

Watershed Management Plan 2022–2032



Black Dog Watershed Management Organization
May 2022 – 60-day Review Draft



BLACK DOG
Watershed Management Organization





Watershed Management Plan

2022-2032

Prepared for the
Black Dog Watershed Management Organization

May 2022 – **60-day Review Draft**

Watershed Management Plan

May 2022 – 60-day Review Draft

Contents

Executive Summary.....	ES-1
1.0 Introduction	1-1
1.1 The Role of Watershed Management Organizations.....	1-1
1.2 Black Dog Watershed Management Organization.....	1-1
1.2.1 Location.....	1-2
1.2.2 History and Accomplishments since the 2012 Plan.....	1-2
1.2.3 Management Structure	1-3
1.2.4 BDWMO Vision and Guiding Principles.....	1-3
1.2.5 Authority Granted by the Joint Powers Agreement	1-4
2.0 Land and Water Resources Inventory.....	2-1
2.1 Climate and Precipitation	2-1
2.1.1 Precipitation-Frequency Data (Atlas 14).....	2-2
2.1.2 Climate Trends and Future Precipitation	2-3
2.2 Topography and Drainage	2-5
2.3 Population, Demographics, and Land Use.....	2-7
2.4 Soils	2-11
2.5 Geology	2-14
2.5.1 Surficial Geology.....	2-14
2.5.2 Bedrock Geology	2-14
2.6 Groundwater.....	2-15
2.6.1 Groundwater Recharge	2-17
2.6.2 Drinking Water Supply, Wellhead Protection, and Pollution Prevention.....	2-18
2.6.3 Groundwater Monitoring and Groundwater Quality	2-21
2.7 Surface Water Resources	2-21
2.7.1 Lakes and Ponds	2-26
2.7.1.1 Crystal Lake (MDNR #19-0027P).....	2-26
2.7.1.2 Keller Lake (MDNR #19-0025P)	2-27
2.7.1.3 Orchard Lake (MDNR #19-0031P).....	2-28
2.7.1.4 Kingsley Lake (MDNR #19-0030P).....	2-28

2.7.1.5	Lac Lavon	2-29
2.7.1.6	Sunset Pond (MDNR #19-011500W).....	2-29
2.7.1.7	Lee Lake (MDNR #19-0029P).....	2-30
2.7.1.8	Earley Lake (MDNR #19-0033P)	2-30
2.7.1.9	Wood Pond (MDNR #19-0024W).....	2-31
2.7.1.10	Twin Lake (MDNR #19-0028W)	2-31
2.7.2	Streams and Open Channels	2-32
2.7.3	Wetlands.....	2-32
2.7.4	Stormwater Systems.....	2-36
2.8	Water Quality Monitoring & Studies	2-39
2.8.1	BDWMO Monitoring Programs	2-39
2.8.1.1	Survey Level Water Quality Monitoring	2-39
2.8.1.2	Management Level Water Quality Monitoring.....	2-39
2.8.1.3	Intensive Water Quality Monitoring	2-40
2.8.2	Citizen Assisted Monitoring Program (CAMP).....	2-40
2.8.3	Member City Lake Monitoring	2-40
2.8.4	Other Programs and Water Quality Studies	2-41
2.8.4.1	WOMP Monitoring	2-41
2.8.4.2	Sediment Core Analysis	2-41
2.8.4.3	MPCA Citizen Lake Monitoring Program.....	2-41
2.8.4.4	Water Quality Studies	2-41
2.9	Water Quality and BDWMO Management Classification	2-44
2.9.1	BDWMO Classification System.....	2-44
2.9.2	Lake Water Quality, Trend Analysis, and Action Levels.....	2-46
2.9.2.1	Water Quality Trend Analyses & Action Levels	2-47
2.9.3	MPCA Impaired Waters.....	2-47
2.10	Water Quantity and Flooding	2-48
2.10.1	Floodplains and Floodplain Management.....	2-49
2.10.2	Local Flooding Issues	2-49
2.11	Natural Communities and Rare Species	2-52
2.12	Fish and Wildlife Habitat.....	2-54
2.12.1	BDWMO Habitat Monitoring Activities	2-54
2.12.2	Macrophyte Monitoring	2-55
2.12.3	Wetland Health Evaluation Program	2-56

2.13	Open Space and Recreation Areas	2-56
2.14	Pollutant Sources.....	2-58
3.0	Priority Issues and Resources.....	3-1
3.1	Stakeholder Engagement and Issue Identification.....	3-1
3.1.1	Responses to the Plan update notification letter	3-2
3.1.2	Member city/partner staff interviews	3-2
3.1.3	Technical Advisory Committee (TAC) issue identification meeting.....	3-3
3.1.4	Public survey results.....	3-3
3.2	BDWMO Issue Prioritization	3-4
3.3	BDWMO Resource Prioritization.....	3-4
3.4	Water Quality Issues	3-5
3.4.1	Stormwater runoff and pollutant loading.....	3-5
3.4.1.1	City MS4 Programs	3-6
3.4.1.2	Erosion and Sedimentation	3-6
3.4.1.3	Chloride loading	3-7
3.4.2	In-lake water quality and impaired waters	3-7
3.4.2.1	Impaired waters and TMDLs	3-8
3.5	Lake Ecology and Habitat Issues	3-9
3.5.1	Shoreland Buffers	3-9
3.5.2	Aquatic Invasive Species (AIS).....	3-10
3.6	Groundwater Issues	3-11
3.7	Education and Public Engagement Issues	3-12
3.8	Lower Priority Issues	3-12
3.8.1	Flooding and Water Quantity Issues	3-12
3.8.2	Wetlands Management Issues	3-13
3.8.3	Upland and Natural Area Issues	3-14
4.0	Goals and Policies.....	4-1
4.1	Water Quality	4-1
4.1.1	Goals.....	4-1
4.1.2	Policies	4-1
4.2	Water Quantity and Flooding	4-4
4.2.1	Goals.....	4-4
4.2.2	Policies	4-4
4.3	Erosion/Sedimentation.....	4-5

4.3.1	Goals.....	4-5
4.3.2	Policies.....	4-5
4.4	Wetland Management.....	4-6
4.4.1	Goals.....	4-6
4.4.2	Policies.....	4-6
4.5	Shoreland, Habitat and Open Space Management.....	4-6
4.5.1	Goals.....	4-6
4.5.2	Policies.....	4-7
4.6	Groundwater.....	4-8
4.6.1	Goals.....	4-8
4.6.2	Policies.....	4-8
4.7	Administration.....	4-8
4.7.1	Goals.....	4-8
4.7.2	Project Review Policies.....	4-9
4.7.3	Evaluation and Accountability Policies.....	4-9
4.7.4	Financing Policies.....	4-10
4.8	Education and Public Involvement.....	4-11
4.8.1	Goals.....	4-11
4.8.2	Policies.....	4-11
4.9	BDWMO Performance Standards.....	4-12
4.9.1	Performance Standards.....	4-12
5.0	Implementation Program.....	5-1
5.1	BDWMO Roles and Responsibilities.....	5-1
5.1.1	Administration.....	5-1
5.1.2	Engineering and planning.....	5-1
5.1.3	Education and Outreach Program.....	5-2
5.1.3.1	Technical Advisory Committee.....	5-2
5.1.4	Monitoring Program.....	5-3
5.1.4.1	Water quality trend analysis and goal evaluation.....	5-4
5.1.5	Projects, Studies, and Capital Improvements.....	5-4
5.2	Implementation Schedule.....	5-5
5.2.1	Implementation Plan Structure.....	5-5
5.2.2	Prioritization and Targeting.....	5-6
5.3	Funding Sources.....	5-12

5.3.1	BDWMO General Fund.....	5-12
5.3.2	BDWMO Capital Improvement Fund.....	5-12
5.3.3	Ad Valorem Taxing Authority	5-12
5.3.4	Member City Funding.....	5-12
5.3.5	Grant Funding and Partner Cost-share.....	5-13
5.4	Reporting and Assessment	5-13
5.4.1	Annual Reporting	5-13
5.4.2	Evaluation of Progress.....	5-14
5.5	Local (City) Water Management	5-14
5.5.1	City Regulatory Framework.....	5-15
5.5.2	Local Water Management Plans.....	5-15
5.5.2.1	Local Water Management Plan Review and Approval	5-17
5.5.3	Impact on Local Governments	5-17
5.6	Plan Amendment Procedures	5-17
6.0	References	6-1

List of Tables

Table 2-1	Monthly Precipitation Data (Climate Normal and 10-year Average)	2-2
Table 2-2	Selected Rainfall Events Used for Design Purposes	2-3
Table 2-3	Existing Land Use (2016)	2-8
Table 2-4	Bedrock geology characteristics	2-15
Table 2-5	Public Waters within the BDWMO	2-23
Table 2-6	Strategic Waterbody Criteria.....	2-44
Table 2-7	Strategic Waterbody Classifications and MPCA Water Quality Standards	2-46
Table 2-8	Average Lake Water Quality (2012-2021)	2-47
Table 2-9	Strategic Waterbody Submergent Vegetation Quality	2-55
Table 2-10	Pollutants Commonly Found in Stormwater	2-59
Table 4-1	Summary of BDWMO member city performance standards.....	4-15
Table 4-2	Summary of BDWMO member city wetland management standards	4-17
Table 5-1	BDWMO strategic waterbody monitoring schedule (2023-2032).....	5-4
Table 5-2	BDWMO 2023-2032 implementation schedule with activity descriptions.....	5-8
Table 5-3	BDWMO 2023-2032 implementation schedule estimated costs by year.....	5-10
Table 5-4	Local Water Plan Status	5-16

List of Figures

Figure ES-1	Stakeholder engagement workflow.....	ES-2
Figure ES-2	Location of the BDWMO	ES-5
Figure 2-1	Trends in Average Annual Precipitation (Twin Cities Region).....	2-4
Figure 2-2	Topography and drainage patterns.....	2-6
Figure 2-3	Existing Land Use (2018)	2-9
Figure 2-4	Estimated Future Land Use (2040)	2-10
Figure 2-5	Hydrologic Soil Groups.....	2-13
Figure 2-6	Sensitivity of the water table to pollution	2-19
Figure 2-7	Drinking waters supply management areas	2-20
Figure 2-8	Public waters within the LMRWMO and BDWMO strategic waterbodies	2-25
Figure 2-9	National Wetland Inventory.....	2-34
Figure 2-10	Member City Wetland Classifications	2-35
Figure 2-11	Municipal Stormwater Systems.....	2-38
Figure 2-12	Monitoring Locations	2-43
Figure 2-13	FEMA Floodplains	2-51
Figure 2-14	Sites of Biodiversity Significance.....	2-53
Figure 2-15	Open Spaces and Recreational Areas	2-57
Figure 2-16	Potential Pollutant Sources	2-60
Figure 3-1	Stakeholder engagement workflow.....	3-1

List of Appendices, Attachments, or Exhibits

Appendix A	Joint Powers Agreement
Appendix B	Summary of Stakeholder Engagement Activities

Certifications

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.

Sterling G. Williams Jr.
PE #: 47642

TBD

Date

Acronyms

Acronym	Description
AIS	Aquatic Invasive Species
BDWMO	Black Dog Watershed Management Organization
BMP	Best Management Practice
BWSR	Minnesota Board of Water and Soil Resources
CAMP	Citizen Assisted Monitoring Program
CLP	Clean Lakes Program
CWA	Clean Water Act
DWSMA	Drinking Water Supply Management Area
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FIN	Fishing in the Neighborhood (MDNR Program)
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
JPA	Joint Powers Agreement
LA	Load Allocation
LGU	Local Governmental Unit
LiDAR	Light Detection and Ranging
LMRWD	Lower Minnesota River Watershed District
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NWI	National Wetland Inventory
OHWL	Ordinary High Water Level
PWI	Public Waters Inventory
SCS	Soil Conservation Service
SSURGO	Soil Survey Geographic Dataset
SSTS	Subsurface Sewage Treatment System
SWA	Subwatershed Assessment
SWCD	Soil and Water Conservation District
SWMM	Stormwater Management Model
SWMP	Surface Water Management Plan
SWPPP	Storm Water Pollution Prevention Program
TAC	Technical Advisory Committee
TMDL	Total Maximum Daily Load
TP	Total Phosphorus
TSS	Total Suspended Solids
UAA	Use Attainability Analysis
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service

VIC	Voluntary Investigation and Cleanup
VRWJPO	Vermillion River Watershed Joint Powers Organization
WCA	Wetland Conservation Act
WHPP	Wellhead Protection Plan
WLA	Waste Load Allocation
WMO	Watershed Management Organization
WOMP	Watershed Outlet Monitoring Program
WRAPS	Watershed Restoration and Protection Strategy

Executive Summary

The Black Dog Watershed Management Organization (BDWMO) *Watershed Management Plan* (Plan) sets the vision and guidelines for protection, restoring, and managing surface waters within the boundaries of the BDWMO. The WMP provides resource data and background information, identifies and prioritizes watershed-wide and resource-specific issues, establishes measurable goals, sets policies and performance standards for the BDWMO and its cities, and lays out a 10-year implementation schedule including projects and programs. The Plan is organized into five major sections, summarized as follows:

Section 1 – Introduction

Section 1.0 of this Plan summarizes the BDWMO's role as a watershed management organization (WMO), its location and history, and management structure. Like all WMOs, the BDWMO is a special purpose unit of local government that manages water resources on a watershed basis. The BDWMO's jurisdiction spans approximately 26 square miles in Dakota County and includes portions of the Cities of Apple Valley, Burnsville, Eagan, and Lakeville (see Figure ES-2). Consistent with Minnesota Statutes 103B.201, the purposes of BDWMO water management programs are as follows:

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

The BDWMO has adopted goals, policies, and an implementation program to support its statutory purposes and pursue the following vision:

Water resources and related ecosystems are managed to sustain their long-term health and aesthetic beauty to contribute to the well-being of the citizens within the watershed.

The BDWMO is governed by a five-member Board of Commissioners including three members representing Burnsville, one member representing Lakeville, and one member representing Eagan and Apple Valley. The powers of the Board are detailed in the most current iteration of the BDWMO joint powers agreement (JPA, see Appendix A) and are summarized in Section 1.0.

Section 2 – Land and Water Resources Inventory

Section 2.0 of this Plan contains information about the water and natural resources located within the BDWMO. Information is provided as text, tables, and maps and organized according to the following topics and resources:

- Climate and precipitation
- Topography and drainage
- Population, demographics, and land use
- Soils
- Geology
- Groundwater
- Surface water resources (lakes, ponds, and wetlands)
- Water monitoring and studies
- Water quality and BDWMO management classifications
- Water quantity and flooding
- Natural communities and rare species
- Fish and wildlife habitat
- Open space and recreational areas
- Pollutant sources

Understanding the condition of water and natural resources present in the BDWMO is key to identifying priority issues, establishing goals, and targeting the actions of the BDWMO, its member cities, and other partners.

Section 3 – Priority Issues and Resources

Section 3.0 of the Plan presents and discusses the priority issues and resources that will be the focus of the BDWMO during the life of this Plan. As part of Plan development, the BDWMO commissioners solicited input on priority issues and concerns from residents, state agencies, member cities, and regional partners through multiple stakeholder engagement activities illustrated in Figure ES-1.

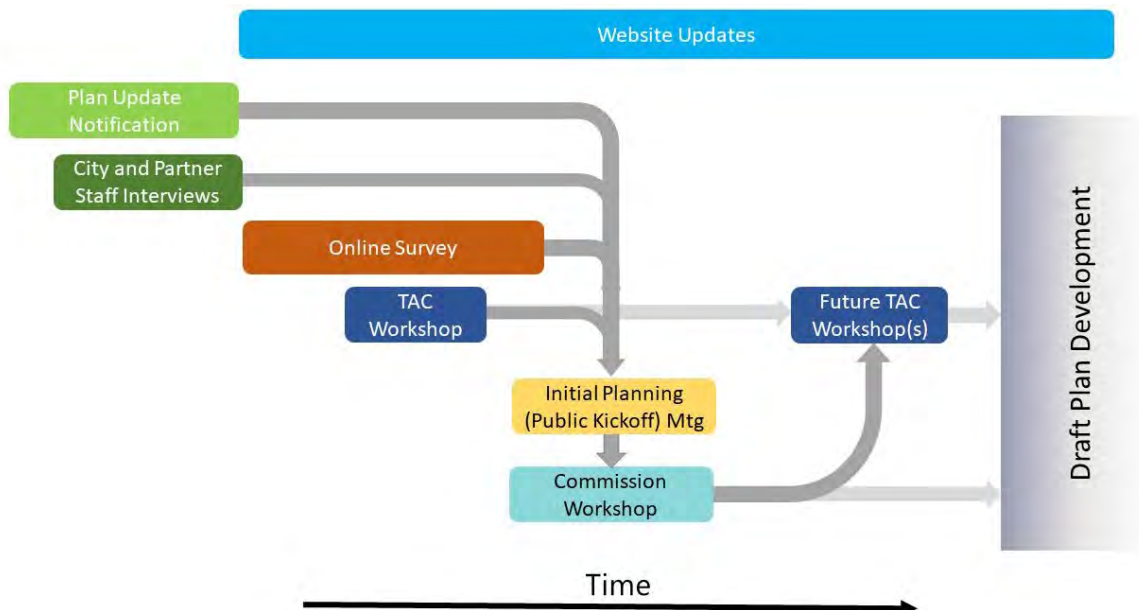


Figure ES-1 Stakeholder engagement workflow

Stakeholder engagement and issue identification activities are summarized in Appendix B. With consideration for the stakeholder engagement and data review activities, the BDWMO established the following Plan priorities:

Higher Priority Issues	Lower Priority Issues
<ul style="list-style-type: none">• Water quality, including:<ul style="list-style-type: none">○ Stormwater runoff quality○ In-lake water quality○ Impairments (Keller Lake)• Lake ecology and habitat, including:<ul style="list-style-type: none">○ Habitat quality○ Invasive species management• Groundwater management, including<ul style="list-style-type: none">○ Pollution prevention○ Conservation and sustainability• Education and Engagement	<ul style="list-style-type: none">• Flooding and water levels• Wetland management• Upland and natural area management

The BDWMO also classified the following lakes as **strategic waterbodies** to be the focus of BDWMO activities:

- Crystal Lake
- Keller Lake
- Kingsley Lake
- Lac Lavon
- Orchard Lake

The priority issues and the resource and issue prioritization process are described in greater detail in Section 3.0.

Section 4 – Goals and Policies

Section 4.0 presents the goals and policies of the BDWMO. Goals in Section 4.0 are generally organized according to the resource or operational issue they most closely address along with the policies to support those goals. Where possible, BDWMO goals contain measurable targets to evaluate progress (see Section 5.4.2). Key goals included in Section 4.0 include:

- A. Maintain or improve water quality in BDWMO strategic waterbodies to meet applicable state standards or existing 10-year (2012 – 2021) summer average water quality, if better than state standards, including:
 - Keller Lake – 60 ug/L total phosphorus, 20 ug/l chlorophyll *a*, and 1.0 meter Secchi disc transparency (i.e., applicable state shallow lake water quality standards for eutrophication)

- Crystal Lake – 26 ug/L total phosphorus, 13 ug/l chlorophyll *a*, and 2.1 meter Secchi disc transparency
 - Kingsley Lake – 17 ug/L total phosphorus, 2.3 ug/l chlorophyll *a*, and 3.0 meter Secchi disc transparency
 - Lac Lavon – 13 ug/L total phosphorus, 2.9 ug/l chlorophyll *a*, and 4.2 meter Secchi disc transparency
 - Orchard Lake – 21 ug/L total phosphorus, 6.2 ug/l chlorophyll *a*, and 2.5 meter Secchi disc transparency
- D. Work with member cities to reduce chloride loading relative to current conditions through practices consistent with the Twin Cities Metropolitan Area Chloride Management Plan (MPCA, 2016) and Minnesota Statewide Chloride Management Plan (MPCA, 2021).
- N. Maintain or improve the ecological and habitat quality of BDWMO strategic waterbodies to achieve applicable standards for floristic quality index ($FQI \geq 17.8$) and native species diversity of submerged vegetation (at least 11 species).
- O. Support member city and partner actions to prevent the increase or reduce the occurrence of aquatic invasive species within BDWMO strategic waterbodies.
- S. Increase awareness and knowledge of residents, local officials, and city staff regarding water resources and stormwater management through actions coordinated with member cities, Dakota SWCD, and other partners, including:
- presentations at K-12 schools
 - electronic newsletters/social media posts presenting information on priority issues
 - resource clean-up events or similar volunteer activities.
- T. Increase community capacity to implement water and natural resource stewardship action through:
- increased participation in volunteer activities
 - increased participation in small-scale BMP cost share projects
 - consistently providing data through accessible media

The BDWMO Plan includes policies to support the achievement of BDWMO goals and establishes performance standards that member cities must enforce through ordinance, local water management plans, or other means. Among these, the BDWMO requires that member cities shall maintain or strengthen stormwater management, erosion and sediment control, wetland, floodplain and shoreland official controls.

