMRWD policies, standards and criteria, and provide review comments at no cost to the City of Carver within twenty days of receipt.

2. Conduct periodic inspections to monitor City of Carver enforcement of LMRWD policies, standards, and criteria, and to work cooperatively to resolve conflicts over the implementation of LMRWD policies, standards and criteria.

3. Administer its Minnesota River Floodplain Regulations in the City of Carver until the City of Carver adopts either a) a DNR-approved floodplain ordinance, or b) a floodplain ordinance that conforms with the LMRWD's water management plan. After the City of Carver adopts either a DNR-approved floodplain ordinance or a floodplain ordinance that conforms with this plan, it is the responsibility of the City of Carver to regulate floodplain activities, unless the City of Carver gives the authority to LMRWD. Landowners must obtain permits from the appropriate governmental unit prior to making alterations in the Minnesota River floodplain.

Both parties agree this agreement shall be changed to account for changes in their relationship as occasioned by approval of the local water management plan, approval of changes to the LMRWD Plan, or other circumstances affecting the management of water resources within the LMRWD and the City of Carver. For example, as resource assessments and plans are completed, LMRWD will seek to amend this agreement to include specific limits and/or special resource protection methods/strategies in the watershed. This agreement may only be amended by a joint writing of the parties.

This agreement is rescindable upon sixty days notice by either party. In the event this agreement is rescinded, or if the LMRWD determines, after a public hearing, that the City of Carver has failed to enforce the standards and policies of the LMRWD, then the LMRWD will adopt regulations, in conformance with applicable statutes, pursuant to the findings of a subsequent public hearing, and begin operating a permit program in the City of Carver to enforce the standards and policies of the LMRWD.

Accepted 8/15 ~~2000~~ 2001

Lower Minnesota River Watershed District

8/15/01

President Date

Accepted 12/04/00, 2000

City of Carver

Cindy Monroe

Mayor Date

Kevin Carroll 12/04/00

City Administrator Date

Larry/carver/lower/agreement
First draft 11/29/00

Appendix G

Carver County Rules

Chapter 153 Water Resource Management

10/15/2016

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GENERAL PROVISIONS

§ 153.01 DISCLAIMER, INTERPRETATION AND OTHER GENERAL PROVISIONS.

(A) Disclaimer. This chapter does not imply that areas within or outside of the CCWMO will be free from water related damages. This chapter does not create liability on the part of the county or its officers or employees for water related damage that may result from reliance on this chapter or any administrative decisions made under it.

(B) Interpretation. 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.

(C) Supremacy. This chapter is not intended to abrogate any easements, restrictions, or covenants, relating to the use of land or imposed on lands within the community by private declaration or agreement, but where the provisions of this chapter are more restrictive than any such easement, restriction, or covenant, or the provision of any private agreement, the provisions of this chapter shall prevail.

(D) Liability. The responsible party is responsible for safely and legally completing the project. Neither the issuance of approval under the provisions of this chapter nor the compliance with the provisions hereto or with any condition imposed by the issuing authority, shall relieve any person from responsibility for damage to persons or property resulting therefrom, or as otherwise imposed by law, nor impose any liability upon the county for damages to persons or property.

§ 153.02 DEFINITIONS.

(A) Definitions as set forth in Appendix B of the Minnesota Permit R100001 (the General Permit Authorization to Discharge Storm Water Associated With Construction Activity Under The National Pollutant Discharge Elimination System) as amended from time to time which are hereby adopted and incorporated by reference.

(B) Unless specifically defined below, words or phrases used in this chapter shall be interpreted so as to give them the same meaning as they have in common usage and to give this chapter its most reasonable application. The following words and terms, whenever they occur in this chapter are defined as follows:

ADDITIONS. A land altering activity where new impervious surface is being added over green space in an area where some impervious surface already exists.

APPLICATION. A completed application for activities regulated by this permit.

ATLAS 14. National Oceanic and Atmospheric Administration's (NOAA) precipitation event frequency and magnitude estimates.

BEST MANAGEMENT PRACTICE (BMP). A structural or non–structural method used to treat runoff, including methods such as ponding or infiltration or filtration through a rain garden.

BIORETENTION. The process of capturing stormwater runoff, holding it, and removing suspended particles from the runoff via plant uptake and by passing it through a porous media. Also see FILTRATION.

BLUFF. A topographic feature such as a hill, cliff, or embankment in which the average grade of any portion of the slope is 25% or greater and there is at least a 25-foot rise in elevation.

BLUFF TOP. The top of a bluff is a point on the upper part of a bluff where the average slope levels off to 18% or less.

CCWMO. Carver County Water Management Organization.

COMPENSATORY STORAGE. The replacement of floodplain storage lost by placement of fill below the 100-year flood elevation. Measured by the volume of material excavated below the floodplain elevation that is required to offset floodplain fill.

CONSTRUCTION ACTIVITY. A disturbance to the land that results in a change in the topography, existing soil cover (both vegetative and non-vegetative), or the existing soil topography that may result in accelerated stormwater runoff, leading to soil erosion and movement of sediment into surface waters or drainage systems. Examples of construction activity may include clearing, grading, filling, and excavating.

COUNTY. Shall refer to Carver County as the water management authority within the CCWMO.

DISCHARGE. The conveyance, channeling, runoff, or drainage of stormwater, including snow melt, from a construction site.

DOWNSTREAM CAPACITY. The ability of the natural and structural conveyance system to accommodate additional flows from the site discharge points to the nearest receiving major waterbody without causing nuisance conditions or flooding. This includes capacity of the conveyance system to accommodate additional rates, volumes, velocities and duration of flow.

DOWNSTREAM FACILITY. A constructed/altered water body created specifically for the purpose of treating stormwater runoff which may be located off the project site and would receive runoff from the project site.

EMERGENCY WORK. Work needed to protect life, limb, and property.

EROSION. The wearing away of soil by rainfall, surface water runoff, wind, or ice movement.

EROSION CONTROL. Methods employed to prevent erosion. Examples include, but are not limited to soil stabilization practices, horizontal slope grading, temporary or permanent cover, and construction phasing.

EXISTING CONDITIONS. The condition of a site (amount of impervious, soil condition, topography, vegetative cover, etc) prior to the start of a land altering activity.

FEEDLOT. Refer to the county feedlot regulations.

FILL. The deposit of soil or other earth materials by artificial means.

FILTRATION. The process of capturing stormwater runoff, holding it, and removing suspended particles from the runoff by passing it through porous media. Also see BIORETENTION.

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

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.

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

HIGH WATER LEVEL (HWL). The calculated peak elevation of a water body for the greater of the 100-year, 24-hour rainfall or 100-year, 10-day snowmelt event.

IMPERVIOUS. A constructed hard surface that either prevents or retards the entry of water into the soil and causes water to run off the surface in greater quantities and at an increased rate of flow than prior to development. Examples include rooftops, sidewalks, patios, driveways, parking lots, storage areas, and concrete, asphalt, or gravel roads.

INFILTRATION AREAS. A stormwater runoff impoundment designed to capture stormwater runoff volume, hold this volume and infiltrate it into subsurface soil.

LAND ALTERING ACTIVITY. Projects, permits or other activities which result in construction activity.

LINEAR TRANSPORTATION PROJECT. Construction of a new road, trail, utility, or sidewalk or reconstruction of an existing road, trail, utility, or sidewalk. May include an increase in the area of impervious surface.

LOCAL GOVERNMENT UNIT, LGU or LOCAL UNIT. Has the meaning given it in M.S. § 473.852, as it may be amended from time to time.

MAJOR WATERBODY. See PROTECTED WATERS AND WATERWAYS.

MAJOR SUBWATERSHED. Major subwatersheds within the Carver County Watershed Management Organization are defined as the drainage areas for the following waterbodies Bevens Creek, Carver Creek, East Chaska Creek, West Chaska Creek, and the South Fork of the Crow River.

MILL AND OVERLAY. A street maintenance technique that removes the top layer (typically 1-3 inches) of a street by the grinding action of a large milling machine. After the top layer is removed, a new layer of bituminous pavement is put in its place. Underlying base, subbase, and subgrade are not disturbed.

MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4). A municipal separate storm sewer system is a conveyance or system of conveyances (roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, storm drains, etc.) that is also:

- owned or operated by a public entity (which can include cities, townships, counties, military bases, hospitals, prison complexes, highway departments, universities, etc.) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage districts, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the Clean Water Act that discharges to waters of the United States;
- designed or used for collecting or conveying stormwater;
- which is not a combined sewer; and
- which is not part of a publicly owned treatment works.

NEW CONSTRUCTION. A land altering activity that creates impervious surface in an area where prior to the activity there was minimal or no impervious surface.

NEW DEVELOPMENT. A land altering activity that creates impervious surface in an area where there was minimal or no impervious surface.

NEW ROAD CONSTRUCTION. Construction of a new road that creates impervious surface in an area where there was minimal or no impervious surface.

NORMAL WATER LEVEL (NWL). The elevation of water at its fixed outlet elevation

PAVEMENT RECLAMATION. A street maintenance technique that consists of uniformly crushing, pulverizing and re-mixing the pavement section of a road along with a small portion of the underlying base material and relaying it in one operation. The existing subgrade and the large majority of the subbase are left undisturbed.

PAVEMENT REHABILITATION. A street maintenance technique that consists of structural enhancements that extend the service life of an existing pavement and/or improve its load carrying capacity. Rehabilitation techniques include restoration treatments and structural overlays but do not typically involve major corrections to base or subbase.

PERVIOUS. A surface that is readily penetrated or permeated by rainfall or runoff resulting in infiltration and reduced runoff.

POND. A graded area which collects and stores water.

PRETREATMENT. Sediment removal designed to capture or trap coarse sediments to preserve storage, prevent clogging and extend the life of facilities. Pretreatment may include but is not limited to vegetated filter strips, small sedimentations basins, forebays, and grit chambers.

PROPERTY OWNER. The person or party possessing the title of the land on which the construction activities will occur; or if the construction activity is for a lease holder, the party or individual identified as the lease holder; or the contracting government agency responsible for the construction activity.

PROTECTED WATERS AND WATERWAYS. Water bodies or watercourses so identified on the Public Waters Wetlands Inventory Map published by the Department of Natural Resources, State of Minnesota or watercourses determined by the county to have a watershed of two square miles or more.

PUBLIC WATER. See PROTECTED WATERS AND WATERWAYS.

REDEVELOPMENT. A land altering activity that creates new or replaces existing impervious surface on a parcel that is fully or partially occupied by buildings and/or other impervious surface.

RECEIVING WATERBODY. A body of water such as a stream, river, lake, or wetland which receives stormwater.

RESPONSIBLE PARTY. The property owner or his or her agent.

RIGHT-OF-WAY (R-O-W). A strip of land acquired by reservation, dedication, prescription, or condemnation and intended to be occupied or used by a road, street, trail, water line, sewer line, electrical transmission line or similar public and/or utility service. Unless otherwise specified, the term RIGHT-OF-WAY (R-O-W) as used in this chapter refers to road or street right-of-way.

ROAD RECONSTRUCTION. Full removal reconstruction of the road bed and road surface (including pavement structure, base, and subbase). May or may not include an increase in the amount of impervious surface.

SEDIMENT. The product of an erosion process; solid material both mineral and organic that is in suspension, is being transported, or has been moved by water, air or ice, and has come to rest on the earth's surface either above or below water level.

SEDIMENT CONTROL. Methods employed to prevent sediment from leaving the site. Sediment control practices include, but are not limited to silt fences, sediment traps, earth dikes, drainage swales, check dams, subsurface drains, pipe slope drains, storm drain inlet protection and temporary or permanent sedimentation basins.

SENSITIVE AREAS. Areas within 150 feet of DNR protected waters; areas within 150 feet of watercourses as defined; a designated floodplain; bluffs and areas within 100 feet of the bluff top; Wellhead Protection Areas as adopted by LGU; areas within 100 feet of a delineated wetland boundary or wetlands as shown on the National Wetland Inventory (NWI); areas within 100 feet of protected properties such as DNR wildlife areas, USFW property, and parkland.

SOIL. The unconsolidated mineral and organic mineral material on the immediate surface of the earth.

STABILIZED. The exposed ground surface has been covered by staked sod, riprap, wood fiber blanket, or other material which prevents erosion from occurring. Grass seed is not stabilization.

STORM EVENT. As defined in Technical Paper 40 from NOAA, Rainfall Frequency Atlas of the United States for Durations from 30 minutes to 24 Hours and Return Periods from 1 to 100 Years (1961).

STRUCTURE. Anything constructed or erected on or connected to the ground.

SWCD. The Carver County Soil and Water Conservation District.

TEAR DOWNS. A land altering activity where existing impervious surface is being replaced with new impervious surface.

TOPSOIL. The uppermost layer of soil, containing organic matter and micro-organisms.

WATERBODY. All waterbasins, watercourses, and wetlands as defined in these rules.

WATERBASIN. An enclosed natural depression with definable banks capable of containing water which may be partly filled with waters.

WATERCOURSE. Any channel having definable beds and banks capable of conducting generally confined runoff from adjacent lands. During floods water may leave the confining beds and backs but under low and normal flows water is confined within the channel. A watercourse may be perennial or intermittent.

WATERS OF THE STATE. All streams, lakes, ponds, marshes, wetlands, watercourses, waterways, drainage systems and all other bodies or accumulations of waters, natural or artificial, public or private, which are contained within, flow through, or border upon the state or any portions thereof. WATERS OF THE STATE do not include stormwater detention basins, or wetlands constructed for the purposes of treating stormwater, which do not discharge to surface waters. (Includes, but not limited to, any lake, stream or wetland; any natural or artificial water diversion or detention area; any surface or subsurface drainage facility or stormwater conveyance).

WATERSHED. The drainage area under the jurisdiction of a watershed management organization.

WETLANDS. All wetlands identified as wetlands under M.S. § 103G.005, subd 19. The term does not include "public waters wetlands" as defined under M.S. § 103G.005, subd 15a.

WETLAND CONSERVATION ACT (WCA). As defined by Minnesota Wetland Conservation Rules, Minn. Rules Ch. 8420, as it may be amended from time to time.

(C) All distances, unless otherwise specified, shall be measured horizontally.

(D) Any words not defined in this section shall have the meanings given them in Merriam-Webster's Collegiate Dictionary, 11th Edition.

§ 153.03 STATUTORY AUTHORIZATION AND PURPOSE.

(A) This chapter is adopted pursuant to M.S. §§ 103B.211 through 103B.255 and Minn. Rules 8410, as they may be amended from time to time.

(B) The overall purpose of this chapter is to protect, preserve and manage natural surface and groundwater systems within Carver County in the face of rapid urban growth and intensive agricultural activity. The chapter also presents sustainable and equitable means to effectively reach those goals by providing guidance and specific standards for decision-makers, residents, landowners, educators, and implementing staff at the local level.

GENERAL REQUIREMENTS AND REVIEW PROCESS

§ 153.10 GENERAL REQUIREMENT FOR COMPLIANCE.

(A) Effective date. This chapter shall take effect immediately upon its passage and publication according to law.

(B) The standards contained in this chapter shall be the minimum standards for the issues covered by this chapter for any land altering activity in the CCWMO. All land altering activities shall conform to the standards in this chapter unless specifically exempted below. For long term land altering activity that does not have a defined start and stop timeframe (such as routine agricultural activity), standards under other state and federal programs may apply. Some projects or activities fall below the thresholds that require formal review and approval process. The fact that formal review and approval is not required does not excuse these activities from compliance with this chapter.

(C) The following activities shall not be subject to the requirements of this chapter or to the specific requirement as shown below:

(1) Routine agricultural activity. Tilling, planting, harvesting, and associated activities. Other agricultural activities are not exempt such as feedlots, storage sheds;

(2) Emergency work to protect life, limb, or property;

(3) Installation of fence, sign, telephone, electric or other kinds of posts or poles;

(4) Downstream Facility Exemption. A project is exempt from the rate control, water quality, and volume control standards of this chapter upon determination by the county that a downstream facility is in place or has been ordered and the facility is designed with adequate capacity to meet the treatment requirements for the project.

(5) Road projects consisting of mill and overlay activities, pavement rehabilitation, pavement reclamation, and normal maintenance are exempt from the rate control, water quality, and volume control requirements of this chapter;

(6) New trails or sidewalk projects that create impervious surfaces 12 feet or less in width, are created independently from road projects, and will be bordered on the downgradient side(s) by a pervious buffer averaging at least one-half the width of the sidewalk or trail are exempt from requirements;

(7) Redevelopment projects that reduce cumulative site impervious by 10% or more are exempt from the rate control, water quality, and volume control requirements of this chapter; and

(8) Individual residential lots that are part of a common plan of development with an approved stormwater or erosion and sediment control permit shall not require an individual permit unless an individual permit was required under the approval conditions for the common plan of development.

(D) For previously approved projects, the conditions which require permit review and reapproval are described below:

(1) If the amount of impervious surface approved in the stormwater permit increases, a new combined erosion control and stormwater permit shall be required and the project shall meet the rules in place at the standards in place at the time of re-application;

(2) If 18 months have passed since the date of approval without construction activity on the site or if 18 months have passed since the last construction activity on the site, permit review and reapproval are required;

(3) Common Plan of Development. Individual commercial or industrial lots or phases of a residential development that are part of a common plan of development that has received an approved combined erosion control and stormwater permit from the county on or before the effective date of this chapter shall be required to obtain a permit as described below:

(a) If previously approved stormwater infrastructure has been fully constructed and or alterations will not result in reductions in approved treatment amounts, a new erosion control permit shall be obtained. Verification that the stormwater treatment infrastructure is functioning shall be required.

(b) If previously approved stormwater treatment infrastructure has not been constructed, a new combined erosion control and stormwater permit shall be obtained. The project shall meet standards in place at the time of re-application.

(4) Projects Proposed for Replatting. Projects with a previously approved combined erosion control and stormwater permit that are proposed for replatting shall be required to obtain a permit as described below:

(a) If previously approved stormwater treatment infrastructure has been fully constructed or alterations will not result in reductions in approved treatment amounts, if the stormwater treatment infrastructure is functioning as designed, and the amount of proposed impervious surface remains the same or decreases, the project will be considered exempt from the current stormwater treatment requirements and a new erosion control permit shall be obtained.

(b) If previously approved stormwater treatment infrastructure has not been constructed, a new combined erosion control and stormwater permit shall be obtained. The project shall meet standards in place at the time of re-application.

§ 153.11 REVIEW PROCESS.

Carver County shall have the authority to administer and enforce this chapter.

(A) Thresholds and requirements for review and approval. The need for review and approval and procedures will be dependent on the scale of the project and its location relative to sensitive areas. Regardless of whether or not an activity meets a threshold for review, all land altering activities shall take appropriate erosion control measures to prevent the sedimentation of receiving waterbodies or discharges of sediment onto neighboring properties.

(1) Activities requiring an Erosion Control Permit.

(a) Any of the following activities shall require an Erosion Control Permit:

1. Projects with one to less than five acres of construction activity and not in a sensitive area; or

2. Projects with less than one acre of construction activity that are part of a larger common plan of development or sale if the larger common plan ultimately has construction activity equal to or greater than one and less than five acres; or

3. Projects with less than one acre of construction activity within a sensitive area; or

4. Projects which require the release of material off-site or into waters of the state; or

5. Projects which create new crossings, culverts, alterations of flows or other obstructions to waters of the state with flows over ten cubic feet per second (cfs); or

6. Projects which create new culverts or other discharges with flows over ten cubic feet per second (cfs).

(b) Activities described in § 153.11(A)(1)(a)1-4 require review and approval by the county based on standards in § 153.55.

(c) Activities described in §153.11(A)(1)(a)5-6 require review and approval by the county based on standards in § 153.55 and § 153.56(G).

(2) Activities requiring a combined Erosion Control and Stormwater Permit.

(a) Any of the following activities shall require a combined Erosion Control and Stormwater Permit:

1. Projects with five acres or more of construction activity; or

2. Projects with less than five acres of construction activity that is part of a larger common plan of development or sale if the larger common plan ultimately has construction activity of five acres or more; or

3. Projects with one to less than five acres of construction activity occurring within a sensitive area; or

4. Projects with one acre or more of cumulative impervious surface constructed after September 1, 2002; or

5. Projects with 10,000 square feet or more of cumulative impervious surface constructed after September 1, 2002 and located within a sensitive area; or

6. Projects which include structural stormwater treatment.

(b) These activities require review and approval by the county based on standards in §§ 153.55 through 153.60.

(B) General review process. The following steps are recommended prior to LGU preliminary plat approval in order to expedite the review process.

(1) Determination of project level. Project level shall be determined based on thresholds described above. Projects that meet the thresholds described above shall continue with the process described below.

(2) Pre-application meeting. An initial development review team (DRT) meeting between the responsible party, SWCD, county and LGU should be held as early as possible in the process. Typically submittal of a concept plan for review initiates this process.

(3) Application submittal. A permit application which includes all required exhibits described in § 153.40 shall be submitted to the county. This should occur in conjunction with an application to the LGU.

(4) Application review and determination of completeness. The county shall make a determination regarding the completeness of an application within ten business days of the receipt of the application and notify the applicant if the application is not complete. The county will make its decision in accordance with M.S. § 15.99, as it may be amended from time to time.

(5) Approval. The responsible party shall not commence any construction activity subject to this chapter until approval has been given by Carver County. If the county determines that the application meets the requirements of this chapter, the county may issue approval which authorizes the project or activity.

(a) Time period of approval. Construction activity must commence within 18 months of the date of approval, or permit reapproval or reverification is required.

(b) Form of approval. Approval will typically be in the form of a letter from the county to the applicant.

(c) Incomplete/insufficient applications. If the application does not meet the requirements, the county may issue approval contingent upon compliance with this chapter. If non-compliance is substantial, the county may require a re-application.

(d) Permit modifications. An approved application may be modified following review and approval by the county. In reviewing the modifications, the county may require additional submittals may be required.

(6) Denial. If the responsible party fails to meet requirements the county may deny the application. Reason for denial shall be in writing.

APPLICATION REQUIREMENTS

§ 153.40 FEES.

Responsible parties for approval of a project shall provide a fee as set forth in the Carver County fee schedule.

§ 153.41 SUBMITTAL REQUIREMENTS.

An application containing the following information shall be submitted by the responsible party of a site or an authorized representative. The responsible party must sign the application and cannot transfer authority. An application will typically include the following information. At county discretion, less information may be required to constitute a complete application.

(A) Location map. The map shall show the site location with property lines in relation to surrounding roads, other geographic features, buildings and other structures.

(B) Topography. Topography showing two-foot contours for the site, invert elevations of existing storm sewer, and/or spot elevations of the conveyance system from drainage discharge points to the nearest receiving waterbody and for a minimum of 100 feet beyond the site boundary. Topography showing ten-foot contours for subwatersheds upstream and downstream of the project site. Where topography in the region is characteristically flat or hydrologic flow path is undetermined, two-foot contours may be required.

(C) Vegetation map. In areas where there has been a natural resource or similar inventory, the map shall show the location of trees and vegetation on-site, with identification of those trees and vegetation intended to be retained.

(D) Stormwater management plan. The stormwater management plan shall contain the following:

(1) Existing and proposed sub-watershed boundaries, upstream and downstream hydrologic flow paths, all on-site water features (including waters of the state), drainage patterns, flow directions, floodplain, and shoreland shown on separate figures;

(2) Location and amount of existing and proposed impervious area including roads, trails, parking areas, and building areas;

(3) Location, alignment and elevation of existing and proposed stormwater facilities;

(4) Construction plans and specifications for all proposed facilities designed to meet requirements of §§ 153.55 – 153.60;

(5) Hydrologic calculations for runoff volume, velocities, and peak flow rates using Atlas 14 precipitation depths and storm distributions for the 2-year rainfall event; 10-year, 24-hour storm event; 100-year, 24-hour storm event; and 100-year, 10-day snowmelt event for existing and proposed conditions;

(6) All hydrologic, hydraulic, and water quality computations completed to design the proposed facilities, including a demonstration of conformance with the water quality and volume control requirements of § 153.56;

(7) Curve numbers used to calculate runoff; Curve numbers used to calculate runoff shall be based on TR 55, Second Edition, June 1986, Table 2 2a with the following changes:

(a) Cover type "open space" will be based on the amount of top soil as well as grass cover. Less than six inches of top soil equals poor condition; and more than six inches of topsoil equals good condition;

(b) Curve numbers used for cover types "urban districts" and "residential districts" assume at least six inches of topsoil and six inches of non-compacted subsoil soil based on the standards in § 153.60 Topsoil management.

(8) Existing and proposed normal water level, high water level, and emergency overflow elevations for the site;

(9) For sites requiring extended detention, calculations showing the 2-year storm discharge reduced by 50 percent of existing conditions to demonstrate compliance with the extended detention requirement. The minimum outlet diameter shall be 6 inches;

(10) Plans, specifications and computations for stormwater management facilities submitted for review shall be signed by a professional engineer licensed in the State of Minnesota.

(E) Erosion and sediment control plan shall have both existing and final proposed conditions drawn to scale, shall be consistent with the manual Protecting Water Quality in Urban Areas (Minnesota Pollution Control Agency, 2000) as revised, and shall include the following:

(1) Proposed area of grading or other land-disturbing activities and delineation of the limits of disturbance including areas of grubbing, clearing, tree removal, grading, excavation, fill and other disturbance;

(2) Quantity of soil or earth material to be removed, placed, stored or otherwise moved on site;

(3) Locations and descriptions of proposed runoff control, erosion prevention, sediment control and temporary and permanent soil stabilization measures;

(4) A sequence of land alteration activity and corresponding implementation of erosion control practices, monitoring, maintenance and removal of erosion and sediment control measures; and permanent site stabilization measures. Prior to commencing activity (following all necessary approvals), the responsible party shall provide the SWCD with a construction schedule which will include approximate dates for the following:

(a) Completion of installation of perimeter erosion and sediment controls;

(b) Completion of required seeding and mulching activities;

(c) Completion of land-disturbing activities and putting into place measures for final soil stabilization and revegetation;

(d) When the site will be permanently stabilized and re-vegetated;

(e) When all temporary erosion and sediment controls will be removed from the site.

(F) SWPPP. The Stormwater Pollution Prevention Plan (SWPPP) developed for the site to meet National Pollution Discharge Elimination System/State Disposal System (NPDES/SDS) Phase II requirements shall be submitted as part of the applications.

(G) Wetland protection. The plan shall have both existing and final proposed conditions drawn to scale and shall contain the following:

(1) Delineated boundaries of wetlands as determined under the Wetland Conservation Act;

(2) Boundaries of wetland transition setbacks, if applicable per § 153.57;

(3) Computations/calculations used to design the wetland transition setback;

(4) Upon request, evidence of permits and process required under the Wetland Conservation Act (WCA).

(H) Topsoil Management Plan.

(I) Additional information as relevant and necessary to evaluate an application may be required. Requests for additional information shall be submitted in writing to the responsible party and shall specify requirements for submittal to the county.

STANDARDS

§ 153.55 EROSION AND SEDIMENT CONTROL DESIGN AND OPERATIONAL STANDARDS.

(A) Carver County adopts and incorporates by reference the erosion and sediment control design and operational standards as set forth in Minnesota Permit R100001 (the General Permit Authorization to Discharge Storm Water Associated With Construction Activity Under The National Pollutant Discharge Elimination System), as amended from time to time.

(B) Land altering activity shall not result in the detrimental deposition of sediment or construction materials into the waters of the state or onto neighboring property. Erosion and sediment control facilities must be installed prior to commencing any construction activity.

(C) Erosion and sediment control measures must be designed and maintained to prevent the detrimental deposition of sediment or construction materials into the waters of the state or onto neighboring property. There are a variety of publications available that describe BMP's that can be used to meet these standards. Examples of BMP's can be found in:

(1) Minnesota Stormwater Manual, Minnesota Pollution Control Agency, as amended from time to time;

(2) Erosion Control Handbook, Minnesota Department of Transportation, 2006.

§ 153.56 STORMWATER MANAGEMENT STANDARDS.

(A) Stormwater BMPs must be designed and maintained to meet these standards. Examples of BMP's can be found in:

(1) Minnesota Stormwater Manual, Minnesota Pollution Control Agency, as amended from time to time;

(2) Appendix A: Volume and Water Quality Calculations;

(3) Carver County Water Management Ordinance and BMP Guidelines, Carver County Water Management Department, as amended from time to time.

(B) Summary of stormwater management requirements by project type

(1) New development.

(a) New development sites adding 1 acre or more of new impervious must meet the treatment requirements described below for rate, water quality, and volume.

(b) In sensitive areas, new development sites creating 10,000 square feet or more of new impervious would have to meet the treatment requirements described below for rate, water quality, and volume for new impervious created as part of the project.

(2) Redevelopment.

(a) Additions.

1. Sites adding 1 acre or more of new impervious must meet the treatment requirements described below for rate, water quality, and volume for new impervious created as part of the project.

2. In sensitive areas, sites adding 10,000 square feet or more of new impervious would have to meet the treatment requirements described below for rate, water quality, and volume for all impervious created as part of the project.

3. Treatment areas must be designed for the volume of water draining to the feature.

(b) Tear downs.

1. Tear down sites replacing 1 acre or more of existing impervious must meet the treatment requirements described below for rate, water quality, and volume for all impervious created as part of the project.

2. In sensitive areas, tear down sites replacing 10,000 square feet or more of existing impervious would have to meet the treatment requirements described below for rate, water quality, and volume for all impervious created as part of the project.

3. Tear down sites that reduce existing impervious by 10% or more are exempt from the treatment requirements described below for rate, water quality, and volume.

4. Treatment areas must be designed for the volume of water draining to the feature.

(c) Combination Sites.

1. Combination sites must meet the requirements for tear down sites as described in part §153.56(B)(2)(c) above.

(3) Linear Transportation Projects

(a) Linear Project Permit Thresholds and Treatment Requirements.

1. New Road Construction. Linear transportation projects adding 1 acre or more of new impervious (10,000 square feet in a sensitive area) must meet treatment requirements described below for rate, water quality, and volume for all new impervious created as part of the project.

2. Road Reconstruction. Linear transportation projects fully reconstructing the road bed and surface must meet the treatment requirements described below.

(a) Decrease in impervious surface. Projects that reconstruct 1 acre or more of existing impervious (10,000 square feet in a sensitive area) but that reduce impervious by 10% or more are exempt from the treatment requirements described below for rate, water quality, and volume.

(b) No change in impervious surface. Projects that reconstruct 1 acre or more of existing impervious (10,000 square feet in a sensitive area) but result in no net change in impervious surface must provide treatment that results in a 10% reduction from pre-project conditions (for a 1.0 inch storm) for water quality (total suspended solids and total phosphorus), and volume.

(c) Increase in impervious surface. Projects that reconstruct or create 1 acre or more of impervious (10,000 square feet in a sensitive area) and result in an increase in impervious surface (e.g. an expansion of an existing roadway) must meet the following treatment requirements:

(i) New impervious: must meet treatment requirements described below for rate, water quality, and volume for all new impervious created as part of the project.

(ii) Existing impervious: must provide treatment that results in a 10% reduction from pre-project conditions (for a 1.0 inch storm) for water quality (total suspended solids and total phosphorus), and volume for impervious areas reconstructed as part of the project.

3. Exemptions for linear transportation projects

(a) Mill & overlay, pavement rehabilitation, and pavement reclamation projects are exempt from the rate control, water quality, and volume control requirements of this chapter.

(b) New trails or sidewalk projects that create impervious surfaces 12 feet or less in width, are created independently from road projects, and will be bordered on the downgradient side(s) by a pervious buffer averaging at least one-half the width of the sidewalk or trail are exempt from requirements.

(b) Treatment Locations/Sequencing.

1. Treatment Locations.

(a) Water quality treatment must be provided prior to discharging stormwater runoff to a receiving waterbody. If it is not feasible to provide full water quality treatment prior to discharge to a receiving waterbody, structural treatment for TSS removal must be provided at a minimum. Full water quality treatment shall then be provided at a 2:1 ratio at a discharge point to a different receiving waterbody within the project area.

(b) Volume control can be provided at any feasible location within the same major watershed of the project.

2. Treatment areas must be designed for the volume of water draining to the feature.

(c) Alternative Compliance for Linear Projects. Specific site conditions may make volume control difficult, undesirable, or impossible. Linear projects are eligible for alternative compliance for volume control as described in §153.56(E)(3).

(C) Rate control standard.

(1) Peak rates. The peak rates shall not increase from existing conditions for the 2-, 10-, 100-year storm events, and the 100-year, 10-day snowmelt event. Peak rates shall be calculated using Atlas 14 precipitation depths and storm distributions.

(2) Conveyance System. At a minimum, the storm sewer conveyance system shall be designed for a 10-year, 24-hour storm event. The pond and pond outlet structure shall handle the 100-year, 24-hour storm event. An emergency overflow structure, downstream drainage route and capacity shall be submitted for review.

(3) Extended Detention. To protect receiving channels, extended detention must be provided for the runoff generated from the 2-year event for sites with direct discharges to streams. To demonstrate compliance with the extended detention requirement, calculations showing the 2-year storm discharge reduced by 50 percent of existing conditions shall be submitted. The minimum outlet diameter shall be 6 inches.

(D) Water quality standard.

(1) Design Storm Event. The stormwater management plan must provide water quality treatment for 1.0 inches of rainfall from the site's new impervious surface as described in parts (2) and (3) below.

(2) Phosphorus Removal Standards.

(a) The stormwater management plan must remove 90% of the phosphorus generated by the site under developed conditions.

(b) Treatment areas must be sized appropriately for the area draining to the feature.

(3) Total Suspended Solids (TSS) Removal Standards.

(a) The stormwater management plan must remove 90% of the total suspended solids generated by the site under developed conditions.

(b) Treatment areas must be sized appropriately for the area draining to the feature.

(4) Design Standards. BMPs shall be designed according to the design standards included in Appendix A: Volume and Water Quality Calculations. Compliance with the water quality treatment standard will be calculated by the applicant using Appendix A: Volume and Water Quality Calculations or industry standard water quality models.

(5) Credit Banking. Water quality treatment provided in excess of the 1.0 inch requirement may be banked for use on another project. Excess banked water quality credit amounts shall not exceed the volume of two inches over the impervious surfaces of the drainage area to the BMP or the volume provided within the BMP, whichever is less. Transfer of banked water quality credits between applicants is allowed within the same major subwatershed. Applicants shall submit a letter to the county outlining the conditions of the transfer and confirming the volume of the transfer. The county must review and approve all credit transfers

(E) Volume Control Standard.

(1) Volume Control Standards

(a) The stormwater management plan must provide volume control for 1.0 inches from the impervious surface.

(b) Treatment areas must be sized appropriately for the watershed area tributary to the feature.

(2) BMP Volume Calculations. Compliance with the 1.0 inch volume control standard will be calculated by the applicant using Appendix A: Volume and Water Quality Calculations or an approved equivalent.

(3) Site Conditions Eligible for Alternative Compliance. Specific site conditions may make volume control difficult, undesirable, or impossible. Some of these conditions are listed in Table 1 and <u>may</u> qualify the applicant for Alternative Compliance Sequencing. The applicant may also submit a request to the County for Alternative Compliance Sequencing for site conditions not listed below. All requests for alternative compliance shall indicate the specific site conditions present and include a grading plan, utility plan, and the submittal requirement listed in Table 1.

Table 1. Alternative Compliance Site Conditions

Type	Specific Site Condition	Volume Reduction Limitation	Submittal Requirement
Potential Contamination	Potential stormwater hotspots/industrial facilities	Infiltration prohibited	
	Contaminated soils	Infiltration prohibited	Soil analysis
	Vehicle fueling and maintenance areas	Infiltration prohibited	Site map with vehicle fueling/maintenance areas shown
Physical Limitations	Low permeability soils	Infiltration restricted	1) Carver County Soil Survey data showing greater than 50% of site is hydrologic group C and D soils; or 2) Carver County Soil survey data showing greater than 50% of site has the following Unified Soil Classifications: MH, ML, GS, SC, CL, OL, CH, OH 3) Documentation that site has been previously disturbed by construction activity; or 4) Documentation of field infiltration tests showing infiltration rate of less than 0.3 inches per hour.
	Bedrock or groundwater within 3 vertical feet of bottom of volume control practice	Infiltration restricted	Soil borings required
Land Use Limitations	Wellhead Protection Areas	Infiltration restricted	Site map with wellhead protection areas shown

(4) Alternative Compliance Sequencing for Volume Control. To the maximum extent practicable, the volume control standard shall be fully met onsite. If it is not possible because of site conditions listed above, Alternative Compliance may be achieved by any combination of the methods described below.

(a) First, the applicant shall provide 0.5 inches volume control on-site through volume reduction methods as listed in Appendix A: Volume and Water Quality Calculations or in the application guidance materials. If the applicant meets the 0.5 inch volume control requirement on-site, the project is compliant, and no further sequencing steps are necessary.

(b) Second, if the applicant is unable to provide 0.5 inches of volume control on-site, the applicant shall comply by providing on-site volume control to the maximum extent practicable and then shall provide the remainder through one or both of the methods described below. Once the applicant meets the 0.5 inch volume control requirement through a combination of on-site and off-site practices, the project is compliant, and no further Sequencing steps are necessary.

1. Off-site Treatment. Volume reduction may be accomplished at another site as long as it yields the same volume reduction benefit, and is approved by the county prior to construction. Offsite compliance shall be achieved in the same major subwatershed as the project site.

2. Banking. For the remaining volume reduction required, the applicant shall comply with the volume control standard through the use of qualified banking credits. Volume reduction may be accomplished through the use of banked credits as long as it yields the same volume reduction benefit, and is approved by the county prior to construction. Banking credits shall be achieved in the same major watershed as the project site.

(5) Credit Banking. Volume control provided in excess of the 1.0 inch requirement may be banked for use on another project. Excess banked volume reduction amounts shall not exceed the volume provided within the BMP. Transfer of banked volume credits between applicants is allowed. Applicants shall submit a letter to the county outlining the conditions of the transfer and confirming the volume of the transfer. The county must review and approve all credit transfers.

(F) High Water Elevation Standard.

(1) As described below, all applications shall provide vertical separation between low openings of new and existing structures and the 100-year, 24-hour high water elevations or 100-year, 10-day high water elevations of facilities constructed as part of the project, whichever is greater. Emergency overflows are required for all ponds.

(a) Low opening of new and existing structures must have a minimum of 2 feet of separation from pond high water level.

(b) Low floor of new and existing structures must have a minimum of 1 foot of vertical separation from pond high water level.

(c) In rare cases where an emergency overflow (overland or pipe) is not feasible, the low opening vertical separation is increased to 3 feet.

(2) The requirements described above can be waived for non-habitable structures if an LGU allows for less vertical separation from high water elevations based on flood-proofing standards included in a building code.

(3) If side or rear yard overflow swales are constructed, the cities should document through the building permitting and inspection process that high water levels for side or rear yard overflow swales are below the low openings of structures.

(G) Upstream and Downstream Impacts.

(1) Upstream. Drainage flowing onto the site from upstream areas must be managed and accommodated. Alterations to flow paths which impound or slow down water will not be allowed unless it can be shown that the upstream system can accommodate the change. Proposed rates,

volumes, velocities and duration of flow may be requested in order to document that any impacts are nonexistent or insignificant.

(2) Downstream.

(a) To the extent possible, existing drainage areas and discharge points from the site should be maintained post-development and concentrated flows onto neighboring properties should be avoided or mitigated. The downstream conveyance system (natural or structural) must be able to accommodate, to the nearest major receiving waterbody, increased volumes caused by development.

(b) If diversions from existing drainage areas and alterations to discharge points are proposed, the responsible party shall provide additional documentation (rates, volumes, velocities, duration of flow, etc.) to demonstrate that the downstream conveyance system can accommodate the change. The responsible party shall provide evidence of easements or other agreements concerning water flow if a plan involves increased impervious or directing concentrated runoff from onto a neighboring property.

(c) If diversions from existing drainage areas, alterations to discharge points, increased duration of flow, or additional runoff volumes are proposed, the responsible party shall provide additional documentation (rates, volumes, velocities, duration of flow, etc.) to demonstrate that the downstream conveyance system can accommodate the change. The responsible party shall provide evidence of mitigation, easements or other agreements concerning water flow if a plan involves increased impervious or directing concentrated runoff from onto a neighboring property.

(H) Requirements for Maintenance and Access.

(1) Maintenance of stormwater facilities. All stormwater management structures and facilities must be designed to allow access for maintenance and must be properly maintained in perpetuity to ensure that they continue to function according to the approved design.

(2) Maintenance Agreement. No stormwater plan may be approved unless a maintenance agreement is provided that defines maintenance responsibilities following completion of the project, specifies types and frequency of inspection and maintenance activities, and specifies who will conduct inspections and maintenance activities. A sample agreement and list of inspection/maintenance activities are included in the Carver County Water Resource Management Ordinance and BMP Guidelines.

(a) Prior to project close out return of the financial security, an agreement shall be in place regarding maintenance responsibilities.

(b) Maintenance responsibilities must be assumed by either the local government unit (LGU) or by the responsible party.

(c) If the Local Government Unit (LGU) is assuming maintenance responsibilities, a single Memorandum of Agreement for each LGU may be used to cover all stormwater management structures and facilities required by this ordinance within the LGU's jurisdiction.

(d) The agreement must be executed and recorded in a format acceptable to the county. The recordable executed agreement must be submitted to the county prior to release of financial security for the project.

§ 153.57 WETLAND PROTECTION.

(A) Wetland Conservation Act Implementation. Carver County adopts and incorporates by reference the Minnesota Wetland Conservation Act and its implementing rules as set forth in Minn. Rules chapter 8420, as amended periodically.

(B) Wetland Transition Setbacks

(1) Requirement. Establishment or preservation of an unmanicured, vegetated, transition setback is required adjacent and contiguous to wetlands is required for projects meeting the thresholds described in §153.11(A)(2)(a). Activities meeting the exemption requirements of Minnesota Rule 8420 are exempt from these requirements. Wetlands or portions of wetlands impacted and mitigated through Minnesota Rule 8420 are exempt from these setback requirements.

(2) Determining setback widths.

(a) Base Width. The Base Width for a wetland transition setback is 20 feet.

(b) Minimum Width. The minimum width for a wetland transition setback is 20 feet.

(c) Applied Width. The setback width shall be adjusted to reflect site conditions based on the criteria below. The maximum Applied Width is 50 feet.

1. Stormwater treatment. The Base Width must be increased by 10 feet in areas where untreated stormwater runoff from impervious surfaces is directed to the wetland and not treatment facilities.

2. Slopes. For every 5 percent increase in average setback slope from 5 percent, the Base Width must be increased 5 feet in the area where the slope increase exists.

Average Setback Slope	Increase in Setback Width
0-5% slope	No increase
5-10% slope	Add 5 feet to Base Width
10-15% slope	Add 10 feet to Base Width
>15% slope	Add 15 feet to Base Width

3. High quality wetland. If the wetland received a ranking of “High” value in the Carver County Wetland Function and Value Assessment or an equivalent wetland function and value assessment, the Base Width must be increased 10 feet (provide link to map of Wetland Function and Value Assessment).

(d) Flexibility in Applied Width. The CCWMO retains the right to allow the setback width to vary and the minimum width to be reduced based on demonstrated site constraints, to allow unique BMPs, or to allow other activities that protect and enhance the wetland. Adjustments to the Applied Width may not result in a reduction to the total setback area and the adjusted setback must provide wetland protection at least equivalent to a setback of uniform width (e.g. the setback area may be reduced in one area of the wetland if the area is replaced at a 1:1 ratio elsewhere around the same wetland).

(e) Setback Area Transfers. The total setback area may be reduced on a wetland if the area is replaced at a 2:1 ratio around another wetland on site.

(f) For linear projects, non-impervious portions of the right of way are allowed within the setback.

(3) Setback vegetation requirements.

(a) Setback vegetation shall not be cultivated, cropped, pastured, mowed, fertilized, subject to the placement of mulch or yard waste, or otherwise disturbed, except for:

1. Periodic cutting or burning that promotes the health of the setback or to maintain the proposed natural community,

2. Removal of trees, limbs, or branches that are dead, diseased, or pose safety hazards,

3. Actions to address disease or invasive species,

4. Mowing for purposes of public safety,

5. Mowing or clearing of trees and shrubs from a path no more than 12 feet in width to allow access to the wetland,

6. Temporary disturbance for placement or repair of buried utilities, or

7. Other actions to maintain or improve setback quality, each as approved by the WMO.

(b) Pesticides and herbicides may be used in accordance with Minnesota Department of Agriculture rules and guidelines.

(c) Once vegetation is established in a setback, no fill, debris or other material shall be excavated from or placed within a setback.

(d) Areas of the transition setback that will be disturbed by grading activities during construction, shall be planted according to the following standards:

1. Soils must be decompacted to a depth of 18 inches and organic matter must be incorporated into soils before seeding or planting. Decompaction shall be accomplished solely by incorporation of organic matter within the drip line or critical root zone of trees or within 10 feet of underground utilities.

2. Transition setback areas shall be planted with a native seed mix and/or native plantings approved by the WMO.

(4) Recording of Setback. The setback shall be documented by a declaration or other document approved by the WMO or municipality and recorded in the office of the County Recorder before the permit will be issued.

(5) Monumentation. The setback shall be indicated by permanent, free-standing markers at the setback's upland edge, with a design and text approved by the WMO in writing. A marker shall be placed where each lot line crosses the setback, with additional markers at major points of deflection.

(6) Maintenance. The setback shall be maintained in accordance with the provisions outlined in the Carver County Water Management Ordinance and BMP Guidelines.

§ 153.58 SHORELANDS.

(A) This chapter applies only in situations where a protected water exists but the LGU responsible for land use planning and zoning has not adopted a DNR-approved shoreland ordinance.

(B) All development and land use changes shall meet the setback requirements of Minn. Rules Parts 6120.3300 and 6120.3400, as they may be amended from time to time.

§ 153.59 FLOODPLAIN.

(A) This section applies in situations where the floodway and 100-year flood elevation have been defined by the Federal Emergency Management Agency (FEMA).

(B) Regulation.

(1) Fill in the floodway. Placement of fill in the floodway shall not be allowed.

(2) Fill in the 100-year flood elevation.

(a) Placement of up to 50 cubic yards of fill below the 100-year flood elevation for the purposes of restoring or stabilizing soils, banks, or slopes shall be allowed.

(b) Placement of more than 50 cubic yards of fill below the 100-year flood elevation for the purposes of restoring or stabilizing soils, banks, or slopes OR any amount of fill placed below the 100-year flood elevation for other purposes shall not be allowed unless it is shown that the proposed fill can be mitigated through provision of compensatory storage, or will not cause a net decrease in flood storage.

(c) Placement of fill for the construction of linear public projects that are necessary in order to meet state or federal safety standards or requirements are NOT required to provide compensatory storage but must demonstrate that the fill will not cause a net decrease in flood storage.

(C) Requirements for compliance.

(1) Fill placed below the 100-year flood elevation must not hydraulically separate one area of the floodplain from another.

(2) Demonstration that the placement of fill will not cause a net decrease in storage must be provided by a professional engineer licensed in the State of Minnesota.

(3) Compensatory storage must be created prior to or concurrent with the placement of fill.

(4) Siting of compensatory storage must follow this priority order:

(a) on the same property as the affected floodplain;

(b) on properties adjacent to the affected floodplain;

(c) in the same major watershed as the affected floodplain.

(5) Meeting the requirements of this section does not constitute compliance with an existing DNR-approved local floodplain ordinance.

§ 153.60 TOPSOIL MANAGEMENT.

(A) Requirement. A minimum of 6 inches of topsoil must be provided in all green space areas of the project. Topsoil shall meet one of the topsoil standards described in §153.60(1) below. When available onsite, topsoil shall be managed to protect and/or restore soil permeability to non-compacted soil conditions following construction.

(1) Topsoil Standards.

(a) Carver County Topsoil Standard

Table 2. Carver County Topsoil Standard

Requirement	Range	Test Method
Material Passing the ¾ in [19 mm]	100 %	ASTM D 422
Material passing No 4 in [4.75 mm]	≥ 85%	-
Clay	5% – 30%	ASTM D 422
Silt	5% - 35%	ASTM D 422
Sand	38% - 75%	ASTM D 422
Organic matter	3% – 15%	ASTM D 2974
pH	6.1 – 7.5	ASTM G 51
Compaction	- 1,400 kilopascals (kPa) / 200 pounds per square inch (psi) in the upper 12 inches of soil, or - bulk density of less than 1.4 grams per cubic centimeter (g/cm3) in the upper 12 inches of soil	Field test

(b) Match Existing Soils. For sites that have not been previously graded, a site specific topsoil standard can be developed using one of the methods described below.

1. Soil Survey Data. A site specific topsoil standard can be developed using information on physical soil properties from the Natural Resource Conservation Service's Web Soil Survey for Carver County. The proposed site specific standard must be submitted prior to permit approval.

2. Onsite Testing. A site specific topsoil standard may be developed using onsite sampling results. One (1) sample shall be collected of the top 12 inches of soil from each soil map unit within the disturbed area of the project. Samples shall be collected and analyzed for percent clay, percent sand, percent silt, organic matter content, and pH. A site specific standard shall then be developed using a weighted average of the samples collected on site. Sample results and the proposed site specific standard must be submitted prior to permit approval.

3. Organic Matter, pH, and Compaction Standards. All site specific standards shall include the ranges described in the Carver County Topsoil Standard for organic matter, pH, and compaction.

(2) Topsoil Replacement Methods.

(a) Stockpile Existing Material and Respread. When available, on site topsoil (A soil horizon) shall be stripped and stockpiled for later reapplication. Stockpiled topsoil shall meet the standard selected for the project. If stockpiled material does not meet the selected standard for the project, the material shall be amended to meet the selected standard or topsoil meeting the selected standard shall be imported to the site.

1. Stockpile Testing. The stockpile shall be tested prior to respreading. Sample results must be submitted to County staff a minimum of 2 business days prior to respreading.

(b) Import Material and Spread. If topsoil is not available on-site due to previous construction activity and existing material cannot be amended to meet the Carver County Topsoil Standard, topsoil meeting the standard shall be imported to the site.

(B) Submittal Requirements. A "Topsoil Management Plan" shall be submitted and shall include information on the topsoil management strategies to be utilized to maintain soil permeability at or above required standards.

ENFORCEMENT

§ 153.70 AUTHORITY/RESPONSIBILITY.

The county shall have the overall authority to enforce the provisions of this chapter. If the LGU has an approved and adopted Local Water Plan and elects to take on principal responsibility for enforcement of this chapter, an individual agreement will be negotiated to determine principal review and enforcement responsibility based on the LGU's ability to implement this chapter.

§ 153.71 METHOD OF ENFORCEMENT.

The county may take the following actions as appropriate:

(A) Issue stop work orders;

(B) Issue a notice of violation;

(C) Issue an order for correction;

(D) Withhold the scheduling of inspections and/or the issuance of a certificate of occupancy;

(E) Revoke any approval issued by the county to the responsible party for the site in question;

(F) Take such action as necessary in a court of competent jurisdiction to attain compliance;

(G) Use financial security as provided under § 153.74;

(H) Institute appropriate actions or proceedings, including injunctive relief to prevent, restrain, correct or abate such violations or threatened violations. The county may recover costs incurred for corrective action in a civil action in any court of competent jurisdiction and such costs may be certified by court order to the County Auditor as a special tax against the real property.

§ 153.72 INSPECTIONS.

(A) After issuance of a permit, the county or SWCD may perform such field inspections and monitoring of the approved activity as the county or SWCD deems necessary to determine compliance with the conditions of the permit and this ordinance. Any portion of the activity not in compliance shall be promptly corrected. In applying for a permit, the applicant consents to the county or SWCDs entry upon the land for field inspections and monitoring.

§ 153.73 FINANCIAL SECURITY.

(A) Purpose. The purpose of the financial security is to ensure installation and maintenance of erosion and sediment control measures and installation of practices intended to meet the filtration/bioretention/infiltration requirement. The responsible party will provide a financial security for projects requiring an Erosion and Sediment Control Permit per 153.11(A)(1) or a Stormwater Permit per 153.11(A)(2). Federal, state, county, city, and township governments will not be required to provide financial security.

(B) Form and amount.

(1) The responsible party shall provide security for the performance of the work described and delineated on the approved erosion and sediment control plan and/or the approved stormwater management plan and any related remedial work.

(a) Security for Erosion Control Permit. Security in the amount of $1,000 per acre disturbed shall be provided.

(b) Security for Combined Erosion Control and Stormwater Permit. Security in the amount of $5,000 per acre disturbed shall be provided.

(c) Minimum Amount.

1. The minimum security required for an Erosion Control permit is $1,000.

2. The minimum security required for a Combined Erosion Control and Stormwater Permit is $5,000.

(d) Maximum Amount. For projects disturbing up to 40 acres, the maximum combined security required of an individual responsible party is $25,000. For projects disturbing 40 or more acres, the maximum combined security required of an individual responsible party is $50,000.

(2) The form and conditions of the securities:

(a) Deposit, either with the county, a responsible escrow agent, or trust company, at the option of the county, irrevocable letter of credit, cash escrow, or other assurance. The financial assurance must be in a form acceptable to the county and from a surety licensed to do business in the State of Minnesota.

(b) The financial assurance shall be in favor of the county and conditioned upon the applicant's performance of the authorized activity in compliance with the permit and applicable laws, including this Chapter, and the payment when due of any fees or other charges authorized or required by the permit and this Chapter. The financial assurance shall state that in the

event the conditions of the financial assurance are not met, the county may make a claim against it. The county shall be authorized to make a claim or draw against the security after any default by the responsible party under the permit or these rules.

(C) Maintaining the financial security.

(1) If at any time during the course of the work the financial security amount falls below 50% of the required deposit, the responsible party shall make another deposit in the amount necessary to restore the cash deposit to the required amount.

(2) If the responsible party does not bring the financial security back up to the required amount within seven days after notification by the county that the amount has fallen below 50% of the required amount the county may take such legal action as specified in § 153.74.

(D) Action against the financial security.

(1) The county shall be authorized to make a claim or draw against the security after any default by the responsible party under the permit or this chapter.

(2) The county may use funds from this security to finance remedial work undertaken by the county or a private contractor and to reimburse the county for all costs incurred in the process of remedial work including, but not limited to, staff time and attorney's fees under the following circumstances:

(a) The responsible party ceases land altering activities and abandons the work site prior to completion of the grading plan.

(b) The responsible party fails to conform to the erosion and sediment control plan and/or the approved stormwater management plan as approved by the county.

(c) The erosion and sediment control techniques utilized under the erosion and sediment control plan and/or the approved stormwater management plan are not maintained during site construction.

(d) The responsible party fails to reimburse the county for corrective action.

(E) Returning the financial security. The security deposited with the county for faithful performance of the erosion and sediment control plan and any related remedial work to finance necessary remedial work shall be released after construction is complete, the site has been re-vegetated, all erosion and sediment measures have been removed, the practices identified in the approved stormwater management plan has been installed and are working as designed, and a final inspection has been completed by the county.

(F) Partial return of the financial security. The county may return a portion of the financial security submitted to assure performance if the county determines that the entire amount is no longer required to ensure compliance with permit conditions and rules.

§ 153.74 RELIEF.

Any request for relief from a standard of this chapter must be decided by the Carver County Board of Adjustment. The standards and procedures set forth in §§ 152.214 through 152.218 shall apply to any request for relief in this chapter

(A) Carver County Board of Adjustment cannot grant relief from any Minnesota Permit R100001 (the General Permit Authorization to Discharge Storm Water Associated With Construction Activity Under The National Pollutant Discharge Elimination System) requirements. Such requests for relief must be heard by the Minnesota Pollution Control Agency (MPCA).

(B) Carver County Board of Adjustment cannot grant relief which is in conflict with or violates the Water Management Plan.

(C) In cases where an LGU has a similar standard, the Carver County Board of Adjustment cannot grant relief in instances where the LGU has not granted similar relief.

(D) Notice must also be given to the following:

(1) Property owners located adjacent to the applicant property,

(2) Property owners located downstream of the applicant property to the nearest receiving waterbody, and

(3) Property owners located upstream affected by the project.

Chapter 153 Water Resource Management
Appendix A: Volume and Water Quality Calculations

A. Purpose

This appendix provides assistance to applicants in calculating volume and water quality credits for best management practices (BMPs) to meet the requirements outlined in Carver County Ordinance Chapter 153. For additional information on designing BMPs, please see the Carver County Water Resource Management Ordinance and BMP Guidelines.

B. Calculation for Volume and Water Quality Treatment Volume

The treatment volume is a storm event of 1.0 inches. The treatment is divided into volume reduction and water quality treatment as described below.

1. Volume Reduction. The volume to be controlled on site is 1.0 inches from the site impervious.

2. Water Quality Treatment. The water quality treatment volume is calculated as 1.0 inches from the site impervious.

C. Volume Credits

Practices that can be used to meet the 1 inch volume requirement are described below. Methods for calculating the volume retained are included for each practice.

1. Amended Soils. The volume retained is calculated using 0.5 inches over the amended area.

2. Bioretention basins. The volume retained is calculated as 40% of the ponded volume. No volume credit will be given for bioretention practices within 3 feet of vertical separation from the seasonally high groundwater or sited immediately adjacent to wet ponds and/or bioretention practices controlled by the same outlet as a wet pond (e.g. bioretention shelves or benches).

3. Dry Swale. The volume retained is calculated as 40% of the ponded volume. No volume credit will be given for bioretention practices within 3 feet of vertical separation from the seasonally high groundwater or sited immediately adjacent to wet ponds and/or bioretention practices controlled by the same outlet as a wet pond (e.g. bioretention shelves or benches).

4. Stormwater Reuse (irrigation). To meet the volume requirement, the volume to be retained onsite must be utilized on site once per week for a period of 20 weeks during the growing season. The volume reduction for stormwater reuse is calculated by the area irrigated times the irrigation rate.

5. Preservation or Restoration of Upland Vegetation.

    a. Volume Retained. The volume retained is calculated using 0.5 inches over the area preserved.

    b. The area to be preserved should consist of existing trees or predominantly native vegetation. Areas to be restored must be restored to predominantly native vegetation.

    c. The area to be preserved must be placed under easement to ensure that it continues to provide treatment in perpetuity.

6. Green Roof. The area of the green roof is excluded from the total impervious calculation, thereby reducing the total treatment volume.

7. Pervious Pavement. The volume reduction for pervious pavement is calculated as 50% of the volume below the tile outlet elevation (assumes 50% pore space below tile). The area of pervious pavement is also excluded from the total impervious calculation.

8. Infiltration. The volume retained is calculated as 80% of the ponded volume.

9. Bioretention Shelf/Bench. No volume credit will be given for bioretention practices sited immediately adjacent to wet ponds and/or bioretention practices controlled by the same outlet as a wet pond (e.g. bioretention shelves or benches).

10. Disconnecting Impervious Surfaces. Volume reduction for disconnecting impervious surface is dependent upon the pervious area being routed and must have amended soils to receive volume reduction credits. Volume reduction is 0.5 inches over the area of amended soils. Impervious areas must be discharging to the amended soils as a uniform sheet flow, with a max flow path of 100 feet.

D. Water Quality Credits

Practices that can be used to meet the water quality treatment requirement are described below. Methods for calculating the amount of water quality treatment provided are included for each practice. In order to be eligible for the water quality credit described below, BMPs must meet the design standards in the Carver County BMP guidelines.

1. Removal Requirements. The following removal percentages are required for the site.

    a. 90% Total Phosphorus (TP) removal for 1.0 inches off site impervious.

    b. 90% Total Suspended Sediment (TSS) removal for 1.0 inches off site impervious.