Section 5 – Implementation Program

Section 5.0 describes the significant components of the BDWMO implementation program; the program reflects the BDWMO's goals and organizational authorities. Activities included in the BDWMO's

implementation schedule (see Table 5-2) are divided among the following categories described in Section 5.0:

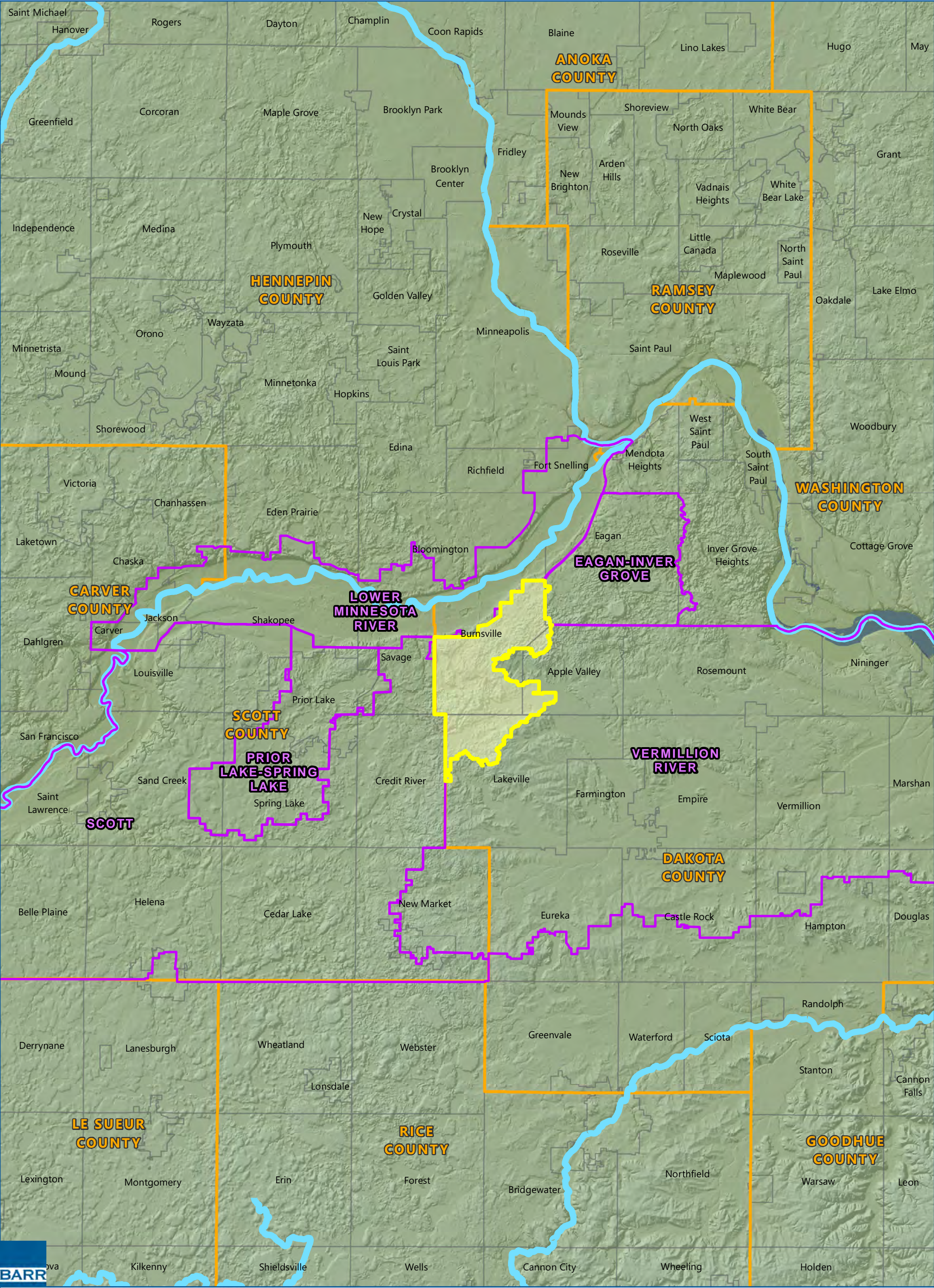
- Administration
- Engineering and Planning
- Education and Outreach
- Monitoring
- Projects, Studies, and Capital Improvements

The BDWMO implementation schedule includes the continuation of ongoing activities as well as new activities to address emerging issues and changing priorities. Notable new or expanded activities include (activity IDs are based on Table 5-2):

- Expanded water chemistry monitoring of Keller Lake and Kingsley Lake (item MN-1)
- Algal community monitoring of strategic waterbodies (item MN-1)
- Chloride monitoring of strategic waterbodies (item MN-3)
- Development of K-12 education outreach/programming (item ED-3)
- Targeted outreach to address chloride loading (item ED-4)
- Opportunities to use watershed-based implementation funding (WBIF) to support member city projects for (multiple items in Table 5-2):
 - stormwater treatment
 - shoreline improvement
 - aquatic plant management for strategic waterbodies

Section 5.0 describes the funding mechanisms used and available to the BDWMO, assessment and reporting practices, and the process for amending this Plan. Requirements for City local water management are also presented in this section. Requirements for BDWMO member cities are consistent with those of the previous BDWMO Plan and include, briefly:

- Developing local water management plans consistent with Minnesota Statutes 103B.235 and Minnesota Rules 8410.0160
- Continuing to enforce local performance standards addressing water quality, erosion, wetlands, and floodplains (at least as stringent as current standards)
- Operate and maintain city-owned stormwater management infrastructure
- Require and enforce maintenance agreements for privately-owned stormwater management infrastructure



BDWMO Boundary

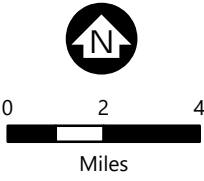
County Boundary

Adjacent Watershed Districts and Joint Powers Watershed Management Organizations

Municipal Boundary

Major River

Data Source: MDNR, BWSR



LOCATION OF THE BDWMO
BDWMO Watershed Management Plan

FIGURE ES-2

1.0 Introduction

The Black Dog Watershed Management Organization (BDWMO) *Watershed Management Plan* sets the vision and guidelines for managing surface water within the boundaries of the BDWMO. This section summarizes the history, purpose, authorities, and vision of the BDWMO.

1.1 The Role of Watershed Management Organizations

Like all watershed management organizations (WMOs), the BDWMO is a special purpose unit of local government that manages water resources on a watershed basis. Watershed management organization boundaries generally follow natural watershed divides, rather than political boundaries. Thus, they may include several municipalities and counties.

Recognizing that water does not follow political boundaries, the State of Minnesota established the Watershed Act (Minnesota Statutes 103D) in 1955, which provided for the creation of watershed districts anywhere in the state. In 1982, the Minnesota Legislature enacted the Metropolitan Surface Water Management Act (Minnesota Statutes 103B.201 – 103B.255). This act required the formation of a WMO, and the development and implementation of a watershed management plan, for each of the watersheds in the seven county Twin Cities metropolitan area. WMOs can be organized as joint powers agreement organizations among municipalities (e.g., BDWMO), as watershed districts (e.g., Lower Minnesota River Watershed District (LMRWD)), or under county government (e.g., Vermillion River JPO).

Per Minnesota Statutes 103B.201, the purposes of WMO water management programs are as follows:

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

1.2 Black Dog Watershed Management Organization

Watershed planning is an important process for developing a coordinated approach to identify and resolve water resource management problems. Addressing these problems at the watershed scale is important because water does not respect political boundaries. Activities occurring in one city may cause impacts in another community. By managing water resources on a watershed basis, communities within

the watershed can jointly plan to prevent, minimize, and correct problems, and coordinate and equitably pay for projects.

1.2.1 Location

The BDWMO is located in northwestern Dakota County. Figure ES-2 shows the location of the BDWMO in relation to the adjacent watershed management organizations in the seven-county metropolitan area. The majority of the BDWMO discharges through the Lower Minnesota River Watershed District (LMRWD) before reaching the Minnesota River. However, the Murphy-Hanrehan, Kingsley Lake, and Orchard Lake subwatersheds are tributary to the Credit River located west of the BDWMO. Water management activities in these subwatersheds are of particular interest to Scott County (Scott WMO), the City of Savage, and the City of Credit River.

The BDWMO is moderately developed with generally suburban land use (see Figure 2-3). The total drainage area of the BDWMO is 25.9 square miles (about 16,600 acres) and includes part of four cities:

- Apple Valley
- Burnsville
- Eagan
- Lakeville

1.2.2 History and Accomplishments since the 2012 Plan

The BDWMO was first established by a joint powers agreement (JPA) between the member cities that went into effect in 1985. At the time of its formation, the BDWMO covered 20.2 square miles (12,900 acres) including parts of the cities of Apple Valley, Burnsville, Eagan, Lakeville, and Savage. In 1999, the JPA was revised and restated along, with a new memorandum of understanding with Scott County, when the portion of the former Credit River WMO in Dakota County was incorporated into the BDWMO, increasing the BDWMO to its current area of 25.9 square miles (16,600 acres). In 2010, a new JPA went into effect as did an additional memorandum of understanding between the BDWMO and Scott County when the City of Savage was removed from the BDWMO and incorporated into the Scott WMO. The JPA was amended in 2020 to revise the 2010 JPA and extend its duration to January 1, 2030. The JPA will continue to be revised as necessitated by the policies of this Plan, future amendments, or other actions taken by the Commission (e.g., jurisdictional changes, membership, funding formulas).

The 2020 amended JPA is included as Appendix A to this Plan.

Since its formation, the BDWMO has developed and adopted four watershed management plans. This document, adopted by the BDWMO in 2022, is the fourth generation BDWMO Plan and supersedes the third-generation plan adopted in December 2012. This Plan shall extend 10-years from the date of BWSR approval (through 2032), unless otherwise superseded. Accomplishments of the BDWMO since the adoption of the 2012 Plan include:

- Review and approval of local water management plans for BDWMO member cities of Apple Valley, Burnsville, Eagan, and Lakeville

- Ongoing attendance and participation from member city technical staff at BDWMO meetings
- Publishing the BDWMO watershed annual report (newsletter)
- Submitting an annual activity report to BWSR to document work performed in the prior year
- Updating and maintaining the BDWMO website (major update in 2021)
- Distributing educational materials to support natural resources stewardship through the BDWMO website and member city communication channels
- Ongoing management level water quality monitoring, trend analysis, and water quality reporting for three of the BDWMO strategic waterbodies: Crystal Lake, Lac Lavon, and Orchard Lake
- Habitat monitoring of submergent, emergent, and upland vegetation and shoreline conditions for all BDWMO strategic waterbodies: Crystal Lake, Keller Lake, Kingsley Lake, Lac Lavon, and Orchard Lake
- Funding annual water quality monitoring of all BDWMO strategic waterbodies through the Metropolitan Council's Citizen Assisted Monitoring Program (CAMP)
- Funding educational workshops on small-scale shoreline restoration and runoff capture projects via Dakota County's Landscaping for Clean Water program (123 BDWMO residents participated in 2021)
- Funding implementation of small-scale best management practices to improve water quality (nine projects were funded in 2021)
- Working with member cities and the Minnesota Pollution Control Agency (MPCA) to remove Crystal Lake, Lee Lake, and Earley Lake from the impaired waters list following water quality improvement
- Assisting the City of Burnsville in successfully obtaining a BWSR Clean Water Fund grant for their Crystal Beach Park water quality improvement project
- Completing a feasibility assessment and subsequent in-lake alum treatment of Keller Lake, including obtaining funding from the BWSR Clean Water Fund grant program
- Facilitating the distribution of BWSR Clean Water Fund WBIF funds

1.2.3 Management Structure

The BDWMO Board of Commissioners consists of five commissioners and three alternates appointed by the member cities to a three-year term. The City of Burnsville appoints three commissioners, the cities of Apple Valley and Eagan appoint the fourth commissioner, and the City of Lakeville appoints the fifth commissioner. Member city staff attend board meetings on a regular basis as informal technical advisors. Regular meetings are held on the 3rd Wednesday of the month at the City of Burnsville offices. The public is invited to attend the BDWMO Commission meetings. Meeting schedules, agendas, and materials are posted on the BDWMO website at: www.blackdogwmo.org

1.2.4 BDWMO Vision and Guiding Principles

Within the context of the statutory authority granted to WMOs and contained in the JPA, the BDWMO Board has established the following vision to provide strategic direction to its work. The following vision helps to focus the organization's efforts and is a reminder of what the BDWMO is working to achieve:

Water resources and related ecosystems are managed to sustain their long-term health and aesthetic beauty to contribute to the well-being of the citizens within the watershed.

In addition to the statutory authority and functions identified in the JPA, the BDWMO has further clarified its mission in relationship to its members. The following guiding principles of the BDWMO helped the organization establish its Goals and Policies in Section 3.0:

- Keep regulation at the local level—the BDWMO will not administer a permit program.
- Assist member communities with intercommunity floodplain and runoff planning and with mediation of water management disputes between communities.
- Monitor, classify and manage strategic water resources to meet their intended use. Strategic resources are waterbodies that have broad watershed significance.
- Monitor, evaluate and/or model stormwater runoff quality.
- Improve the quality of the stormwater runoff reaching the Minnesota River.
- Manage intercommunity stormwater runoff, flooding, and other water quantity issues.
- Develop policies to be implemented by the cities to protect the BDWMO's water resources.
- Assess performance of the BDWMO and the member cities toward achieving the goals stated in this Plan.
- Provide member cities with useful information about the BDWMO, its activities, and water resource management.
- Educate all watershed citizens and member cities in water resource issues and BDWMO activities.
- Assist member cities with funding water quality projects through grants and other funding available directly to watershed organizations.

1.2.5 Authority Granted by the Joint Powers Agreement

The authority of the BDWMO is established by Minnesota Statutes 103B and by the JPA. The responsibilities of the BDWMO, taken from the JPA, include, but are not limited to:

1. Prepare and adopt a watershed management plan.
2. Review and approve municipal water management plans.
3. Provide any member city with technical data or other information to assist the city in preparing its local water management plan.
4. Regulate use and development of land in the watershed, either as authorized by a member city, or in the absence of an approved local water management plan, or for projects requiring a variance from the local water management plan or implementation program of the member city.
5. Publish and distribute a newsletter at least annually.
6. Establish and maintain devices for acquiring and recording hydrological and water quality data.
7. Enter upon lands to make surveys and investigations to accomplish the BDWMO's purposes.
8. Order any member city to carry out the BDWMO-approved local water management plan, including any capital improvements.
9. Acquire, operate, construct, and maintain only the capital improvements, if any, delineated in the adopted BDWMO plan.

-
10. Obtain an annual audit of the books and accounts of the BDWMO.
 11. Adopt an annual work plan.
 12. Accumulate reserve funds and invest funds not currently needed for BDWMO operations.
 13. Collect money from the BDWMO members and from any other BDWMO-approved source.
 14. Make contracts, employ consultants, incur expenses, and make expenditures.
 15. Enter into contracts or cooperate with governmental agencies, private/public organizations, or individuals to accomplish the purposes for which the BDWMO is organized.
 16. Contract for or purchase insurance, as needed.
 17. Exercise all other powers necessary and incidental to the implementation of the purposes and powers set forth in the joint powers agreement.
 18. Investigate complaints relating to water pollution and take appropriate action to alleviate the pollution and to assist in protecting and improving the water quality of surface water in the watershed.
 19. Coordinate its planning activities with contiguous WMOs and counties conducting water planning and implementation under Minnesota Statutes 103B.

2.0 Land and Water Resources Inventory

This section summarizes the land and water resources located within the BDWMO. It contains information on climate and precipitation, topography and drainage, land use, soils, geology, groundwater, surface waters, natural areas, habitat, and rare species, recreation, and potential pollutant sources. Land and water resource information is important because it describes the condition of the watershed that may impact decisions about infrastructure, development, and resource management.

2.1 Climate and Precipitation

The climate of the seven county Twin Cities Metropolitan Area is a humid continental climate, characterized by moderate precipitation (normally sufficient for crops), wide daily temperature variations, large seasonal variations in temperature, warm humid summers, and cold winters with moderate snowfall. Climate data is often presented according to 30-year “climate normal” periods, the most recent spanning the period from 1991-2020. Several of the wettest years on record have been observed during the most recent climate normal period, including several wet years since 2010. Climate trends are discussed in Section 2.1.2. Climate data presented in this section is based on the 30-year period from 1991 through 2020, unless otherwise noted.

The mean annual temperature as measured at the Minneapolis-St. Paul international airport (MSP) is 46.6°F (1991-2020). Mean monthly temperatures vary from 15.9°F in January to 74.1°F in July (1991-2020). For the 1991-2020 climate normal period, the average frost-free period (growing season) is approximately 160 days.

Table 2-1 summarizes monthly precipitation data for the approximate centroid of the BDWMO, based on the Minnesota Climatology Working Group gridded precipitation dataset for the most recent complete climate normal period (1991-2020) and 10-year period (2011-2020). Average total annual precipitation is 34.6 inches (1991-2020). The mean monthly precipitation varies from 5.1 inches in June to 1.0 inches in January and February (1991-2020). From May to September, the growing season months, the average rainfall (1991-2020) is 22.0 inches, or 64% of the average annual precipitation. Snowfall averaged 52 inches annually at the MSP station during the 1991-2020 climate normal period.

Additional information about local and regional climate is available from the Minnesota Department of Natural Resources (MDNR) State Climatology office and NOAA at:

- Minnesota State Climatology Office: <https://www.dnr.state.mn.us/climate/index.html>
- National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC): <https://www.ncdc.noaa.gov/cdo-web/>

Table 2-1 Monthly Precipitation Data (Climate Normal and 10-year Average)

Month	1981-2010 Precipitation (inches)	1991-2020 Precipitation (inches)	2011-2020 Precipitation (inches)
January	0.92	0.98	0.90
February	0.79	0.97	1.29
March	1.96	1.86	1.75
April	2.71	2.96	3.52
May	3.79	4.45	5.54
June	4.56	5.05	5.62
July	4.16	4.42	5.09
August	4.86	4.82	4.17
September	3.40	3.30	2.80
October	2.61	2.81	2.85
November	1.80	1.66	1.44
December	1.12	1.35	1.63
Total	32.79	34.62	36.60

Source: Minnesota Climatology Working Group gridded precipitation dataset

2.1.1 Precipitation-Frequency Data (Atlas 14)

The amount, rate, and type of precipitation are important in determining flood levels and stormwater runoff rates. While average weather poses little risk to human health and property, extreme precipitation events may result in flooding that threatens infrastructure and public safety. NOAA published Atlas 14, Volume 8, in 2013. Atlas 14 is the primary source of information regarding rainfall amounts and frequency in Minnesota. Atlas 14 provides estimates of precipitation depth (i.e., total rainfall in inches) and intensity (i.e., depth of rainfall over a specified period) for durations from 5 minutes up to 60 days. Atlas 14 supersedes publications Technical Paper 40 (TP-40) and Technical Paper 49 (TP-49) issued by the National Weather Bureau (now the National Weather Service) in 1961 and 1964, respectively. Atlas 14 improvements in precipitation estimates include denser data networks, longer (and more recent) periods of record, application of regional frequency analysis, and new techniques in spatial interpolation and mapping. Comparison of precipitation depths between TP-40 and Atlas 14 indicates increased precipitation depths for more extreme (i.e., less frequent) events. Table 2-2 lists selected rainfall events within the BDWMO. The BDWMO member cities typically use Atlas 14 design precipitation depths specific to their jurisdictions.

Runoff from spring snowmelt is not provided in Atlas 14 and current regional snowmelt runoff data is not available (Minnesota Stormwater Manual, 2019). Older estimates of snowmelt runoff come from the

Hydrology Guide for Minnesota (USDA Soil Conservation Service – NRCS, 1975, see Table 2-2). Snowmelt and rainstorms occurring during snowmelt in early spring are significant in this region. The volumes of runoff generated, although they occur over a long period, can have significant impacts where the contributing drainage area to a lake or pond is large and the outlet is small.

Table 2-2 Selected Rainfall Events Used for Design Purposes

Type	Frequency	Duration	Depth (in)
Rainfall	2-year	24 hour	2.82
	5-year	24 hour	3.50
	10-year	24 hour	4.18
	25-year	24 hour	5.30
	50-year	24 hour	6.30
	100-year	24 hour	7.42
	10-year	10 day	6.77
	100-year	10 day	10.1
Snowmelt	10-year (10%)	10 day	4.7
	25-year (4%)	10 day	5.7
	50-year (2%)	10 day	6.4
	100-year (1%)	10 day	7.1

Source: NOAA Atlas 14 – Volume 8 interpolated to approximate centroid of BDWMO; depths reflect the 50% exceedance limit. Snowmelt values from Hydrology Guide for Minnesota (USDA Soil Conservation Service – NRCS) and reported as liquid water.

2.1.2 Climate Trends and Future Precipitation

There are typically wide variations in climate conditions in the BDWMO. However, climatologists found four significant recent climate trends in the Upper Midwest (NOAA, 2013):

- Warmer winters—decline in severity and frequency of severe cold; warming periods leading to mid-winter snowmelt
- Higher minimum temperatures
- Higher dew points
- Changes in precipitation trends – more rainfall is coming from heavy thunderstorm events and increased snowfall

According to NOAA's 2013 assessment of climate trends for the Midwest, annual and summer precipitation amounts in the Midwest are trending upward, as is the frequency of high intensity storms. Annual precipitation in the BDWMO averaged 34.6 inches from 1991-2020, a 1.8 inch increase over the

1981-2010 climate normal period (32.8 inches). Annual precipitation exceeded the previous climate normal average (34.6 inches) in 7 of 10 years since 2010.