2. TP and TSS Removal Percentages. The CCWMO assumes the following removal percentages for total phosphorus:

    a. Stormwater Pond. For stormwater ponds designed to meet NURP design criteria, 60% TP removal can be assumed and 80% TSS removal can be assumed.

    b. Bioretention Basin. For bioretention basins designed to meet the design criteria in the Carver County BMP Guidelines, 75% TP removal can be assumed and 90% TSS removal can be assumed.

    c. Iron-enhanced Sand Filter. For iron-enhanced sand filter systems designed to meet design criteria in the Carver County BMP Guidelines, 90% TP removal can be assumed and 90% TSS removal can be assumed.

    d. Hydrodynamic Separator. TSS removal is 50% of the watershed being treated by the device. No credit is given for TP removal.

    e. Disconnecting Impervious Surfaces. 45% TP reduction and 75% TSS reduction with a maximum area equal to the area of impervious area discharging to the area. Discharge must be uniformed sheet flow with a max flow path of 100 feet.

    f. Volume Practices.

i. Stormwater Reuse. 50% TP and 50% TSS requirements can be met through reuse when treating 1 inch of stormwater.

ii. Infiltration. 100% TP and TSS removal can be assumed for the volume naturally infiltrating.

E. Alternative Design Approaches

1. *Alternative Designs.* Alternative designs may be approved if, upon review, the county determines the design will provide treatment equal to or greater than the practices described in this appendix. Applicants wishing to utilize an alternative design must submit plans and specifications for the proposed design along with calculations showing compliance with the stormwater standards of Carver County Ordinance Chapter 153. Calculations should be generated using industry standard models. In order to be eligible for the volume credit described below, BMPs must meet the design standards in the Carver County BMP guidelines.

2. *Site Specific Soil Determinations.* On-site information may be accepted in lieu of the Hydrologic Soil Group determinations found in the Carver County Soil Survey. The on-site determination must be completed by a state- licensed soil scientist. Information submitted must present a detailed soil profile description including, but not limited to, horizon depths, Munsell colors, USDA textural classifications, bulk density analysis, and saturated hydraulic conductivity tests to a minimum depth of eight feet. Geotechnical soil borings alone are not acceptable. If requested, an on-site meeting can be held for further determination. If the initial determination is disputed, the applicant must submit a minimum number of soil profile locations in the disputed area based on one per soil group and one per five acres or as agreed upon between the county and the applicant in the disputed area. A final determination of on-site soils will be made by a consensus of the county, Carver SWCD and the LGU following review by state soil licensed staff and/or consultant.

3. *Infiltration Rates.* Design infiltration rates from the most recent version of the Minnesota Stormwater Manual shall be used to calculate the area and draw-down time period for infiltration BMPs. Percolation tests can be conducted and submitted to determine the actual rate of infiltration after the sub-grading is established.

F. References

Additional information and design guidelines are available in the following documents:

1. “Carver County Water Resource Management Ordinance and BMP Guidelines”, as amended from time to time.

2. MPCA’s “Minnesota Stormwater Manual”, as amended from time to time.

5 IMPACT OF IMPLEMENTATION

This section discusses how the District's implementation program will affect administrative and operational costs to the LGUs.

5.1 LOCAL WATER PLAN DEVELOPMENT AND IMPLEMENTATION

LGUs are required to develop a local water plan (LWP) with a coordinated system of managing the watershed on a regional or subwatershed basis consistent with this Plan. In accordance with MN Rules 8410.0160, each LWP must, at a minimum, meet the requirements for LWPs in Minnesota Statutes, section 103B.235, except as provided by the watershed management organization plan under part 8410.0110, subpart 3. This requirement allows for all or part of the Plan to be adopted by an LGU for all or part of its LWP within 18 months following approval of the District's amended Plan.

5.1.1 District LWP Review

After consideration, but before adoption by the governing body, each LGU shall submit its LWP to the District for review and consistency with this Plan. The District shall approve or reject all or part of the LWP. The District shall have 60 days to complete its review and shall, as part of its review, consider the comments by the Metropolitan Council. If the District fails to complete its review within the prescribed period, the LWP shall be deemed approved unless the LGU agrees to an extension.

5.1.2 Metropolitan Council Review

Concurrent with LWP submission to the District, as provided in M.S. 103B.235 Subdivision (Subd.) 3a, each LGU shall submit its LWP to the Metropolitan Council for review and comment. The Metropolitan Council shall have 45 days to review and comment on the LWP (or parts of the LWP) with respect to consistency with the council's comprehensive development guide. The Metropolitan Council's 45-day review period shall run concurrently with the District's 60-day review period. The Metropolitan Council shall submit its comments to the District and shall send a copy of its comments to the LGU. If the Metropolitan Council fails to submit comments within the 45-day period, the District shall complete its review as provided in M.S. 103B.235. Subd. 3a.

5.1.3 Administration and Enforcement of LWPs

LGUs are responsible for implementing and enforcing LWPs covering their jurisdictions. The District will have oversight responsibility to ensure implementation of LWPs. Oversight will include spot checks of municipal projects and program audits. If the LGU is found non-compliant, the District will work with the LGU to correct the issue. However, if problems persist, the District will develop a permitting program to assume the land use authorities granted by M.S. 103B and 103D to

enforce the standards in this Plan. The District's preferred position is to avoid unnecessary duplication of permitting programs.

5.2 EXISTING CONTROL

The District's intention in developing this Plan was to limit additional requirements imposed upon LGUs. The impact of the District's Plan on each LGU is difficult to quantify, although general observations can be made. Most of the Plan's implementation program elements are either solely District projects, projects initiated by the LGUs, or voluntary projects/programs that call for cooperation and collaboration with LGUs. Many of the implementation program elements reflect the goals, policies, and requirements of state and regional units of government that LGUs need to address. The District recognizes the importance of minimizing the financial burden on the member municipalities and taxpayers. These standards were developed in compliance with MN Rules 8410.0080 and may require additional resources and work for the LGUs, at least in the short-term.

Appendix K: Lower Minnesota River Watershed District Standards

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1 Foreword

In 1955, the Minnesota State Legislature enacted the initial Minnesota Watershed Act (Act), previously called Minnesota Statute (M.S.) Chapter 112. Pursuant to this statutory authority, five counties (Hennepin, Ramsey, Dakota, Scott, and Carver) petitioned for a watershed district. On March 23, 1960, the Minnesota Water Resources Board, now the Board of Water and Soil Resources (BWSR), established the Lower Minnesota River Watershed District (District or LMRWD). The District, as stated in M.S. 103D.201, is responsible for conserving the state's natural resources by land use planning, flood control, and other conservation projects. The District uses sound scientific principles for the protection of public health and welfare and the provident use of natural resources.

The District is located in the southwest part of the Twin Cities metropolitan area along the Minnesota River. It encompasses 80 square miles of Carver, Hennepin, Dakota, Scott, and Ramsey Counties, which includes the Minnesota River Valley from Fort Snelling, at the confluence of the Minnesota and Mississippi Rivers, upstream to Carver, Minnesota. The width of the District includes the bluffs on both sides of the Minnesota River within this reach of the river. Portions of the communities of Mendota Heights, Mendota, Lilydale, Eagan, Bloomington, Burnsville, Savage, Shakopee, Eden Prairie, Chanhassen, Chaska, Jackson Township, Louisville Township, and Carver are located within the District's boundaries.

The Act, and its successors, necessitates that the District prepare and implement a watershed management plan (Plan) for the lower Minnesota River watershed area. Additionally, the Metropolitan Surface Water Management Act (M.S.103B.201-.253) requires certain plan components and local government compliance. The District has adopted a Plan pursuant to the Act. These Standards implement the Plan's principles and objectives. If the Standards identified are not implemented, the District will exercise its authority granted under M.S. 103B to enforce these Standards through the creation of rules and a permitting program.

2 Relationship with Municipalities

The District recognizes that the control and determination of appropriate land use is the responsibility of the municipalities or local government units (LGU). Given its desire for local implementation and coordination of regulatory authorities, the District anticipates implementation and enforcement of the Standards outlined in this document by the appropriate LGU. The exception being, the Shoreline and Streambank Alteration, Water Appropriations and Water Crossing Standards which will be administered by the Minnesota Department of Natural Resource with input from District.

In accordance with M.S. 103B.235, LGUs are responsible for adopting Local Water Plans (LWP) and local controls necessary to implement the directives and standards set forth in the Plan and presented herein. The District recognizes that the authorities and procedures used by the various

LGUs in implementing these Standards will not be identical, and therefore, some LGUs may occasionally need language and procedures that vary from the language and procedures outlined herein. In all cases, the District reserves the right to conduct periodic audits/inspections of LGU programs, project approvals, permits, and other processes to assess conformance with these Standards. The Standards are intended as a minimum threshold requirement that must be met, and LGUs may adopt more restrictive requirements.

The District prefers to allow LGUs to serve as the permitting authority for these Standards. To avoid unnecessary duplication of permitting programs, the District anticipates providing oversight in order to confirm that LWPs, including the Standards, are properly implemented and enforced. If an LGU, however, fails to properly implement an adopted LWP, or fails to adopt and implement local controls necessary to implement these Standards, as determined by the District, the District may revoke the LWP approval and take enforcement actions as required to ensure compliance with these Standards. The District will not be responsible for liabilities, costs, and damages caused by the lack of proper implementation by an LGU.

3 Definitions

Regarding these Standards, unless the context otherwise requires, the following terms are defined below. References in these Standards to specific sections of the Minnesota Statutes or Minnesota Rules include amendments, revisions, or recodifications of such sections. The words "shall" and "must" indicate a mandatory standard; the word "may" indicates a permissive standard.

Abstractions: Removal of stormwater from runoff, by such methods as infiltration, evaporation, transpiration by vegetation, and capture and reuse, such as capturing runoff for use as irrigation water.

Agricultural Activity: The use of land for the growing and/or production of agronomic, horticultural, or silvicultural crops, including nursery stock, sod, fruits, vegetables, flowers, cover crops, grains, Christmas trees, and grazing.

Alteration or Alter: When used in connection with public waters or wetlands, is any activity that will change or diminish the supply, course, current or cross-section, of public waters or wetlands.

Atlas 14: Precipitation frequency estimates released by the National Oceanic and Atmospheric Administration's National Weather Service Hydrometeorological Design Studies Center. The information supersedes precipitation frequency estimates in Technical Paper No. 40 (1961), National Weather Service HYDRO-35 (1977) and Technical Paper No. 49 (1964).

Base Flood Elevation: The computed elevation to which floodwater is anticipated to rise during the base flood. Base flood elevations are shown on Flood Insurance Rate Maps (FIRMs) and on the flood profiles.

Best Management Practices or BMPs: Structural or non-structural methods used to treat runoff, including such diverse measures as ponding, street sweeping, filtration through a rain garden and

infiltration to a gravel trench.

Bioengineering: Various shoreline and streambank stabilization techniques using aquatic vegetation and native upland plants, along with techniques such as willow wattling, brush layering, and willow-posts.

Buffer zone: An area of maintained grassy or woody vegetation adjacent to a waterbody.

Compensatory storage: Excavated volume of material below the floodplain elevation required to offset floodplain fill.

Construction activity: Disturbance to the land that results in a change in the topography, existing soil cover (both vegetative and non-vegetative), or existing soil topography that may result in accelerated stormwater runoff, leading to soil erosion, and the movement of sediment into surface waters or drainage systems.

Development: The construction of any public or private improvement project, infrastructure, structure, street, or road, or the subdivision of land.

Dewatering: The removal of water for construction activity.

Drain or Drainage: Any method for removing or diverting water from waterbodies, including excavation of an open ditch, installation of subsurface drainage tile, filling, diking or pumping.

Easement: The right to use the land of another owner for a specified use and may be granted for the purpose of constructing and maintaining walkways, roadways, subsurface sewage treatment systems, utilities, drainage, driveways, and other uses.

Erosion: The wearing away of the ground surface as a result of wind, flowing water, ice movement, or land-disturbing activities.

Erosion and Sediment Control Plan: A plan of BMPs or equivalent measures designed to control runoff and erosion and to retain or control sediment on land during the period of land-disturbing activities in accordance with the applicable standard.

Excavation: The artificial removal of soil or other earth material.

Existing conditions: Site conditions at the time of application consideration by the LGU or District, before any of the work has commenced, except that when impervious surfaces have been fully or partially removed from a previously developed parcel, but no intervening use has been legally or practically established, "existing conditions" denotes the previously established, developed use and condition of the parcel.

FEMA: Federal Emergency Management Agency

Fens: Rare and distinctive wetlands characterized by a substrate of non-acidic peat and dependent on a constant supply of cold, oxygen-poor groundwater rich in calcium and magnesium bicarbonates.

Fill: Any rock, soil, gravel, sand, debris, plant cuttings, or other material placed onto land or into

water.

Floodplain: The area adjacent to a waterbody that is inundated during a 100-year flood.

Floodway: The channel of the river or stream and the adjacent land that must remain free from obstruction, so the 100-year flood can be conveyed downstream.

Fully reconstructed: The reconstruction of an existing impervious surface that involves site grading and subsurface excavation so that soil is exposed. Mill and overlay and other resurfacing activities are not considered fully reconstructed.

Groundwater Recharge: The replenishment of groundwater storage through infiltration of surface runoff into subsurface aquifers.

Hardship: As defined in Minnesota Statues, Chapter 394.

High Value Resource Area or HVRA: Portion of land (or a watershed) contributing runoff to a trout water and/or fen within the Lower Minnesota River Watershed District.

Impervious Surface: A constructed hard surface that either prevents or retards the entry of water into the soil and causes water to run off the surface in greater quantities and at an increased rate of flow than prior to development. Examples include rooftops, sidewalks, patios, driveways, parking lots, storage areas, and concrete, asphalt, or gravel roads.

Infiltration: A passage of water into the ground through the soils.

Infrastructure: The system of public works for a county, state, or municipality including, but not limited to, structures, roads, bridges, culverts, sidewalks; stormwater management facilities, conveyance systems and pipes; pump stations, sanitary sewers and interceptors, hydraulic structures, permanent erosion control and stream bank protection measures, water lines, gas lines, electrical lines and associated facilities, and phone lines and supporting facilities.

Land-Disturbing Activity: Any change of the land surface to include removing vegetative cover, excavation, fill, grading, stockpiling soil, and the construction of any structure that may cause or contribute to erosion or the movement of sediment into water bodies. The use of land for new and continuing agricultural activities shall not constitute a land-disturbing activity under these standards.

Landlocked basin: A localized depression that does not have a natural outlet at or below the 100-year flood elevation.

Linear project: Construction or reconstruction of a public road, sidewalk or trail, or construction, repair or reconstruction of a utility or utilities that is not a component of a larger contemporaneous development or redevelopment project.

Local Government Unit (LGU): Local government unit, such as cities and counties.

Local Water Plan (LWP): A plan adopted by each municipality pursuant to Minnesota Statute 27 103B.235.

MNDOT: Minnesota Department of Transportation

MPCA: Minnesota Pollution Control Agency

MPCA General Construction Permit: General Permit Authorization to Discharge Storm Water Associated with Construction Activity under the National Pollutant Discharge Elimination System/State Disposal System Permit Program Permit MN R100001 (NPDES General Construction Permit) issued by the Minnesota Pollution Control Agency, August 1, 2013, and as amended.

Municipality: Any city or township wholly or partly within the Lower Minnesota River Watershed District.

Natural Vegetation: Any combination of ground cover, understory, and tree canopy that, while it may have been altered by human activity, continues to stabilize soils, retain and filter runoff, provide habitat, and recharge groundwater.

Nested: A hypothetical precipitation distribution where the precipitation depths for various durations within a storm have the same exceedance probabilities. This distribution maximizes the rainfall intensities by incorporating selected short-duration intensities within those needed for longer durations at the same probability level. As a result, the various storm durations are "nested" within a single hypothetical distribution. Nested-storm distribution (or frequency-based hyetograph) development must be completed utilizing the most recent applicable National Weather Service reference data (e.g., Atlas 14), in accordance with:

1. the alternating block methodology as outlined in Chapter 4 of the HEC-HMS (Hydrologic Engineering Center - Hydrologic Modeling System) Technical Reference Manual, (USACE, 2000);
2. methods in HydroCAD;
3. methods established by the Natural Resources Conservation Service; or
4. otherwise as approved by the District.

Reference: U.S. Army Corps of Engineers. 2000. Hydrologic Modeling System HEC-HMS Technical Reference Manual.

NPDES: National Pollutant Discharge Elimination System

Nondegradation: For purposes of these rules, nondegradation refers to the regulatory policy stated in Minnesota Rules 7050.0185, as it may be amended.

Ordinary High Water Level (OHW): Ordinary high water level, as defined by the Minnesota Department of Natural Resources, means the boundary of water basins, watercourses, public waters, and public waters wetlands, and:

a. The OHW is an elevation delineating the highest water level that has been maintained for a sufficient period of time to leave evidence upon the landscape, commonly the point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial.
b. For watercourses, the OHW is the elevation of the top of the bank of the channel.

c. For reservoirs and flowages, the OHW is the operating elevation of the normal summer pool.

Overlay District: A district established by Lower Minnesota River Watershed District standards/regulations that may be more or less restrictive than the primary District's standards/regulations. Where a property is located within an overlay district, it is subject to the provisions of both the primary standards/regulations and those of the overlay district.

Owner: Any individual, firm, association, partnership, corporation, trust, or any other legal entity having proprietary interest in the land.

Person: Any individual, trustee, partnership, unincorporated association, limited liability company, or corporation.

Public Drainage System: Any drainage system as defined in Minnesota Statutes Section 103E.005, subdivision 12.

Public Project: Land development or redevelopment or other land-disturbing activities for which a District permit is required that is conducted or sponsored by a federal, state, or local governmental entity.

Public Waters: Any waters as defined in Minnesota Statute 103G.005, subdivision 15.

Qualified Professional: A person, compensated for her/his service, possessing the education, training, experience, or credential to competently perform or deliver the service provided.

Redevelopment: Any construction or improvement performed on sites where the existing land use is commercial, industrial, institutional, or residential.

Runoff: Rainfall, snowmelt, or irrigation water flowing over the ground surface.

Sediment: The solid mineral or organic material that is in suspension, is being transported, or has been moved from its original location by erosion and has been deposited at another location.

Sedimentation: The process or action of depositing sediment.

Shoreland District: Shoreland areas regulated by a local municipal or county Shoreland Ordinance, or by Minnesota Statues Section 103F. Generally, Shoreland District consists of land located within a floodplain, within 1,000 feet of the ordinary high water level of a public water or public waters wetland, or within 300 feet of a stream or river.

Shoreline: The lateral measurement along the contour of the ordinary high water mark of waterbodies other than watercourses, and the top of the bank of the channel of watercourses, and the area waterward thereof.

Site: A contiguous area of land under common ownership, designated and described in official public records and separated from other lands.

Standard: A preferred or desired level of quantity, quality, or value.

Steep slope: A natural topographic feature having average slopes of 18 percent or greater measured

over a horizontal distance of 25 feet or more.

Steep Slopes Overlay District. A district containing steep slope areas established by Lower Minnesota River Watershed District standards/regulations and is subject to the provisions of both the primary standards/ regulations and those of the overlay district.

Stormwater: Stormwater runoff, snow melt runoff, and surface runoff and drainage.

Structure: Anything manufactured, constructed, or erected that is normally attached to or positioned on land, including portable structures, earthen structures, water and storage systems, drainage facilities and parking lots.

Subsurface Sewage Treatment System or SSTS: A sewage treatment system, or part thereof, serving a dwelling, or other establishment, or group thereof, and using sewage tanks followed by soil treatment and disposal or using advanced treatment devices that discharge below final grade. Subsurface sewage treatment system includes holding tanks and privies.

Subwatershed: A portion of land (or a watershed) contributing runoff to a particular point of discharge.

Surface Water: All streams, lakes, ponds, marshes, wetlands, reservoirs, springs, rivers, drainage systems, waterways, watercourses, and irrigation systems regardless of whether natural or artificial, public or private.

Thalweg: A line following the lowest points of a valley, river, stream, or creek bed.

Trout waters: Trout lakes or streams that support a population of stocked or naturally produced trout.

Waterbody: All surface waters, watercourses, and wetlands as defined in these Policies.

Watershed: A region draining to a specific watercourse or water basin.

Wellhead Protection Plan: A document that provides for the protection of a public water supply, submitted to the Minnesota Department of Health, is implemented by the public water supplier, and complies with: (a) the wellhead protection elements specified in the 1986 amendments to the Federal Safe Drinking Water Act, United States Code, title 42, chapter 6A, subchapter XII, part C, section 300h-7 (1986 and as subsequently amended); and (b) Minnesota Rules parts 4720.5200 to 4720.5290.

Wetland: Any wetland as defined in Minnesota Statutes Section 103G.005, subdivision 19.

4 Administrative Procedures

The LMRWD is a political subdivision of the state under the Minnesota Watershed Act, and a watershed management organization as defined in the Metropolitan Surface Water Management Act. These Acts provide the District with power to accomplish its statutory purpose – to protect, preserve and restore water resources and to improve Minnesota River navigation within the boundaries of the District through sound scientific principles. The Plan, developed through an

extensive stakeholder process and adopted by the District pursuant to the Acts, provides the principles, objectives and scientific basis for these Standards.

These Standards protect the public health, safety and water and natural resources of the District by responsively regulating improvement or alteration of land and waters within the District to reduce the severity and frequency of high water level and the erosive nature of high flows, to preserve floodplain and wetland storage capacity, to improve the chemical and physical quality of surface and ground waters, to reduce sedimentation, to preserve unique resources (such as fens, trout waters and bluffs/ steep slopes), and to promote and preserve natural infiltration areas.

4.1 Variance and Conditional Use

4.1.1 Policy Statement

It is the District's policy to allow LGUs to grant variances or issue conditional use permits according to processes for such actions contained in existing local controls, except for the professional certification requirement for steep slopes. The District will cooperate with and, if requested, provide technical and other assistance to LGUs when considering variances from these Standards.

4.1.2 Standards

Each LGU shall notify the District of requested variances and conditional use permits and allow the District to provide comment on the requested action. Variances that would circumvent the intent and purposes of the Standards shall not be granted.

4.2 Enforcement

In accordance with M.S. 103B.235, each LGU within the District is required to prepare an LWP, capital improvement plan, and official controls as necessary to bring local water management into conformance with the District's Plan. LGUs shall enforce and implement the requirements of these Standards through the development and implementation of an LWP and supporting ordinances. Each LGU shall amend and/or update its official controls, regulations, and permitting processes as necessary to implement and enforce these Standards. The District reserves the right to conduct periodic audits/inspections of LGU's programs and/or projects to verify the Plan and these Standards are being followed. In addition, the District reserves the right to audit project approvals and permits by LGUs to assess conformance with District's policies, standards, objectives, and criteria. If an LGU fails to properly implement an approved LWP, or any of these Standards, the District may revoke the LGU's Local Plan Approval and administer the Standards for that LGU.

The District shall not be responsible for any liabilities, costs, damages, or other negative impacts caused by the failure of an LGU to implement or enforce these Standards.

5 Erosion and Sediment Control Standard

5.1 Policy Statement

It is the District's policy to:

- Minimize erosion and sediment transport to lakes, streams, fens, and the Minnesota River.
- Retain or control sediment on land during land-disturbing activities.
- Prevent the resource degradation and the loss or damage of property due to erosion and sedimentation.
- Protect receiving water bodies, wetland, and storm sewer inlets.
- Require the preparation and implementation of erosion and sediment control plans to control runoff and erosion.

5.2 Regulated Activity and Threshold

5.2.1 General

Land-disturbing activities of one (1) acre or more.

5.2.2 High Value Resources Area (HVRA) Overlay District, as shown on the Lower Minnesota River Watershed District – High Value Resources Area Overlay District Map (Figure K1).

Land-disturbing activities that involve the displacement or removal of 5,000 square feet or more of surface area or vegetation, or the excavation of 50 cubic yards or more of earth within the HVRA overlay district.

5.3 Exceptions

No erosion control plan or permit shall be required for the following land-disturbing activities:

- Minor land-disturbing activities such as home gardens contained within a residential lot, landscape repairs, and maintenance work.
- Installation of any fence, sign, telephone or electric poles, or other kinds of posts or poles.
- Emergency activity necessary to protect life or prevent substantial harm to persons or property.
- All maintenance, repair, resurfacing, and reconditioning activities of existing road, bridge, and highway systems that do not involve land-disturbing activities outside of the existing surfaced roadway.

- Agricultural activity.

5.4 Standards

5.4.1 General

An erosion and sediment control plan and inspection and maintenance strategy shall be required for all regulated activities meeting the thresholds defined above.

5.4.1.1 Erosion and sediment control plan including:

a) Topographic maps of existing and proposed conditions that clearly indicate all hydrologic features and areas where grading will expose soils to erosive conditions, as well as the flow direction of all runoff; temporary erosion and sediment control BMP, and permanent erosion control BMPs.

b) Construction schedule with implementation of best management practices highlighted.

c) Construction staging plan.

d) Name, address, and phone number of the individual (s) responsible for inspection and maintenance of all erosion and sediment control measures.

e) Documentation on the status of the project's General Permit Authorization to Discharge Storm Water Associated with Construction Activity Under the National Pollutant Discharge Elimination System (NDPES)/State Disposal System (SDS) Permit Program, Permit MN R100001 (NPDES General Construction Permit), issued by the Minnesota Pollution Control Agency, August 1, 2013, as amended.

5.4.1.2 Inspection and Maintenance

5.4.1.2.1 Inspection

Routine inspections shall be conducted at least once every seven (7) days during active construction and within 24 hours after a rainfall event greater than 0.5 inches in 24 hours by the Owner or the Owner's representative. Following a rainfall inspection, the next inspection shall be conducted within seven (7) days. The inspection schedule will be modified for the following conditions:

a) Where parts of the construction site have permanent cover, but work remains on other parts of the site. Inspections of the areas with permanent cover shall be reduced to once per month.

b) Where construction sites have permanent cover on all exposed soil areas and no construction activity is occurring anywhere on the site, monthly inspections shall be

performed for 12 months (except during frozen ground conditions). After the 12th month of permanent cover and no construction activity, inspections may cease until construction activity resumes, or sooner if notified by the District or the LGU.

c) Where work has been suspended due to frozen ground conditions, the inspection and maintenance schedule shall resume within 24 hours after runoff occurs at the site or upon resuming construction, whichever comes first.

Routine inspections shall include:

a) All areas disturbed by construction activity and areas used for storage of materials that are exposed to precipitation.

b) Discharge locations, inaccessible locations, and nearby downstream locations where inspections are practicable.

c) Locations where vehicles enter or exit the site for evidence of off-site sediment tracking.

Records for each inspection and maintenance activity shall be kept on file with the owner and shall contain the following information:

a) Date and time of inspection.

b) Name, title, and qualifications of person(s) conducting inspection.

c) Date, duration, and amount of all rainfall events that produce more than 0.5 inches of rain in a 24-hour period, and whether any discharges occurred.

d) Inspection findings, including corrective action recommendations and implementation dates.

e) Locations of the following:

   i. Sediment discharges or other pollutants from the site.

   ii. BMPs that need to be maintained.

   iii. BMPs that have failed to operate as designed or proven inadequate for a particular location.

   iv. BMPs that are needed and did not exist at the time of inspection.

f) Documented changes to the erosion and sediment control plan.

g) Inspector's signature.

An Inspection Log shall be kept by the Owner with the Erosion and Sediment Control Plan for a period of three (3) years from completion of the project.

5.4.1.2.2 Maintenance

All maintenance conducted during construction must be recorded in writing, and these records must

be kept. All nonfunctional BMPs must be repaired, replaced, or supplemented with functional BMPs within 24 hours after discovery, or as soon as field conditions allow access unless another period is specified below. Maintenance will include the following:

a. Excess sediment behind silt fences and biorolls shall be removed and properly disposed of when sediments reach one-third the height of the structure. Such sedimentation shall be corrected within 24 hours of discovery.

b. Construction site vehicle exit locations shall be inspected for evidence of off-site sediment tracking onto paved surfaces. Tracked sediment will be removed from all paved surfaces within 24 hours of discovery, or if applicable, within a shorter time.

c. Surface waters, including drainage ditches and conveyance systems, shall be inspected for evidence of erosion and sediment deposition. Evidence of erosion and/or sediment deposition will be addressed within seven (7) days.

d. Infiltration areas shall be maintained to ensure no compaction or sedimentation occurs.

e. Construction entrances shall be maintained daily.

f. Turf shall be maintained until final stabilization is established.

The maintenance of temporary erosion and sediment controls and implementation of additional controls shall be performed as soon as possible and before the next storm event, whenever practicable. All remaining temporary erosion and sediment controls and accumulated sediments from silt fences will be removed within 30 days of achieving final stabilization at the site.

5.4.2 HVRA Overlay District, as shown on the Lower Minnesota River Watershed District – High Value Resources Area Overlay District Map (Figure K1).

5.4.2.1 Grading/Erosion Control Plan

The grading/erosion control plan must meet all of the requirements of section 5.4.1.1 subsections a – d.

5.4.2.2 Inspection and Maintenance

All of the requirements set forth in section 5.4.1.2 must be met.

6 Floodplain and Drainage Alteration

6.1 Policy Statement

It is the District's policy to:

- Regulate alterations within the floodplain and drainageways within the watershed to provide

flood protection to natural resources, permanent structures, and private lands, in accordance with M.S. 103F.

- Preserve existing water storage capacity below the 100-year high water elevation of all public waters, wetlands subject to the Wetland Conservation Act, and public drainage systems subject to Minnesota's buffer law in the watershed to minimize the frequency and severity of high water.
- Minimize development below the Federal Emergency Management Agency (FEMA) base flood elevation that will unduly restrict flood flows or aggravate known high water problems.