Higher intensity precipitation events typically produce more runoff than lower intensity events with similar total precipitation amounts; higher rainfall intensities are more likely to overwhelm the capacity of the land surface to infiltrate and attenuate runoff. Precipitation data from the Mississippi River-Twin Cities basin dating back to 1895 (available from the MDNR climate trends website) indicates that annual precipitation, averaged over 30-year climate normal periods, is increasing (see Figure 2-1).

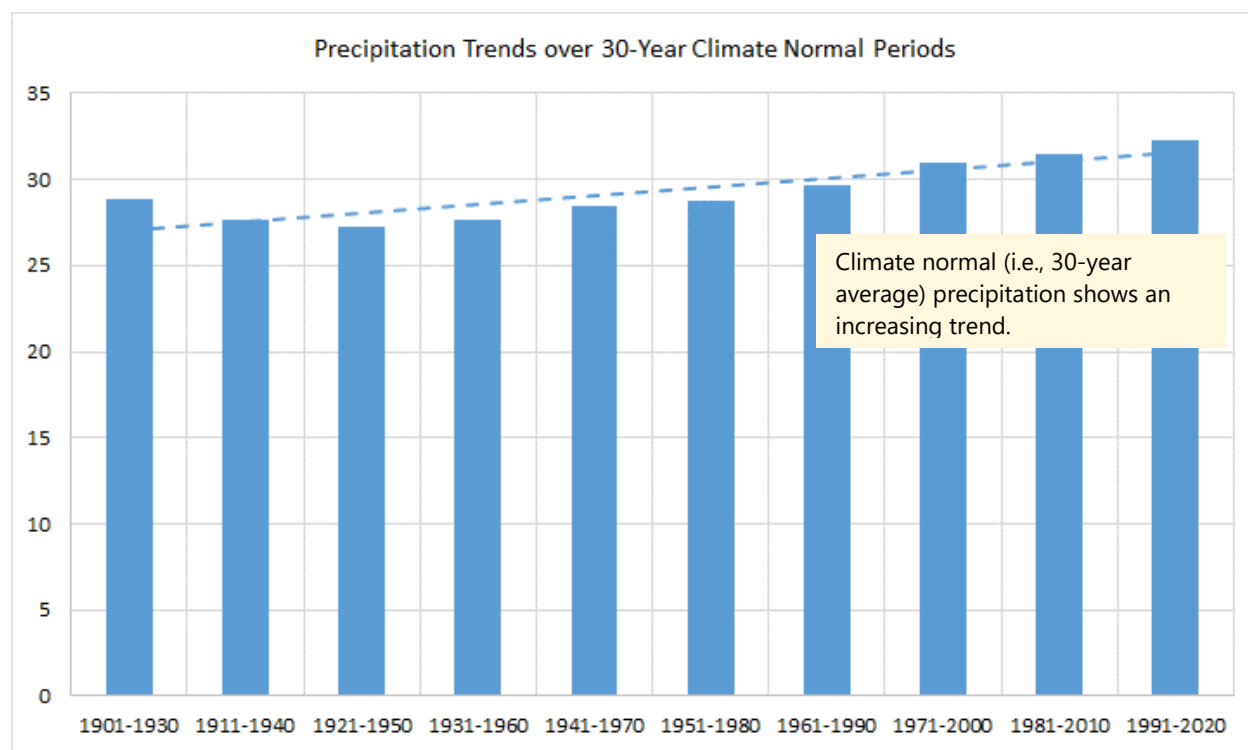


Figure 2-1 Trends in Average Annual Precipitation (Twin Cities Region)

Work completed by the University of Minnesota (Moore et al., 2016) provides information useful to consider long-term extreme weather trends in the region. The study of long-term extreme weather trends found that precipitation amounts are predicted to increase significantly over what is historically used in floodplain assessments and infrastructure design. Stack et al. (2014) identified a range of estimates for the mid-21st century 100-year 24-hour rainfall event applicable to the Twin Cities metro area. The lower estimate for the mid-21st century 100-year, 24-hour rainfall estimate was approximately 7.3 inches, which is similar to the current mean 100-year, 24-hour rainfall depth published in Atlas 14 (7.8 inches). The middle estimate is 10.2 inches, which is similar to the upper limits of the Atlas 14 90-percent confidence limits for the 100-year rainfall depth (10.4 inches). Upper estimates of mid-21st century 100-year 24-hour rainfall exceed the 90-percent confidence limits of Atlas 14.

Additional information about climate change is available from NOAA and the Minnesota Department of Natural Resources (MDNR) at:

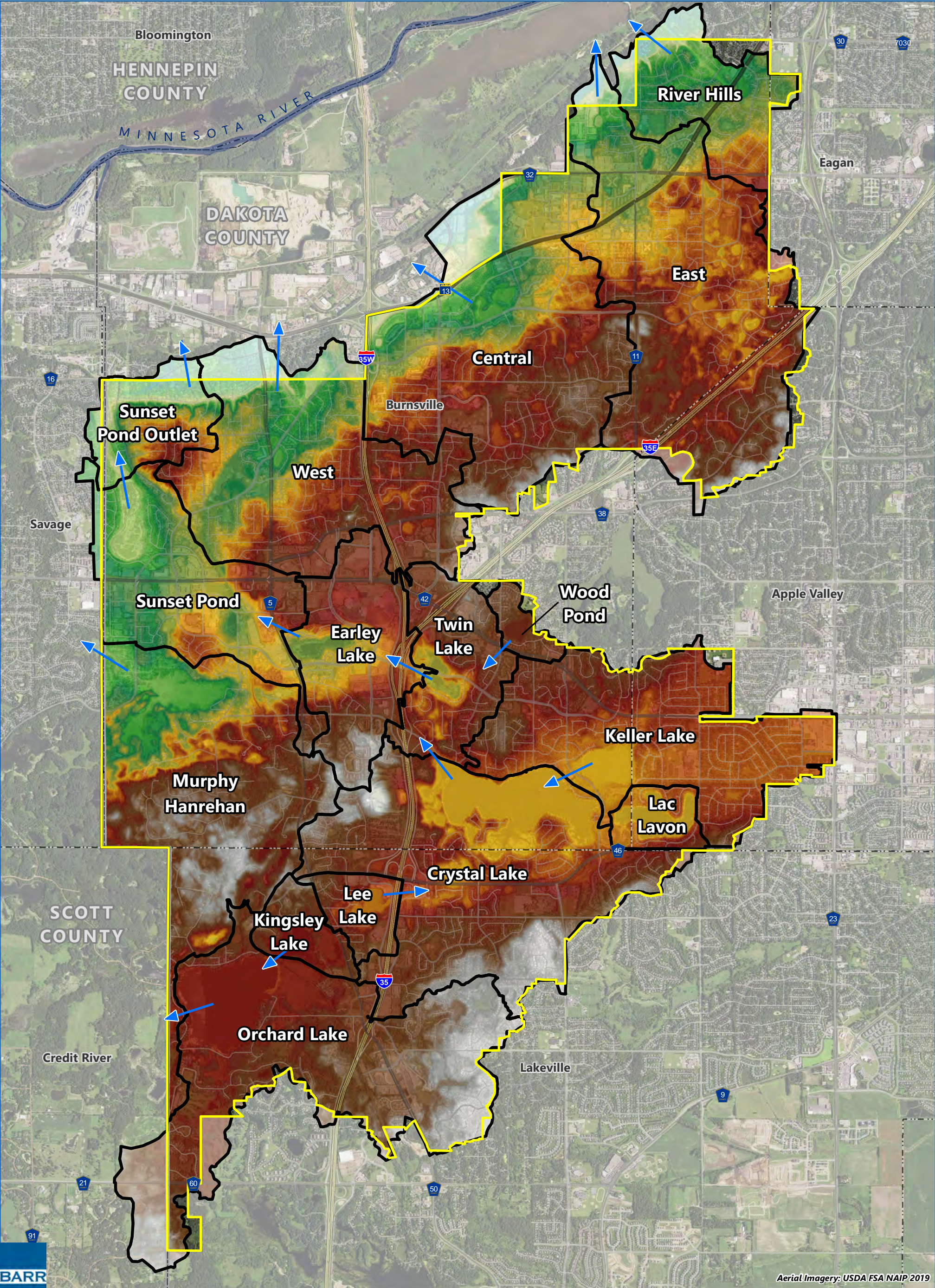
- <https://www.noaa.gov/categories/climate-change>
- https://www.dnr.state.mn.us/climate/climate_change_info/index.html

2.2 Topography and Drainage

The topography of the watershed consists of rolling to hilly terrain and generally slopes from the southwest to the north towards the Minnesota River and east to the Credit River. At the southern end of the watershed, an upland ridge slopes down to Crystal Lake. High ground in the southwest of the watershed separates the area draining north to the Minnesota River and the area draining west to the Credit River. Continuing north, the upland transitions into an undulating glacial outwash plain. This area is pitted with shallow depressions surrounded by mounds of glacial till. Further north, the pitted outwash plain gives way to an outwash terrace, just above the Minnesota River floodplain. This transition corresponds roughly to the jurisdictional boundary between the BDWMO and the Lower Minnesota River Watershed District.

The highest point within the watershed is Buck Hill, in the City of Burnsville, at an elevation of 1,195 above mean sea level (MSL). The lowest point within the watershed is approximately 720 feet MSL at the northern boundary of the BDWMO. Figure 2-2 presents LiDAR elevation data collected in 2011 by the MDNR. Local topography creates some landlocked basins for which outlets have not been constructed. Lac Lavon is a significant waterbody that is landlocked under normal hydrologic conditions.

The BDWMO includes areas that drain to the Minnesota River (north of the BDWMO) and the Credit River watershed (west of the BDWMO). The area of the BDWMO is subdivided among watersheds of varying levels of detail as defined by the MDNR and USGS. The BDWMO further subdivided the watershed for water resource planning purposes. Figure 2-2 presents BDWMO planning level subwatersheds.



BDWMO Boundary

Watershed Boundary

County Boundary

Municipal Boundary

River

Elevation (ft)

High : 1,210 ft

Low : 700 ft

0

1,750

3,500

Feet

TOPOGRAPHY AND DRAINAGE PATTERNS

BDWMO Watershed Management Plan

FIGURE 2-2

Topography Source: MnDNR 3-meter DEM

2.3 Population, Demographics, and Land Use

The BDWMO is located within the Twin Cities Metropolitan Area, in northwest Dakota County. Land use within the watershed (2016 data provided by the Metropolitan Council) is summarized in Table 2-3 and Figure 2-3.

Over time, the land within the BDWMO has been transformed from a natural landscape, first to agricultural land use and, over time, to more urban and suburban land uses. Agricultural land use now occupies approximately less than 1% of the watershed. Residential land use occupies approximately 54% of the watershed; approximately 94% of residential land use is single-family. The watershed is mostly developed, with approximately 1,480 acres (about 9% of the watershed) remaining undeveloped. Higher intensity land uses (typically commercial and industrial development) are clustered along I-35W, County Road 42 and Highway 13. Most of the remaining undeveloped areas are concentrated in the City of Lakeville. Some areas currently identified as undeveloped may not be suitable for future development.

Development of the watershed has coincided with population growth among the member cities. Population within the BDWMO member cities by grew by approximately 400% between 1970 and 2000. Since 2000, population within the BDWMO has increased by approximately 10% per decade. Continued population growth of between 5% and 10% per decade is anticipated through 2040. In addition to population increase, the population within the BDWMO (and greater Dakota County) is expected to age and grow more racially and ethnically diverse (Dakota County, 2019). Additional information about population and demographic trends is available in the comprehensive plans of the BDWMO member cities and Dakota County.

The conversion of natural areas and vegetation over time for residential, commercial, and other land uses increases the amount of impervious surfaces (i.e., surfaces through which water cannot infiltrate), resulting in increases in stormwater runoff volume and associated pollutant loading. Thus, local governmental units' (LGU's) continued implementation of stormwater management performance standards for development and redevelopment are key to addressing water quality and water quantity issues.

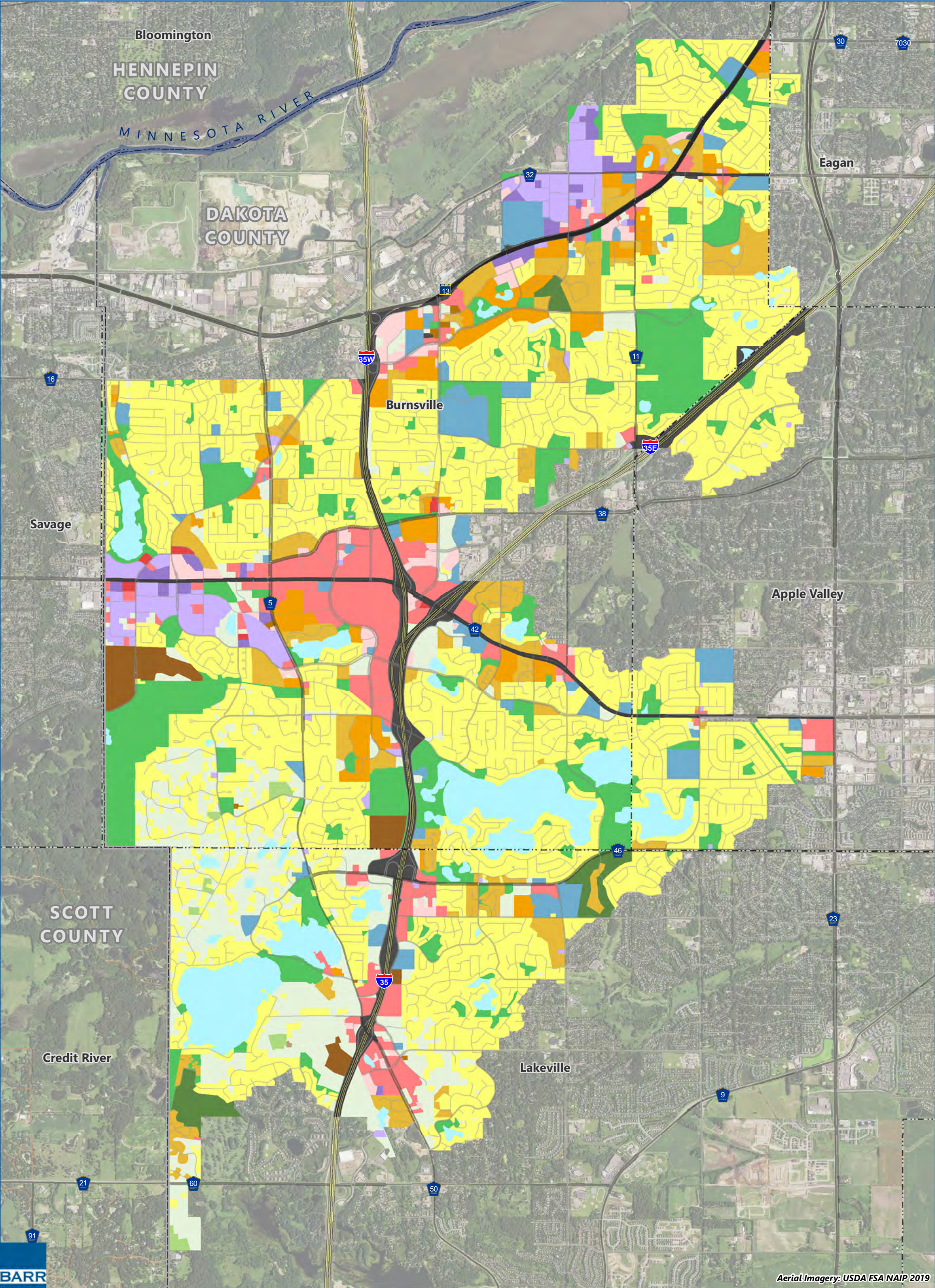
Because much of the watershed is already developed, most land use changes and construction activity within the watershed will likely occur through redevelopment. Figure 2-4 presents the estimated 2040 land use, as available from the Metropolitan Council. Redevelopment presents an opportunity to implement stormwater best management practices previously omitted or augment existing practices. Possible redevelopment anticipated by BDWMO member cities include possible locations along Cedar Avenue and County Road 42.

More detailed information about current and future land use, anticipated population growth, and land development is presented in the 2040 comprehensive plans for the BDWMO member cities.

Table 2-3 Existing Land Use (2016)

Land Use	Acres	Percent Area
Agricultural or Farmstead	44	0.3%
Commercial or Retail	918	5.5%
Office	246	1.5%
Golf Course	156	0.9%
Industrial and Utility	425	2.6%
Institutional	562	3.4%
Mixed Use	148	0.9%
Open Water	998	6.0%
Park, Recreational, or Preserve	1,864	11.2%
Residential, Single Family	8,387	50.5%
Residential, Multifamily	525	3.2%
Transportation (Highway, Rail, Airport)	677	4.1%
Undeveloped	1,476	8.9%
Other	194	1.2%
Total	16,620	100%

Source: Metropolitan Council



County Boundary
 Municipal Boundary
 River

Existing Land Use

Farmstead
 Seasonal/Vacation
 Single Family Detached

Manufactured Housing Park
 Single Family Attached
 Multifamily
 Retail and Other
 Commercial
 Office

Mixed Use Residential
 Mixed Use Industrial
 Mixed Use Commercial and Other
 Industrial and Utility

Institutional
 Park, Recreational or Preserve
 Golf Course
 Major Highway
 Agricultural
 Undeveloped
 Water

0

1,750

3,500

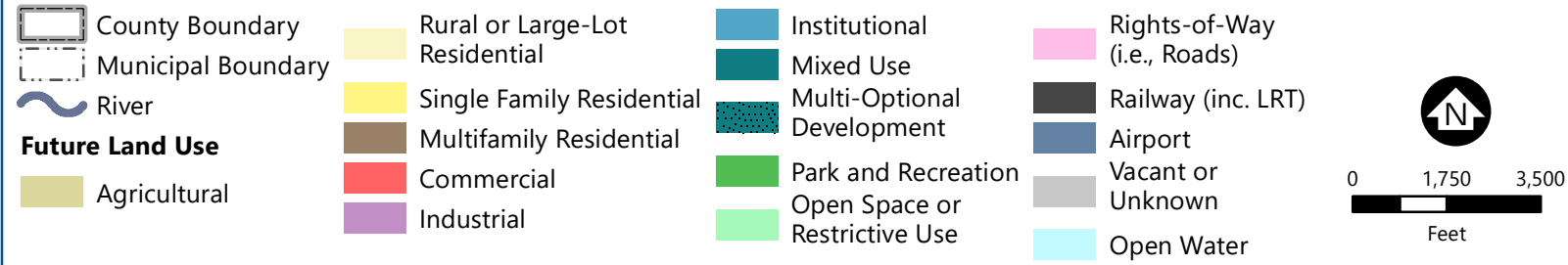
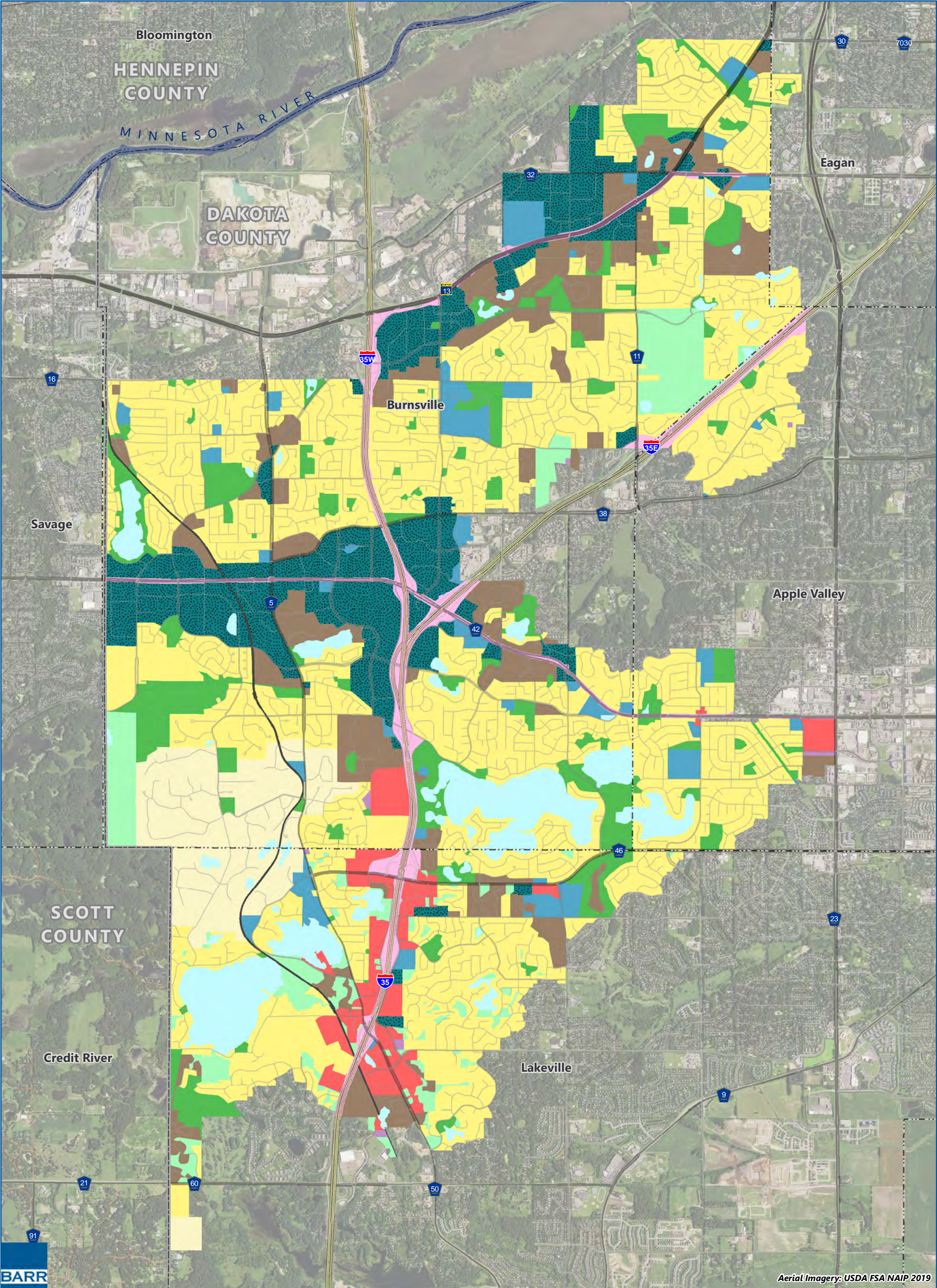
Feet

Data Source: Generalized Land Use 2016, Metropolitan Council, 2016.