6.2 Regulated Activity and Threshold

Alteration to or filling land below the 100-year flood elevation of any wetland, public water, or landlocked subwatershed (as identified by municipalities) shall be subject to the following regulations and shall be completed in accordance with a state-approved floodplain management and shoreland ordinance:

a) No filling is allowed within the 100-year floodplain which causes a rise in the 100-year flood elevation without providing compensatory floodplain storage equal to or greater than the volume of fill. A no-rise certification by a professional engineer satisfies this requirement.

b) No grading or filling is allowed within the 100-year floodplain which reduces the flood carrying capacity of the watercourse.

c) The lowest floor of the lowest enclosed area of proposed structures must be a minimum of two (2) feet above the 100-year high water level of nearby surface waters or one (1) foot above the emergency overflow elevation, whichever is greater, unless they have protection through flood proofing or by another approved construction technique.

d) No permanent structure, with the exception of drainage conveyance structures and monitoring equipment, may be constructed in the floodway as it is shown on FEMA flood maps.

6.3 Exceptions

If the 100-year high water elevation of a waterbody is entirely within a municipality, the waterbody does not outlet during the 100-year event, and the municipality has adopted a floodplain ordinance prescribing an allowable degree of floodplain encroachment, the ordinance governs the allowable degree of encroachment.

6.4 Standards

a. Fill shall not cause a net decrease in storage capacity below the projected 100-year high water elevation nor an increase in the 100-year elevation of a waterbody.

b. The allowable fill area shall be calculated by a professional engineer registered in the state of Minnesota. Creation of floodplain storage capacity to offset fill shall occur before any fill is placed in the floodplain, unless it has been demonstrated to the District and the municipality that doing so is impractical and that placement of fill and creation of storage capacity can be achieved concurrently. Any placement of fill prior to creation of floodplain storage capacity will only be allowed upon a demonstration by a registered professional engineer that such work will not aggravate high water conditions.

c. Fill or grading shall not cause a decrease in the conveyance capacity of a waterbody below the projected 100-year high water elevation.

d. The conveyance capacity shall be calculated by a professional engineer registered in the state of Minnesota. The analysis must demonstrate no decrease in conveyance upstream and downstream of the proposed fill or grading.

e. All new residential, commercial, industrial, and institutional structures shall be constructed such that the lowest floor of the lowest enclosed area (including basement or crawl space) is at a minimum of two (2) feet above the 100-year high water elevation.

f. No person shall install or remove a culvert or other artificial means to remove or drain surface water, create artificial pond areas, or obstruct the natural flow of waters without demonstrating that there is no adverse impact on upstream or downstream landowners or water quality, habitat, or fisheries.

g. Temporary placement of fill within the floodway for staging or processing of river dredge or fill material, including facilities for such activities, shall be allowed when conducted, in whole or part, pursuant to a cooperative or local sponsorship agreement with the United States under the Rivers and Harbors Act and it meets requirements of the LGU.

7 Stormwater Management Standard

7.1 Policy Statement

It is the District's strategy to:

- Manage new development, redevelopment, and drainage alternations, by requiring each development or land-disturbing activity to manage its stormwater effectively, either on or off-site.
- Promote and encourage a reduction in runoff rates, to encourage infiltration, and to promote groundwater recharge.
- Encourage infiltration and stormwater storage in the upland areas of the District.
- Maximize groundwater recharge as a means of maintaining drinking water supplies, preserving base flows in streams and water levels in fens, and limiting discharges of

stormwater to downstream receiving waters.

- Protect and maintain existing groundwater flow, promote groundwater recharge, and improve groundwater quality and aquifer protection.
- Require that property owners control the rate and volume of stormwater runoff originating from their property so that surface water and groundwater quantity and quality is protected or improved, soil erosion is minimized, and flooding potential is reduced.
- Protect and improve natural resources within the watershed to prevent further degradation.

7.2 Regulated Activity and Threshold

7.2.1 General

Development, redevelopment, and drainage alterations (including roads) creating new impervious areas greater than one (1) acre.

7.2.2 High Value Resources Area (HVRA) Overlay District, as shown on the Lower Minnesota River Watershed District – High Value Resources Area Overlay District Map (Figure K1).

Development, redevelopment, and drainage alterations (including roads) creating new impervious areas greater than 10,000 square feet (sq. ft.).

7.3 Standards

7.3.1 General

7.3.1.1 Rate Control

Stormwater runoff rate from development, redevelopment, and drainage alterations shall not exceed the existing runoff rates for the 1-year or 2-year, 10-year, and 100-year 24-hour events using Atlas 14 nested distribution.

7.3.1.2 Volume

Projects that create one (1) acre or more of new impervious surface on sites without restrictions, the post-construction stormwater runoff volume retained onsite shall be equivalent to 1-inch of runoff from impervious surfaces or the MPCA's Construction General Permit abstraction requirements (as amended), whichever is greater.

7.3.1.3 Water Quality

Projects shall have no net increase from existing conditions in total phosphorus (TP) and total suspended solids (TSS) to receiving waterbodies.

7.3.2 HVRA Overlay District, as shown on the Lower Minnesota River Watershed District – High Value Resources Area Overlay District Map (Figure K1).

7.3.2.1 Rate Control

Stormwater runoff rate from development, redevelopment, and drainage alterations shall not exceed the existing rates for the 1-year or 2-year, 10-year, and 100-year 24-hour events using Atlas 14 nested distribution.

7.3.2.2 Volume

1. New Development: For new, nonlinear developments that create 10,000 sq. ft. or more of new impervious surface on sites without restrictions, the post-construction stormwater runoff volume retained onsite shall be equivalent to 1.1 inches of runoff from impervious surfaces.
2. Redevelopment: Nonlinear redevelopment projects on sites without restrictions that create 10,000 sq. ft. or more of new and/or fully reconstructed impervious surfaces shall capture and retain onsite 1.1 inches of runoff from the new and/or fully reconstructed impervious surfaces.
3. Linear projects on sites without restrictions that create 10,000 sq. ft. or greater of new and/or fully reconstructed impervious surfaces, shall capture and retain the larger of the following:
    a. 0.55 inches of runoff from the new and fully reconstructed impervious surfaces.
    b. 1.1 inches of runoff from the net increase in impervious area.

To the maximum extent practicable, volume control shall be fully met onsite. Site conditions may make infiltration undesirable or impossible. The Owner must make soil corrections and/or investigate other locations on the site for feasible infiltration locations. Infiltration of stormwater should avoid areas of contaminated soil. Infiltration practices are not allowed in:

a) Areas that receive discharges from vehicle fueling and maintenance facilities.

b) Areas with less than three (3) feet of separation distance from the bottom of the infiltration system to the elevation of the seasonally saturated soils or the top of bedrock.

c) Areas that receive discharges from industrial facilities which are not authorized to infiltrate industrial stormwater under an NPDES/SDS Industrial Stormwater Permit issued by the Minnesota Pollution Control Agency (MPCA).

d) Areas where high levels of contaminants in soil or groundwater will be mobilized by the infiltrating stormwater.

e) Areas of predominately Hydrologic Soil Group D (clay) soils unless allowed by an LGU

with a current NPDES/SDS Municipal Separate Storm Sewer Systems (MS4) permit.

f) Areas within 1,000 feet up-gradient, or 100 feet down-gradient of active karst features unless allowed by an LGU with a current MS4 permit.

g) Areas within a Drinking Water Supply Management Area (DWSMA) as defined in Minnesota Rule 4720.5100, subp. 13., unless allowed by an LGU with a current MS4 permit.

h) Areas where soil infiltration rates are more than 8.3 inches per hour unless soils are amended to slow the infiltration rate below 8.3 inches per hour, or as allowed by an LGU with a current MS4 permit.

If the Owner claims that infiltration is not feasible or allowed onsite, sufficient supporting documentation must be provided. Filtration technologies may be an acceptable alternative for type C and D soils and other sites where infiltration is infeasible given the criteria above.

7.3.2.3 Water Quality

7.3.2.3.1 Total Phosphorus and Total Suspended Solids

All projects shall have a net decrease TP and TSS to receiving waterbodies from existing conditions. For new development projects, the decrease in TP and TSS shall be 60 percent and 80 percent from existing conditions, respectively.

7.3.2.3.2 Buffer Zone

An undisturbed buffer zone of 100 linear feet from trout waters shall be maintained at all times, both during construction and as a permanent feature after construction, except where a water crossing, or other encroachment is necessary to complete the project.

Exceptions: Buffer encroachments (circumstance and reason) and restoration activities must be documented. The replacement of existing impervious surfaces within the buffer zone is allowed. All potential water quality, scenic, and other environmental impacts of these exceptions must be minimized by the use of additional or redundant BMPs and documented.

7.3.2.3.3 Temperature Controls

Permanent Stormwater Management facilities shall be designed to minimize any increase in the temperature of trout waters receiving waters resulting from the 1-year and 2-year 24-hour precipitation events. This includes all tributaries of designated trout streams within the Public Land Survey System (PLSS) Section where a trout water is located. Projects that discharge to trout waters must minimize the impact using one or more of the following measures, in order of preference:

a. Minimize new impervious surfaces.

b. Minimize the discharge from connected impervious surfaces by discharging to vegetated areas, or grass swales, and using other nonstructural controls.

c. Use Infiltration or other volume reduction practices to reduce stormwater runoff in excess of pre-project conditions (up to the 2-year, 24-hour precipitation event).

d. Design appropriate combination of measures such as shading, filtered bottom withdrawal, vegetated swale discharges, or constructed wetland treatment cells that will limit temperature increases when incorporating ponding. Also, design the pond to drawn down in 24 hours or less.

e. Use other methods that will minimize any increase in the temperature of the trout water.

7.3.3 Maintenance and Easement

1. All stormwater management structures and facilities must be designed for maintenance access and properly maintained in perpetuity so that they continue to function as designed.
2. A maintenance plan shall identify and protect the design, capacity, and functionality of onsite and offsite stormwater management facilities; specify the methods; and schedule responsible parties for maintenance for every stormwater management facility.
3. The maintenance agreement shall be recorded with the applicable county (Carver, Dakota, Hennepin, Scott, or Ramsey) as part of the LGU development approval process.
4. A public entity assuming a maintenance obligation may submit a written executed agreement in lieu of the recorded maintenance agreement.

7.3.4 Alternative Measures

Sites where infiltration is infeasible, should comply with the NPDES General Construction Permit, issued by the Minnesota Pollution Control Agency, August 1, 2013 as amended.

8 Shoreline and Streambank Alteration Standard

8.1 Policy Statement

It is the District's policy to:

- Manage stable, intact, and vegetated shorelines and streambanks that provide valuable functions to the associated water resource, including erosion prevention, reinforcement of soils through root structure, trapping of nutrients and sediments, and provision of fish and wildlife habitat.
- Promote the preservation and enhancement of the ecological integrity and natural appearance of shorelines and streambanks with the intent of preventing erosion.
- Encourage practices such as bioengineering and preservation of natural vegetation practices,

when alterations are necessary.

- Preserve water quality and the ecological integrity of the riparian environment, including wildlife and fisheries habitat, and recreational water resources.

8.2 Regulated Activity and Threshold

a. Improvement or alteration below the ordinary high water mark of a lake or wetland, or the bankfull height of a watercourse; including but not limited to, bioengineered installations, placement of riprap, retaining walls, sand blankets, or boat ramps.

b. Maintenance of an existing riprap or hard-armored shoreline or streambank that involves the addition of new material or structural change.

8.3 Standards

a. Use bioengineering techniques to the extent possible. The use of bioengineering is encouraged as an alternative to traditional engineered stabilization techniques for cost advantage, aesthetic superiority, and ecological integrity. If bioengineering cannot provide a stable shoreline, a combination of riprap and bioengineering may be used to restore or maintain shoreline. If a combination of riprap and bioengineering cannot provide a stable shoreline within a reasonable period, riprap may be used to restore or maintain shoreline.

   - Live plantings incorporated in shoreline bioengineering must be native aquatic vegetation and/or native upland plants.
   - Riprap used in shoreline erosion protection must be sized appropriately in relation to the erosion potential of the wave or current action of the particular water body, but in no case shall the riprap rock average less than six (6) inches in diameter or more than 30 inches in diameter. Riprap shall be durable, natural stone, and of a gradation that will result in a stable shoreline embankment. Stone, granular filter, and geotextile material shall conform to standard Minnesota Department of Transportation (MNDOT) specifications, except that neither limestone nor dolomite shall be used for shoreline or stream bank riprap but may be used at stormwater outfalls. All materials used must be free from organic material, soil, clay, debris, trash, or any other material that may cause siltation or pollution.
   - Riprap placement shall conform to the natural alignment of the shoreline/streambank.
   - A transitional layer consisting of graded gravel, at least six (6) inches deep, and an appropriate geotextile filter fabric shall be placed between the existing shoreline and any riprap. The thickness of riprap layers should be at least 1.25 times the maximum stone diameter. Toe boulders, if used, must be at least 50 percent buried.
   - Riprap must not cover emergent vegetation, unless authorized by a Department of Natural Resources (DNR) permit.

- Riprap shall extend no higher than the top of bank or two feet above the 100-year high water elevation, whichever is lower.

b. Stabilize the shoreline with minimal horizontal encroachment and without interference of water flow or navigation. No riprap or filter material shall be placed more than six (6) feet waterward of the OHW. Streambank riprap shall not reduce the cross-sectional area of the channel or result in a stage increase of more than 0.01 feet at or upstream of the treatment.

c. Design of shoreline erosion protection must reflect the engineering properties of the underlying soils and any soil corrections or reinforcements necessary. The design shall conform to engineering principles for wave energy dispersion and resistance to deformation from ice pressures and movement, considering prevailing winds, fetch, and other factors that induce wave energy.

d. Use of riprap for merely cosmetic purposes is prohibited.

e. Use retaining walls only when there is no adequate stabilization alternative and in accordance with MN Rules 6115.0211. Retaining walls extending below the OHW of a water body are prohibited, except where:

    - There is a demonstrable need for a retaining wall in a public improvement project.
    - The design of the retaining wall has been certified by a registered engineer.

A determination by the District for a project meeting this Standard does not preclude it from needing a DNR Public Waters Work Permit.

9 Steep Slopes Standard

9.1 Policy Statement

It is the District's policy to:

- Protect water quality down gradient steep slopes from pollutant loadings of sediment, nutrient, bacteria, and other contaminants.
- Maintain stability of steep slopes, shorelines, and other areas prone to erosion.
- Sustain and enhance the biological and ecological functions of non-invasive vegetation on steep slopes.
- Minimize impacts to and preserve the natural character and topography of steep slopes.
- Protect properties and waterbodies adjacent to steep slopes from erosion, sedimentation, flooding, and other damage.
- Promote public safety by requiring certification from qualified individuals before land-disturbing activities and other changes to land on steep slopes.

9.2 Regulated Activity and Threshold

- Land-disturbing activities that involves the excavation of 50 cubic yards or more of earth, or displacement or removal of 5,000 square feet or more of surface area or vegetation within the Steep Slopes Overlay District, as shown on the Lower Minnesota River Watershed District - Steep Slopes Overlay District Map (Figure K2).

- Activities requiring municipal/LGU grading, building, parking lot, and foundations permits that result in a net increase in impervious surface or stormwater runoff within the Steep Slopes Overlay District as illustrated on Figure K2.

9.3 Exceptions

- Upon showing, to the satisfaction of the LMRWD, that the LGU has enacted and is following official controls necessary to meet the intent of these standards, the LMRWD may issue an exception to the standard for projects with land-disturbing activities that require a municipal grading, building, parking lot, or foundation permit that impact less than 50 cubic yards or less than 5,000 square feet of surface area or vegetation. The exception, if issued, will be documented in a Memorandum of Agreement wherein the LGU must agree: (1) that it will enforce its official controls; (2) that the exception will terminal if the LGU amends its official controls, so they no longer meet the intent of these standards; and (3) that it will provide notice to the LMRWD of all permits issued under the exception.
- New impervious areas associated with driveway widenings that drains to the street where runoff water is managed by a municipal storm sewer system.
- Maintenance, repair, or replacement of existing structures, public roads, utilities, and drainage systems within the Steep Slopes Overlay District.
- Disturbances that are part of an approved local water plan (LWP) to repair, grade, or re-slope existing steep slopes that are eroding or unstable to establish stable slopes and vegetation.
- Native plantings that enhance natural vegetation of steep slopes.
- Selective removal of noxious, exotic, or invasive vegetation using locally recognized methods to control and/or minimize their spread.
- Pruning of trees or vegetation that are dead, diseased or pose a public hazard, and removal of vegetation in emergency situations from steep slopes.
- Maintenance of existing lawns, landscaping, and gardens.
- Agricultural and forestry activities.

9.4 Standard

The standards outlined in this section apply to the areas identified on the Lower Minnesota River Watershed District - Steep Slopes Overlay District Map (Figure K2).

A. Land disturbing activities as regulated in this section may occur within the Steep Slopes Overlay District, provided a qualified professional/professional engineer registered in the state of Minnesota certifies the suitability of the area for the proposed activities, structures or uses resulting from the activities and the following requirements are addressed:

    1. Minimum erosion and sediment control best management practices (BMPs) include site stabilization and slope restoration measures to ensure the proposed activity will not result in:

        i. adverse impacts to adjacent and/or downstream properties or water bodies;

        ii. unstable slopes conditions; and

        iii. degradation of water quality due to erosion, sedimentation, flooding, and other damage.

    2. Preservation of existing hydrology and drainage patterns. Land-disturbing activities may not result in any new water discharge points on steep slopes or along the bluff.

Stormwater ponds, swales, infiltration basins, or other soil saturation-type features shall not be constructed within Steep Slopes Overlay District.

10 Water Appropriations Standard

10.1 Policy Statement

It is the District's policy to:

- Maintain groundwater recharge and protect groundwater from contamination.
- Promote management practices that protect groundwater recharge and quality.
- Support enforcement of Wellhead Protection Plans, Individual Sewage Treatment Systems/ISTS, and community septic ordinances.
- Support development and implementation of Wellhead Protection Plans.
- Review appropriations requests for groundwater in HVRAs.
- Evaluate the potential impacts of public or private infrastructure (including private and municipal groundwater appropriations) interference of flows on groundwater recharge, transmission, and discharge.

10.2 Regulated Activity and Threshold

Temporary withdrawal of groundwater for construction dewatering, landscaping, dust control, and hydrostatic testing of pipelines, tanks, and wastewater ponds, and groundwater withdrawal of more than 10,000 gallons of water per day or 1 million gallons per year within HVRA Overlay District, as shown on the Lower Minnesota River Watershed District – High Value Resources Area Overlay District Map (Figure K1).

10.3 Standards

10.3.1

A. In all cases of groundwater appropriation requiring a DNR permit in the District, a copy of the permit application and information on the location of the discharge/withdrawal shall be filed with the District for review.

B. Develop and submit a discharge management plan to the District.

C. Demonstrate no net change in groundwater levels to adjacent fen.

11 Water Crossing Standard

11.1 Policy Statement

It is the District's policy to:

- Prohibit the use of beds and banks of streams and lakes for the placement of roads, driveways, and utilities.
- Regulate crossings of watercourses for driveways, roads, and utilities to maintain stream stability, conveyance capacity, and the ability to transport, without adverse effect, the flows and detritus of its watershed.
- Preserve the ecological integrity of the riparian and aquatic environment, including wildlife and fisheries habitat and recreational water resources.
- Encourage improvement of wildlife passage and habitat, especially for projects involving culvert and public right-of-way in or near natural corridors.

11.2 Regulated Activity and Threshold

Horizontal drilling under or placement of a road, highway, utility, bridge, boardwalk or associated structure in contact with the bed or bank of any waterbody, including alteration of a waterbody to enclose it within a pipe or culvert.

11.3 Exceptions

Ecological restoration of a waterbody that has been significantly altered from its natural state or degraded, for which the proposed application would provide a greater degree of resource protection and restoration than would strict compliance with the standard.

11.4 Standards

a. Show the effects of the project through analysis completed by a qualified professional on the stream's physical characteristics, hydraulic capacity, and water quality.

b. Time construction by taking advantage of seasons with no or low stream flow as appropriate.

c. Time construction to avoid spawning seasons, if applicable.

d. Demonstrate a public benefit and ensure the crossing will retain adequate hydraulic and navigational capacity for the portion of a road, highway, utility, or associated structure that crosses the bed or bank of any waterbody. If applicable, the project should not adversely affect water quality, and represent the "minimal impact" solution to a specific need with respect to all other reasonable alternatives.

e. Projects must follow the DNR manual *Best Practices for Meeting DNR General Public Waters Work Permit GP 2004-0001*, and as amended, when applicable.

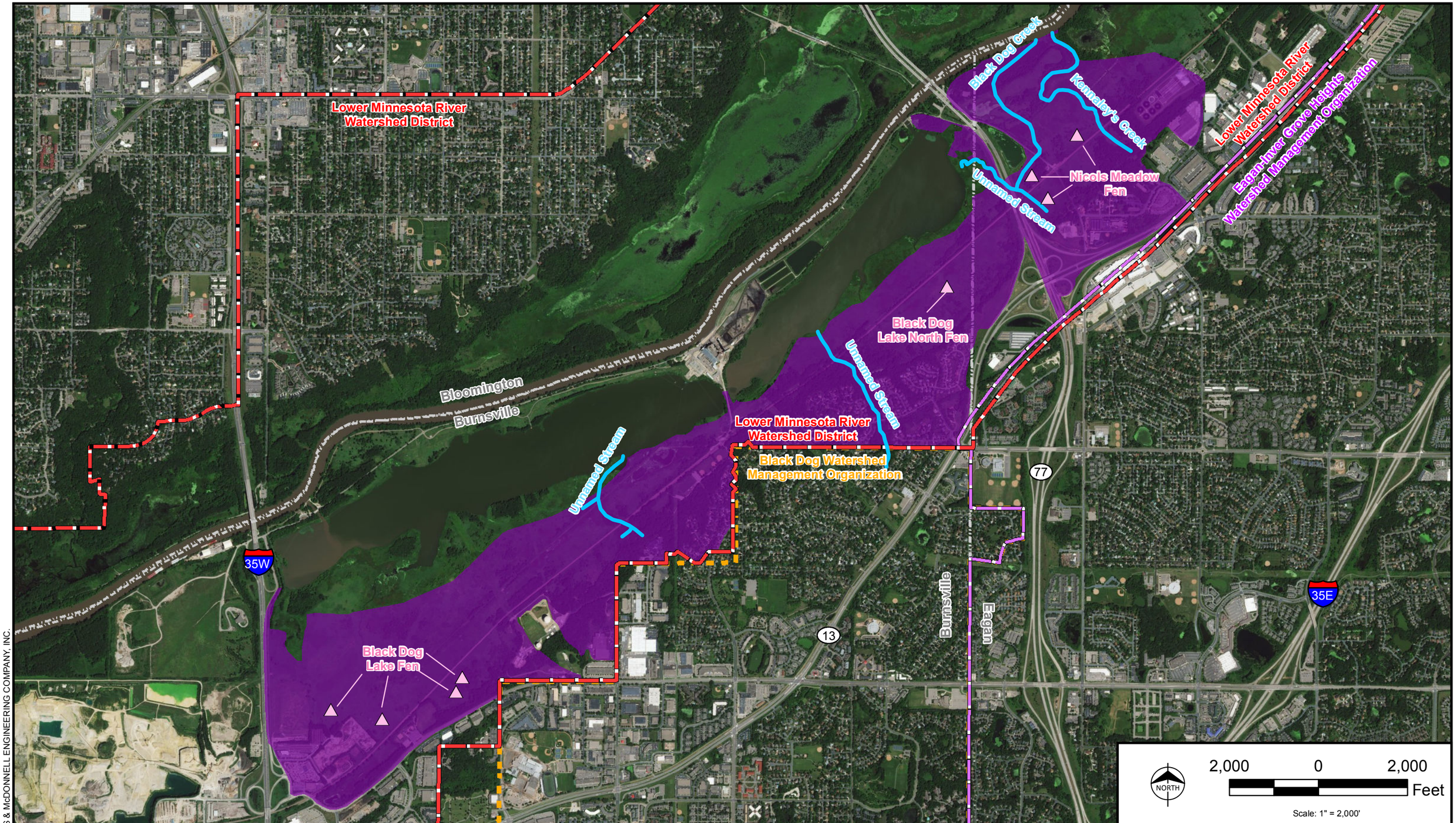
f. Size and place stream crossings, as follows:

   - Regardless of the stream's width-to-depth ratio (bankfull width/mean depth), minimum culvert width shall match or exceed stream bankfull width (water surface width at discharge associated with the 1.5-year return period). Combined width of multiple culverts is satisfactory.
   - Culvert length shall extend beyond side slope toe and be buried one-sixth of its height.
   - Slope of culvert shall match stream thalweg (the deepest continuous line along a watercourse) slope.
   - When using multiple culverts, offset culvert inverts. Use the fewest and largest multiples possible. A minimum vertical separation of 1-foot is required between the lowest placed culvert and multiples.
   - Alignment of culvert shall match stream alignment.
   - Additional consultation is required with DNR, the District, and other regulatory agency staff when the stream is a designated trout stream or contains endangered or threatened species.

g. Provide a maintenance agreement. A declaration, or other recordable instrument, stating terms for hydraulic capacity maintenance shall be recorded in the County recorder's office or registrar before activity commences. In lieu of recordation, a public body or project proposer

without a property interest sufficient for recordation may assume the maintenance obligation by means of a written agreement. The agreement shall state that if the ownership of the structure is transferred, the public body shall require the transferee to comply with this requirement.

h. Preserve aquatic and upland wildlife passages.



High Value Resource Area (HVRA)

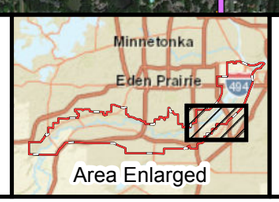
- HVRA Overlay District

MNDNR Publicly Available Data

- Calcareous Fen Point
- Trout Stream
- Trout Pond/Lake

Jurisdictional Boundaries

- Municipal Boundary
- Lower Minnesota River Watershed District
- Riley-Purgatory-Bluff Creek Watershed District
- Black Dog Watershed Management Organization



LOWER MINNESOTA RIVER WATERSHED DISTRICT

BURNS McDONNELL

Lower Minnesota River Watershed District
High Value Resources Area
Overlay District Map
Figure K1
1 of 5

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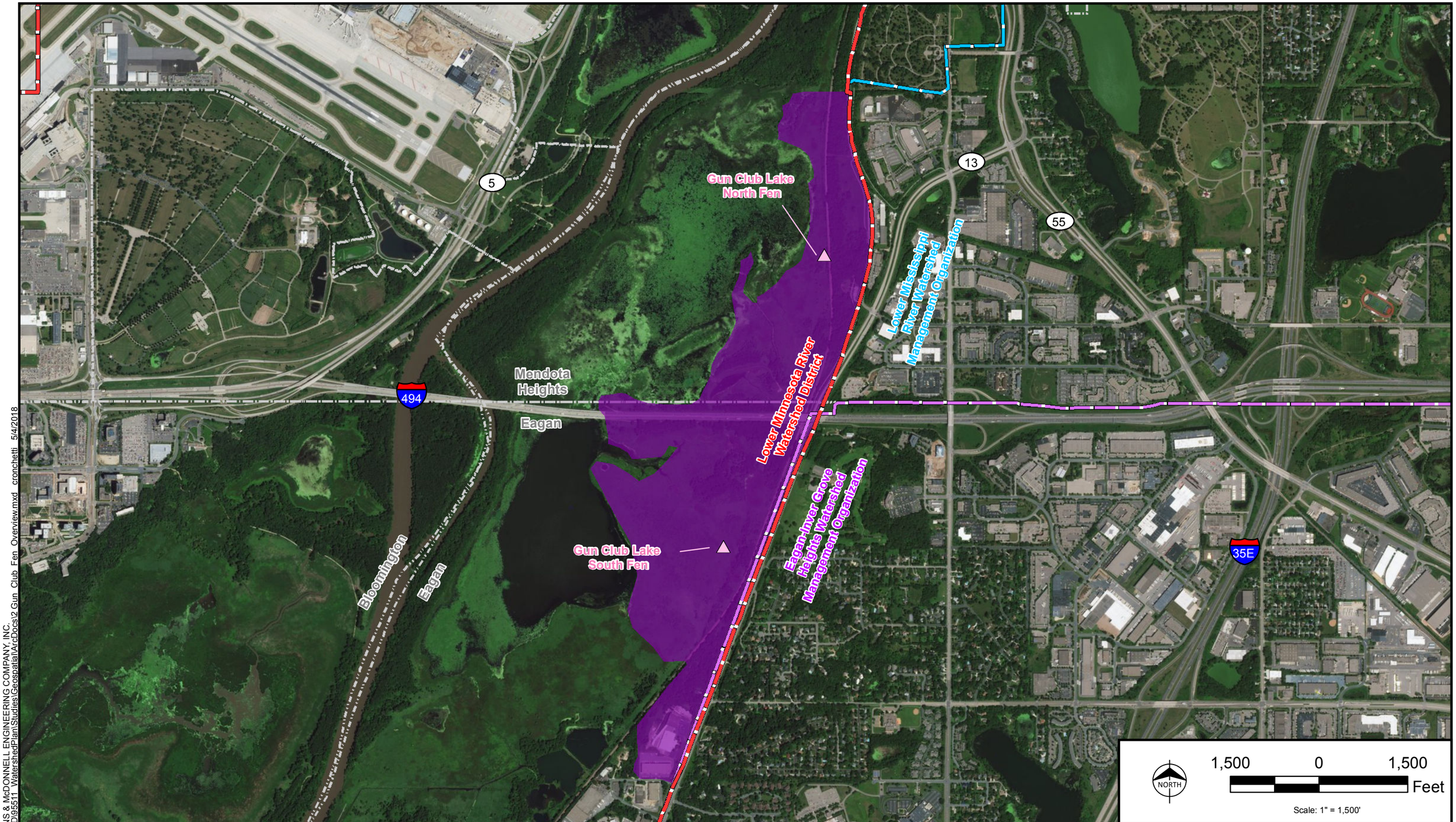

High Value Resource Area (HVRA)

- HVRA Overlay District

MNDNR Publicly Available Data

- Calcareous Fen Point
- Trout Stream
- Trout Pond/Lake

Jurisdictional Boundaries

- Municipal Boundary
- Lower Minnesota River Watershed District
- Riley-Purgatory-Bluff Creek Watershed District
- Lower Mississippi River Watershed Management Organization

LOWER MINNESOTA RIVER WATERSHED DISTRICT

BURNS McDONNELL

Lower Minnesota River Watershed District
High Value Resources Area
Overlay District Map
Figure K1
2 of 5

Source: MNDNR, MN Geospatial Commons, ESRI, and Burns & McDonnell Engineering Company, Inc.