Aerial Imagery: USDA FSA NAIP 2019

EXISTING LAND USE (2018)
BDWMO Watershed
Management Plan

FIGURE 2-3



ESTIMATED FUTURE LAND USE (2040)
BDWMO Watershed Management Plan

FIGURE 2-4

Data Source: Regional Planned Land Use - Twin Cities Metropolitan Area, Metropolitan Council, 2020.

2.4 Soils

Soil composition and slope are important factors affecting the rate and volume of stormwater runoff. The shape and stability of aggregates of soil particles—expressed as soil structure—influence the permeability, infiltration rate, and erodibility (i.e., potential for erosion) of soils. Slope is important in estimating stormwater runoff rates and susceptibility to erosion.

Prevalent soil series located within the watershed are described in the Dakota County Soil Survey, available online from the Natural Resources Conservation Service (NRCS). General soil map units prevalent in the BDWMO portion of Dakota county include:

The **Waukegan-Wadena-Hawick** unit includes well drained soils on glacial outwash plains and terraces. These soils vary from level to very steep. These soils are formed in loamy or silty sediments and generally underlain by sandy outwash. These soils are well suited for agricultural land use and building but are sensitive to groundwater pollution (USDA SCS, 1983).

The **Kingsley-Mahtomedi** unit includes well drained soils that range from gently sloping to very steep. These soils are formed in loamy and sandy glacial till and outwash in uplands and outwash plains. Soils within this unit are complex and intermixed. These soils are not well suited to agricultural land use and can be subject to erosion on steeper slopes (USDA SCS, 1983).

Detailed mapping of soil series present in Dakota County and the BDWMO is available from the NRCS Web Soil Survey at: <https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>

Soil infiltration capacity affects the amount of direct runoff resulting from rainfall. Higher infiltration rates result in lower potential for runoff, as more precipitation can enter the soil. Conversely, soils with low infiltration rates produce high runoff volumes and high peak discharge rates, as most or all of the rainfall moves as overland flow. The NRCS (formerly the Soil Conservation Service) has established four general hydrologic soil groups (HSGs). These groups are:

Hydrologic Soil Group A— (Low runoff potential): Group A soils have a high infiltration rate and are typically composed of more than 90% sand and gravel.

Hydrologic Soil Group B— (Moderately low runoff potential): Group B soils have a moderate infiltration rate and are typically composed of 50-90% sand.

Hydrologic Soil Group C— (Moderately high runoff potential): Group C soils have a slow infiltration rate and are composed of less than 50% sand.

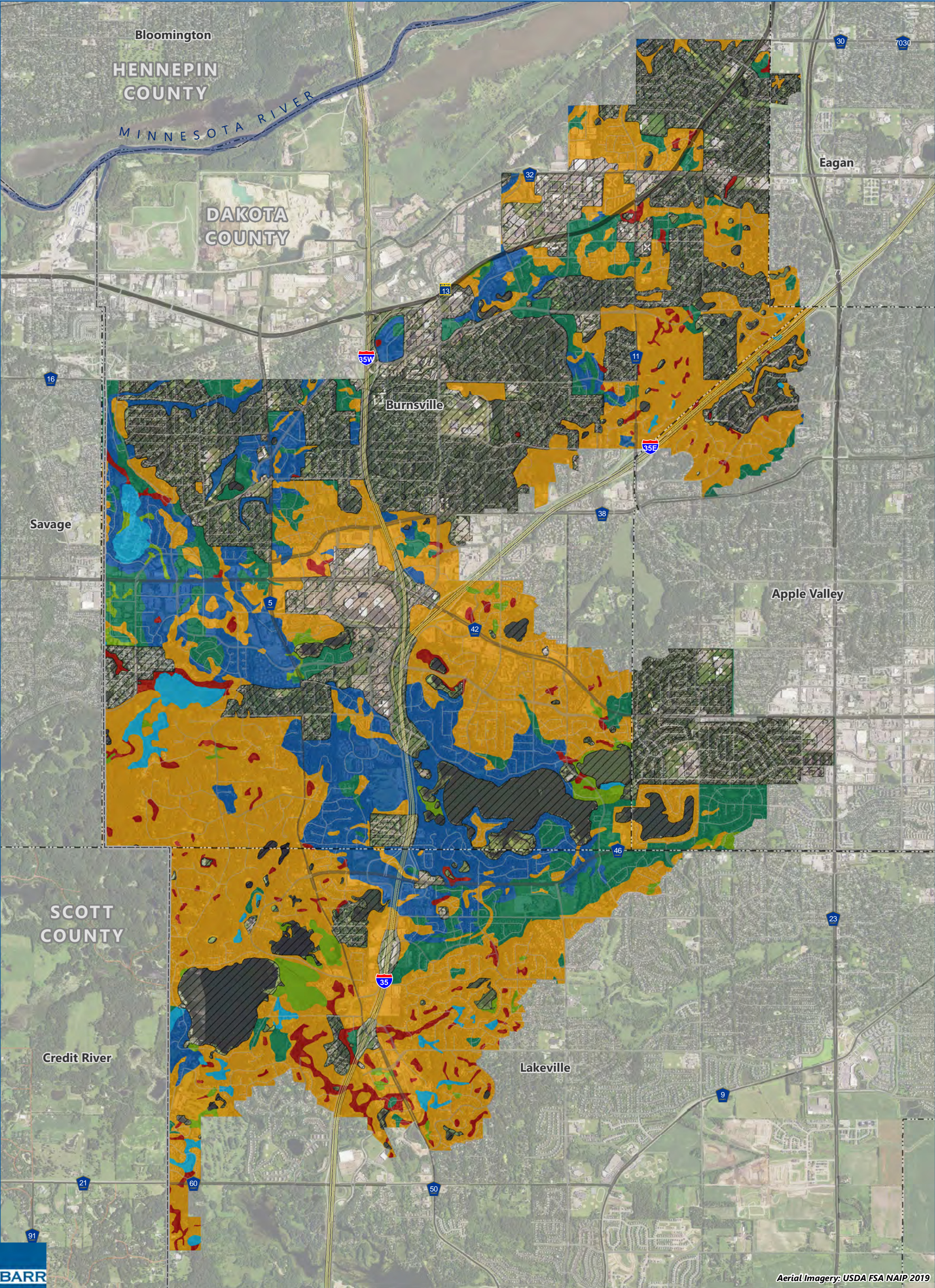
Hydrologic Soil Group D— (High runoff potential): Group D soils have a very slow infiltration rate and are composed of more than 40% clay. These soils have a combination of high swelling potential, a permanently high water table, and a clay layer at or near the surface.

Dual HSGs (types A/D, B/D, and C/D) are soils that are considered D soils primarily because of a high water table. However, if the soil were drained it would be classified into a different group. The second

group listed for dual HSG soils is for an undrained condition. To evaluate infiltration capacity, dual HSGs are usually considered as D soils. Figure 2-5 presents the most current HSG data within the watershed, which are based on the Soil Survey Geographic dataset (SSURGO) from the NRCS.

Large areas concentrated in the northern part of the watershed are not rated with respect to HSG. The “Not Rated/Not Available” classification is typically assigned to areas where development has altered the existing soil, or data were unavailable prior to development. Development may increase the potential for high volumes of runoff. As land is developed for urban use, much of the soil is covered with impervious surfaces, and soils in the remaining areas are significantly disturbed and altered. Development often results in consolidation of the soil and tends to reduce infiltration capacity of otherwise permeable soils, resulting in significantly greater amounts of runoff. Grading, plantings, and tended lawns tend to dominate the pervious landscape in urbanized areas and may become more important factors in runoff generation than the original soil type.

Figure 2-5 provides general guidance about the infiltration capacity of soils. Site specific data such as geologic borings, piezometers, and other engineering studies are necessary to evaluate soil infiltration capacity for individual project sites.



County Boundary

Municipal Boundary

River

Hydrologic Soil Group

A

A/D

B

B/D

C

C/D

Not Rated

01,7503,500

Feet

Aerial Imagery: USDA FSA NAIP 2019

**HYDROLOGIC
SOIL GROUPS**

BDWMO Watershed
Management Plan

FIGURE 2-5

2.5 Geology

2.5.1 Surficial Geology

The geology of the watershed includes consolidated bedrock formations overlain by unconsolidated glacial and non-glacial sediments (also known as quaternary deposits). Unconsolidated glacial sediments are from glacial deposits left from the quaternary geologic period and modified by post-glacial erosion and soil formation processes. Most of the quaternary deposits in the watershed were deposited approximately 12,000 to 20,000 years ago by the Superior lobe and Des Moines lobe of the Wisconsin Glaciation (the most recent local glacial episode) (Balaban and Hobbs, 1990). Glacial till underlies most of the BDWMO, with loamy till more common in the south and sandy till more common in the north.

The depth of the surficial deposits varies across the watershed, but generally ranges from 100 to 200 feet thick. Areas of surficial deposits less than 50 feet occur in the northwest of the BDWMO. Thicker surficial deposits (more than 300 feet) occur in minor buried bedrock valleys present in the watershed; there is little to no relationship between surface topography and the location of buried bedrock valleys.

More information about the surficial geology of the BDWMO is available from the Dakota County Geologic Atlas at: <https://conservancy.umn.edu/handle/11299/58494>

2.5.2 Bedrock Geology

Consolidated bedrock formations (bedrock deposits) are much older than, and lie below, the glacial deposits. They include overlapping sequences of sandstones, limestones, dolostones, and shales from the Cambrian or Ordovician series. The uppermost layer of bedrock varies with location within the watershed and includes:

- Platteville and Glenwood dolostone, limestone, and shale (youngest)
- St. Peter sandstone
- Prairie du Chien dolomite
- Jordan sandstone
- St. Lawrence shale (oldest)

These bedrock units are sedimentary rocks deposited by shallow seas during late Cambrian and Ordovician times, approximately 500 million years ago. The bedrock formations form part of a gently sloping bowl-like structure centered under the Minneapolis-St. Paul metropolitan area, known as the Twin Cities basin. Bedrock characteristics are summarized in Table 2-4.

Table 2-4 Bedrock geology characteristics

Geologic Unit	Approximate Thickness (feet)	Description	Approximate Subcropping Locations	Water-Bearing Characteristics
Glacial Drift	<50 to 300+	Till, sand, gravel, lake deposits	Present throughout watershed, varying in thickness by location	May yield small supplies for domestic use
Platteville and Glenwood Formation	0-40	Fine-grain dolostone and limestone over green, sandy shale	Portions of Burnsville and eastern Lakeville	Low yield; acts as a confining layer
St. Peter sandstone	0-160	Fine to medium-grain quartzose sandstone, underlain by siltstone and shale	Present throughout, but concentrated in the eastern BDWMO	Widely used for domestic wells
Prairie du Chien dolomite	150-300	Thin-bedded with thin beds of sandstone and chert	Far northern portion of the BDWMO and Murphy-Hanrehan subwatershed	Major high-capacity aquifer
Jordan Sandstone	100	Medium- to coarse-grain quartzose sandstone	Does not subcrop within the BDWMO	Major high-capacity aquifer
St. Lawrence Formation	100-200	Dolomitic siltstone and sandstone	Does not subcrop within the BDWMO	Confining bed with little yield

Source: Dakota County Geologic Atlas (plates 2 and 4)

More information about the surficial geology of the BDWMO is available in the Dakota County Geologic Atlas at: <https://conservancy.umn.edu/handle/11299/58494>

2.6 Groundwater

The glacial and bedrock deposits form layered sequences of aquifers and confining units. An aquifer is a geologic formation capable of supplying sufficient quantities of water to a well. A confining unit is a geologic deposit that impedes the flow of water between aquifers.

The uppermost aquifers in the BDWMO are glacial deposits. Glacial aquifers (also known as surficial aquifers) include the water table and buried glacial aquifers, which are primarily used for domestic and irrigation purposes in Dakota County. The elevation of the surficial (or quaternary) water table beneath the watershed generally ranges from approximately 900 to 1,000 feet; less in the north, and greater in the south. The depth of the water table ranges widely from tens of feet (e.g., around Crystal Lake) to upwards of 200 feet (e.g., areas of high ground elevation) (Balaban and Hobbs, 1990). Glacial aquifers are variable in location and yield. Water yield from surficial aquifers in the BDWMO ranges from less than 5 gallons per minute in the eastern portion of the watershed to between 50 and 250 gallons per minute in the western portion of the watershed. Groundwater quality in glacial aquifers is often correlated to the quality of the water that is infiltrating at the surface; these aquifers are not used locally for public water supplies due to their susceptibility to contamination (Balaban and Hobbs, 1990).

Surficial groundwater may be a source or a sink for local surface waters depending on relative elevation, soil conditions, and other factors. Generally, data characterizing the relationship between surficial groundwater and surface water features in the BDWMO is limited due in part to the lack of surficial aquifer use within the watershed (Palen, 1990).

Most high-capacity wells draw water from bedrock aquifers. Below the surficial aquifers, six bedrock aquifers are present under the BDWMO. The major bedrock aquifers are, in order of use and development:

1. Prairie du Chien-Jordan
2. Mount Simon-Hinckley
3. St. Lawrence-Tunnel City
4. Wonewoc
5. St. Peter
6. Platteville

The aquifer used most often for water supply in the area is the Prairie du Chien-Jordan aquifer. The Prairie du Chien-Jordan aquifer is high yielding, more easily tapped than deeper aquifers, has very good water quality, and is continuous throughout most of the area.

Groundwater levels in the Prairie du Chien-Jordan aquifer range from than 700 feet MSL to more than 900 feet MSL (Balaban and Hobbs, 1990). The aquifer is recharged in areas where thin permeable drift overlies the limestone layers. Some recharge of this aquifer occurs locally from percolation through the overlying glacial deposits or St. Peter sandstone. Local recharge to the aquifer is generally low. Regional recharge of the Prairie du Chien-Jordan aquifer occurs to the south, in Freeborn and Mower Counties. Groundwater movement in the aquifer is generally from south to north, toward the Minnesota and Mississippi Rivers.

The aquifer with the highest water quality and highest possible yields is the Mt. Simon-Hinckley aquifer, but it is more expensive to use than the Prairie du Chien-Jordan aquifer because of its greater depth; also, there are limitations to its use. Minnesota statutes limit appropriations from the Mt. Simon-Hinckley aquifer to potable water uses, where there are no feasible or practical alternatives, and where a water conservation plan is incorporated with the appropriations permit. The water level of the Mt. Simon-Hinckley aquifer is approximately 700 feet MSL. Recharge of the Mt. Simon-Hinckley aquifer takes place far north of the watershed, where the bedrock is closer to the surface, and occurs by percolation through the overlying drift and bedrock. Groundwater movement in the aquifer is generally to the southeast.

Municipal water supply wells within Apple Valley, Burnsville, Eagan, and Lakeville draw drinking water from a combination of the Prairie du Chien – Jordan and the Mount Simon Hinckley aquifers. Users of groundwater meeting certain use criteria are required to obtain a water appropriation permit from the MDNR; more information is available from:

https://www.dnr.state.mn.us/waters/watermgmt_section/appropriations/index.html

The Metropolitan Council completed the *Regional Water Supply, Enhanced Groundwater Recharge, and Stormwater Capture and Reuse Study for the Southeast Metro Study Area* in 2016. Groundwater modeling performed as part of the study estimates future drawdown of local aquifers from continued development of groundwater sources, as well as potential recovery if other water sources are developed. The study estimates continued development of the Prairie du Chien – Jordan aquifer may result in 20 to 40 feet of drawdown by 2040. Conversely, scenarios including reduced groundwater development show similar levels of aquifer recovery.

Additional information about the aquifers within the watershed is available from the following sources:

- Dakota County Geologic Atlas (Balaban and Hobbs, 1990), available at: <https://conservancy.umn.edu/handle/11299/58494>
- Metropolitan Council Water Supply Planning, available at: <https://metro council.org/Wastewater-Water/Planning/Water-Supply-Planning.aspx>

2.6.1 Groundwater Recharge

Recharge to groundwater occurs throughout the watershed. The local surficial geologic characteristics affect the rate, volume, and distribution of recharge. Water infiltrates most rapidly into sandy deposits and flows easily through sandy materials; clay deposits tend to slow and impede infiltration and subsurface flows. Relative to natural conditions, impervious surfaces (e.g., buildings, streets, parking lots) in developed areas have reduced the amount of open space and decreased the amount of land available to infiltrate runoff and recharge groundwater.

Groundwater recharge reaches the water table (i.e., quaternary, or surficial aquifer) at a fast rate through sandy geologic deposits. The presence of sandy soils within portions of the BDWMO creates potential for high local infiltration rates and associated groundwater contamination from pollutants carried from the ground surface. Groundwater sensitivity to pollution is presented in Figure 2-6.

Surficial aquifers usually have higher static water levels than deeper aquifers, indicating that water flows downward into the aquifer system and that surficial aquifers help recharge deeper aquifer systems. Deeper bedrock aquifers are recharged through bedrock valleys, leakage through confining layers, fractures in tills and confining layers, improperly constructed wells, and other areas where good hydraulic connections and unforeseen flow paths exist within upper aquifer units.

The Metropolitan Council's *Regional Water Supply, Enhanced Groundwater Recharge, and Stormwater Capture and Reuse Study for the Southeast Metro Study Area* (Metropolitan Council, 2016) considered opportunities for enhanced recharge within Dakota County based on infiltration rate and depth of the water table. The study identified approximately 900 acres of priority infiltration areas in the BDWMO, located primarily in the western portion of the BDWMO, north of Orchard Lake.

2.6.2 Drinking Water Supply, Wellhead Protection, and Pollution Prevention

Residents within the BDWMO obtain their drinking water entirely from groundwater via municipal groundwater wells as well as private domestic wells. Municipal wells serving the BDWMO member cities tap the Mt. Simon-Hinckley and Prairie du Chien – Jordan aquifers.

In 1989 the state of Minnesota instituted the Minnesota Groundwater Protection Act, which identified the Minnesota Department of Health (MDH) as responsible for the protection of groundwater quality. Through its wellhead protection program, the MDH administers and enforces the Minnesota Water Well Code, which regulates activities such as well abandonment and installation of new wells. The MDH also administers the Wellhead Protection Program, which is aimed at preventing contaminants from entering the recharge zones of public well supplies. In 1997, the Wellhead Protection Program rules (Minnesota Rules 4720.5100 to 4720.5590) went into effect.

Some public water suppliers are required to prepare wellhead protection plans (WHPPs), including the BDWMO member cities of Apple Valley, Burnsville, Eagan, and Lakeville. Through these wellhead protection plans, public water suppliers delineate drinking water supply management areas (DWSMA) for groundwater wells, assess the water supply's susceptibility to contamination from activities on the land surface, and establish management programs, such as identification and sealing of abandoned wells and education/public awareness programs. The DWSMA represents the boundaries of the recharge area to the well and is the area to be protected and managed by the wellhead protection plan. Figure 2-7 presents the DWSMAs located within the BDWMO.

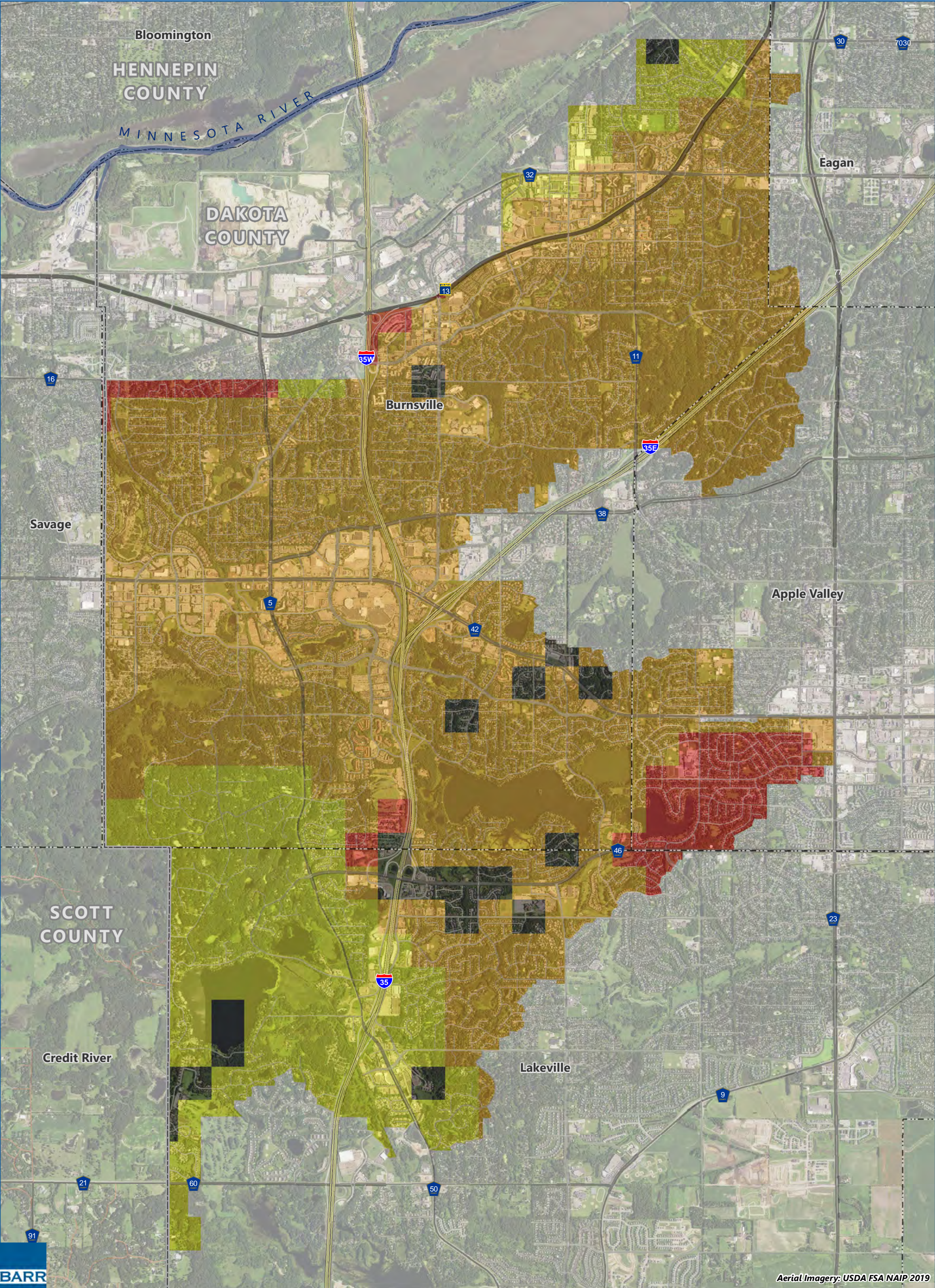
The BDWMO and its cities rely on infiltration practices to improve water quality and reduce stormwater runoff volumes. Thus, the BDWMO and its member cities will continue to consider the possible impacts of infiltrated stormwater on groundwater quality. The MDH and Minnesota Pollution Control Agency (MPCA) also provide guidance for evaluating infiltration projects in areas with vulnerable groundwater supplies; the guidance considers the presence of wellhead protection areas, aquifer characteristics, land use, and other factors. For example, infiltration is not allowed within DWSMA emergency response zones.

Infiltration guidance is available from the MPCA website:

[https://stormwater.pca.state.mn.us/index.php/Stormwater and wellhead protection](https://stormwater.pca.state.mn.us/index.php/Stormwater%20and%20wellhead%20protection)

Additional information regarding groundwater resource protection and management is available from the following sources:

- 2020-2030 Dakota County Groundwater Plan available at: <https://www.co.dakota.mn.us/Environment/WaterResources/Groundwater/Pages/groundwater-plan.aspx>
- Metropolitan Council Water Supply Planning, available at: <https://metro council.org/Wastewater-Water/Planning/Water-Supply-Planning.aspx>



County Boundary

Municipal Boundary

River

Groundwater Contamination Susceptibility

Lowest Susceptibility

Low Susceptibility

Medium Susceptibility

High Susceptibility

Highest Susceptibility

Insufficient Data to Rank

01,7503,500

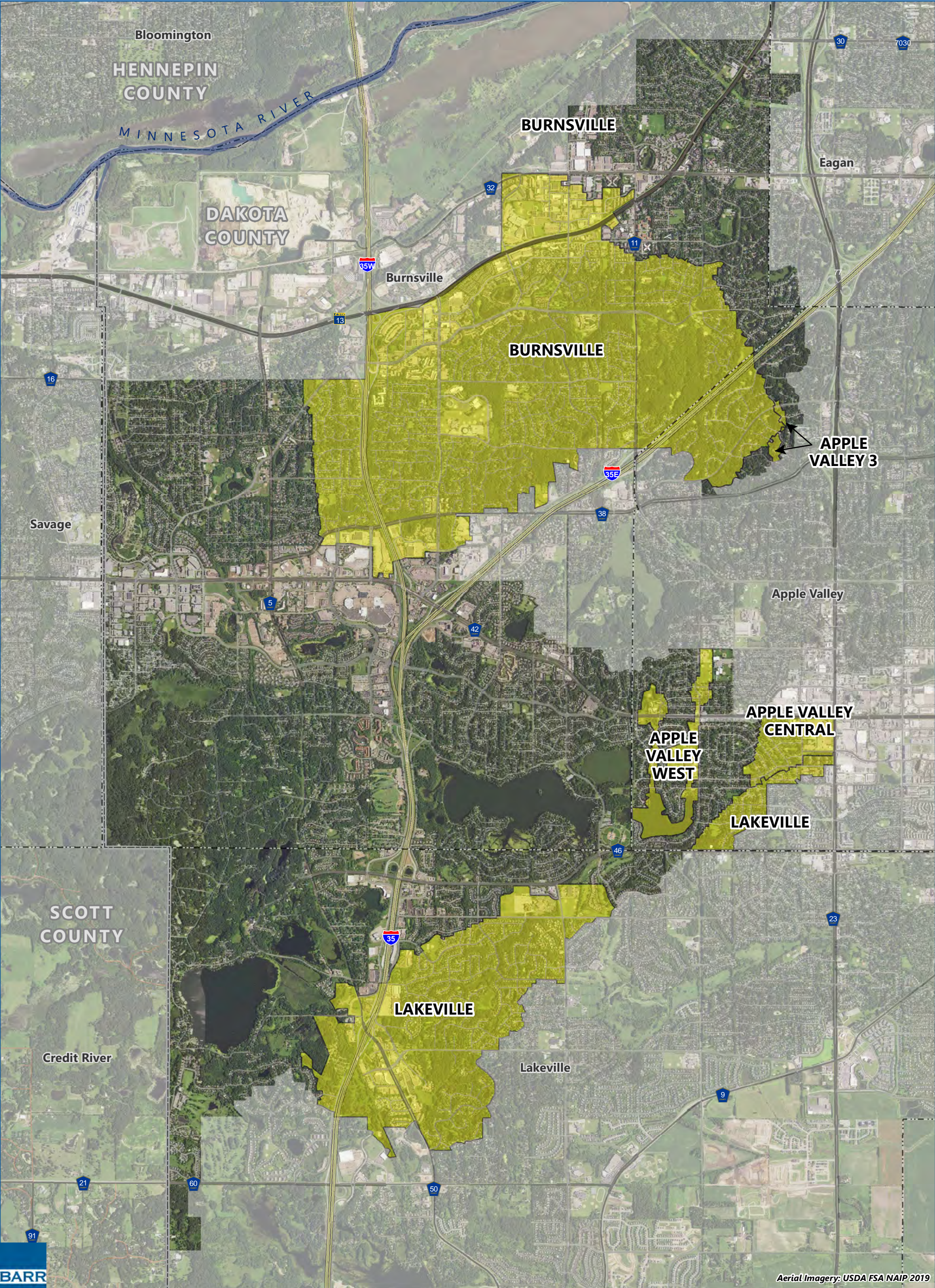
Feet

SENSITIVITY OF THE WATER TABLE TO POLLUTION

BDWMO Watershed Management Plan

FIGURE 2-6

Data Source: Ground Water Contamination Susceptibility in Minnesota, Minnesota Pollution Control Agency and Land Management Information Center, 1989.



Data Source: Minnesota Department of Health, Drinking Water Supply Management Areas, 2019.

2.6.3 Groundwater Monitoring and Groundwater Quality

Limited groundwater monitoring data is available within the watershed and includes data collected by Dakota County, the Minnesota Department of Agriculture, MPCA, U.S. Geological Survey (USGS), and others. Pesticide and nitrate concentrations within northwest Dakota County and the BDWMO are low (Dakota County, 2021). Figure 2-12 presents groundwater quality monitoring locations within the BDWMO. Groundwater quality monitoring information and data are available online from the MPCA at: <https://www.pca.state.mn.us/water/groundwater-monitoring>

Potential sources of groundwater contamination in the watershed include commercial and industrial waste disposal, landfills, leaking petroleum tanks, unsealed wells, non-compliant subsurface sewage treatment systems (SSTS), fertilizer/pesticide applications, animal waste, and road salt application (see also Section 2.14). Emerging contaminants include pharmaceuticals, industrial effluents, personal care products, fire retardants, and other items that are washed down drains and not able to be processed by municipal wastewater treatment plants or septic systems.

The MDNR also coordinates an observation well network and collects static groundwater-level data to assess groundwater resources, determine long term trends, interpret impacts of pumping and climate, plan for water conservation, and evaluate water conflicts. The observation well network includes 4 wells located within the BDWMO (see Figure 2-12). More information is available from the MDNR at: <https://www.dnr.state.mn.us/waters/cgm/program.html>

2.7 Surface Water Resources

Figure 2-2 shows the major watersheds, tributary areas, and drainage patterns within the BDWMO. Development of the land within the BDWMO member cities has resulted in alterations to the natural hydrologic system. To facilitate development, natural drainages were diverted or piped, wetlands were drained or filled, and stormwater infrastructure was constructed.

Figure 2-8 shows the surface waters classified by the MDNR as public waters. The MDNR designates specific water resources as public waters to indicate those lakes, wetlands, and watercourses over which the MDNR has regulatory jurisdiction. By statute, the definition of public waters includes “public waters basins” (i.e., lakes), “public waters watercourses” (i.e., rivers and streams) and “public waters wetlands.” The collection of public waters and public waters wetlands designated by the MDNR is generally referred to as the public waters inventory, or PWI.

Public waters are all water basins (i.e., lakes, ponds, wetlands) and watercourses (i.e., streams, rivers) that meet the criteria set forth in Minnesota Statutes, Section 103G.005, Subd. 15 that are identified on public water inventory maps and lists authorized by Minnesota Statutes, Section 103G.201. The regulatory boundary of public waters and public water wetlands is called the ordinary high water level (OHWL). For watercourses, the OHWL is generally the elevation of the top of the bank of the channel. A MDNR permit is required for work within designated public waters. Additionally, shoreland development requirements may exist for public waters with shoreland classifications. Table 2-5 summarizes the public waters located

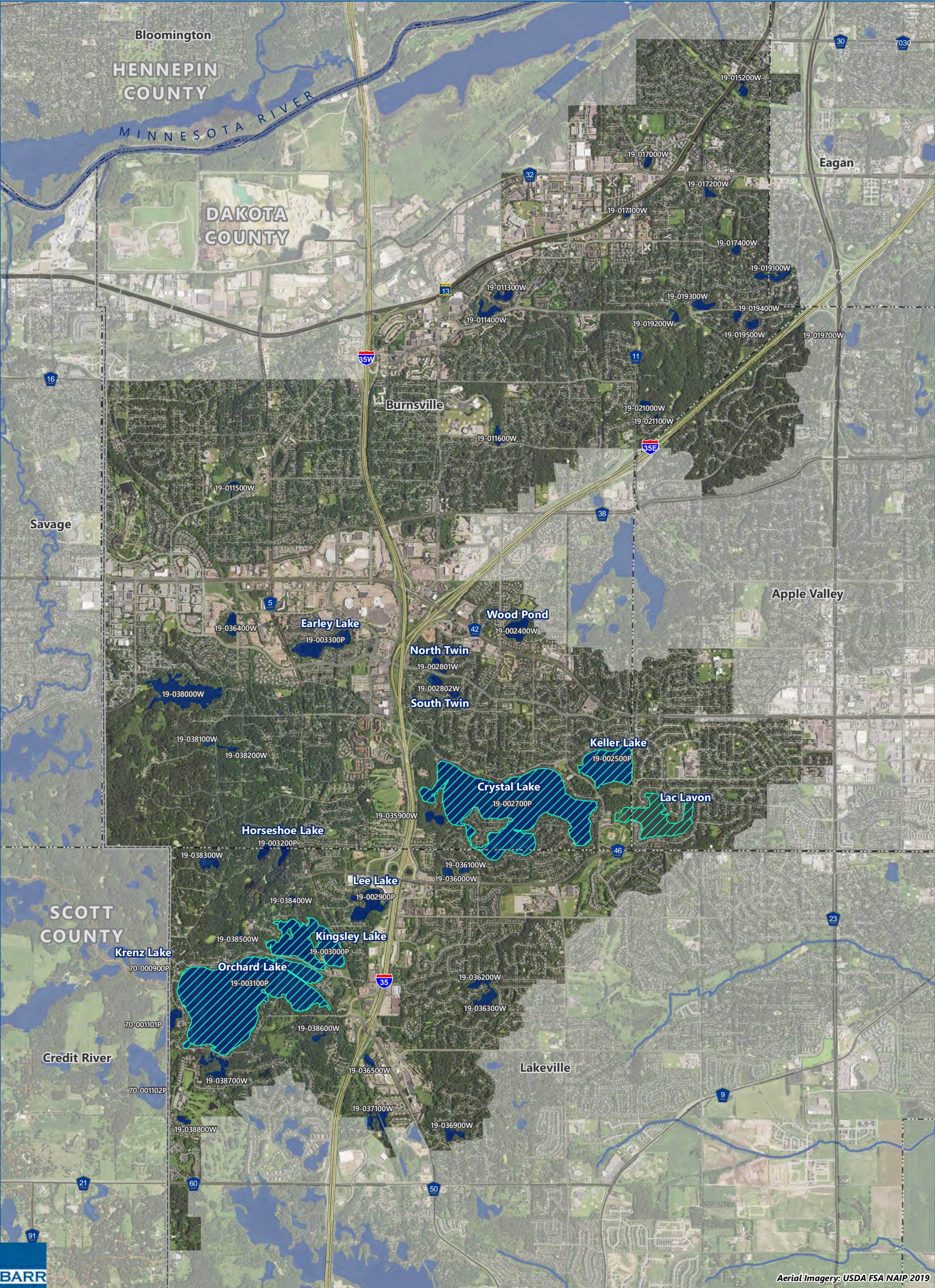
within the watershed. PWI maps and lists are available on the MDNR's website:
http://www.dnr.state.mn.us/waters/watermgmt_section/pwi/maps.html.

Table 2-5: Summary of BDWMO PWI and Physical Characteristics

BDWMO Water Body	Municipality	Downstream Receiving Water	MDNR Identification		Physical Characteristics								
			MDNR Public Waters ID Number	PWI Class	Water Area (acre)	Perimeter (mi)	Littoral Area (acre)	Average Depth (feet)	Max Depth (feet)	Direct Watershed Area, including Lake Surface Area (acre)	Total Watershed Area including All Upstream Lakes (acre)	Normal Water Level (ft MSL)	100-Year Flood Elevation (ft MSL)
Lakes													
Crystal	Burnsville & Lakeville	Minnesota River	19-0027	P	292	5.3	208	10	35	2013	3852	933.5	935.8
Keller	Burnsville	Minnesota River	19-0025	P	52	1.2	52.0	4.8	8	1447	1447	934.3	938.6
Orchard	Lakeville	Credit River	19-0031	P	243	4.7	177	10	33	2045	2260	N/A	979.1
Kingsley	Lakeville	Credit River	19-0030	P	51	3.0	51.0	N/A	10.2	216	216	N/A	982.4
Lac Lavon	Apple Valley & Burnsville	Minnesota River	19-0446	N/A	60	2.1	39	N/A	32	184	184	Landlocked	933.1
Sunset Pond	Burnsville	Minnesota River	19-0451	N/A	60.0	2.5	60.0	N/A	10.5	1019	6311	N/A	854.8
Lee	Lakeville	Minnesota River	19-0029	P	19.0	1.2	19.0	7.0	15	206	206	948.5/ 947.0	951.9
Earley	Burnsville	Minnesota River	19-0033	P	23.3	1.1	23.3	3.8	7.8	757	5292	905	910.1
Horseshoe	Lakeville	Credit River	19-0032	P	11.7	0.9	--	--	--	--	--	--	--
Wetlands													
Wood Pond	Burnsville	Minnesota River	19-0024	W	14.0	0.6	14.0	10	14	110	110	1000.9	1003.6
Twin (South)	Burnsville	Minnesota River	19-0028	W	11.7	1.0	11.7	3.6	11	574	4536	918	920.2
Twin (North)					5.1		5.1	6.6	12				
Unnamed (Cam Ram Wetland)	Burnsville	Credit River	19-0380	W	51.2	2.3	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0113	W	5.6	0.5	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0114	W	6.9	0.7	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0115	W	4.7	0.5	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0116	W	4.3	0.5	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0152	W	3.3	0.4	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0170	W	3.0	0.3	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0171	W	1.0	0.2	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0172	W	2.5	0.3	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0174	W	2.2	0.2	--	--	--	--	--	--	--
Unnamed	Burnsville & Eagan	Minnesota River	19-0191	W	8.6	0.8	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0192	W	2.5	0.4	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0193	W	5.7	0.5	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0194	W	2.4	0.3	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0195	W	3.4	0.3	--	--	--	--	--	--	--
Unnamed	Burnsville	Credit River	19-0197	W	0.2	0.1	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0210	W	4.2	0.3	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0211	W	1.2	0.2	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0359	W	5.7	0.5	--	--	--	--	--	--	--
Unnamed (Goose Lake)	Lakeville	Minnesota River	19-0360	W	5.3	0.4	--	--	--	--	--	--	--
Unnamed	Lakeville	Minnesota River	19-0361	W	3.2	0.3	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0362	W	4.9	0.5	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0363	W	11.4	0.9	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0364	W	7.3	0.4	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0365	W	2.9	0.3	--	--	--	--	--	--	--

Table 2-5: Summary of BDWMO PWI and Physical Characteristics

BDWMO Water Body	Municipality	Downstream Receiving Water	MDNR Identification		Physical Characteristics								
			MDNR Public Waters ID Number	PWI Class	Water Area	Perimeter	Littoral Area	Average Depth	Max Depth	Direct Watershed Area, including Lake Surface Area	Total Watershed Area including All Upstream Lakes	Normal Water Level	100-Year Flood Elevation
					(acre)	(mi)	(acre)	(feet)	(feet)	(acre)	(acre)	(ft MSL)	(ft MSL)
Unnamed	Lakeville	Credit River	19-0369	W	5.8	0.5	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0371	W	10.1	1.2	--	--	--	--	--	--	--
Unnamed	Burnsville	Credit River	19-0381	W	2.3	0.2	--	--	--	--	--	--	--
Unnamed	Burnsville	Credit River	19-0382	W	2.2	0.4	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0383	W	6.9	0.5	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0384	W	2.4	0.4	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0385	W	3.3	0.3	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0386	W	2.6	0.4	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0387	W	11.2	1.3	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0388	W	2.7	0.3	--	--	--	--	--	--	--



County Boundary

Municipal Boundary

Public Water Inventory Basin

Public Water Inventory Watercourse

Strategic Waterbodies

0

1,750

3,500

Feet

N

0

1,750

3,500

Feet

PUBLIC WATERS WITHIN THE BDWMO AND STRATEGIC WATERBODIES

BDWMO Watershed Management Plan

FIGURE 2-8

Data Source: Minnesota Department of Natural Resources, Public Waters (PW) Basin and Watercourse Delineation, 2020.

2.7.1 Lakes and Ponds

This section summarizes some of the lakes and ponds of local significance within the BDWMO. The BDWMO classified some of these waterbodies as strategic waterbodies to aid in prioritizing BDWMO activities (see Section 5.0 – Implementation Program).

2.7.1.1 Crystal Lake (MDNR #19-0027P)

Crystal Lake is a 292-acre lake located in the cities of Burnsville and Lakeville in the southern portion of the BDWMO. The lake is a major recreational resource for the area. A public beach and public boat landing provide opportunities for swimming, fishing, water skiing and aesthetic viewing. Crystal Lake is a BDWMO strategic waterbody and is classified as a deep lake by the MPCA. The MPCA listed Crystal Lake as impaired in 2002 due to excessive nutrients, leading to the completion of the *Crystal, Keller, Lee, and Earley Lakes Total Maximum Daily Load (TMDL)* (MPCA, 2011). Crystal Lake was removed from the impaired waters list in 2018 following improved water quality achieved in part by actions taken by the BDWMO and member cities.

Crystal Lake consists of five basins: Bluebill Bay, Mystic Bay, Maple Island Bay, Buck Hill Bay, and the main lake basin. The lake outlet is located at the northwest end of the lake in Buck Hill Bay and consists of a box weir with an overflow elevation of 933.5 feet NGVD29. The lake has 5.3 miles of shoreline, a mean depth of 10 feet, and a maximum depth of 35 feet. The area of the lake shallow enough (15 feet deep or less) for aquatic plants to grow (the littoral area) is approximately 210 acres. Crystal Lake is a dimictic lake – it mixes two times per year (during the spring and fall turnover events). The lake thermally stratifies during the growing season.