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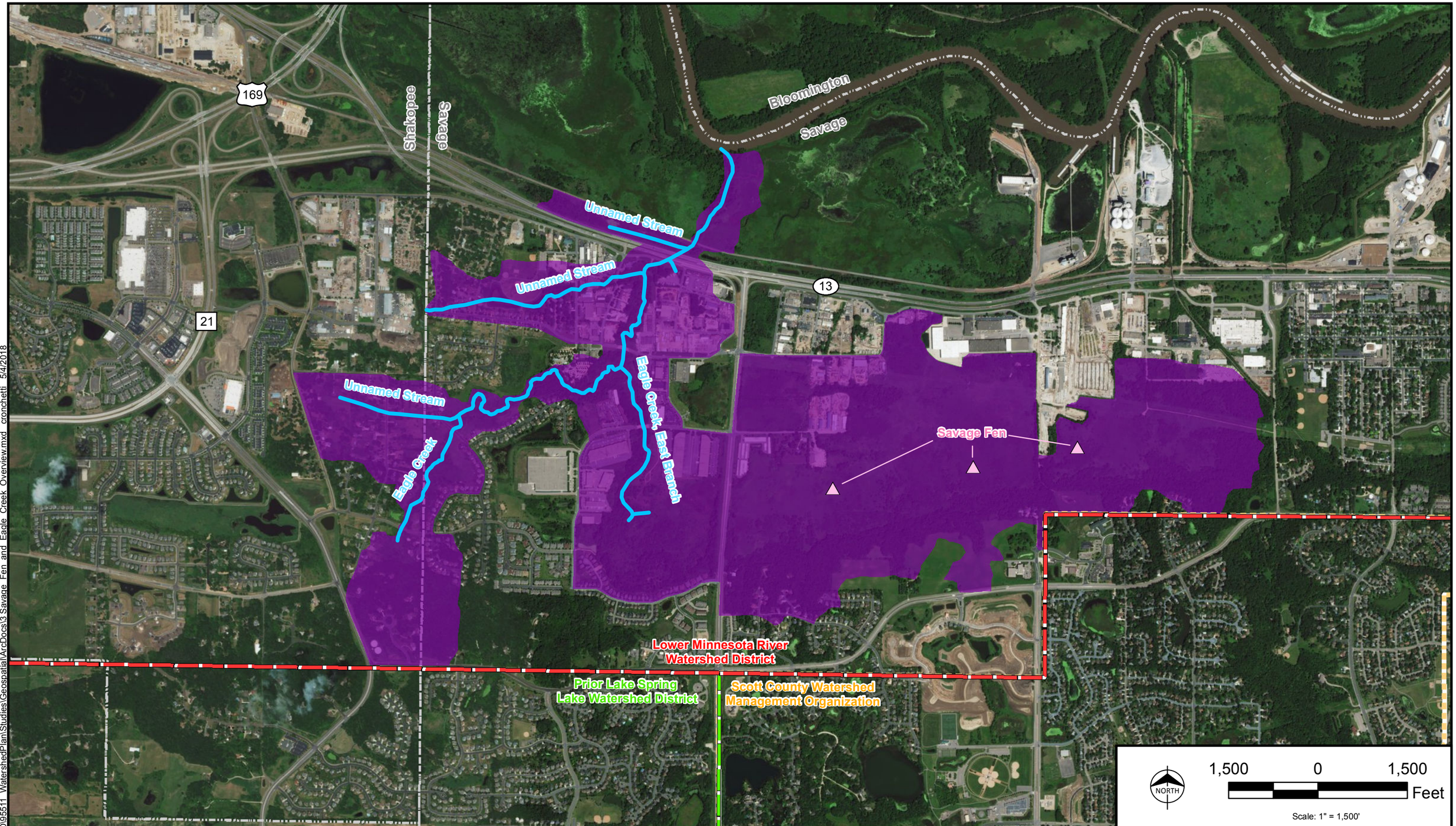

High Value Resource Area (HVRA)

- HVRA Overlay District

MNDNR Publicly Available Data

- Calcareous Fen Point
- Trout Stream
- Trout Pond/Lake

Jurisdictional Boundaries

- Municipal Boundary
- Lower Minnesota River Watershed District
- Prior Lake Spring Lake Watershed District
- Scott County Watershed Management Organization

LOWER MINNESOTA RIVER WATERSHED DISTRICT

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Lower Minnesota River Watershed District
High Value Resources Area
Overlay District Map
Figure K1
3 of 5

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Source: MNDNR, MN Geospatial Commons, ESRI, and Burns & McDonnell Engineering Company, Inc.

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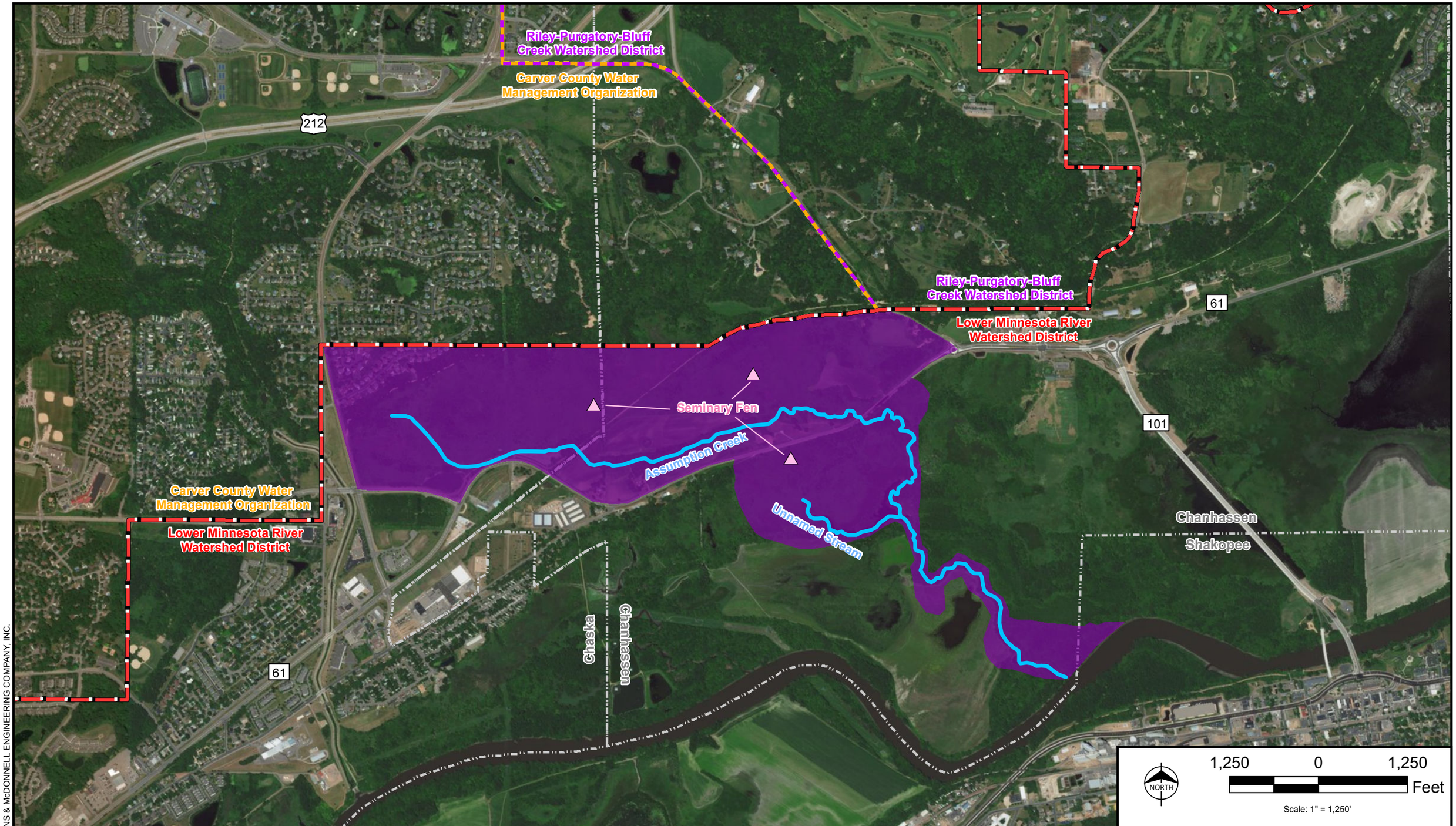


High Value Resource Area (HVRA)

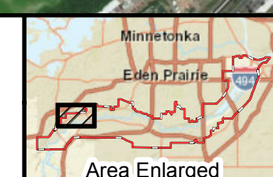
- HVRA Overlay District

MNDNR Publicly Available Data

- Calcareous Fen Point
- Trout Stream
- Trout Pond/Lake

Jurisdictional Boundaries

- Municipal Boundary
- Lower Minnesota River Watershed District
- Riley-Purgatory-Bluff Creek Watershed District



LOWER MINNESOTA RIVER WATERSHED DISTRICT

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Lower Minnesota River Watershed District
High Value Resources Area
Overlay District Map
Figure K1
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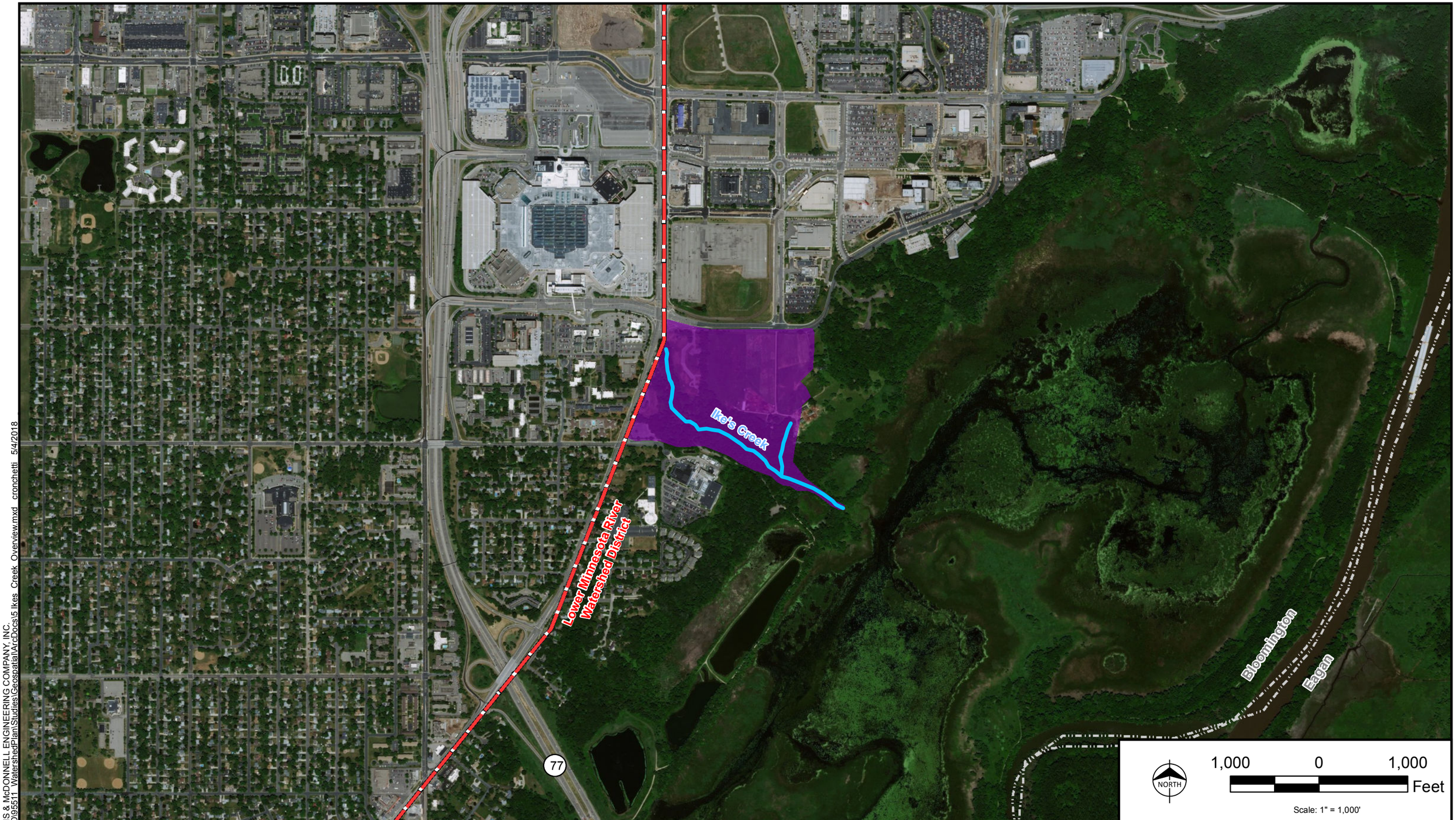

High Value Resource Area (HVRA)
- HVRA Overlay District

MNDNR Publicly Available Data
- Calcareous Fen Point
- Trout Stream
- Trout Pond/Lake

Jurisdictional Boundaries
- Municipal Boundary
- Lower Minnesota River Watershed District

LOWER MINNESOTA RIVER WATERSHED DISTRICT

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Lower Minnesota River Watershed District
High Value Resources Area
Overlay District Map
Figure K1
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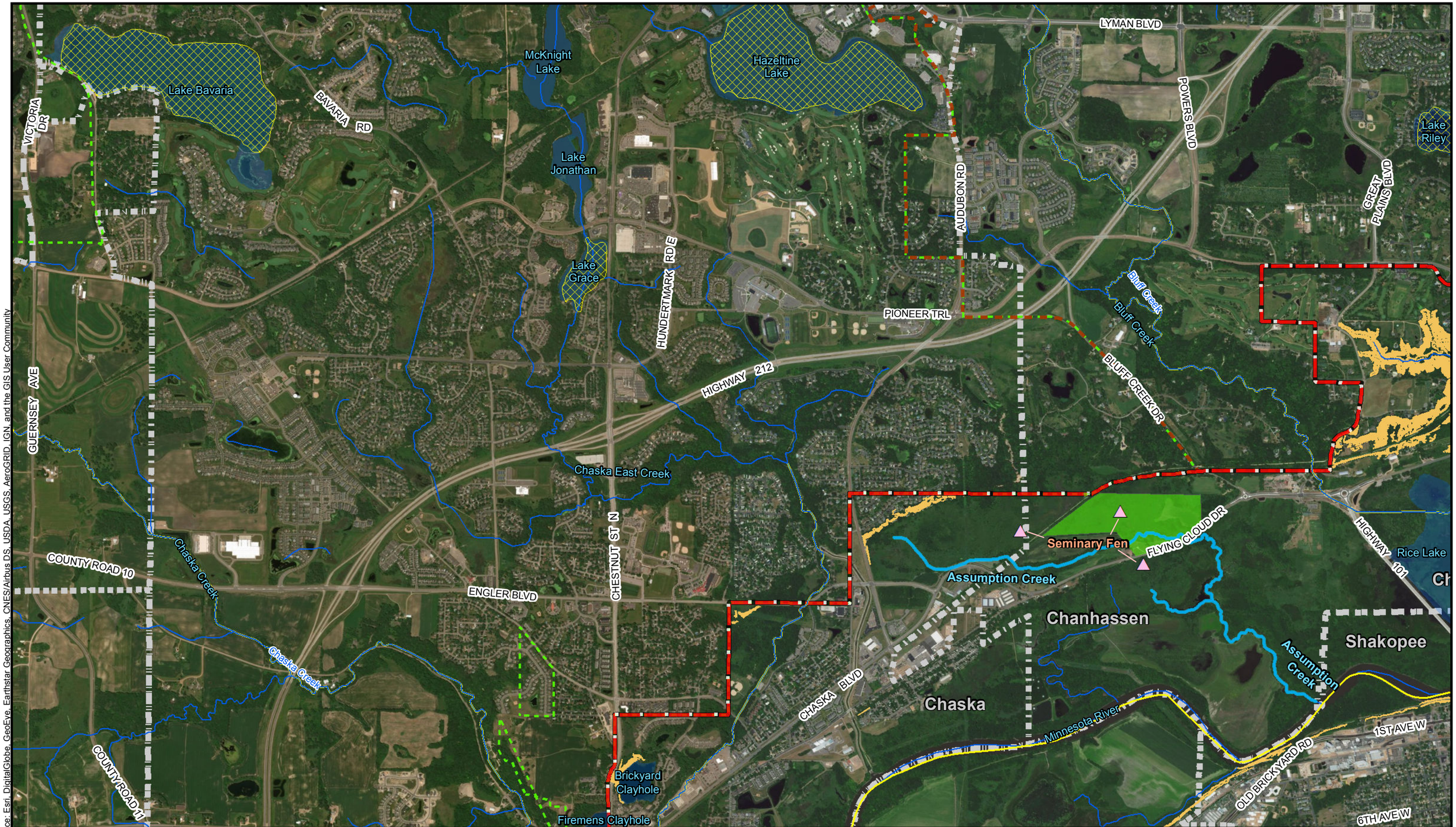
Figure K1: Lower Minnesota River Watershed District – High Value Resources Area Overlay District Map



Steep Slope

Watershed District Boundary
- Carver County
- Riley-Purgatory-Bluff Creek
- Scott
- Lower MN River

MNDNR Publicly Available Data
- Stream\River
- Impaired River or Stream
- Impaired Lake
- SNA - Fens
- PWI Water
- Trout Stream
- Calcareous Fen Point
- Municipal Boundary

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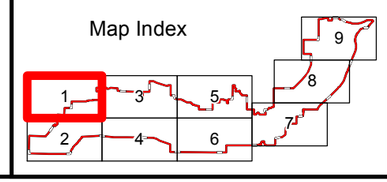
Feet

NORTH

Map Index



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Lower Minnesota River Watershed District
Steep Slopes Overlay District
Figure K2
1 of 9

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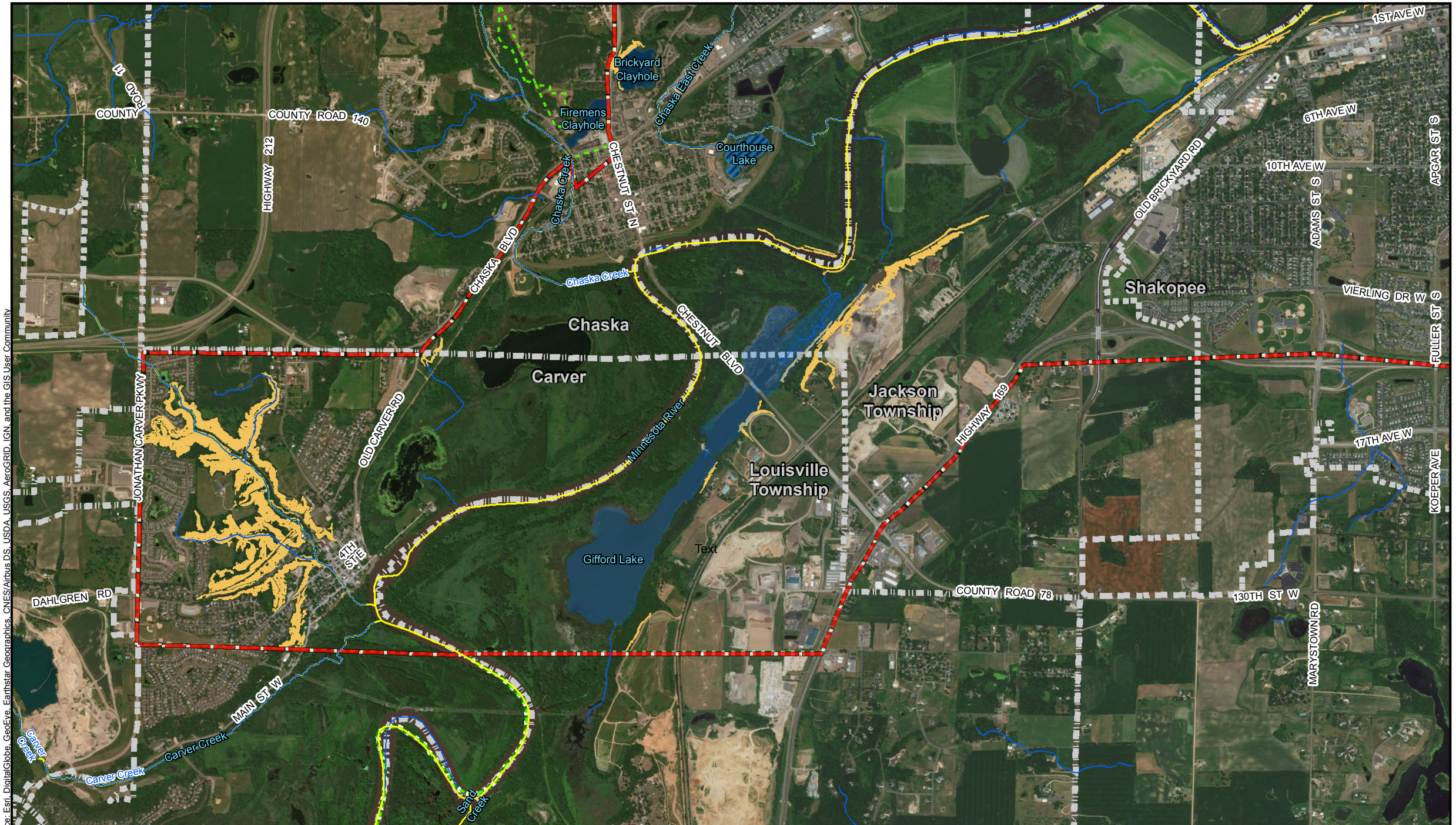

Steep Slope

Watershed District Boundary
- Carver County
- Scott
- Lower MN River

MNDNR Publicly Available Data
- Stream\River
- Impaired River or Stream
- Impaired Lake
- SNA - Fens
- PWI Water
- Trout Pond/Lake
- Calcareous Fen Point
- Municipal Boundary

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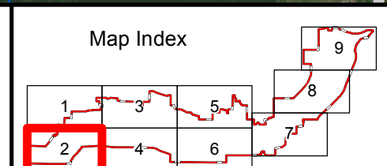

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Steep Slopes Overlay District
Figure K2
2 of 9

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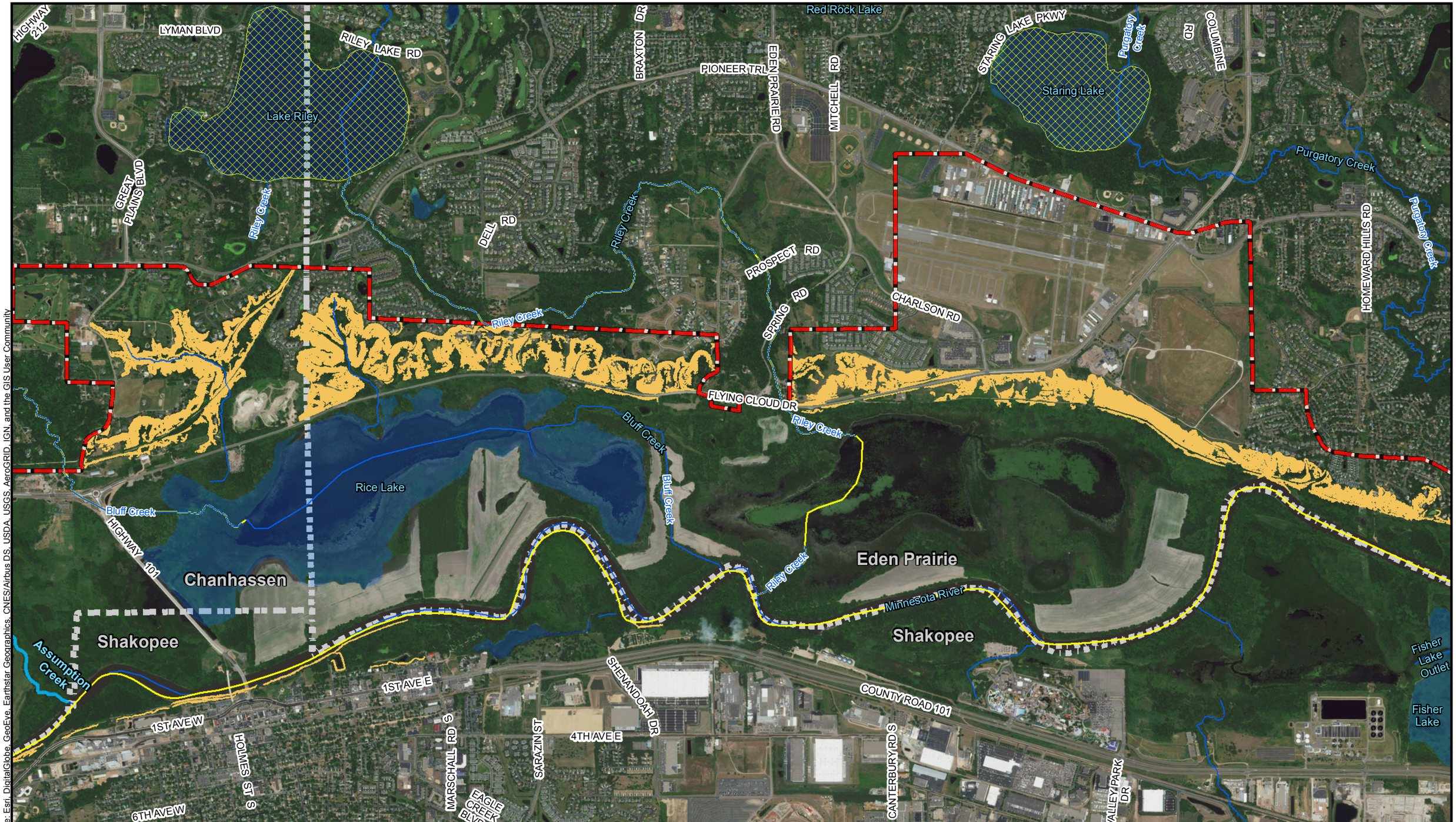

Steep Slope

Watershed District Boundary
- Riley-Purgatory-Bluff Creek
- Scott
- Lower MN River

MNDNR Publicly Available Data
- Stream\River
- Impaired River or Stream
- Impaired Lake
- SNA - Fens
- PWI Water
- Trout Stream
- Calcareous Fen Point
- Municipal Boundary

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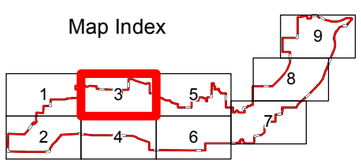
Map Index



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Lower Minnesota River Watershed District
Steep Slopes Overlay District
Figure K2
3 of 9

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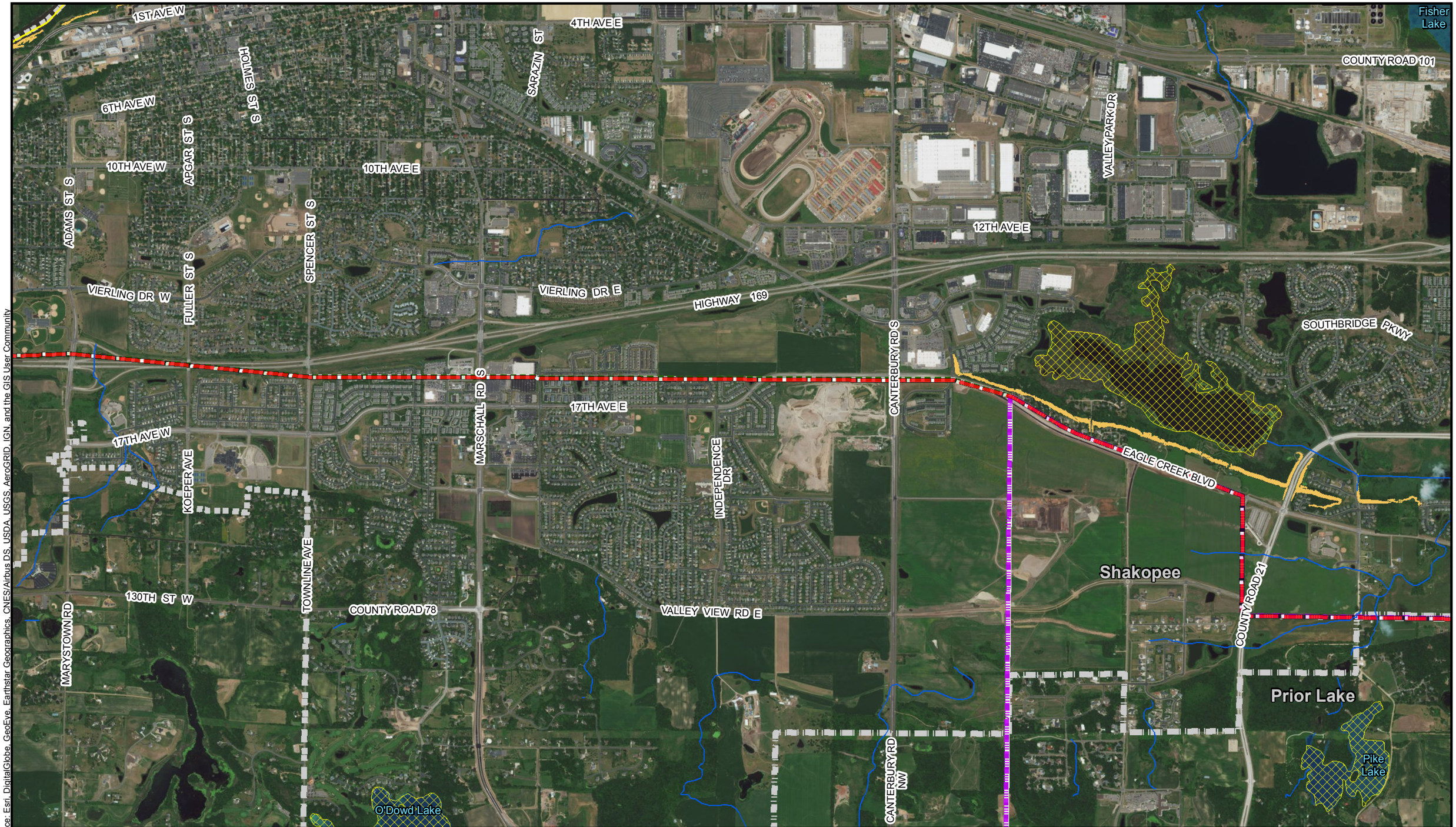