Crystal Lake receives runoff from a 3,852-acre tributary watershed that includes the direct watershed and the watersheds of Keller Lake, Lee Lake, and Lac Lavon (Lac Lavon's 185-acre watershed is typically landlocked). The tributary watershed to Crystal Lake includes portions of the cities of Apple Valley, Burnsville, and Lakeville. Crystal Lake receives outflows from Keller Lake and Lee Lake and drains northwest through a series of storm sewer pipes to Twin and Earley Lakes, ultimately reaching the Minnesota River via Sunset Pond.

The Crystal Lake watershed (including the Keller and Lee Lake watersheds) is almost fully-developed, with only a few small parcels available for new development. Low density residential land use is the major land use (41%), followed by highway (20%) and open water (11%). Other land uses include medium density residential, natural, park, and open space, commercial, developed parks, golf course, high density residential, institutional, and industrial/office. The portion of the watershed located in Lakeville has developed significantly since 2000, with the most intense development occurring along I-35, where the undeveloped land was converted to commercial use. For the commercial area of Lakeville within the Crystal Lake watershed, the city restricts the maximum amount of impervious cover to 70% for new development sites.

The BDWMO began operating a ferric chloride treatment system in 1996 to remove phosphorus from the deepest part of Crystal Lake. The treated water was discharged to a nearby storm sewer and conveyed to

Keller Lake. The project was a cooperative venture of the BDWMO, the MPCA, and the United States Environmental Protection Agency (U.S. EPA) under the Clean Lakes Program (CLP). The system operated during the 1996 and 1997 recreation seasons and half of the 1998 season. Operation was suspended in July 1998 after strong neighborhood opposition to the odor (a side effect of the treatment). Operation was discontinued in April 1999 with consideration for public input, operating costs, and marginal water quality benefit during the summer.

A recommendation of the *Crystal & Keller Lake Use Attainability Analysis (UAA)* (BDWMO, 2003) was to modify the ferric chloride treatment system to withdraw surface waters and resume operating the system. The BDWMO implemented the recommendation to reduce the total phosphorus concentration and suppress the growth of curly-leaf pondweed in Keller Lake to reduce the phosphorus loading to Crystal Lake.

The BDWMO resumed operation of the ferric chloride treatment system for varying time periods during the summers of 2003, 2004, 2005, 2006, 2007, and 2008, following the recommendation in the *Crystal & Keller Lake UAA* (BDWMO, 2003). In 2009, the BDWMO again decided to terminate operation of the ferric chloride system because of concerns over operating costs and limited benefits.

Lake monitoring data indicate that operation of the ferric chloride treatment system was successful in reducing the total phosphorus concentration in the deepest portions of Crystal Lake but had negligible impact on overall lake water quality, including phosphorus concentrations measured at the lake surface or water clarity measured during the summer season. The operation of the hypolimnetic withdrawal system did maintain water levels and improve water quality in Keller Lake.

2.7.1.2 Keller Lake (MDNR #19-0025P)

Keller Lake is an approximately 50-acre lake located in the cities of Burnsville and Apple Valley in the southern portion of the BDWMO. The lake is used primarily for fishing, canoeing, and wildlife viewing by the local residents. There is a park on the south side of Keller Lake but no beach or public access. Keller Lake is a BDWMO strategic waterbody and is considered a shallow lake by the MPCA. The MPCA listed Keller Lake as impaired in 2002 due to excessive nutrients and remains on the impaired waters list. This impairment was evaluated in the completion of the *Crystal, Keller, Lee, and Earley Lakes Total Maximum Daily Load (TMDL)* (MPCA, 2011). The BDWMO conducted an alum and sodium aluminate treatment on Keller Lake in Spring 2019, resulting in improved water quality in 2019 and 2020 compared to the previous decade. The BDWMO conducted a second alum treatment in Fall 2021.

Keller Lake discharges to the northeast side of Crystal Lake over a weir structure, at an elevation of 934.3 feet NGVD29, through a 72-inch diameter RCP arch pipe. Keller Lake has an average depth of 4.8 feet and a maximum depth of about 8 feet. Because the lake is so shallow, aquatic plants can grow over the entire lakebed and thermal stratification typically does not occur during the summer. The lake is polymictic (mixes several times per year) due in part to intermittent wind mixing.

The Keller Lake watershed is 1,447 acres (including the lake surface area). The Keller Lake watershed is fully-developed. Analysis performed as part of the TMDL found that runoff from 46% of the drainage area

reached Keller Lake without first passing through some form of water quality treatment. Low density residential land use is the primary land use within the watershed (52.6%), followed by highway (20.5%) and natural, park, and open space (8%). Other land uses include medium density residential, open water, commercial, developed parks, high density residential, and institutional. There is a large wetland area adjacent to the southwest side of Keller Lake.

2.7.1.3 Orchard Lake (MDNR #19-0031P)

Orchard Lake is a 243-acre lake located in Lakeville, in the southwest portion of the BDWMO. The lake is used primarily for fishing, but swimming, boating and aesthetic and wildlife viewing are also popular recreational uses of the lake. Over seventy private homes are located on the lake. Three city parks are located on Orchard Lake: a public boat access on the south shore (Orchard Lake Park), a public beach on the west shore (Orchard Lake Beach), and Wayside Park. Orchard Lake is a BDWMO strategic waterbody and is classified as a deep lake by the MPCA. Orchard Lake is not currently listed as impaired by the MPCA.

Orchard Lake's maximum depth is 33 feet, and its average depth is 10 feet. The littoral area (the portion less than 15 feet deep where submerged aquatic plants can grow) covers approximately 75 percent of the lake. The total watershed area tributary to Orchard Lake is 2,260 acres and includes the Kingsley Lake watershed. The lake outlet is located on the west shore and discharges to the Credit River watershed through Murphy-Hanrehan Park Reserve.

Current land use within the watershed includes a mixture of residential, commercial, institutional, park, golf course and undeveloped land. The commercial and high-density residential land uses are in the central portion of the watershed. Much of the Orchard Lake watershed is developed at low density. The portion of the watershed along the I-35 corridor has undergone recent development, but portions of the watershed remain undeveloped.

2.7.1.4 Kingsley Lake (MDNR #19-0030P)

Kingsley Lake is a 63-acre lake located in Lakeville in the southwest portion of the BDWMO (the lake area is approximately 80 acres including adjacent wetlands and floating mats). There is no public beach or access on Kingsley Lake, but the lake provides boating and canoeing opportunities for shoreline residents. Kingsley Lake is a BDWMO strategic waterbody and is considered a shallow lake by the MPCA. Kingsley Lake is not currently listed as impaired by the MPCA.

Kingsley Lake has a maximum depth of about 10 feet and the littoral area (the portion over which submerged aquatic plants can grow) covers the entire lake. A summer thermocline does not develop in Kingsley Lake due to its shallow depth. Kingsley Lake flows to Orchard Lake and ultimately to the Minnesota River via the Credit River watershed. In Fall 2020, the City of Lakeville replaced the damaged 1993 outlet with a new outlet of the same size and at the same elevation.

The watershed area tributary to Kingsley Lake is 216 acres. Existing land use conditions in the Kingsley Lake watershed include low density residential, undeveloped, commercial, and a small amount of

institutional and very low density residential. Undeveloped land in the watershed is expected to convert to institutional and commercial land uses.

2.7.1.5 Lac Lavon

Lac Lavon is a 60-acre lake occupying a former gravel pit. The lake is located on the border of Burnsville and Apple Valley. Lac Lavon is used primarily for fishing, swimming, and wildlife and aesthetic viewing. The City of Burnsville's Lac Lavon Park, with ballpark, tennis courts, paved trails, picnic shelter, play equipment and boat access, and the City of Apple Valley's Lac Lavon Park, with a fishing pier, canoe rack and access, picnic shelter, paved trails, and children's play equipment provide for most of the lake's recreational use. Because Lac Lavon is a former gravel pit, it is not part of the original MDNR public waters inventory. Lac Lavon is a BDWMO strategic waterbody and is classified as a deep lake by the MPCA. Lac Lavon continues to demonstrate excellent water quality and is not currently listed as impaired by the MPCA.

Lac Lavon is a landlocked basin under normal hydrologic conditions. The only surface water outlet from Lac Lavon is a 12-inch diameter emergency overflow outlet to Keller Lake. A valve controls the flows in the overflow pipe; under normal conditions the valve is closed. Water levels are primarily maintained by groundwater outflow.

The area tributary to Lac Lavon is 184 acres and includes portions of the cities of Apple Valley and Burnsville. Current land use in the watershed is primarily low-density residential and park land, which results in little pollutant loading to Lac Lavon. Significant land use changes in the Lac Lavon watershed are not anticipated.

2.7.1.6 Sunset Pond (MDNR #19-011500W)

Sunset Pond is a 60-acre stormwater pond located in Burnsville in the western portion of the BDWMO. Sunset Pond is located at the downstream end of a series of waterbodies that includes Keller Lake, Lee Lake, Lac Lavon, Crystal Lake, Wood Pond, Twin Lake, and Earley Lake.

Sunset Pond functions as a stormwater detention basin. The City of Burnsville's Sunset Pond Park is located on the southeast side of Sunset Pond and the pond is surrounded by a walking trail. Aquatic recreation facilities are not present, but there is a fishing pier. The MDNR previously managed Sunset Pond as a youth fishing pond through its Fishing in the Neighborhood (FiN) program. Sunset Pond is not a BDWMO strategic waterbody. Sunset Pond is not classified as a lake by the MPCA because it is a constructed waterbody, although it meets the physical criteria of a shallow lake.

The City of Burnsville created Sunset Pond in 1983 by constructing a dam along the northern end of a natural low marshy depression. The pond is shallow (with a maximum depth of about 10.5 feet) and includes areas of open water, islands, and aquatic plants. The littoral area covers the entire lake. The Sunset Pond outlet is located on the north side of the pond. Outflows flow into Willow Creek and drain north out of the BDWMO, through the Kraemer Nature Preserve (in the Lower Minnesota River Watershed District) towards the Minnesota River.

The direct watershed to Sunset Pond is 1,019 acres and includes land in Burnsville and a small amount of land in Savage (outside of the BDWMO jurisdictional boundary). The total area tributary to Sunset Pond is 6,311 acres (6,127 acres excluding the Lac Lavan watershed, which is typically landlocked). Current land use within the direct watershed is a mixture of industrial, low density residential and park land. The City of Burnsville intends to maintain the park areas around Sunset Pond as a nature preserve.

2.7.1.7 Lee Lake (MDNR #19-0029P)

Lee Lake is an approximately 19-acre waterbody located entirely within the City of Lakeville in the southern portion of the BDWMO. Lee Lake is surrounded by privately owned property and has no public access. The BDWMO did not classify Lee Lake as a strategic waterbody based on the lack of public access. It is classified as a shallow lake by the MPCA. The MPCA listed Lee Lake as impaired due to excess nutrients in 2002. Lee Lake was removed from the impaired waters list in 2014 based on water quality data that indicate the lake supports its intended recreational and aquatic life uses.

Prior to 1993, Lee Lake was landlocked and experienced periodic flooding. The City of Lakeville constructed a gated outlet discharging to Crystal Lake in 1993. The Lee Lake outlet is located on the east side of the lake and is a stop log weir (at elevation 948.5 feet NGVD29) followed by a 36-inch-wide gated structure (at an elevation of 947 feet NGVD29). Water level monitoring data shows that lake levels are typically one to two feet below the outlet invert elevation (948.5 feet NGVD29). The average lake depth is 7 feet, and the maximum depth is about 15 feet. Lee Lake is dimictic; it mixes two times each year (during the spring and fall turnover events). The lake thermally stratifies throughout the growing season.

The watershed tributary to Lee Lake is 206 acres. The Lee Lake watershed is nearly fully-developed. Low density residential land use is the major land use (38%), followed by highway (29%) and open water (12%). Other land uses include natural, park, and open space, commercial, and institutional.

2.7.1.8 Earley Lake (MDNR #19-0033P)

Earley Lake is an approximately 23-acre lake located in the City of Burnsville in the central portion of the BDWMO. Recreational uses of Earley Lake primarily include aesthetics and wildlife viewing, as there are no public beaches or boat access. Day Park is located on the southwest side of the lake and a walking trail surrounds the lake. The BDWMO did not classify Earley Lake as a strategic waterbody. The MPCA classifies Earley Lake as a shallow lake. The MPCA previously listed Earley Lake as impaired due to excess nutrients. Earley Lake was removed from the impaired waters list in 2010 based on water quality data.

Earley Lake is a shallow lake, with a mean depth of 3.8 feet and a maximum depth of 7.8 feet. Because of the shallow conditions, macrophyte growth is prevalent throughout most of the lake, and the entire lake is littoral area. The lake outlet consists of a three-sided box weir, with a total length of 12 feet and an overflow elevation of 905.0 feet above MSL (NGVD29). Earley Lake discharges to the southwest into the Sunset Pond watershed; the discharge from the lake is conveyed westward through a 36-inch diameter RCP pipe to Judicial Pond prior to reaching Sunset Pond.

The direct watershed tributary to Earley Lake is approximately 757 acres. Earley Lake also receives inflows from the Lee Lake, Keller Lake, Crystal Lake, Lac Lavan, Wood Pond, and Twin Lake watersheds, bringing

the total tributary area to 5,292 acres (5,108 acres excluding Lac Lavon, which is typically landlocked). The Earley Lake watershed is characterized by heavy commercial land use (including all of Burnsville Center), as well as low-, medium-, and high-density residential use.

2.7.1.9 Wood Pond (MDNR #19-0024W)

Wood Pond is approximately 14 acres and is located in the City of Burnsville in the central portion of the BDWMO. Wood Pond is used for canoeing, fishing, aesthetic viewing, and wildlife habitat. Wood Park is located along the northeast shoreline of Wood Pond. There is no public boat or swimming access on the lake. In 2007, a public fishing dock was constructed at Wood Park, as part of the MDNR FiN Program. The BDWMO did not classify Wood Pond as a strategic waterbody. The MDNR classifies Wood Pond as a public water wetland.

Wood Pond is a shallow waterbody. The average water depth is 10 feet, and the maximum depth is 14 feet (the littoral area covers the entire lake). The water level in the lake is controlled at elevation 1000.9 ft MSL (NGVD29) by an 18-inch diameter inlet/outlet pipe located at the west side of the lake, although the lake rarely discharges and is typically landlocked. From there, the trunk storm sewer system conveys discharge from the lake south beneath Portland Avenue and eventually into Twin Lake.

The Wood Pond watershed is approximately 110 acres and is fully developed, with no significant changes in land use classification expected for the foreseeable future. The Wood Pond watershed includes predominantly low- and medium-density residential land use. There is also some right-of-way land use in the watershed as well as some commercial land use southeast of the lake along County Road 42.

2.7.1.10 Twin Lake (MDNR #19-0028W)

Twin Lake is approximately 17 acres and includes north and south basins separated by Southcross Drive. North Twin Lake and South Twin Lake are approximately 5 acres and 12 acres, respectively. The lake is located within the City of Burnsville in the central portion of the BDWMO. Twin Lake is used for canoeing, fishing, aesthetic viewing, and wildlife habitat. Twin Lake Park surrounds the north basin and it borders the north shore of the south basin. There is no public beach or boat access on the lake. The BDWMO did not classify Twin Lake as a strategic waterbody. The MDNR classifies Twin Lake as a public water wetland.

Twin Lake is a shallow waterbody. South Twin has a mean depth of 3.6 feet and a maximum depth of 11 feet. North Twin Lake has a mean depth of 6.6 feet and a maximum depth of 12 feet. Because of the shallow conditions, macrophyte growth is often prevalent throughout both basins.

Outflows from Crystal Lake and local stormwater runoff enter on the south side of South Twin Lake via a 48-inch diameter RCP storm sewer. Twin Lake is also downstream of Wood Pond; Wood Pond is typically landlocked and discharges to Twin Lake only under high water conditions. The outlet from Twin Lake is located at the southwest side of the north basin and consists of a three-sided box weir, with a total length of 12 feet and an overflow elevation of 918.0 feet above MSL (NGVD29). Discharge from Twin Lake is conveyed in a westward direction through a 36-inch diameter RCP to Earley Lake.

South Twin Lake and North Twin Lake are connected by a 36-inch diameter culvert underneath Southcross Drive which acts as an equalizer pipe. Typically, water flows from the south basin to the north basin. During significant storm events, however, runoff to the north basin can exceed discharge capacity and stormwater can backup and flow to the south basin.

The direct watershed tributary to Twin Lake watershed covers approximately 574 acres (or 683 acres when the Wood Pond watershed is included). The total watershed that flows to Twin Lake includes the areas tributary to Lee Lake, Keller Lake, Lac Lavon, Crystal Lake, and Wood Pond and is 4,352 acres (excluding the area to Lac Lavon, which is typically landlocked). Land use in the watershed is predominantly residential and park land, except for a large commercial area between I-35W and I-35E that drains to North Twin Lake.

2.7.2 Streams and Open Channels

Although there are many lakes and wetlands throughout the BDWMO, there are very few natural streams within the watershed. Much of the watershed is fully-developed and flows that were once conveyed through surface drainages and streams now flow through underground storm sewer.

Flows from the southwestern portion of the BDWMO that pass through Kingsley Lake, Orchard Lake, and the Cam Ram Wetland ultimately reach the Credit River (MDNR ID 07020012-517) in the Scott WMO. Flows from the remainder of the BDWMO discharge to the Minnesota River (MDNR ID 07020012-505) in the Lower Minnesota River Watershed District (LMRWD). In addition, flows from the northern portion of the watershed (in the River Hills subwatershed, see Figure 2-2) reach a MDNR-designated trout stream (in the LMRWD) that flows into Black Dog Lake and eventually the Minnesota River.

2.7.3 Wetlands

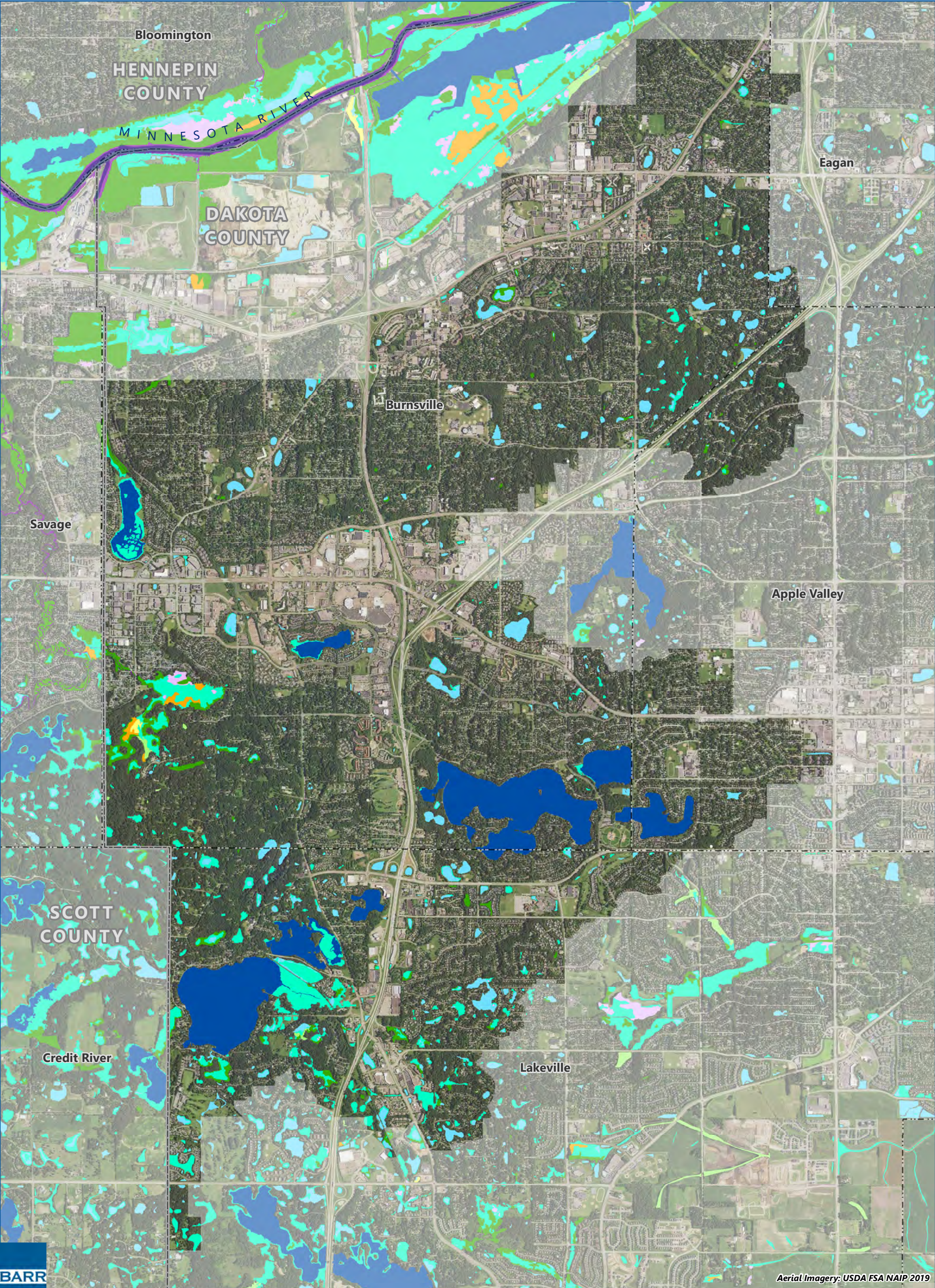
Wetlands in the BDWMO are important community and ecological assets. Wetlands provide recreational value, runoff storage and retention, nutrient and sediment reduction, groundwater recharge, and wildlife habitat benefits. To protect these valuable resources, the BDWMO and its member cities cooperate to manage wetlands to achieve no net loss of acreage, functions, and value. Within the watershed, the member cities serve as the Local Government Units (LGUs) responsible for administration of the Wetland Conservation Act (WCA) (except for on Minnesota Department of Transportation projects). More information about WCA guidance is provided at the BWSR website: <https://bwsr.state.mn.us/wetlands-regulation-minnesota>

The US Fish and Wildlife Service (USFWS) maintains an inventory of wetlands known as the National Wetland Inventory (NWI). Figure 2-9 presents the wetlands identified in the NWI. The NWI is periodically updated. The Cities of Apple Valley, Burnsville, and Lakeville have also developed city-wide wetland inventories with wetland classification systems based on the Minnesota Rapid Assessment Method (MnRAM) or similar framework. The City of Eagan assessed 100 priority wetlands in developing its comprehensive wetland protection and management plan and uses a MnRAM-based classification system.