Steep Slope

Watershed District Boundary
- Prior Lake-Spring Lake
- Scott
- Lower MN River

MNDNR Publicly Available Data
- Stream\River
- Impaired River or Stream
- Impaired Lake

- SNA - Fens
- PWI Water
- Calcareous Fen Point
- Municipal Boundary

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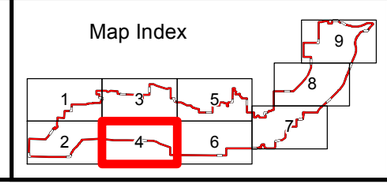

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Lower Minnesota River Watershed District
Steep Slopes Overlay District
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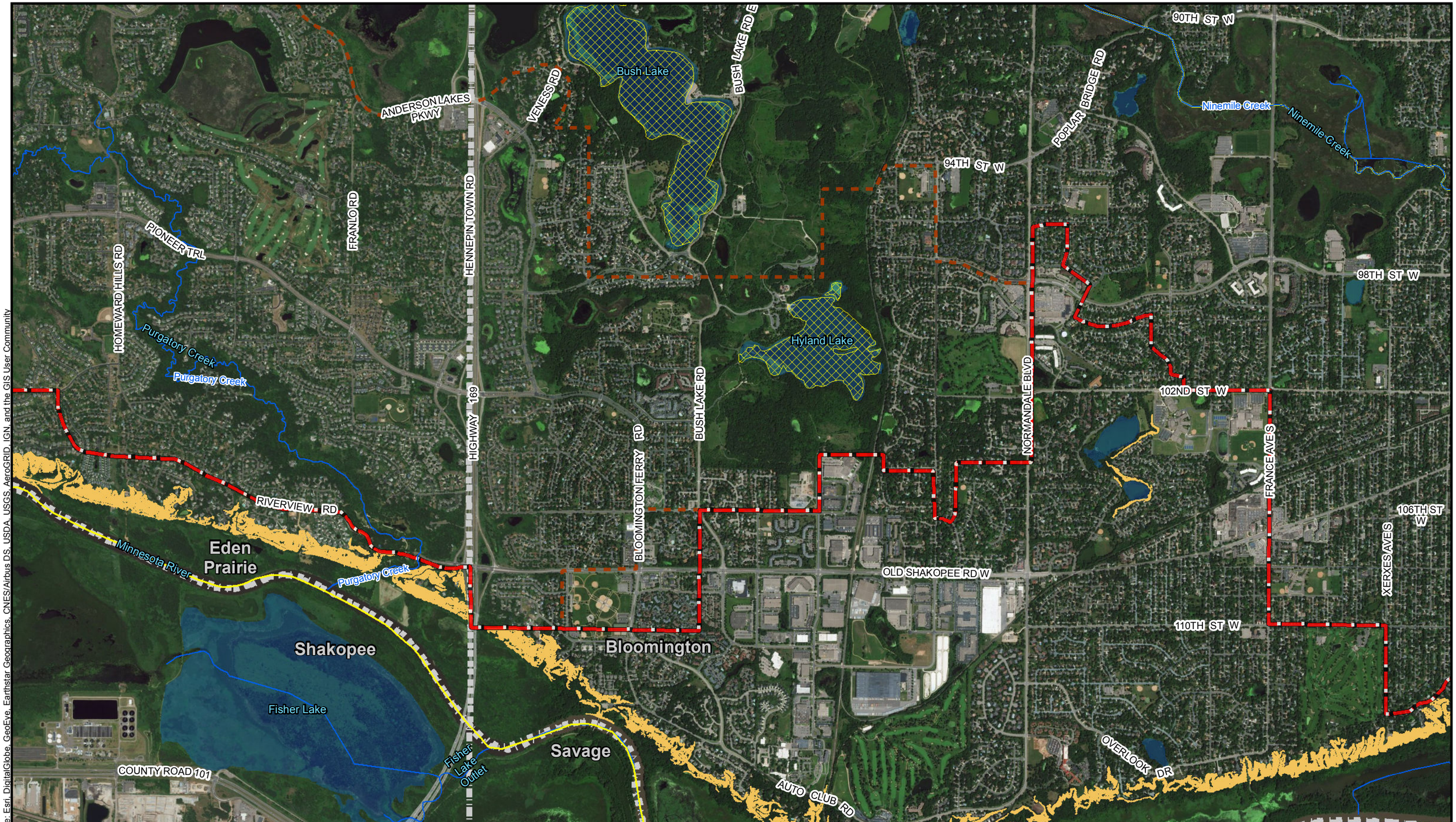

Steep Slope

Watershed District Boundary
- Riley-Purgatory-Bluff Creek
- Scott
- Lower MN River

MNDNR Publicly Available Data
- Stream\River
- Impaired River or Stream
- Impaired Lake

- SNA - Fens
- PWI Water
- Calcareous Fen Point
- Municipal Boundary

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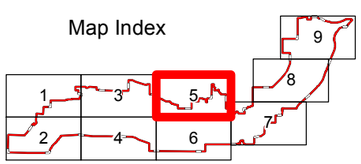

LOWER MINNESOTA RIVER WATERSHED DISTRICT

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Lower Minnesota River Watershed District
Steep Slopes Overlay District
Figure K2
5 of 9

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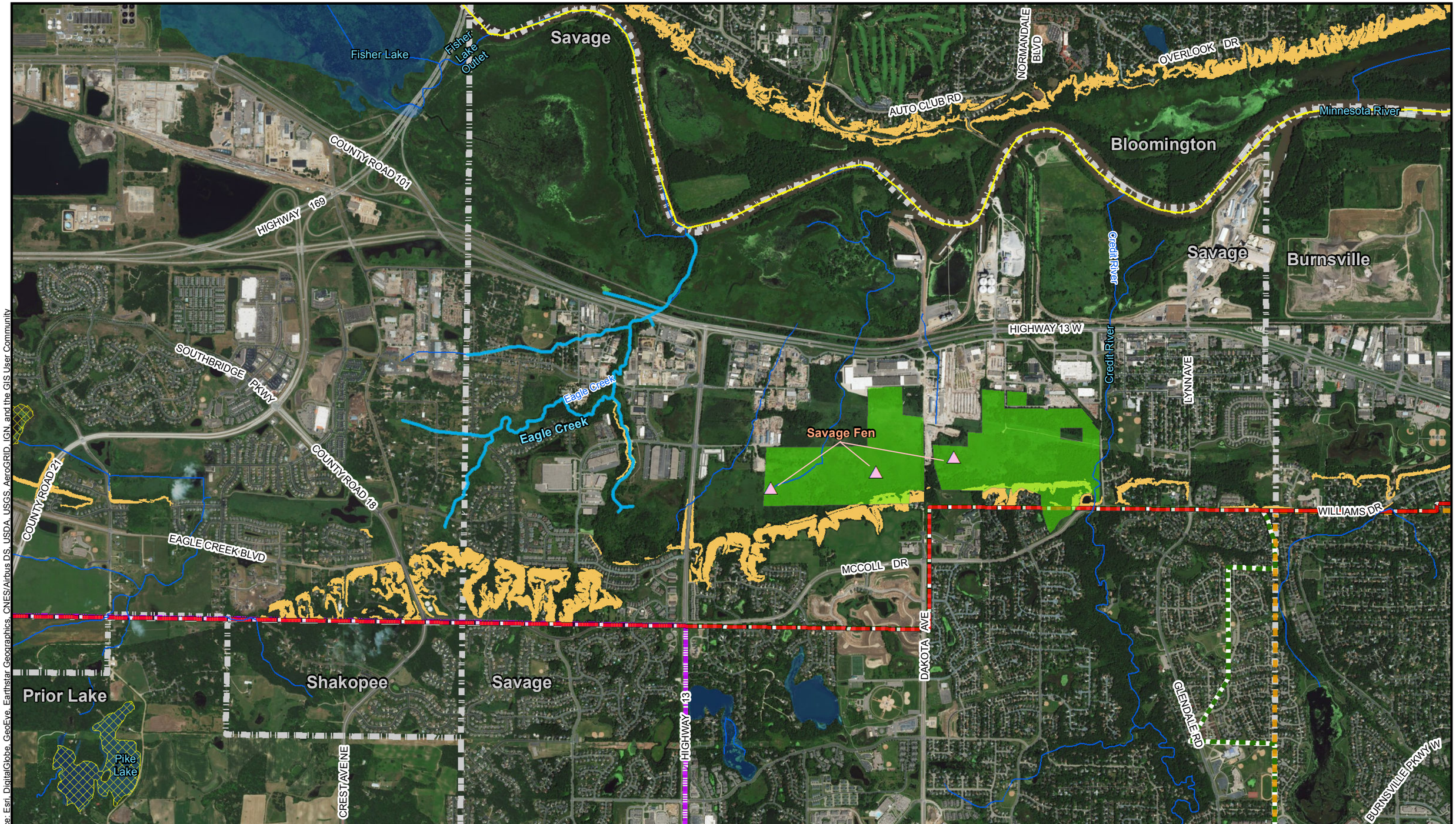

Steep Slope

Watershed District Boundary
- Black Dog
- Prior Lake-Spring Lake
- Scott
- Lower MN River

MNDNR Publicly Available Data
- Stream\River
- Impaired River or Stream
- Impaired Lake
- SNA - Fens
- PWI Water
- Trout Stream
- Calcareous Fen Point
- Municipal Boundary

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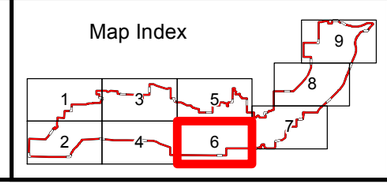

Lower Minnesota River Watershed District
Steep Slopes Overlay District
Figure K2
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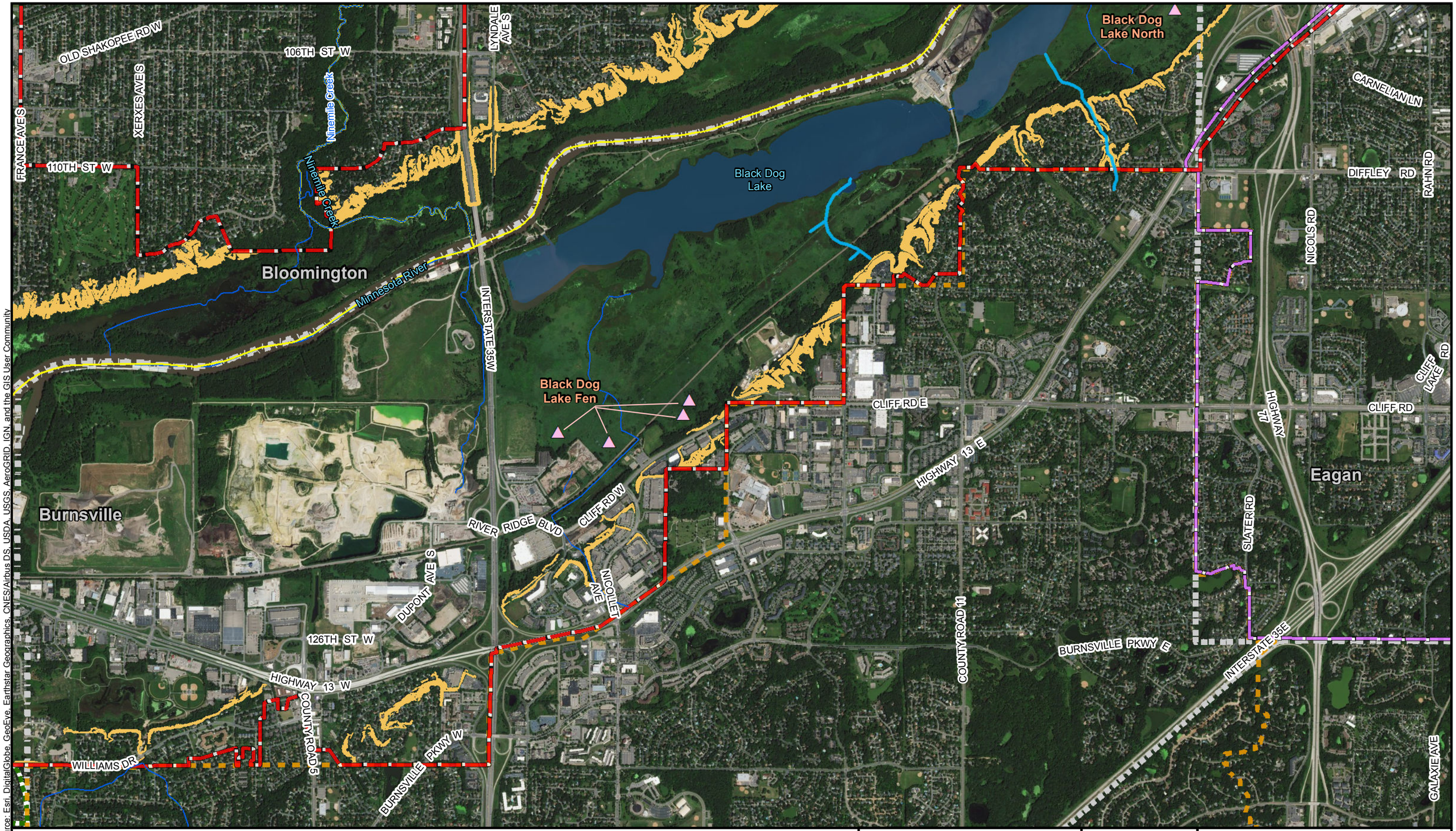

Steep Slope

Watershed District Boundary
- Black Dog
- Eagan-Inver Grove
- Scott
- Lower MN River

MNDNR Publicly Available Data
- Stream\River
- Impaired River or Stream
- Impaired Lake
- SNA - Fens
- PWI Water
- Trout Stream
- Calcareous Fen Point
- Municipal Boundary

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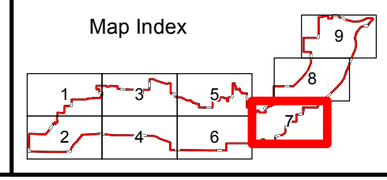
Map Index



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Lower Minnesota River Watershed District
Steep Slopes Overlay District
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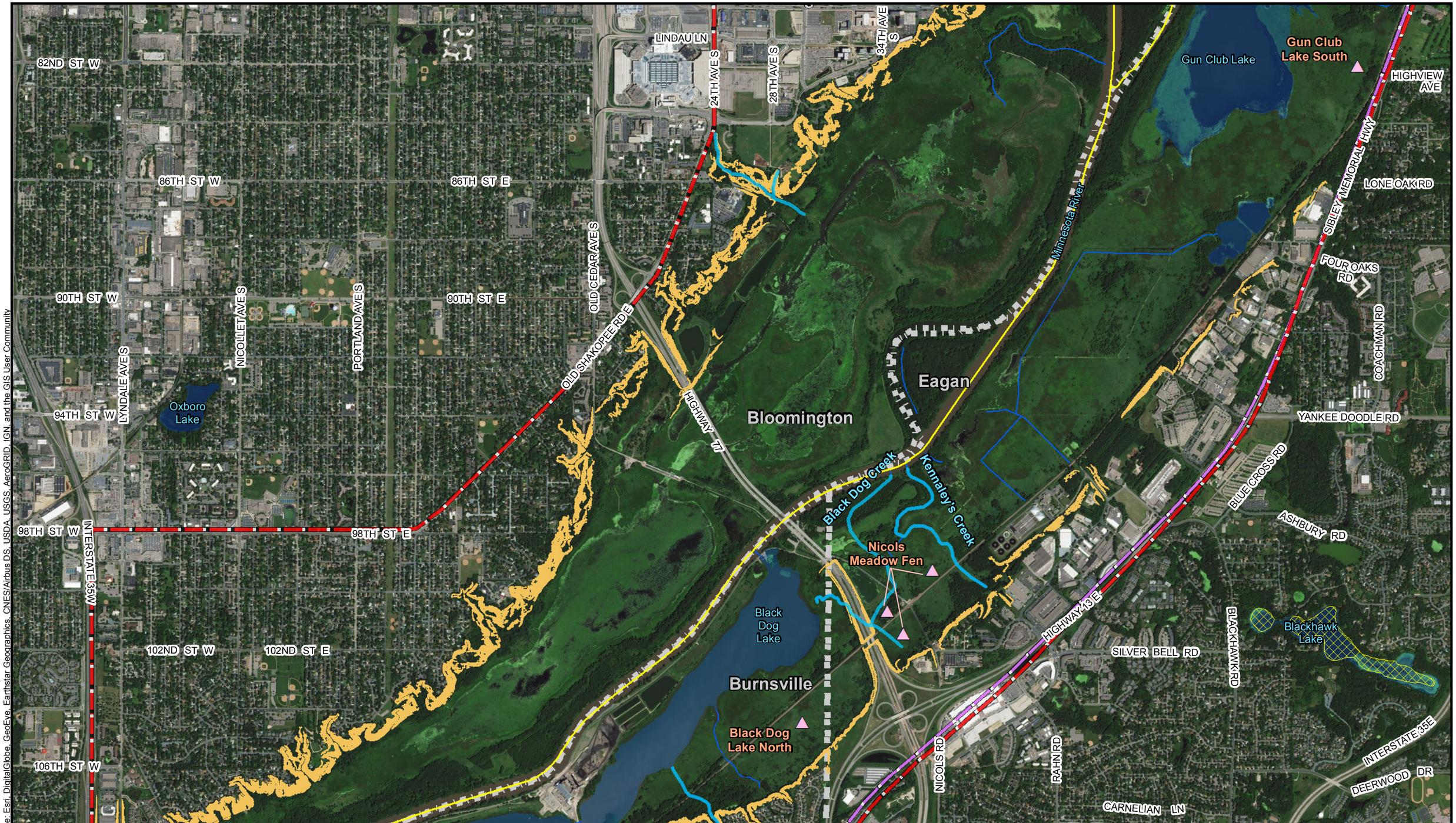

Steep Slope

Watershed District Boundary
- Eagan-Inver Grove
- Scott
- Lower MN River

MNDNR Publicly Available Data
- Stream\River
- Impaired River or Stream
- Impaired Lake
- SNA - Fens
- PWI Water
- Trout Stream
- Calcareous Fen Point
- Municipal Boundary

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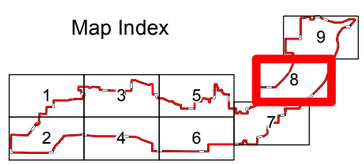
Feet

NORTH

Map Index



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Lower Minnesota River Watershed District
Steep Slopes Overlay District
Figure K2
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Source:ESRI, MNDNR, Minnesota Geospatial Information Office, Burns & McDonnell Engineering Company, Inc.

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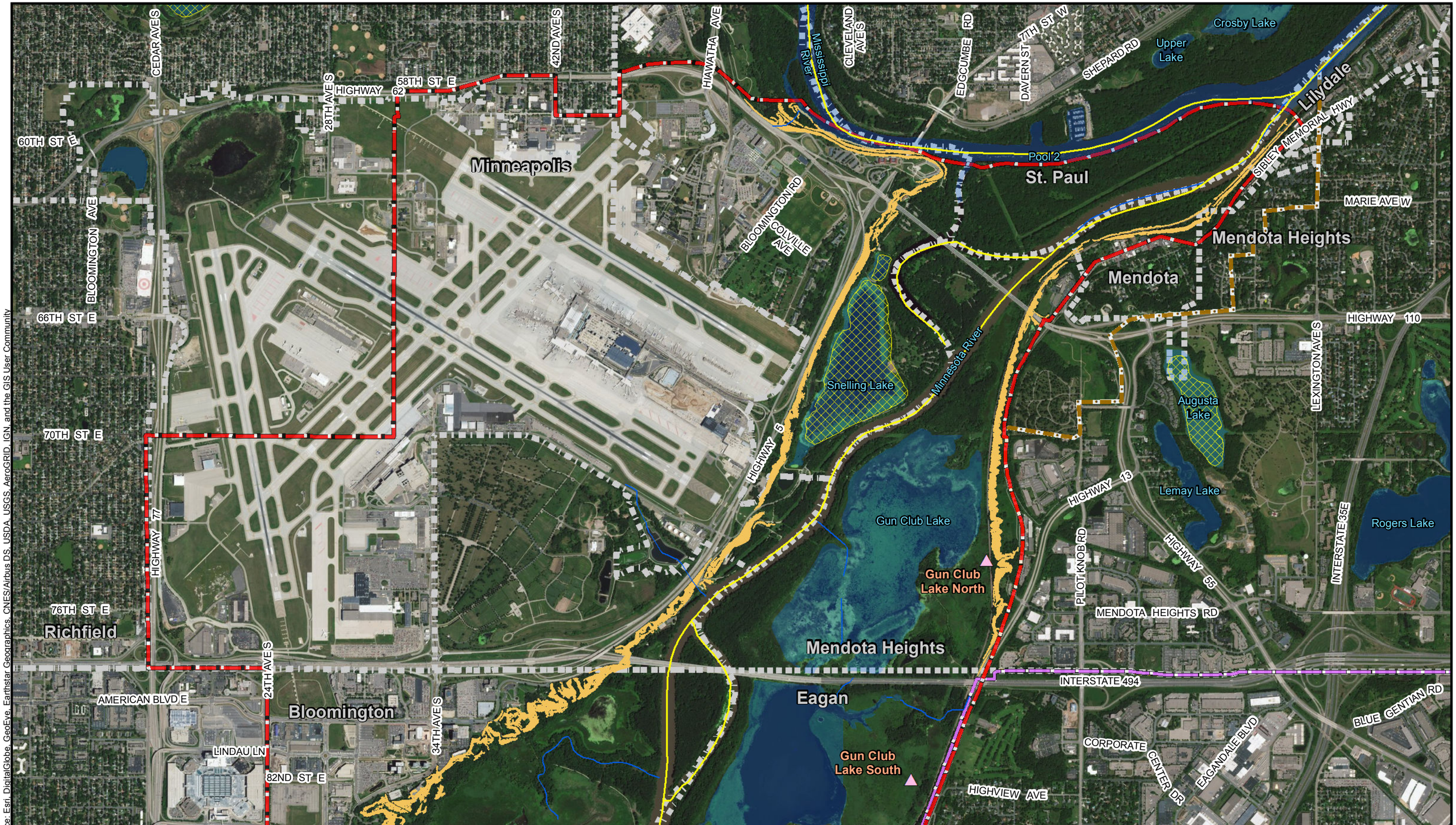

Steep Slope

Watershed District Boundary
- Eagan-Inver Grove
- Lower MS River
- Scott
- Lower MN River

MNDNR Publicly Available Data
- Stream\River
- Impaired River or Stream
- Impaired Lake

- SNA - Fens
- PWI Water
- Calcareous Fen Point
- Municipal Boundary

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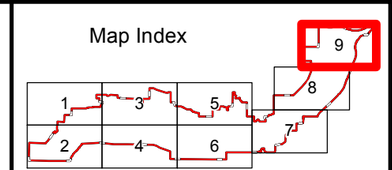
Feet

NORTH

Map Index



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Lower Minnesota River Watershed District
Steep Slopes Overlay District
Figure K2
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Figure K2: Lower Minnesota River Watershed District – Steep Slopes Overlay District Map

Wetland Inventory and Assessment

March 2002

Final Report

CITY of CARVER

Bonestroo
Rosene
Anderlik &
Associates
Engineers & Architects

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Appendices

Appendix A Field Data Sheet
Appendix B Wetland Community Quality
Appendix C Basin Quality and Stormwater Susceptibility

1. WETLAND INVENTORY GOALS

Currently, the City of Carver is working on a Surface Water Management Plan that addresses the watershed around the City. Early phases of this plan included an aerial photo review of National Wetlands Inventory wetlands within the project area but, due to budget constraints, did not include a ground inventory of the basins. Recognizing that concrete, field-based information about wetland quality and type is a core component of sound stormwater planning, the City subsequently was able to commit to a full field inventory of wetland resources within its watershed.

2. METHODOLOGY

Overview

The wetland Inventory and Assessment process involved the following steps:

- Identification of wetlands within the project area
- Review of existing data about the project area, including Hydric soils, rare features records, DNR inventory data, and other sources
- Field inventory and assessment of each site
- Qualitative ranking of each community according to criteria established by MnRAM
- Qualitative ranking of each wetland, based on community type and quality
- Stormwater susceptibility rating for each site, based on community type and quality
- Determination of potential mitigation and/or banking sites, based on ease of hydrologic restoration and size of basin

The majority of the wetlands within the floodplain of the Minnesota River basin were not evaluated, as there is no potential for adjacent development that will impact these areas. Several of these basins, however, either currently or are proposed to receive stormwater discharge. The portion of these basins that is affected by discharge was included in the inventory, to determine the type of stormwater pretreatment necessary to preserve the integrity of the basin.

2.1 Wetland Identification and Preliminary Mapping

Prior to beginning any field assessments, preliminary wetland determinations were made using National Wetland Inventory (NWI) data. Because the NWI does not always capture all of the wetlands within an area, this data was supplemented by analyzing vegetation signatures on Color infra Red (CIR) aerial photographs and comparing this information with hydric soil maps, to locate any additional potential wetlands. All

wetlands were then plotted onto a base planning map, as well as onto clear mylar overlays on the CIR's for use in the field. Rare features and high quality communities mapped by the Minnesota County Biological Survey were also included on these maps.

2.2 Wetland Numbering

The wetland inventory was organized within the context of the Storm Water Management Plan (SWMP) for the City of Carver. Wetland identification numbers used during the wetland inventory are based on the major drainage districts defined during the SWMP, as listed below.

Major Drainage District	Abbreviation
Chaska	Chaska
Spring Creek	SCr
West Carver	WC
Carver Creek	CC
Lower Carver Creek	LCC
Minnesota River	MR
South Carver	SC

Each wetland is identified by the abbreviation of the major drainage district in which it is located, followed by a number to identify the subdistrict in which it is located, and then a number or letter to differentiate the wetlands. A number was used for wetlands that are found on the NWI map (e.g., SCr-A1.14-W1). Non-NWI wetlands were identified with a letter (e.g. SCr-A1.13-Wb). Wetlands that were previously inventoried as part of the Chaska Natural Resource and Surface Water Management Plan are noted with their ID from that project (Major drainage district ID, followed by a number and letter, e.g., CL-W2.) These basins are not discussed as part of this report, but are referenced on the map to aid in planning. For information about these basins, refer to the Chaska Natural Resource and Surface Water Management Plan.

2.3 Wetland Evaluation

Wetlands fill a number of roles in the landscape, including improving water quality, and providing floodwater retention. They are also a critical habitat component for many species of wildlife and often contribute significantly to the aesthetics of an area. In an effort to develop a strategy for evaluating these various functions that wetlands provide, the Minnesota Interagency Wetland Group developed the Minnesota Routine Assessment

Methodology (MnRAM). This approach provides for consistent analysis of wetland functions, based on hydrologic condition, vegetation, adjacent land uses, and certain other functions and values that wetlands provide. This method is not intended to be a rigid procedure, but is instead is designed to complement trained observation by applying consistent qualitative criteria.

Each wetland was field checked and evaluated according to a modified (MnRAM). During the field visit, the following parameters were evaluated for each wetland:

- Wetland Type (Cowardin and Circular 39 type)
- Alterations to the site and its immediate watershed
- Wetland hydrology and any alterations to hydrology
- Adjacent land uses
- Aesthetic Value
- Wildlife Value
- Natural community type and quality
- Restoration potential for hydrology and vegetation

Using this information, field personnel were able to rate each of the MnRAM functions (floral diversity, wildlife habitat, aesthetic/recreational value) on a scale from Low to Exceptional. A copy of the field data form is included in Appendix A.

2.4 Database

All of the MnRAM data sheets completed during the field portion of the project were entered into a database to be used by the City. This allows for a quick retrieval of the information about each wetland, and allows special searches to be performed within the database. For example, a search can be conducted to identify all wetlands with high floral diversity.

3. WETLAND RANKING METHODOLOGY

After assessing the functional value of each wetland, each wetland was ranked for quality and for potential stormwater function. These rankings are closely related to the functions that each wetland provides, in comparison to other wetlands within the study area.

3.1 Stormwater Susceptibility

One of the purposes of the Wetland Inventory was to determine stormwater protection standards for each wetland, as an aid to ongoing stormwater management planning within the watershed.

Two factors determine a wetland's susceptibility to damage from stormwater input: community type and community quality (as measured by floral diversity). Some community types, such as sedge meadows, are highly susceptible to damage and degradation if exposed to repeated and/or extreme fluctuations in water levels (bounce). Native species in these communities can quickly die if runoff impacts their basin, leaving opportunities for disturbance-adapted exotic or aggressive species to invade. Other community types, such as floodplain forests, contain species that are adapted to this type of "bounce" in water levels and can tolerate stormwater impacts with fewer negative effects on the vegetation.