BDWMO member cities classified wetlands for protection, restoration, and/or improvement according to their condition, function, and individual municipal goals. Member city wetland classifications are included

in each city's local water management plan and/or wetland inventory. Wetland inventory and classification data from Apple Valley and Burnsville are presented in Figure 2-10. Wetlands classified as protection wetlands in the BDWMO include several wetlands within the Murphy-Hanrehan Park Reserve, wetlands adjacent to Crystal Lake, and select wetlands adjacent to the Interstate 35E corridor in northeast Burnsville and Apple Valley.

Within all BDWMO member cities, wetlands are inventoried on an individual basis as part of development proposals. The BDWMO requires functional values assessment of wetlands to be performed using the Minnesota Routine Assessment Method for Evaluating Wetland Functions (MnRAM), version 3.2, or similar methodology. Information about wetland functional assessment is available from BWSR at: www.bwsr.state.mn.us/wetlands/mnram/index.html.



County Boundary

Municipal Boundary

River

National Wetlands Inventory

Freshwater Emergent Wetland

Freshwater Forested Wetland

Freshwater Forested/Shrub Wetland

Freshwater Pond

Freshwater Forested/Emergent Wetland

Freshwater Forested/Shrub Wetland

Freshwater Pond

Freshwater Shrub Wetland

Freshwater Shrub/Emergent Wetland

Lake

Riverine

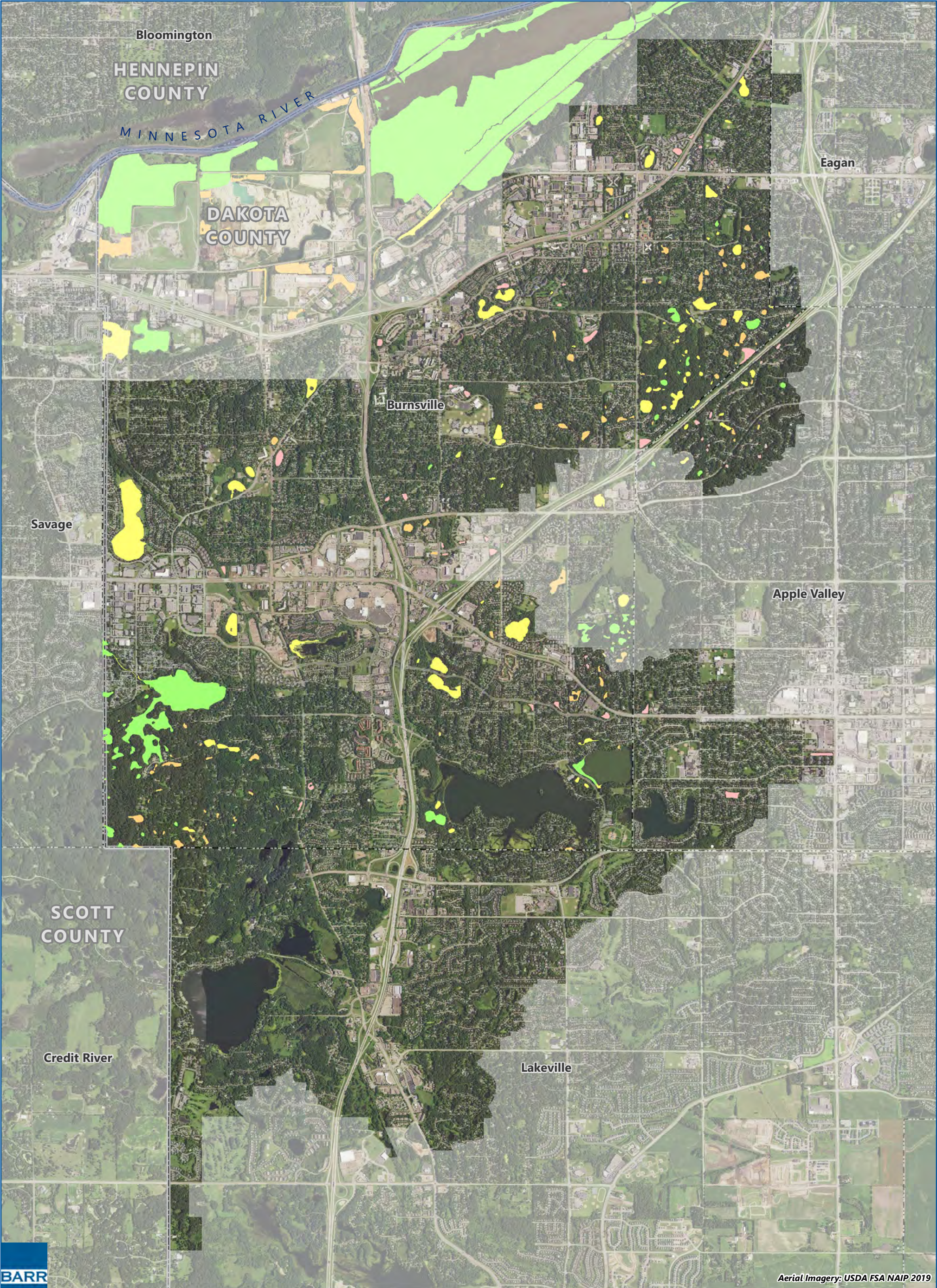
01,7503,500

Feet

NATIONAL WETLANDS INVENTORY
BDWMO Watershed Management Plan

FIGURE 2-9

Data Source: National Wetlands Inventory, MnDNR, 2019.



County Boundary

Municipal Boundary

River

Wetland Classification (City)

AV = Apple Valley; B = Burnsville

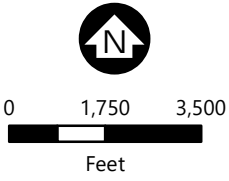
Protect (AV), Protect (B)

Manage 1 (AV), Improvement (B)

Manage 2 (AV), Manage 1 (B)

Manage 3 (AV), Manage 2 (B)

Data Source: National Wetlands Inventory, MnDNR, 2019.



MEMBER CITY WETLAND CLASSIFICATIONS

BDWMO Watershed Management Plan

FIGURE 2-10

2.7.4 Stormwater Systems

The area within the BDWMO is suburban and rural land use (see Section 2.3). In developed areas, pre-settlement drainage patterns have been significantly altered as part of development activity, resulting in networks of stormwater management infrastructure designed to collect stormwater and convey it downstream. The stormwater system includes pipes, ponds, lakes, wetlands, ditches, streams, swales, and other drainageways. Most stormwater in the BDWMO is ultimately routed to the Minnesota River. Public stormwater systems within the BDWMO are presented in Figure 2-11.

Various units of government and private entities have jurisdiction over different parts of the stormwater system within the watershed. The Minnesota Department of Transportation (MNDOT) is responsible for maintaining the stormwater systems within their rights-of-way, such U.S. highways (e.g., Interstate 35), and state highways. Dakota County is responsible for maintaining at least part of the stormwater systems within their rights-of-way, such as county roads and county state aid highways.

Each city within the BDWMO has jurisdiction and maintenance responsibility over its own stormwater management systems. These systems include lateral (also called primary) stormwater systems (i.e., street gutters, pipes, and ditches) and outflow (also called main, trunk, or secondary) conveyors, which collect flows from city lateral systems and move the water downstream. Cities generally design lateral stormwater systems with capacity to convey runoff from 5- or 10-year frequency storms without significant flooding and protect public health and safety for storms up to the 100-year frequency interval (these design levels are sometimes referred to as “level of service” and “level of protection”). City stormwater management systems are described in greater detail in each City’s local water management plan.

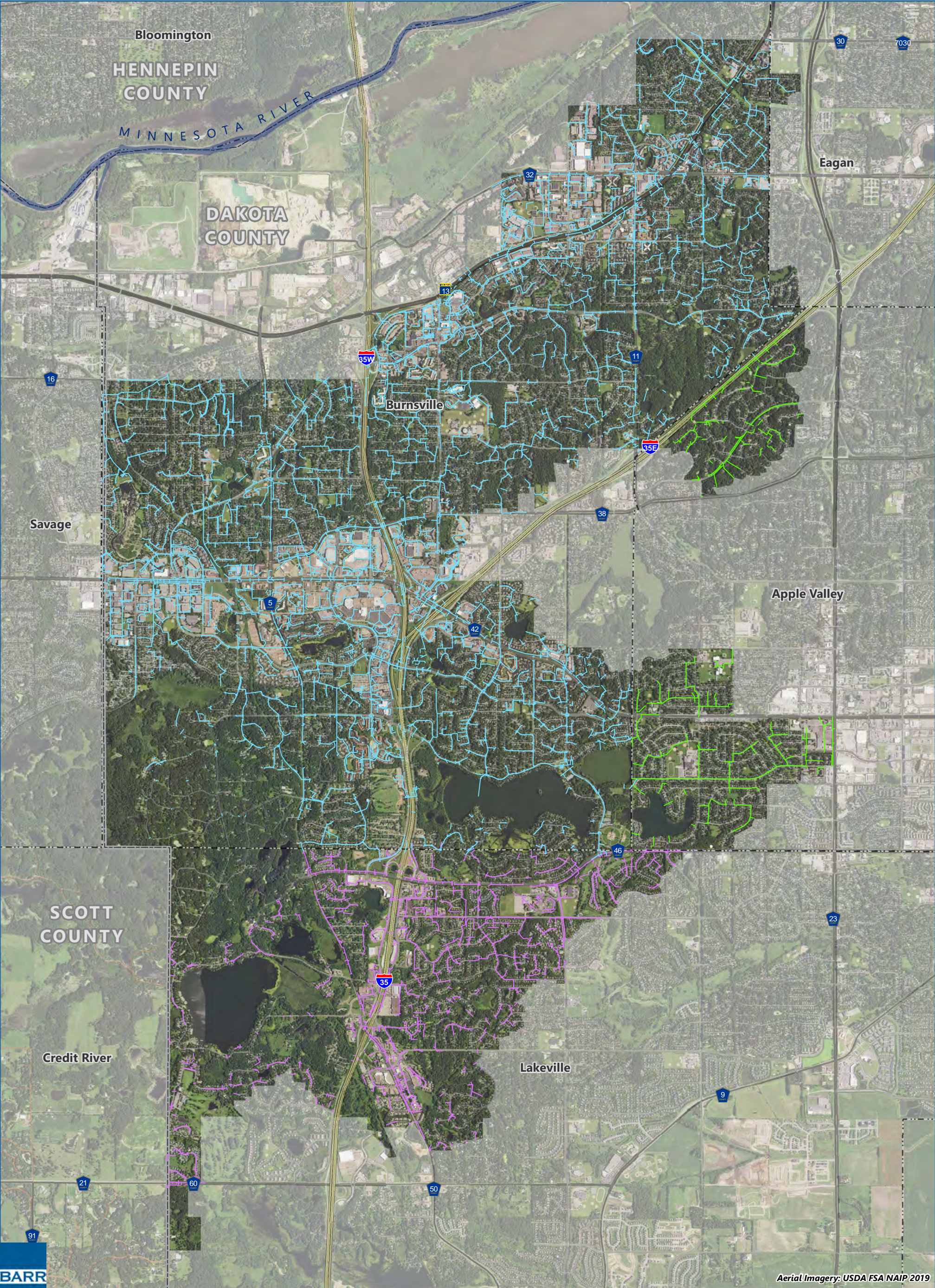
Each city within the BDWMO must obtain Municipal Separate Storm Sewer System (MS4) permit coverage from the MPCA. The MS4 Stormwater Program is designed to reduce the amount of sediment and pollution that enters surface water and groundwater from storm sewer systems. As a requirement of the permit, each city must develop and maintain a stormwater pollution prevention program (MS4 SWPPP), which outlines programs and practices to minimize pollutant loading and water quality impacts resulting from stormwater management. The SWPPP contains six areas of focus, known as minimum control measures, including:

- Public Education and Outreach
- Public Participation/Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Stormwater Runoff Control
- Post-Construction Stormwater Management
- Pollution Prevention/Good Housekeeping for Municipal Operations

The MPCA issued a new general MS4 permit in November 2020. Each member city has revised/will revise its MS4 program, if needed, to meet current MS4 permit and MS4 SWPPP requirements. Each MS4 permittee submits a report to the MPCA annually documenting the implementation of its MS4 SWPPP. The BDWMO is not required to obtain MS4 permit coverage because it does not own stormwater

management infrastructure. The MPCA periodically updates the MS4 General Permit. More information is available from the MPCA at: <https://www.pca.state.mn.us/water/municipal-stormwater-ms4>

Owners of private stormwater systems in the BDWMO are generally responsible for maintaining their facilities. Member cities require maintenance agreements for private systems as part of project permitting.



MUNICIPAL
STORMWATER SYSTEMS

BDWMO Watershed
Management Plan

FIGURE 2-11

2.8 Water Quality Monitoring & Studies

Surface water quality data exists for many of the waterbodies within the watershed. Several organizations have performed monitoring based on their needs and priorities, including:

- BDWMO
- BDWMO member cities
- Metropolitan Council
- MPCA
- USGS

Monitoring parameters vary by monitoring program, but may include:

- Water chemistry (e.g., phosphorus, total suspended solids, chloride)
- Biological data (e.g., indices of biological integrity, macroinvertebrates, fish inventories)
- Habitat data (e.g., vegetation, physical conditions)
- Hydrologic data (e.g., flow, water level)

Monitoring locations within the watershed are presented in Figure 2-12. Much of the historical monitoring data for the watershed is available from the MPCA's Environmental Data Access (EDA) database at:

<https://www.pca.state.mn.us/eda-surface-water-data>

2.8.1 BDWMO Monitoring Programs

The BDWMO monitors the water quality of all strategic waterbodies through its consultants or partners. The following sections describe the various types of waterbody monitoring programs.

2.8.1.1 Survey Level Water Quality Monitoring

The BDWMO survey level water quality monitoring program is equivalent to the Metropolitan Council's Citizen Assisted Monitoring Program (CAMP) (see Section 2.8.2). The BDWMO performs or funds (via CAMP) survey level monitoring of all BDWMO strategic waterbodies annually.

Aquatic plant surveys that focus on identifying exotic invasive aquatic plants are completed as part of the survey level monitoring for Keller Lake, Orchard Lake, Crystal Lake, and Kingsley Lake. Aquatic plant surveys are periodically performed for Lac Lavon as part of management level water quality monitoring. The BDWMO include significant results of aquatic invasive species (AIS) studies and plant surveys in its annual report.

2.8.1.2 Management Level Water Quality Monitoring

The BDWMO management level monitoring program involves collecting surface water samples on 11 occasions—ice-out and then May through September, twice per month. similar to survey/CAMP level monitoring. Management level monitoring, however, includes more detailed total phosphorus sampling (i.e., samples at depths throughout the water column and more precise results), field measurements of temperature, dissolved oxygen, pH, redox potential, specific conductivity, and turbidity, and performing

aquatic plant surveys. This type of monitoring is needed to assess problems (diagnostic) and is appropriate for regular monitoring (e.g., every five years) of the BDWMO strategic waterbodies.

2.8.1.3 Intensive Water Quality Monitoring

The BDWMO intensive water quality monitoring program involves more sample collection dates and analyzing additional parameters at depth (besides total phosphorus) than the management level monitoring. This type of monitoring is not regularly scheduled but may be needed to calibrate water quality models and to perform targeted resource studies.

2.8.2 Citizen Assisted Monitoring Program (CAMP)

The Metropolitan Council's Citizen Assisted Monitoring Program (CAMP) has been collecting water quality data on numerous Twin Cities metropolitan area lakes since 1980. Through CAMP, volunteers collect water samples from the top 0-2 meters of the lake and measure water clarity approximately 7 to 14 times between April and October. Collected samples are analyzed by the Metropolitan Council for nutrients and other parameters.

Several waterbodies within the BDWMO have been monitored as part of the CAMP program, including Crystal Lake, Keller Lake, Orchard Lake, Kingsley Lake, Lac Lavon, Sunset Pond, Lee Lake, Horseshoe Lake, Earley Lake, Wood Pond, Twin Lake, and Goose Lake. CAMP monitoring of BDWMO waterbodies is typically funded by the BDWMO (for strategic waterbodies) and member cities (for non-strategic waterbodies).

More information is available from the Metropolitan Council at: <https://metro council.org/Wastewater-Water/Services/Water-Quality-Management/Lake-Monitoring-Analysis/Citizen-Assisted-Monitoring-Program.aspx>

2.8.3 Member City Lake Monitoring

The BDWMO member cities are responsible for managing non-strategic Category I and II lakes and ponds to achieve the cities' goals (see Section 4.1.2). City management of these waterbodies includes classifying, monitoring, tracking trends, conducting studies, and implementing other lake water quality management actions.

The member cities have outlined their water quality monitoring programs in their approved local water management plans (see Section 5.5.2). The City of Apple Valley participates in the CAMP program, monitoring water quality in each of their priority waterbodies. The City of Burnsville water quality monitoring program includes participating in the CAMP program including the following BDWMO waterbodies: Keller, Crystal, Lac Lavon, Wood Pond, Earley Lake, Twin Lake, and Sunset Pond. The City of Lakeville has developed monitoring and management plans, including participation in the CAMP program, for their priority lakes, which include Orchard, Lee, and Kingsley Lakes in the BDWMO.

2.8.4 Other Programs and Water Quality Studies

The BDWMO, member cities, and other entities have periodically performed additional monitoring beyond regular water quality monitoring of lakes and ponds.

2.8.4.1 WOMP Monitoring

The BDWMO, in cooperation with the Metropolitan Council, operated a Watershed Outlet Monitoring Program (WOMP) station on Willow Creek from spring 1999 through 2003. The station was located downstream of Sunset Pond along a primary discharge route from the BDWMO. This station collected data on the volume and quality of stormwater runoff discharging from a large portion of the BDWMO. Operation of the WOMP station was turned over to the LMRWD in 2004 and the site was operated through 2009. Additional information about WOMP monitoring is available from the Metropolitan Council at: <https://metro council.org/Wastewater-Water/Services/Water-Quality-Management/Stream-Monitoring-Assessment.aspx>

2.8.4.2 Sediment Core Analysis

In addition to phosphorus loading from stormwater runoff, the release of phosphorus from lake sediments under anoxic conditions (i.e., internal loading) can negatively impact water quality. To better understand the impact of internal loading on lake water quality, the BDWMO has collected and analyzed sediment cores for the following lakes from 2006-2010:

- 2006: Earley Lake, Twin Lake
- 2007: Wood Pond
- 2009: Keller Lake, Crystal Lake, Lee Lake
- 2010: Lac Lavon
- 2019: Keller Lake

The internal loading data collected from the above analyses were used to support the development of the *Crystal, Keller, and Lee Lakes Nutrient Impairment TMDL Report and Earley Lake Water Quality Assessment* and design the alum treatment initiated in Keller Lake in 2019.