Similarly, the overall quality of the community affects how susceptible an area is to stormwater impacts. Because a high quality area is more diverse, it is likely to contain species that are somewhat conservative in habitat. These conservative species have a lower tolerance for disturbance, and usually drop out of a community as disturbance pressures increase. Thus, stormwater impacts can reduce the diversity at a site and alter the condition of good quality areas. Since low quality areas, by definition, have reduced species diversity and tend to be dominated by disturbance-adapted species, stormwater impacts are unlikely to cause further degradation of the site.

The State of Minnesota Stormwater Advisory Group has prepared a technical paper *Stormwater and Wetlands: Planning and Evaluation Guidelines for Addressing Potential Impacts of Urban Storm-Water and Snow-Melt Runoff on Wetlands* that divides wetland communities into the categories of highly susceptible, moderately susceptible, slightly susceptible, and least susceptible. This document was used as a guideline for developing protection standards for each wetland, and for developing overall stormwater susceptibility rankings. The details of how wetlands were classified for stormwater susceptibility for this plan are provided below.

Highly Susceptible

A wetland is considered highly susceptible if forty percent or more of the wetland complex has one or more highly susceptible wetland communities as shown in Table 3.1

and has medium to exceptional floral diversity/integrity within the susceptible wetland community or communities.

Moderately Susceptible

A wetland is considered moderately susceptible if forty percent or more of the wetland complex has one or more moderately susceptible community, as shown in Table 3.1, and the wetland has medium to exceptional floral diversity/integrity within the susceptible community or communities.

Slightly and Least Susceptible Wetlands

Wetlands with low floral diversity as determined by MN RAM were considered to be least susceptible wetlands. Wetlands that do not fall under the high or moderate categories are considered slightly susceptible. The slightly susceptible category also includes basins which were rated as least susceptible in terms of diversity, but which also had moderate or high restoration potential. This approach was taken to accommodate the restoration and mitigation goals of wetland management.

A summary of different community types and their susceptibility to stormwater impacts is provided in Table 3.1

Table 3.1 Wetland Community Susceptibility Ratings

Susceptibility Rating	Highly Susceptible*	Moderately Susceptible	Slightly Susceptible	Least Susceptible**
Wetland Community	Sedge Meadow	Shrub Carr[1]	Floodplain Forest[4]	Gravel Pit
	Bog	Alder Thicket[1]	Wet Meadow[5]	Cultivated Hydric Soil
	Calcareous Fen	Wet Meadow[1, 2]	Shallow Marsh[6]	Dredge/Fill Disposal Site
	Low Prairie	Shallow Marsh[2, 3]	Deep Marsh[6]	Low Floral Diversity
	Coniferous Swamp	Deep Marsh[2, 3]		
	Lowland Hardwood			
	Seasonally Flooded Basin			

Notes: A) All scientific and natural areas, and pristine wetlands should be considered highly susceptible; **B)** There will always be exceptions to the general categories listed above.

[1] These can tolerate inundation of 6-12" for short periods; may be completely dry in drought or late summer conditions.
[2] These can tolerate inundation of >12 ", and are adversely affected by sediment and/or nutrient loading and prolonged high water level
[3] There are some exceptions to wet meadow and marsh communities
[4] These communities can tolerate inundation of 1-6+ feet, possibly more than once per year
[5] Wet meadows that are dominated by reed canary grass
[6] Marshes dominated by reed canary grass, cattail, giant reed or purple loosestrife.

* Special consideration must be given to avoid altering these wetland types. Inundation must be avoided. Water chemistry changes due to alteration by storm water impact can also cause adverse impacts.
** These wetlands are usually so degraded that input of urban storm water may not have adverse impacts.

3.2 Wetland Quality/Management Class

Wetland quality was determined using a two-step approach. First, a quality determination was made for each plant community within a wetland, using criteria established by MnRAM. While these criteria vary for different plant communities, the levels of native plant diversity, exotic/invasive species infestations, adjacent land use, and other disturbance indicators form the basis for this determination.

Because a given wetland site may contain more than one community type, and because the communities are unlikely to be distributed evenly within a basin, it is not possible to derive the overall quality of the site directly from the information about a site's plant communities. So, to determine the overall quality of a basin, in step two of this process a weighted system was used. This approach takes into account the quality of the plant communities that are found at a given wetland, as well as the percent of the wetland that a given community occupies. Wetlands that are mapped on the DNR's Map of Rare Features and Natural Communities of Carver County were automatically considered to have Exceptional quality.

To develop a management class for each wetland, the overall wetland quality was evaluated in conjunction with the wildlife habitat value, as shown in Figure 3.1.

3.3 Banking and Mitigation Sites

Wetland banking sites were selected based on ease of hydrologic restoration and overall size. These sites include basins that are at least 1 acre in area, and were determined to have a medium or high hydrologic restoration potential during the field assessment, based on the following criteria. These criteria were developed by wetland scientists and ecologists at Bonestroo and Associates, for use in this project.

High

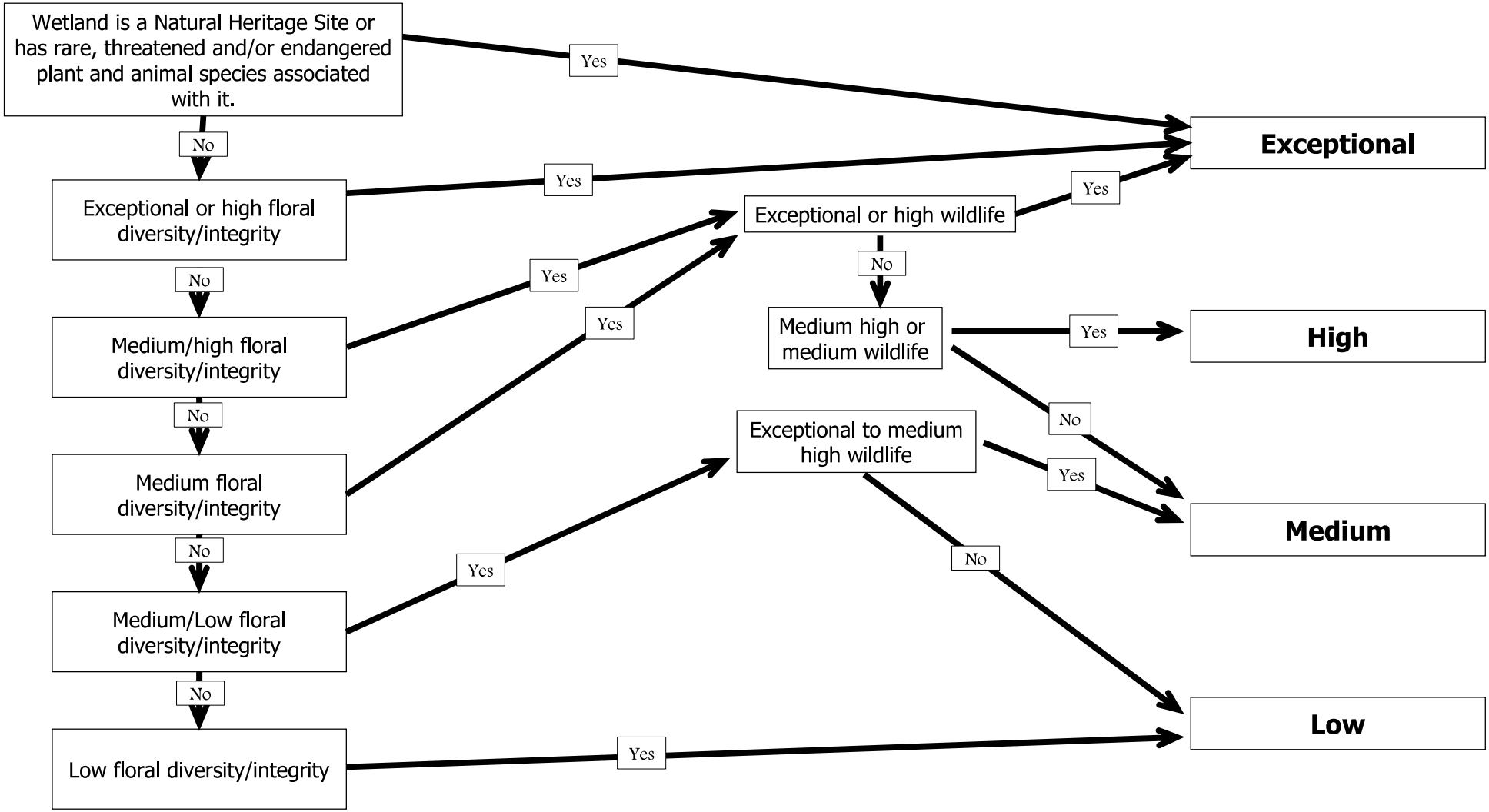
Minimal effort would be required to correct hydrologic alterations. Examples include blocking a small ditch, breaking one or a few tile lines, taking minor corrective actions within the watershed to restore the historic quantity and/or quality of waters reaching the wetland.

Medium

Some physical and financial efforts would be required to restore these communities. Substantial improvement in hydrologic quality in the short-term might require an intensive effort. Examples include creating a small berm(s), plugging large ditches, installing control structures, and /or breaking several tile lines. Also includes moderate efforts within the watershed to restore historic quantity and/or quality of water reaching the wetland.

Low

These communities have often experienced significant hydrologic alteration through human activity. Improvement of these communities in the short term often requires substantial efforts. Examples include creating extensive berms, plugging large and/or multiple ditches, installing control structures and /or breaking many tile lines. This category may also include substantial efforts within the watershed to restore historic quantity and/or quality of waters reaching the wetland. These wetlands may have had such significant alteration to their hydrology and the hydrology of the watershed that hydrologic restoration is unlikely within the next 100 years.



Wetland Resource Value Ranking **Figure 3.1**

Carver Wetland Inventory
Carver, Minnesota

47501103\Word\Work in Progress

Bonestroo

4. WETLAND MANAGEMENT STANDARDS AND RECOMMENDATIONS

All of the inventoried wetlands within the study area were classified for Stormwater Susceptibility and Water Quality Protection. These recommendations include Water Quantity and Water Quality standards, with additional recommendations for buffer strip width

The following sections provide details about the protection strategies developed for wetlands within the City.

4.1 Water Quality

Water quality plays a significant role in the overall quality of a wetland. When the quality of the incoming water decreases, the wetland plant community often becomes less diverse and retains only those species that are tolerant of high nutrient and sediment loads. Once a wetland's plant community changes, the wetland's character and overall ecosystem often shifts to a less valuable system in terms of biodiversity, wildlife habitat value, and aesthetic quality. In order to preserve wetland quality in the face of stormwater impacts, a series of pretreatment standards have been developed. These reflect the quality standards which runoff must meet before discharging into a wetland of a given susceptibility standard, and can be achieved through treatment ponds or other BMP's (Best Management Practices). Water quality standards for input are listed in Table 4.1.

Table 4.1 Carver Water Quality Protection Standards[1]

Management Category	Stormwater Phosphorus Pretreatment Requirement
Highly Susceptible	Maintain predevelopment total phosphorus loads or 60% post development phosphorus load reduction, whichever is more restrictive
Moderately Susceptible	60% post development phosphorus load reduction
Slightly Susceptible	60% post development phosphorus load reduction
Least Susceptible	60% post development phosphorus load reduction

[1]Table from original March 2002 report revised in October 2006

4.2 Water Quantity

Until recently, surface water management plans have protected wetlands from nutrients but not water fluctuations or changes in inundation duration. In fact, it was common to

use wetlands to reduce flooding by maximizing the amount of bounce and detention time in wetlands; this often resulted in significant declines in wetland quality.

This plan addresses stormwater quantity impacts to wetlands by recommending protection strategies that maintain the existing integrity of the wetland, based on the basin's susceptibility to impacts. These strategies are described in Table 4.3.

Table 4.2 Carver Wetland Quantity Standards

Susceptibility	Maximum 2-year Strom Bounce	Maximum Inundation Period for 2-year Storm Event[2]
Highly	Existing[1]	Existing
Moderately	Existing plus 0.5'	Existing plus 1 day
Slightly	Existing plus 1.0'	N/A[3]
Least	No Limit	N/A

[1] Existing corresponds to existing hydrologic conditions. If there have been recent significant changes in hydrologic conditions, the hydrologic conditions that established the wetland should be used.

[2] For wetlands classified as moderately and highly susceptible, the inundation period begins with the storm event and ends when the water level drains to 11/2 foot above the normal water level

:

[3] The city engineer may require an inundation period restriction for slightly susceptible wetlands on a case-by-case basis.

4.3 Wetland Buffers

A buffer of undisturbed vegetation around a wetland can provide a variety of benefits. The buffer can consist of trees, shrubs, grasses, wildflowers, or a combination of plant forms. Buffers reduce the impacts of surrounding land uses on wetland functions by stabilizing soil and reducing runoff rates, to prevent erosion and encourage infiltration; filtering solids, nutrients, and other harmful substances; and moderating water level fluctuations during storms. Buffers also provide essential habitat for feeding, roosting, breeding and rearing of young birds and animals, as well as providing cover for safety, movement and thermal protection for many species of birds and animals. Buffers can reduce problems related to human activities by blocking noise and glare from lights, and reducing disturbance. Even a 10-20 foot buffer (depending on the slope steepness) of tall vegetation can provide some water filtering benefits, but wider buffers provide additional water quality and habitat benefits.

Buffers can be planned to tie important upland habitats to wetlands, or connect wetlands and other waters. Since many animal species require both wetland and upland habitats in order to survive and reproduce, and also require access to cover in order to nest, move from place to place, hide from predators or find food, the corridors created by buffers

can significantly improve the wildlife value of an area. Where possible, buffers should be planned to maximize these connections. Buffers will be most effective if the landowners around a wetland make a continuous buffer, and connect desirable wetland and upland habitats.

Cutting vegetation, dumping grass clippings or other debris, and trampling should be avoided in buffer areas. If a path is desired through the buffer, it should be mown only as wide as necessary for walking, and gently meandered so that it does not encourage erosion or carry sediments and nutrients from surrounding areas to the wetland.

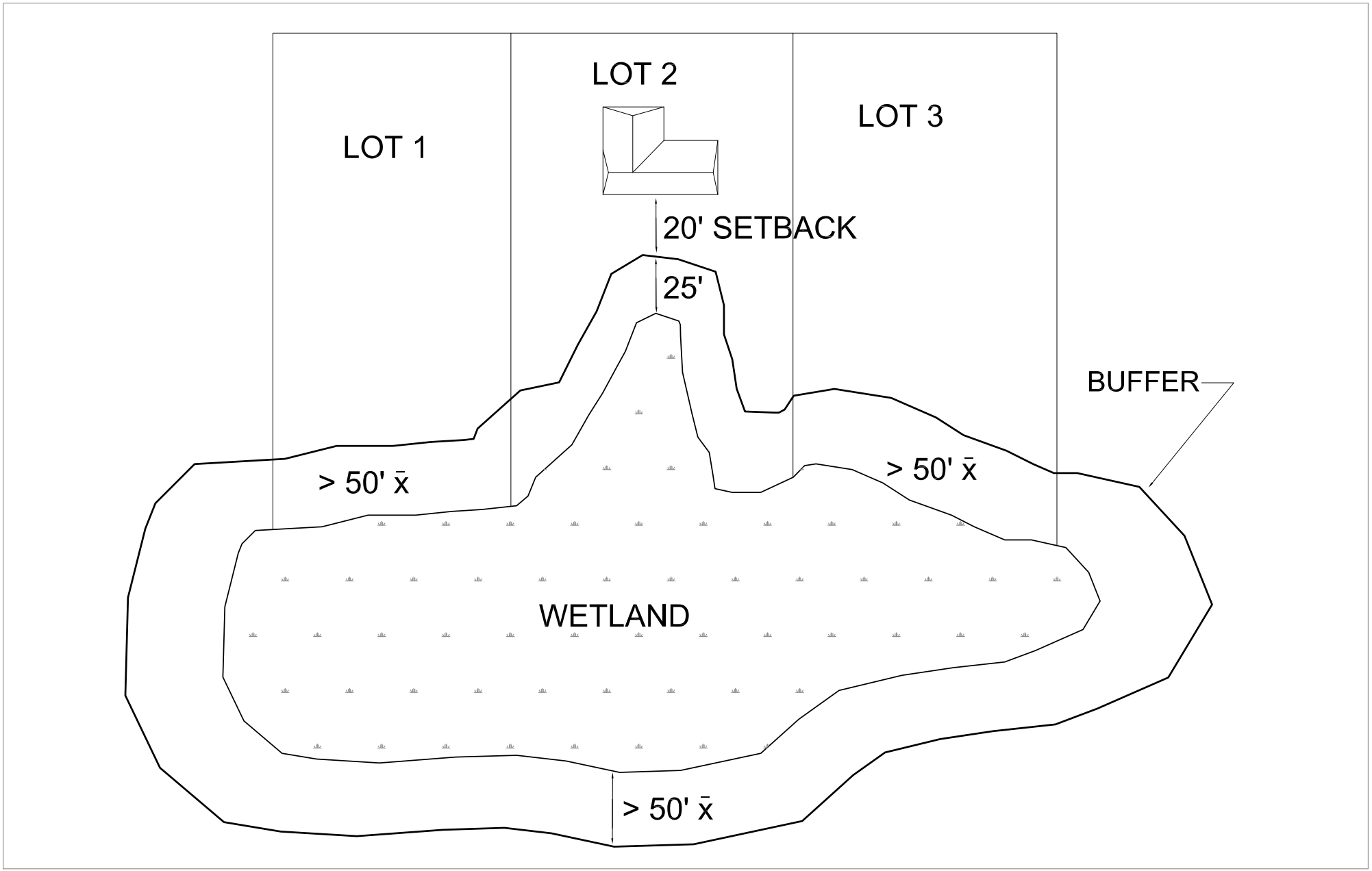
4.3.1 Buffer Standards

The Carver County Water Plan recommends that wetland buffers be placed around wetlands at the time of development, according to the basin's qualitative ranking. An example of a wetland buffer for a wetland with a High Ranking is presented on Figure 4.2. The City's Buffer Strip Standards according to the wetland quality rankingare shown in Table 4.3.

Table 4.3 Wetland Buffer Standards[1]

Wetland Ranking	Permanent Buffer Zone Average Width (feet)[2]	Minimum Permanent Buffer Zone (feet)[2]	Minimum Building Setback from Outer Edge of Buffer (feet)
Exceptional	75	50	20
High	50	25	20
Medium	25	20	20
Low	16	16	10
Streams and Lakes	50	25	10

[1]Table from original March 2002 report revised in October 2006
[2]Grading within buffers during construction is acceptable as long as the buffers are ultimately restored with native vegetation upon completion of the grading.



WETLAND BUFFER FOR HIGH RANKING

Bonestroo

CITY OF CARVER

FIGURE 4.1

CARVER WETLAND INVENTORY AND MANAGEMENT PLAN

NO SCALE

K:\475\47501113\Cad\Dwg\Plan buffer detail.dwg

FEBRUARY 2002

475-01-113

5. WETLAND BANKING AND MITIGATION OPPORTUNITIES

Wetland mitigation sites were identified during the field inventory. Typically, these are sites that have experienced minor hydrologic alterations that could easily by rectified. If restored, these areas would likely qualify as wetland banking sites.

Wetland banking is a type of mitigation, or replacement for wetland losses, allowed under State and Federal rules. Wetland banking allows the appropriate amount and type of wetland acreage to be purchased from an account holder who has a "bank" of functioning wetlands. These wetlands may have been restored from previously drained or filled wetlands, or created where wetlands did not previously exist. Wetland banking contrasts with project-specific replacement, where the project sponsor creates or restores a wetland specifically to replace a wetland that is to be drained or filled. Project specific replacement is usually done on-site, while wetland banks are typically located in another place in the community or watershed.

Site-specific replacement should be encouraged when a wetland restoration or creation is possible on-site. When site-specific replacements are not ecologically appropriate, then wetland banks located within the City and County should be the next priority. The funding for the wetland restoration sites can come from a variety of sources, which include:

- BWSR Banking Money for Road Construction Projects
- Department of Natural Resources, Conservation Partners and Community Environmental Partnerships grants
- Department of Natural Resources Greenway grants
- Soil and Water Conservation District grants

6. SUMMARY OF FINDINGS

In all, 117 basins totaling over 200 acres were field checked for this project. Of this total, 2 basins have been filled and no longer exist and sixteen were NWI basins that were determined to be non-wetland. Two additional basins in the southern portion of the project are not included in the total, as property owners denied access to the area. The total project area contains a diverse mix of wetlands and community types, and many of these remain in moderate to good condition. While nearly all sites show some alterations as a result of the region's agrarian tradition, a number of sites retain some diversity of native species and high quality habitats persist. In all, 19 basins received a qualitative ranking of medium or better.

Areas that have been impacted more heavily, such as those within agricultural fields or pastures, tend to be much less diverse and often support rank growth of invasive and/or exotic species such as reed canary grass. While these areas have less aesthetic and wildlife value, they also often are less susceptible to further degradation and can provide mitigation and banking opportunities. In all, 68 basins ranked as "least susceptible" to stormwater impacts.

In addition to these findings, several instances of rare features and high quality natural areas mapped by the DNR County Biological Survey were noted, and the field inventory phase of this project located three previously undocumented rare plant populations. This includes two populations of kittentails, state listed as Threatened, and one population of Hill's Thistle, also a state-Threatened species. All of these populations occur in areas of moderate to intense recreational ATV use, and can be considered at risk.

6.1 Wetland Quality

Overall wetland quality is determined primarily by the quality of the individual plant communities within each site and the percent of each site occupied by a given plant community (see Section 3.2 for further information on Wetland Quality Determination). Table 6.1 summarizes the quality of the wetlands in the project based on drainage district. For further information about the quality of specific wetlands, see Appendix B.

Table 6.1 Wetland Basin Quality by District

Major Drainage District	Abbreviation	Basin Quality			
		Exceptional	High	Medium	Low
Chaska	Chaska	--	1	--	1
Spring Creek	SCr	--	--	7	14
West Carver	WC	--	--	4	29
Carver Creek	CC	--	--	2	4
Lower Carver Creek	LCC	--	--	1	2
Minnesota River	MR	2	--	1	4
South Carver	SC	--	4	10	9
TOTAL*		2	5	24	63

*This data does not include basin within this project boundary that had previously been inventoried for Chaska, since each project used a slightly different methodology for determining quality. Numbers are less than the total number of basins inventoried due to basins filled or determined to be non-wetland.

6.2 Stormwater Susceptibility

Each site's stormwater susceptibility was evaluated based on the susceptibility of individual plant communities within each site, and the percent of a given site occupied by a specific community. These criteria were established by the Minnesota Stormwater Advisory Board and are discussed in more detail in section 3.1. A summary of the susceptibility values within each area is provided below, in Table 6.2. For a complete list of the stormwater susceptibility rankings for each site, see Appendix B.

Table 6.2 Stormwater Susceptibility by District

Major Drainage District	Abbreviation	Stormwater Susceptibility			
		Highly	Moderately	Slightly	Least
Chaska	Chaska	1	--		1
Spring Creek	SCr	2	2	2	15
West Carver	WC	--	3	--	30
Carver Creek	CC	--	1	1	4
Lower Carver Creek	LCC	--	1	--	2
Minnesota River	MR	--	4	1	5
South Carver	SC	3	8	3	9
TOTAL*		6	19	7	63

* This total includes basins within the project boundary that were inventoried for the Chaska inventory, since criteria for determining susceptibility were the same in each project. Numbers are less than the total number of basins inventoried due to basins filled or determined to be non-wetland.

6.3 Potential Banking and Mitigation Sites

As a result of the field survey, a number of sites were determined to have potential as wetland banking or mitigation sites. These areas are described below, and the list includes those basins with a medium or high restoration potential and total wetland area of at least 1 acre. For additional information on banking and mitigation site determination, refer to section 3.3.

CL-A4-W1a **Approximate Size: 22.6 Acres**

General Description

This good quality, ground-water fed seepage meadow is located on a slope above the Minnesota River, north of the City of Carver. Much of the site retains good to excellent species diversity, and has good potential to improve if managed.

Hydrologic Alteration

A railroad and roadbed through the site have disrupted the sheet flow of water through the site, and created sources of point discharge where culverts run underneath the rail grade or roadbed. This loss of sheet flow downslope has severely degraded the overall character of the wetland. If the railroad is abandoned or roadbed rebuilt, some effort should be made to restore the historic sheet flow to this site.

SCr-A1.11-Wa **Approximate Size: 2.8 Acres**

General Description of Basin

The site consists of a shallow basin and swale that drains east towards Co. Road 147. Much of the area is dominated by reed canary grass, although some diversity of native species persists in areas. The watershed is tilled, and tends to slope gradually towards the site. A broad swath of unmowed grass borders the swale.

Hydrologic Alteration and recommendations

The swale has been ditched. Recommendations include restoring hydrology to pre-ditch conditions, and restoring native vegetation on site.

SCr-A1.2-W1 **Approximate Size: 7.8 acres**

General Description

This shallow basin lies near the northern edge of the project area, and is partially within a cultivated field, partially within a wooded area. Overall, the eastern, wooded portion is in better condition than the plowed wet meadow/seasonally flooded basin in the western portion. Basin topography ranges from depressional to slightly sloping.

Hydrologic Alteration and Recommendations

The most significant alteration is the row-crop farming of the western portion of the basin. Recommendations include revegetating the site and watershed with appropriate native species.

SCr-A1.2-W2 **Approximate Size: 2 acres**

General Description

This wet meadow community is in the middle of an agricultural field, in the northern portion of the project area. The basin is a low quality, reed-canary grass dominated basin in gently rolling terrain.

Hydrologic Alterations and Recommendations

Chief alterations at this basin include conversion of the watershed to row-crop agriculture, and a small ditch that drains southeast. Recommendations include creating upland buffer of native vegetation around the site, blocking the ditch, and managing the site to improve the quality of the vegetation.

SCr-A1.2-Wb **Approximate Size: 2.2 acres**

General Description

This site is a large, low area in an agricultural field, along the north side of Highway 212. Vegetation is quite sparse, and includes sporadic annual weeds and young, stunted crops. The area receives flow from WCR-A1.2-Wa and SCr-A1.2-W2.

Hydrologic Alterations and Recommendations

The south side of the basin is dammed by Hwy 212 and drains via a culvert under the highway. Possible recommendations include improving watershed conditions by revegetating the upland with native species, and changing the outlet to allow for some hydrology.

SCr-A1.7-Wa **Approximate Size 1 acre**

General Description

This seasonally flooded basin lies at the base of a slope slightly south and west of the intersection between County Road 147 and Hwy 212. The adjacent land as well as the basin itself is tilled.

Hydrologic Alteration and Recommendations

Frequent tillage of the basin and adjacent watershed are the chief alterations to this basin. Recommendations include reestablishing native vegetation on the site, both within the basin and within the watershed.

SCr-A2.4b-Wa **Approximate Size 1.3 acres**

General Description

This is a swale at the base of sloping pasture and a cultivated field. The basin drains towards the east into a ditch. Vegetation is somewhat diverse with few invasive species. There is a stand of black willow along the southern edge of the wetland. The basin receives moderate grazing most years.

Hydrologic Alterations and Recommendations

The upland watershed is a mix of pasture, tilled field, and woodland. Blocking the ditch outlet would restore hydrology. A buffer could be established to provide erosion and sediment control on the sloping upland.

WC-A3-Wa **Approximate Size 2.9 acres**

General Description

This basin is in the north central portion of the project area, and is in a shallow depression in a sloping landscape. The site is a mix of wet meadow and lowland hardwood forest, with extensive patches of reed canary grass interspersed with thickets of trees and brush.

Hydrologic Alterations and Recommendations

The site has been grazed historically, and the adjacent land is in crop production. Recommendations include establishing a buffer strip around the site and managing the vegetation to improve species diversity. If managed, the site has good potential for wildlife habitat and aesthetic value.

WC-A4-W1 **Approximate Size 2.3 acres**

General Description

This seasonally flooded basin lies on a slope in a cultivated field, in the north-central portion of the project area.

Hydrologic Alteration and Recommendations

The site has possibly been tiled, and both the wetland and watershed have been converted to row-crop agriculture. Restoration options include breaking any tile lines, and replanting the basin and its immediate watershed to native vegetation.

WC-A4-W3 **Approximate Size: 3.9 acres**

General Description

This seasonally flooded basin lies in a depression, and both the watershed and the basin itself are cultivated.

Hydrologic Alterations and Recommendations

Both the watershed and the basin have been converted to rowcrop agriculture, and the basin itself may have been tiled. Restoration suggestions include breaking any tile lines and replanting the basin and its immediate watershed to native vegetation.

WC-A5-W1 Approximate Size 2.8 acres

General Description

This moderately sized basin lies in a depression immediately north of Highway 212, which impounds the south side of the basin. The site is dominated entirely by reed canary grass. The watershed includes Highway 212, and substantial areas of cropland.

Hydrologic Alterations and Recommendations

A number of alterations have affected this basin. There are at least 3 tile line inlets that discharge into the basin from the adjacent fields, and a ditch through the site flows south to a culvert under Hwy 212. In addition, the watershed has been converted to row crop agriculture. Recommendations include blocking the ditch to allow water to remain in the basin, as well as breaking the tile lines that discharge into the basin. While these lines convey water that would normally end up in the basin, the tile lines bring the water in more quickly than would happen naturally and potentially import more water than the basin would normally receive. These effects increase the amount of bounce in the basin. In addition, consider some type of control structure at the culvert under Hwy 212. These recommendations need to be evaluated in the context of the fact that the basin borders Hwy 212.

WC-A5-Wa Approximate Size 3 acres

General Description

This basin lies in a depression along the south side of Hwy 212, and receives input from WC-A5-W1 via a culvert under the Highway. The immediate watershed of the basin includes Highway 212 and a hay field; the basin itself is planted with hay.

Hydrologic Alterations and Recommendations

Highway 212 separates this basin from WC-A5-W1 and WC-A7-W2; although culverts under the highway maintain a hydrologic connection between these basins, these sites likely were one large basin historically. In addition to these culverts, there is a drain tile inlet at the western edge of the basin. This appears to drain south and west, into a pipe running underneath WC-A17-Wa, and ultimately discharges into a ravine in the upper

reach of Timber Creek. Restoration options for the basin include closing this tile inlet and placing control structures on the outlet culvert in order to manage hydrology.

WC-A7-W1 Approximate Size 6.8 acres

General Description

This large basin lies at the base of a slope immediately north of Highway 212, in the western section of the project area. Much of the immediate watershed is actively pastured, and the basin itself is pastured at times. Reed canary grass dominates most of the site, although there are small areas of marsh in an excavated area and patches of sedges and other native wetland species persist in portions of the site.

Hydrologic Alterations and Recommendations

Alterations at this site include impoundment of the basin by Highway 212, and a ditch that drains south to a culvert under Hwy 212. In addition, small areas have been excavated, and there are possible tile line inputs. Restoration options include managing the outlet and any inlets to restore the hydrologic regime of the basin, controlling the reed canary grass, and restoring native vegetation.

WC-A13-W1 Approximate Size 1.3 acres

General Description

This shallow, seasonally flooded basin is in an agricultural field slightly north of Highway 212, adjacent to a farmhouse driveway. The immediate watershed is cropped.

Hydrologic Alterations and Recommendations

The primary alteration to the basin's hydrology has been from cropping the watershed and tilling the temporary wetland zone around the perimeter of the basin. Restoration options include restoring the native vegetation in both the wetland and its watershed.

WC-A14-Wa Approximate Size 1.7 acres

General Description

This shallow, seasonally flooded basin lies at the base of several gentle slopes in a cultivated field, and receives conventional tillage most years.

Hydrologic alterations and Recommendations

The entire watershed of this basin is tilled, and the basin itself has been tiled. There is a tile inlet at the bottom of the basin. Recommendations including breaking the tile line(s)

to restore hydrology, and restoring vegetation in the basin and watershed to manage runoff.

Appendix A
Field Data Sheet

Basin #_____Date_____ Evaluator(s)_____

Access to Site ☐ Partial Access Only ☐ Full Access

Data has been entered into: ☐ Master ☐ Replica ☐ Laptop

N

Photo # and location:

SCOPE AND LIMITATIONS:

1. Description of temporal factors of this assessment due to seasonal considerations and/or existing hydrologic and climatologic conditions (e.g., after heavy rains, snow or ice cover, frozen soil, during drought period, during spring flood, during bird migration). Circle those that apply and list any others.

HYDROLOGIC SETTING

1. Hydrogeomorphology
   ___Depressional
   ___Riverine (within the river/stream banks)
   ___Lacustrine Fringe (edge of deepwater areas)
   ___Extensive Peatland
   ___Slope
   ___Floodplain
   ___Other _____.

2. Primary hydrology source: Groundwater Surface Water Both Unknown

3. Additional Observations/Descriptions

3. Has the hydrology of (a.) the wetland, or (b.) the wetland's immediate watershed, been substantially altered by ditching, tiles, dams, culverts, pumping, diversion of surface flow, or changes to runoff within the immediate watershed (circle those that apply)?
   a.) Yes No If Yes; when and how?
   b.) Yes No If Yes; when and how?

4. Does the wetland have discernable inlets or outlets? Yes No If Yes, describe each.
   Inlets Outlets

5. Does the wetland have standing water? Yes No
   Maximum depth (if known)?_____
   Percent inundated_____

6. What is the predominant hydroperiod (seasonal water level pattern) of the wetland(s)?

___Permanently Inundated (surface water present all year every year, except during droughts)
___Semi-Permanently Inundated (surface water present throughout growing season in most years)
___Seasonally Inundated (surface water present for extended periods in early growing season but absent by end of the growing season in most years)
___Temporarily Inundated (surface water present for brief periods during the growing season, water table usually below soil surface)
___Saturated (surface water seldom present but substrate saturated for extended periods during the growing season)
___Artificially Inundated (surface water controlled or induced by pumps/dikes/dames, etc.)

7. List any waters or wetlands in close proximity to the wetland. Note approximate distance from the wetland and if there is a surface water connection to other surface waters or wetlands.

VEGETATION **Functional Value (see guidance docs)** **Low** **Med** **High**

1. NWI/Cowardin Classification(s) (field observation) _____Circular 39 Classification(s)____

2. Wetland Type(s): (per Eggers and Reed) shallow open water deep marsh shallow marsh sedge meadow wet meadow low prairie calcareous fen open bog coniferous bog shrub-carr alder thicket hardwood swamp coniferous swamp floodplain forest seasonally flooded basin

3. Fill out the following information for each plant community within the wetland basin. Refer to the Guidance Documents to assess the Value.

Community A

Type_____Percent of Site_____Value_____

Dominant Species

_____

_____

Other Species

_____

_____

Community B

Type_____Percent of Site_____Value_____

Dominant Species

_____

_____

Other Species

_____

_____

Community C

Type_____Percent of Site_____Value_____

Dominant Species

_____

_____

Other Species

_____

_____

4. How much of the vegetation has been altered from a "pristine" state:_____% of area
5. Method of alteration: ditching filling dumping excavation mowing trails docks grazing tiling farming stormwater

6. Frequency/duration of occurrence frequent common occasional permanent
7. Invasive/Exotic species: _____% of area
8. List exotic species:

Floral Diversity and Integrity

1. Y N Is the wetland plant community scarce or rare within the wetland comparison domain?

2. Y N Is an additional plant survey necessary at another time? List reasons.

MAINTENANCE OF HYDROLOGIC REGIME **Functional Value (see guidance docs)**

Low Med High

1. Describe outlet characteristics
   - High: Lacks constructed outlet, or the watercourse/stream has not been channelized/ditched
   - Med. High: Constructed outlet is at or above temporary wetland zone or outlet is managed to duplicated natural conditions
   - Medium: Constricted or managed outlet; outlet lowered to significantly reduce temporary (7 days) and/or long term storage; evidence of ditched /channelized watercourse
   - Low: Excavated or enlarged outlet; outlet removes most/all long-term storage, no/little/some temporary storage remains, OR outlet changes wetland type (shallow to deep, or deep to shallow)

2. Describe the dominant land use and condition of the upland watershed that contributes to the wetland:
   - High: Watershed conditions essentially unaltered; e.g. land use development, minimal, idle lands, lands in hay or forests or low intensity grazing on gentle (<3%) to moderate (3 – 9%) slopes in good to excellent condition.
   - Medium: Watershed conditions somewhat modified; e.g. moderate grazing or recent logging on steep (>9%) slopes; conventional till with residue management on moderate slopes, no-till on steep slopes.
   - Low: Watershed conditions highly modified; e.g. intensive agriculture or grazing, no residue management on moderate or steep slopes, urban semi-pervious or impervious surface, intensive mining activities.

3. Describe the conditions of the wetland itself:
   - High: No evidence of recent tillage, temporary wetland zone intact; e.g. idle land, hayed or lightly to moderately grazed or logged. No compaction, rutting, or trampling damage to the wetland.
   - Medium: Temporary wetland zone tilled or heavily grazed most years. Zones wetter than temporary receive tillage occasionally. Some compaction, rutting, or trampling in wetland is evident.
   - Low: Wetland receives conventional tillage most (>75%) years; or otherwise significantly impacted e.g. filled, cleared. Sever compaction, rutting, or trampling damage to wetland.

4. For flow-through wetlands, describe the functional level of the wetland in retarding surface water flow in relation to primary wetland vegetation cover type.
   - High: Abundance, density, and interspersion very similar to Reference Standard Wetland
   - Medium: Abundance, density, and interspersion somewhat dissimilar to Reference Standard Wetland

Low Abundance, density, and interspersion differs considerably from Reference Standard Wetland

Not a flow through wetland

WILDLIFE HABITAT Functional Value (see guidance docs) Low Med High

Rare/Unique Species and Specialized Habitat

Y N Is the wetland known to be used by locally rare species or species that are state or federally listed? If yes, wildlife habitat functional level rating =exceptional

Y N Is the wetland known to provide specialized habitat components for particular species or groups of species that are not generally available elsewhere (e.g. Colonial waterbird nesting colonies, significant amphibian breeding sites, deer wintering yards, etc.) If yes, wildlife habitat functional level rating = exceptional.

Y N Does the wetland provide seasonal or intermittent habitat components (e.g. amphibian breeding, resting/feeding by migratory waterfowl/shorebirds)?

Species seen/heard:

Habitat Structure

1. How does the plant species diversity of the evaluation wetland compare with an undisturbed reference standard wetland of the same type within the wetland comparison domain?

more diverse same somewhat less diverse much less diverse

2. Describe the dominant land use and condition of the immediate watershed that contributes to the wetland:
   - High Watershed conditions essentially unaltered, e.g. land use development minimal, idle lands, low intensity grazing or haying, forests
   - Med. Watershed conditions somewhat modified, e.g. moderate intensity grazing or haying; dispersed row crop agriculture; low density residential.
   - Low Watershed conditions highly modified, e.g. intensive rowcrop agriculture; urban semi-pervious or impervious surface, high-density residential, intensive mining activities

Aesthetics/Recreation/Education and Science Functional Value Low Med High

1. Y N Is the wetland visible from any of the following kinds of vantage points: roads, waterways, trails, public lands, houses, and/or businesses? (Circle all that apply.)

2. Y N Is the wetland in/near any population centers so as to generate aesthetic/recreation/educational use?

3. Y N Is any part of the wetland in public or conservation ownership?

4. Y N Does the public have direct access to the wetland from public roads or waterways?

5. Is the wetland itself relatively free of obvious human influences, such as:
   a Y N Structures

b. Y N Trash/pollution
c. Y N Filling/dredging/draining

6. Is the area surrounding the wetland relatively free of obvious human influences, such as:
   a Y N Building?
   b Y N Roads?
   c. Y N Other structures?

7. Y N Does the wetland provide a spatial buffer between developed areas?

8. Y N Is the wetland and immediately adjacent area currently being used for (or does it have the potential to be used for) the following recreational activities? (Check all that apply)

ACTIVITY	CURRENT	POTENTIAL USE
Education/scientific study		
Hiking/biking/skiing		
Hunting/fishing/trapping		
Boating/canoeing		
Food harvesting		
Wildlife observation		
Exploration/play/photography		
Others (list)		

SURROUNDING LAND USES

LAND-USE	Estimated % of Wetland's Immediate Watershed
Developed (Industrial/Commercial/Residential)	
Agricultural: cropland	
Agricultural: feedlots	
Agricultural: grazing	
Forested	
Grassed (without grazing)	
Recreation areas/parks	
Highways/Roads	
Mining (specify type)	
Water and wetlands	
Other (specify)	

RESTORATION POTENTIAL

(circle appropriate comments and make notes as needed)

Hydrology

NA (not applicable) These wetlands have not had their hydrology altered through artificial drainage, extensive watershed alteration, or other, OR have been altered so significantly that restoration is not practical, and they are best considered as their current type

High Minimal effort required to correct hydrologic alterations. E.G.: blocking a small ditch, breaking one or a few tile lines, taking minor corrective actions within watershed to restore historic quantity/quality of waters reaching wetland.

Medium Some physical and financial efforts would be required to restore these communities. Substantial improvement in the short-term may require an intensive effort. E.G.: creating small berm(s), plugging large ditches, installing control structures, and/or breaking a several tile lines. Also includes moderate efforts within the watershed to restore historic quantity/quality of waters reaching wetland.

Low These communities have often experienced significant hydrologic alteration through human activity. Improvement of these communities in the short-term requires substantial efforts. E.g., creating extensive berms, plugging large/multiple ditches, installing control structures, and/or breaking many tile lines. This category includes substantial efforts within the watershed to restore historic quantity/quality of waters reaching wetland. These wetlands may have had such significant alteration to their hydrology and the hydrology of the watershed that hydrologic restoration is unlikely within the next 100 years.

Comments:

_____

_____

_____

VEGETATION RESTORATION POTENTIAL

NA (not applicable) These wetlands currently have a good to excellent quality plant communities.

High Minimal effort required to restore composition, structure, and function for community type. Examples could include minor species/seed reintroduction, limited management via cutting, spot herbicide treatment, prescribed fire, and/or other practices, both within the wetland and in the surrounding upland. Limited exotic/invasive species infestations

Medium Some physical and financial efforts required to restore vegetation. Substantial improvement in the short-term might require intensive effort. E.g., reseeding portions of the wetland, and multi-year efforts that include a variety of management tools both within the wetland and in the adjacent upland buffer.

Wetland: includes crop field that can be seeded, hydrologically restored, and has potential to achieve moderate quality within 5 – 25 years, and existing wetland communities with low to moderate exotic/invasive species infestations.
Watershed: moderate efforts required to restore historic quantity/quality of waters reaching wetland.

Low These communities have often experienced significant alteration and may be dominated by nonnative species, or be in a cultivated field known to have problem species (onsite or in seedbank) that are likely to impair the success of the restoration. Improving these communities would require substantial efforts over 10 – 30 or more years. Examples might include reseeding of significant portions of wetland, multi-decade restoration efforts requiring a variety of management tools, both within the wetland and in the immediately surrounding upland buffer.

Wetland: crop field that can be seeded and hydrologically restored, but would require significant long-term maintenance in order to achieve at least moderate quality in 20 – 100+ years, or severe levels of exotic species (note potential seedbank). List problem species._____
Watershed: significant efforts to restore vegetation are necessary, or development is complete (or nearly so) and there are few opportunities for corrective action.

FEASIBILITY
(The intent of this section is gather additional information which may be useful in prioritizing/eliminating potential restoration sites.)

1. Yes No The site has multiple owners, which may complicate management/decision-making.

2. Current size of basin:_____ Potential size, if restored:_____

3*. Connectivity. The wetland is part of a larger wetland complex, or is adjacent to upland that retains some native cover (eg. Woodland, prairie) Non-native cover such as abandoned fields may also be significant, as it can provide for wildlife cover, offer aesthetic contrast to the wetland, or itself be a candidate for management and restoration*.

High Basin has good connectivity to extensive natural communities that appear to be in good condition, and thus both wildlife and aesthetic value of the area could be improved by enhancing wetland quality.

Moderate Basin is near or adjacent to smaller areas of woods, prairie, or old field, or is at one end of a corridor.

Low Basin is isolated within an intensely used landscape, such as agricultural field, urban, or development setting.

4. Other factors:

_____
_____
_____
_____

General Comments on the adjacent upland: Cover type, quality, diversity, other items of note:

_____
_____
_____
_____

Appendix B
Wetland Community Quality

Basin ID	Community Type	% of Basin	Community Quality
CC-A13-W2	Wet Meadow	60.00%	Low
	Shallow Marsh	40.00%	Low
CC-A13-W3	Shallow Open Water	100.00%	Low
CC-A2a-W1	Shallow Open Water	35.00%	Medium
	Shallow Marsh	15.00%	High/Medium
	Wet Meadow	50.00%	Medium/Low
CC-A2c-W1	Other	100.00%	Low
Cc-A2d-W1	Shallow Open Water	100.00%	Medium/Low
CC-A9-W1	Shallow Open Water	100.00%	Low
Chaska-1-Wa	Hardwood Swamp	73.00%	High
	Sedge Meadow	15.00%	High
	Wet Meadow	10.00%	Low
	Shallow Marsh	2.00%	Low
Chaska-1-Wb	Seasonally Flooded Basin	100.00%	Low
CL-A4-W1a	Wet Meadow	100.00%	Exceptional
LC-A4-Wa	Shallow Open Water	100.00%	Low
LCC-A5-Wa	Seasonally Flooded Basin	100.00%	Low
LCC-A8-Wa	Deep Marsh	100.00%	Medium
MR-A1.14-W1	Hardwood Swamp	20.00%	Medium
MR-A1.14-W2	Wet Meadow	10.00%	Low
	Seasonally Flooded Basin	90.00%	Low
MR-A2-Wa	Wet Meadow	100.00%	Medium
MR-A3c-W1	Shallow Marsh	30.00%	Medium
	Wet Meadow	70.00%	Low
MR-A4-W1	Wet Meadow	50.00%	Medium/Low
	Floodplain Forest	50.00%	Medium
SC-A10-W1	Shallow Marsh	60.00%	High/Medium
	Wet Meadow	40.00%	Medium
SC-A10-W2	Shallow Marsh	25.00%	Medium
	Floodplain Forest	50.00%	Medium/Low
	Wet Meadow	25.00%	Medium/Low
SC-A13b-W1	Wet Meadow	100.00%	Low
SC-A14-W1	Shallow Marsh	60.00%	High/Medium
	Floodplain Forest	20.00%	Medium
	Wet Meadow	20.00%	Medium/Low
SC-A14-Wa	Seasonally Flooded Basin	100.00%	Medium/Low
SC-A15-W1	Seasonally Flooded Basin	100.00%	Low
SC-A15-Wa	Shallow Marsh	100.00%	Low
SC-A17-W1	Other	100.00%	Low
SC-A17-W2	Wet Meadow	100.00%	Low

SC-A17-W3	Floodplain Forest	100.00%	Medium
SC-A17-Wa	Seasonally Flooded Basin	100.00%	Medium/Low
SC-A18-W1	Seasonally Flooded Basin	100.00%	Low
SC-A1-W1	Floodplain Forest	40.00%	High/Medium
	Shallow Marsh	40.00%	High
	Wet Meadow	20.00%	Medium/Low
SC-A1-W2	Shallow Marsh	70.00%	High/Medium
	Floodplain Forest	10.00%	Medium/Low
	Wet Meadow	20.00%	Medium/Low
SC-A1-Wa	Shallow Marsh	80.00%	High
	Seasonally Flooded Basin	20.00%	Medium/Low
SC-A2-W2	Shallow Marsh	100.00%	Low
SC-A3-W1	Wet Meadow	100.00%	Medium/Low
SC-A5-W1	Wet Meadow	100.00%	Medium
SC-A5-W2	Shallow Open Water	100.00%	Low
SC-A6-W1	Sedge Meadow	100.00%	High
SC--A6-W2	Shallow Marsh	70.00%	High
	Wet Meadow	30.00%	Medium
SC-A6-Wa	Seasonally Flooded Basin	100.00%	Low
SC-A8-W1	Wet Meadow	50.00%	Medium/Low
	Floodplain Forest	50.00%	Medium/Low
SCr-A1.11-Wa	Wet Meadow	100.00%	Low
SCr-A1.13-W4	Shallow Marsh	60.00%	Medium/Low
	Floodplain Forest	40.00%	Medium
SCr-A1.13-Wa	Other	100.00%	Low
SCr-A1.13-Wb	Seasonally Flooded Basin	100.00%	Low
SCr-A1.2-W1	Hardwood Swamp	30.00%	Medium
	Seasonally Flooded Basin	30.00%	Low
	Shallow Marsh	40.00%	Exceptional
SCr-A1.2-W2	Wet Meadow	100.00%	Low
SCr-A1.2-W3	Wet Meadow	100.00%	Low
		0.00%	
SCr-A1.2-Wa	Wet Meadow	100.00%	Low
SCr-A1.2-Wb	Seasonally Flooded Basin	100.00%	Low
SCr-A1.5-W1	Seasonally Flooded Basin	100.00%	Low
SCr-A1.5-Wa	Wet Meadow	100.00%	Low
SCr-A1.7c-W1	Seasonally Flooded Basin	2.00%	Low
	Deep Marsh	80.00%	Low
	Wet Meadow	18.00%	Low
SCr-A1.7-Wa	Seasonally Flooded Basin	100.00%	Low
	Seasonally Flooded Basin	100.00%	Low
SCr-A1.9-W1	Seasonally Flooded Basin	100.00%	Low
SCr-A1.9-Wa	Seasonally Flooded Basin	100.00%	Medium/Low
SCr-A2.10-Wa	Wet Meadow	100.00%	Medium

SCr-A2.2a-W1	Shallow Marsh Wet Meadow	30.00% 70.00%	High/Medium Low
SCr-A2.3a-W1	Shallow Marsh Wet Meadow	90.00% 10.00%	Medium/Low Medium/Low
SCr-A2.3a-Wa	Wet Meadow	100.00%	Low
SCr-A2.4b-Wa	Wet Meadow	100.00%	Medium
WC-A12-Wa	Wet Meadow	100.00%	Low
WC-A13-W1	Shallow Marsh Wet Meadow	50.00% 50.00%	Low Low
WC-A14-Wa	Seasonally Flooded Basin	100.00%	Low
WC-A15-W1	Seasonally Flooded Basin	100.00%	Low
WC-A15-W2	Seasonally Flooded Basin	100.00%	Low
WC-A15-W3	Hardwood Swamp Wet Meadow Shallow Marsh Other	5.00% 45.00% 5.00% 45.00%	Low Low Low Low
WC-A15-Wa	Seasonally Flooded Basin	100.00%	Low
WC-A16-Wb	Seasonally Flooded Basin	100.00%	Low
WC-A16-Wc	Wet Meadow	100.00%	Low
WC-A17-W1	Hardwood Swamp Wet Meadow	20.00% 80.00%	Low Medium/Low
WC-A17-W2	Hardwood Swamp Wet Meadow	20.00% 90.00%	Low Low
WC-A17-W3	Wet Meadow	100.00%	Low
WC-A17-W4	Other Wet Meadow	50.00% 50.00%	Low Low
WC-A17-W5	Shallow Open Water Wet Meadow Shallow Marsh	25.00% 70.00% 5.00%	Medium Low Low
WC-A17-Wa	Seasonally Flooded Basin Other	10.00% 90.00%	Low Low
WC-A17-Wb	Seasonally Flooded Basin	100.00%	Low
WC-A18-Wa	Wet Meadow	100.00%	Low
WC-A19-Wa	Seasonally Flooded Basin	100.00%	Low
WC-A2-W1	Shallow Marsh Wet Meadow	15.00% 85.00%	Low Low
WC-A2-W2	Wet Meadow	100.00%	Low
WC-A2-Wa	Seasonally Flooded Basin	100.00%	Low
WC-A3-Wa	Wet Meadow	100.00%	Low
WC-A3-Wb	Floodplain Forest Wet Meadow	10.00% 90.00%	Low Low
WC-A4-W1	Seasonally Flooded Basin	100.00%	Low
WC-A4-Wa	Seasonally Flooded Basin	100.00%	Low
WC-A5-W1	Wet Meadow	100.00%	Low

WC-A5-Wa	Wet Meadow	100.00%	Low
WC-A7-W1	Shallow Marsh Sedge Meadow Wet Meadow	5.00% 15.00% 80.00%	Low Medium Medium/Low
WC-A7-W2	Wet Meadow	100.00%	Low
WC-A7-Wa	Seasonally Flooded Basin	100.00%	Low
WC-A8-W2	Shallow Open Water Wet Meadow Shallow Marsh	80.00% 10.00% 10.00%	High/Medium Low Medium

Appendix C
Basin Quality and Stormwater Susceptibility Data

Wetland ID	Potential Banking or Mitigation Site	Wetland Ecological Value	Stormwater Susceptibility
CC-A13-W1	N	Non Wetland*	Non Wetland
CC-A13-W2	N	Low	Least Susceptible
CC-A13-W3	N	Low	Least Susceptible
CC-A2a-W1	N	Medium	Moderately Susceptible
CC-A2b-W1	N	Filled	Filled
CC-A2c-W1	N	Low	Least Susceptible
Cc-A2d-W1	N	Low	Slightly Susceptible
CC-A5-W1	N	Non Wetland	Non Wetland
CC-A5-W2	N	Non Wetland	Non Wetland
CC-A6-W1	N	Non Wetland	Non Wetland
CC-A6-W2	N	Non Wetland	Non Wetland
CC-A6-W3	N	Non Wetland	Non Wetland
CC-A6-W4	N	Non Wetland	Non Wetland
CC-A9-W1	N	Low	Least Susceptible
CC-A9-W2	N	Filled	Filled
Chaska-1-Wa	N	Exceptional	Highly Susceptible
Chaska-1-Wb	N	Low	Least Susceptible
CL-A4-W1a	Y	Exceptional	Moderately Susceptible
LC-A4-Wa	N	Low	Least Susceptible
LCC-A5-Wa	N	Low	Least Susceptible
LCC-A8-Wa	N	Medium	Moderately Susceptible
MR-A1.14-W1	N	Low	
MR-A1.14-W2	N	Low	Least Susceptible
MR-A2-Wa	N	High	Moderately Susceptible
MR-A3c-W1	N	Low	Least Susceptible
MR-A4-W1	N	Low	Slightly Susceptible
SC-A10-W1	N	High	Moderately Susceptible
SC-A10-W2	N	Medium	Slightly Susceptible
SC-A10-W3	N	No Access	No Access
SC-A12-W1	N	No Access	No Access
SC-A13b-W1	N	Low	Least Susceptible
SC-A14-W1	N	High	Moderately Susceptible
SC-A14-Wa	N	Low	Highly Susceptible
SC-A15-W1	N	Low	Least Susceptible
SC-A15-W2	N	Non Wetland	Non Wetland
SC-A15-Wa	N	Low	Least Susceptible
SC-A17-W1	N	Low	Least Susceptible
SC-A17-W2	N	Low	Low
SC-A17-W3	N	High	Slightly Susceptible
SC-A17-Wa	N	Medium	Highly Susceptible
SC-A18-W1	N	Low	Least Susceptible

SC-A1-W1	N	High	Moderately Susceptible
SC-A1-W2	N	High	Moderately Susceptible
SC-A1-Wa	N	High	Moderately Susceptible
SC-A2-W1	N	Non Wetland	Non Wetland
SC-A2-W2	N	Low	Least Susceptible
SC-A3-W1	N	Medium	Moderately Susceptible
SC-A3-W2	N	Non Wetland	Non Wetland
SC-A4-W1	N	Non Wetland	Non Wetland
SC-A5-W1	N	Non Wetland	Non Wetland
SC-A5-W1	N	High	Moderately Susceptible
SC-A5-W2	N	Low	Least Susceptible
SC-A6-W1	N	Exceptional	Highly Susceptible
SC--A6-W2	N	Exceptional	Moderately Susceptible
SC-A6-W3	N	Non Wetland	Non Wetland
SC-A6-Wa	N	Low	Least Susceptible
SC-A8-W1	N	Low	Slightly Susceptible
SCr-A1.11-Wa	Y	Low	Least Susceptible
SCr-A1.13-W4	N	Low	Slightly Susceptible
SCr-A1.13-Wa	N	Low	Least Susceptible
SCr-A1.13-Wb	N	Low	Least Susceptible
SCr-A1.2-W1	Y	High	Highly Susceptible
SCr-A1.2-W2	Y	Low	Least Susceptible
SCr-A1.2-W3	N	Low	Least Susceptible
SCr-A1.2-Wa	N	Low	Least Susceptible
SCr-A1.2-Wb	Y	Low	Least Susceptible
SCr-A1.5-W1	N	Low	Least Susceptible
SCr-A1.5-Wa	N	Low	Least Susceptible
SCr-A1.7c-W1	N	Low	Least Susceptible
SCr-A1.7-Wa	Y	Low	Least Susceptible
SCr-A1.7-Wa	N	Low	Least Susceptible
SCr-A1.9-W1	N	Low	Least Susceptible
SCr-A1.9-Wa	N	Low	Highly Susceptible
SCr-A2.10-Wa	N	Exceptional	Moderately Susceptible
SCr-A2.2a-W1	N	Low	Least Susceptible
SCr-A2.3a-W1	N	Low	Slightly Susceptible
SCr-A2.3a-W2	N	Non Wetland	Non Wetland
SCr-A2.3a-Wa	N	Low	Least Susceptible
SCr-A2.4b-Wa	Y	High	Moderately Susceptible
WC-A12-Wa	N	Low	Least Susceptible
WC-A13-W1	Y	Low	Least Susceptible
WC-A14-Wa	Y	Low	Least Susceptible
WC-A15-W1	N	Low	Least Susceptible
WC-A15-W2	N	Low	Least Susceptible
WC-A15-W3	N	Low	Least Susceptible
WC-A15-Wa	N	Low	Least Susceptible
WC-A16-Wb	N	Low	Least Susceptible
WC-A16-Wc	N	Low	Least Susceptible

WC-A17-W1	N	Low	Moderately Susceptible
WC-A17-W2	N	Low	Least Susceptible
WC-A17-W3	N	Low	Least Susceptible
WC-A17-W4	N	Low	Least Susceptible
WC-A17-W5	N	Medium	Least Susceptible
WC-A17-Wa	N	Low	Least Susceptible
WC-A17-Wb	N	Low	Least Susceptible
WC-A18-W1	N	Non Wetland	Non Wetland
WC-A18-Wa	N	Low	Least Susceptible
WC-A19-Wa	N	Low	Least Susceptible
WC-A2-W1	N	Low	Least Susceptible
WC-A2-W2	N	Low	Least Susceptible
WC-A2-W3	N	Part of SC-A2-W1	
WC-A2-Wa	N	Low	Least Susceptible
WC-A3-W1	N	Chaska Inv	Non Wetland
WC-A3-W2	N	Chaska Inv	Non Wetland
WC-A3-W3	N	Chaska Inv	Non Wetland
WC-A3-Wa	Y	Low	Least Susceptible
WC-A3-Wb	N	Low	Least Susceptible
WC-A4-W1	Y	Low	Least Susceptible
WC-A4-W2	N	Chaska Inv	Least Susceptible
WC-A4-W3	N	Chaska Inv	Least Susceptible
WC-A4-W4	N	Non Wetland	Non Wetland
WC-A4-Wa	N	Low	Least Susceptible
WC-A5-W1	Y	Low	Least Susceptible
WC-A5-Wa	Y	Low	Least Susceptible
WC-A7-W1	Y	Low	Moderately Susceptible
WC-A7-W2	N	Low	Least Susceptible
WC-A7-Wa	N	Low	Least Susceptible
WC-A8-W2	N	High	Moderately Susceptible

*"Non-Wetland" refers to NWI wetlands that were determined to be non-wetland as a result of the field survey.