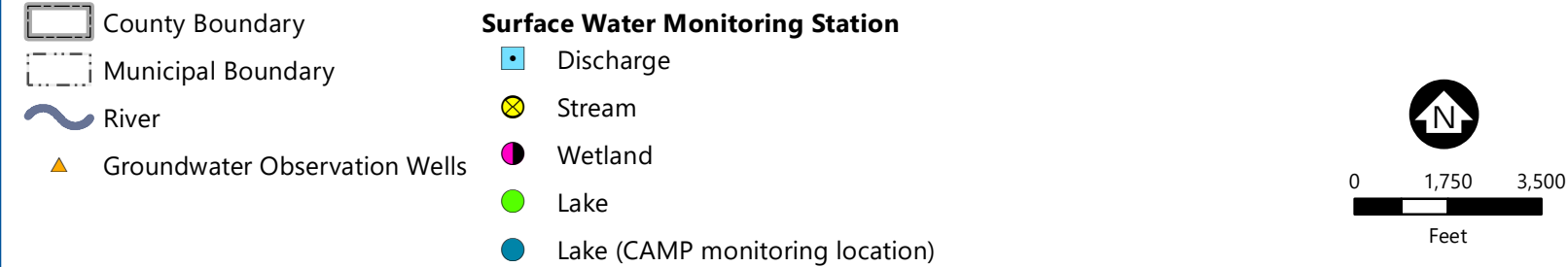
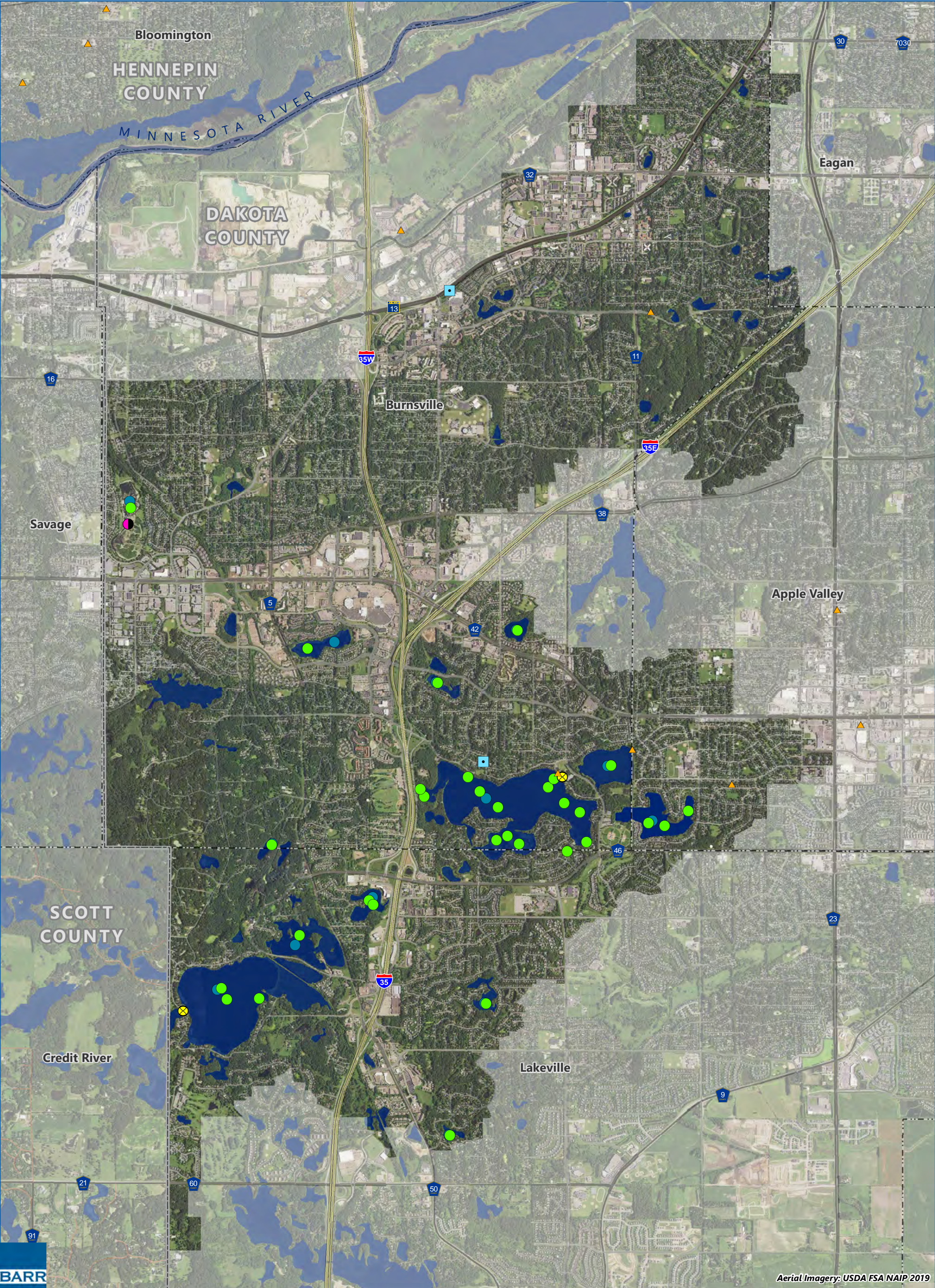
2.8.4.3 MPCA Citizen Lake Monitoring Program

The MPCA's Citizen Lake Monitoring Program (CLMP) is a cooperative program combining the technical resources of the MPCA and the volunteer efforts of citizens who collect water quality data on their lakes. This program provides low-cost Secchi discs to participants for measuring water clarity on an approximate weekly basis. Additional information is available from the MPCA at: <https://www.pca.state.mn.us/water/citizen-water-monitoring>

2.8.4.4 Water Quality Studies

The BDWMO, member cities, and cooperators have completed focused water quality studies for several waterbodies within the watershed in addition to regular monitoring. These include:

-
- *Orchard Lake Diagnostic Feasibility Study* (August 1998); prepared for the City of Lakeville by Barr Engineering
 - *Crystal and Keller Lake Use Attainability Analysis* (July 2003); prepared for the BDWMO by Barr Engineering
 - *Twin and Earley Lake Use Attainability Analyses* (December 2007); prepared for the City of Burnsville by Barr Engineering
 - *Wood Pond Use Attainability Analysis* (September 2008); prepared for the City of Burnsville by Barr Engineering
 - *Crystal, Keller, and Lee Lakes Nutrient Impairment Total Maximum Daily Load Report and Earley Lake Water Quality Assessment* (November 2011); prepared for BDWMO and the MPCA by Barr Engineering
 - *Crystal, Keller, and Lee Lake TMDL Implementation Plan* (November 2011); prepared for BDWMO and the MPCA by Barr Engineering
 - *Lac Lavon Water Quality Assessment* (January 2011); prepared for the BDWMO by Barr Engineering
 - *Keller Lake Alum Treatment Feasibility Study* (2018); prepared for the BDWMO by Barr Engineering
 - *Keller Lake Sub-watershed Assessment* (2017); prepared for the BDWMO by Barr Engineering
 - *Lee Lake Seedbank Study*; prepared for the City of Lakeville



MONITORING LOCATIONS
BDWMO Watershed
Management Plan

FIGURE 2-12

Data Source: Minnesota Pollution Control Agency, Surface Water Stations- MPCA Environmental Data Access, Accessed 3/5/2021.
Metropolitan Council Environmental Services, Lake Monitoring Sites- MCES Data Accessed 4/8/2022.

2.9 Water Quality and BDWMO Management Classification

2.9.1 BDWMO Classification System

The BDWMO established criteria for determining those waterbodies to be managed by the BDWMO; these are identified as **strategic waterbodies**. Strategic waterbodies are waterbodies of broad watershed significance that are important to a larger population than just the municipalities in which they are located. Strategic waterbodies meet three of the following four criteria (summarized in Table 2-6):

- Surface area of at least 50 acres
- Major subwatershed includes more than one city (i.e., intercommunity drainage area)
- Public access or adjacent parks, natural areas, or other public land uses
- Discharges to the major watershed of another strategic waterbody

Table 2-6 Strategic Waterbody Criteria

Waterbody (bold indicates Strategic Waterbody)	Criteria to be classified as BDWMO Strategic Waterbody			
	Major sub-watershed includes multiple cities	Public access or adjacent parks, natural areas, or public land	Discharges to the major watershed of a strategic waterbody	Surface area at least 50 acres
Crystal Lake (19-0027)	X	X		X
Keller Lake (19-0025)	X	X	X	X
Kingsley Lake (19-0030)		X	X	X ¹
Lac Lavon	X	X	X ²	X
Orchard Lake (19-0031)	X ³	X		X
Sunset Pond (19-0115)	-- ⁴	X		X
Earley Lake (19-0033)		X		
Horseshoe Lake (19-0032)	X			
Lee Lake (19-0029)			X	
Twin Lakes (19-0028)		X		
Wetland 19-0381 (CamRam)		X		X
Wood Lake (19-0024)		X		X

Note(s):

- (1) Including connected wetland areas
- (2) Typically landlocked, Lac Lavon is periodically tributary to Crystal Lake
- (3) Tributary watershed to Orchard Lake includes part of the City of Credit River (outside BDWMO jurisdictional boundary)
- (4) Tributary watershed to Sunset Pond includes negligible part of the City of Savage (outside BDWMO jurisdictional boundary)

The BDWMO manages the strategic waterbodies while the member cities are primarily responsible for managing non-strategic lakes, ponds, and wetlands in the BDWMO, including Sunset Pond, Earley Lake, Lee Lake, Wood Pond, and Twin Lake.

The BDWMO classifies the strategic resources (Category I – IV) based on their existing and projected future use, water quality, and/or ecologically or biologically unique resources, as follows:

Category I – these waterbodies support swimming and other direct contact recreational activities, such as water skiing, scuba diving, and snorkeling. These waterbodies have the highest/best water quality and are usually the most popular waterbodies with the public.

Category II – these waterbodies support indirect recreational activities such as boating and fishing. These waterbodies may have poorer water quality than Category I waterbodies but are still popular with the public.

Category III – these waterbodies provide wildlife habitat, aesthetic enjoyment, and possibly warm water fishing, provided winter kill does not occur. Summer algal blooms are more common in Category II and Category III waterbodies than in Category I waterbodies.

Category IV – Waterbodies classified as Category IV are typically water quality ponds used as nutrient and sediment traps to reduce downstream loading of sediment and/or phosphorus and other nutrients that contribute to degradation of water quality.

Table 2-7 includes a summary of BDWMO classifications and MPCA water quality standards. More information about the MPCA classification and impaired waters is included in Section 2.9.3.

Table 2-7 Strategic Waterbody Classifications and MPCA Water Quality Standards

MPCA Lake Classification and associated water quality standards ¹	BDWMO Waterbody Classifications				Non-strategic Waterbodies
	I Direct Contact Recreation	II Non-contact Recreation	III Habitat, Aesthetics, Fishing	IV Nutrient and Sediment Treatment	
Deep Lakes (15 feet or more)					
Total Phosphorus < 40 ug/L Chlorophyll a < 14 ug/L Secchi Disc > 1.4 m	Crystal Lake Orchard Lake Lac Lavon				
Shallow Lakes (less than 15 feet)					
Total Phosphorus < 60 ug/L Chlorophyll a < 20 ug/L Secchi Disc > 1.0 m		Kingsley Lake	Keller Lake		Lee Lake Earley Lake Horseshoe Lake
Not classified as lakes					
					Sunset Pond Twin Lake Wood Lake CamRam Wetland

Note(s):

(1) MPCA water quality standards are summer average values (June – September)

2.9.2 Lake Water Quality, Trend Analysis, and Action Levels

The BDWMO and member cities perform monitoring to assess the water quality of BDWMO lakes. Water quality for BDWMO strategic waterbodies averaged over the 10-year period from 2012 to 2021 is presented in Table 2-8. The most current water quality information is summarized in the BDWMO annual reports available from the BDWMO website at: <http://www.blackdogwmo.org/>

Table 2-8 Average Lake Water Quality (2012-2021)

Waterbody	Summer Average Total Phosphorus (ug/L)	Summer Average Chlorophyll a (ug/L)	Summer Average Secchi Transparency (m)	Significant Trends ¹
Crystal Lake (19-0027)	25.9	13.8	2.1	No trend
Keller Lake (19-0025)	86	48	0.7	Improving Chl <i>a</i>
Kingsley Lake (19-0030)	16.8	2.4	3.0 ²	Worsening Chl <i>a</i>
Lac Lavon	13.3	3.0	4.1	No Trend
Orchard Lake (19-0031)	21.7	6.1	2.5	Improving Secchi

(1) Trends based on most recent 10-year summer average (June – September) data

(2) Kingsley Lake Secchi depth transparency is limited by lake depth

2.9.2.1 Water Quality Trend Analyses & Action Levels

As part of its annual reporting, the BDWMO performs water quality trend analyses on the strategic waterbodies. The trend analysis performed for each of the water quality parameters (total phosphorus, chlorophyll-a, and Secchi disc transparency) is the linear least squares regression method, and it determines if the changes in the water quality over the past 10 years are statistically significant – trends are identified based on significant differences from a slope of zero (no trends in water quality over time) determined at the 90 percent confidence level.

The change in water quality is deemed significant if a statistically significant trend is observed in total phosphorus and at least one other parameter (chlorophyll-a or Secchi disc transparency). Statistically significant trends are presented in water quality for strategic waterbodies are presented in Table 2-8. Based on data from 2012 to 2021, no statistically significant trends in total phosphorus are observed.

The BDWMO uses water quality data and trend analyses to assess whether more frequent or intensive monitoring efforts and/or other management actions are needed (see Section 5.1.4.1).

2.9.3 MPCA Impaired Waters

The federal Clean Water Act (CWA) requires states to adopt water quality standards to protect the nation's waters. Water quality standards designate beneficial uses for each waterbody and establish criteria that must be met to support its designated use(s). In Minnesota, the MPCA established lake eutrophication criteria based on several factors, including the ecoregion of Minnesota in which the lake is located and the lake's classification as a shallow or deep lake. The MPCA defines shallow lakes as lakes with a maximum depth of 15 feet or a littoral area (area of lake 15 feet deep) of 80 percent or more. The BDWMO is entirely located in the North Central Hardwood Forest (NCHF) ecoregion of Minnesota. Applicable lake eutrophication water quality standards are presented in Table 2-7.

Section 303(d) of the CWA requires each state to identify and establish priority rankings for impaired waters that do not meet the water quality standards. The MPCA maintains the list of impaired waters,

sometimes called the 303(d) list, and updates the list every 2 years. For impaired waterbodies, the CWA requires an assessment that addresses the causes and sources of the impairment. This process is known as a total maximum daily load (TMDL) analysis.

A TMDL is a threshold calculation of the amount of a pollutant that a waterbody can receive and still meet water quality standards. A TMDL establishes the pollutant loading capacity for a waterbody and develops an allocation scheme amongst the various contributors, which include point sources, nonpoint sources, and natural background, as well as a margin of safety. As a part of the allocation scheme, a waste load allocation (WLA) is developed to determine allowable pollutant loadings from individual point sources (including loads from storm sewer networks in MS4 communities), and a load allocation (LA) establishes allowable pollutant loadings from nonpoint sources and natural background levels in a waterbody.

Over the years, several waterbodies within the BDWMO have been listed on the MPCA impaired waters (303(d)) list for a variety of impairments, including excess nutrients. Crystal Lake, Lee Lake, and Earley Lake, once listed as impaired due to excess nutrients, have been “delisted” following improvements in water quality. As of 2021, impaired waters within the BDWMO include:

- **Keller Lake** – listed as impaired for excess nutrients in 2002; this impairment is addressed by the *Crystal, Keller, and Lee Lakes TMDL* (MPCA, 2011)
- **Orchard Lake** and **Lac Lavon** – listed as impaired due to mercury in fish tissue; this impairment is addressed by the statewide mercury TMDL (MPCA, 2008)

Completed TMDLs and associated implementation plans may contain actionable steps for the BDWMO and its member cities. The BDWMO and member cities have completed some actions recommended in the applicable TMDLs and will continue to implement actions to improve Keller Lake water quality. The BDWMO will continue to review completed TMDLs and TMDL implementation plans and incorporate recommended actions into the BDWMO implementation plan, where appropriate. See Sections 3.4.2.1 and Section 4.1.2 for a more detailed discussion about the role of the BDWMO in the TMDL analyses required for those waterbodies listed on the MPCA impaired waters list.

Current impaired waters listings are available from the MPCA website:

<https://www.pca.state.mn.us/water/minnesotas-impaired-waters-list>

2.10 Water Quantity and Flooding

Water quantity monitoring, such as lake level monitoring and flow monitoring, has been performed periodically by the BDWMO, member cities, and state agencies. Water level data is available for the following BDWMO strategic and non-strategic waterbodies:

- Crystal Lake
- Keller Lake
- Lac Lavon
- Lee Lake
- Wood Pond

- Twin Lake
- Earley Lake
- Goose Lake
- Kingsley Lake
- Orchard Lake

Water level data is available from the MDNR's LakeFinder website at:

<https://www.dnr.state.mn.us/lakefind/index.html>

Continuous flow monitoring was performed from 1999 to 2009 at a location on Willow Creek downstream of Sunset Pond as part of the Metropolitan Council's WOMP network (see Section 2.8.4.1).

Each of the BDWMO member cities have developed and maintain hydrologic and hydraulic models. These models estimate stormwater runoff based on continuous or event-based precipitation records. These models vary in platform (e.g., HydroCAD, SWMM) and level of detail (e.g., subwatershed level vs. catch basin level). Model outputs reported by member cities may include 100-year water levels, peak flow rates, flow direction, and more. Member cities use these models to evaluate the impact of development proposals, infrastructure improvements, and other relevant activities. More information is available in the local water management plans of the BDWMO member cities.

2.10.1 Floodplains and Floodplain Management

Floodplains are lowland areas adjacent to lakes, wetlands, and rivers that are susceptible to inundation of water during a flood. For regulatory purposes, the term "floodplain" refers to the area inundated during a flood or storm event with a 1 percent chance of occurring in any year (i.e., a 100-year event).

The Federal Emergency Management Agency (FEMA) performs flood insurance studies (FIS) and develops Flood Insurance Rate Maps (FIRMs) to identify areas prone to flooding during 100-year storm events. The water level corresponding to the 100-year flood event is referred to as the Base Flood Elevation (or BFE) and is the basis for the mapped floodplain extent. Figure 2-13 presents floodplains delineated by FEMA.

Each of the cities within the BDWMO has a FIS. The FIS, together with a city's floodplain ordinance, allow the city to take part in the national flood insurance program (NFIP). Homeowners within FEMA-designated floodplains are required to purchase flood insurance. The NFIP is implemented independently of the BDWMO and is described herein for informational purposes. A county-wide FIS was also completed for Dakota County. FEMA-established floodplains and 100-year flood levels are available from FEMA at:

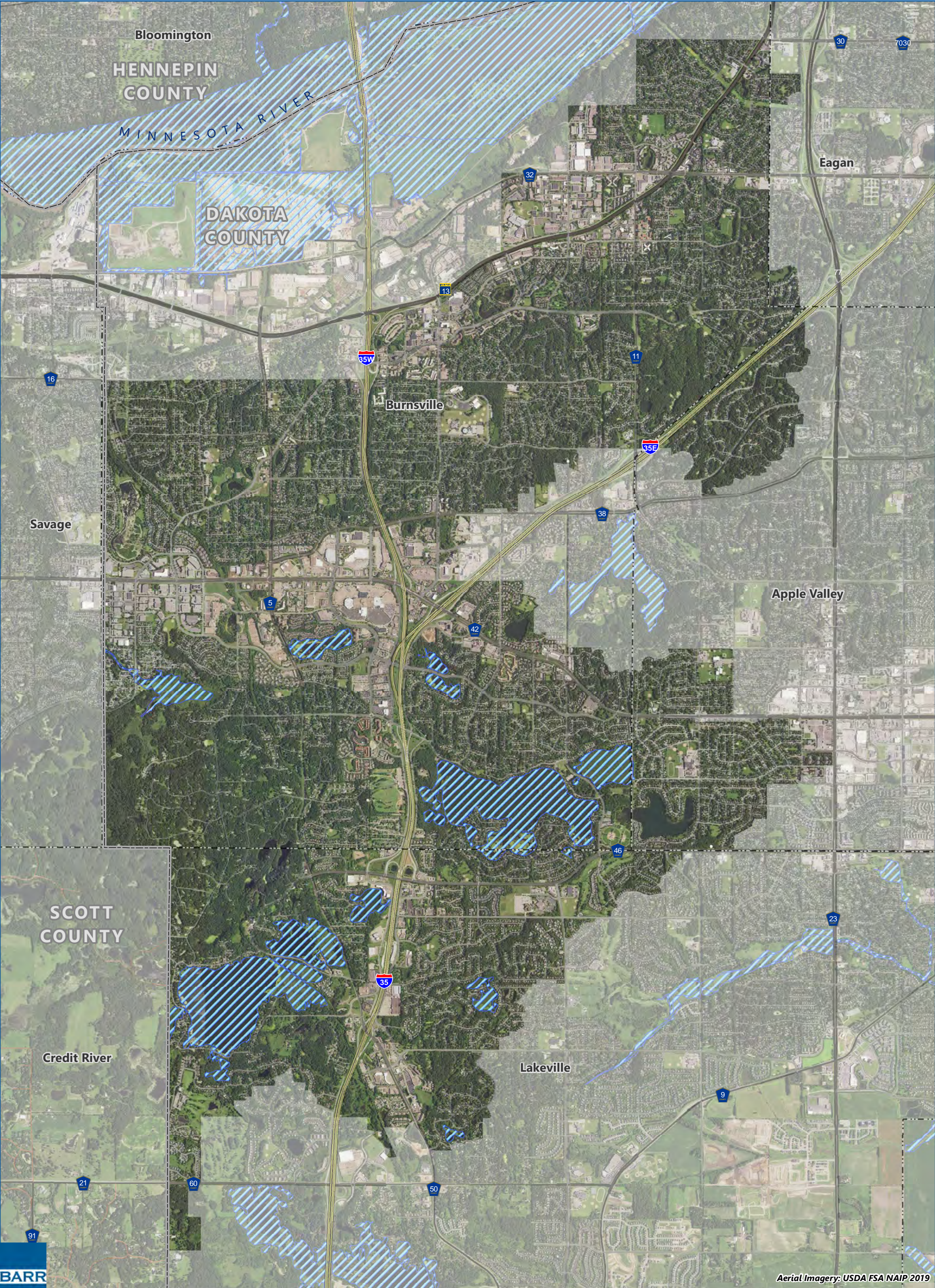
<https://msc.fema.gov/portal/home>

2.10.2 Local Flooding Issues

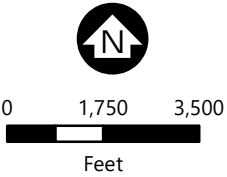
High water levels on some BDWMO lakes have periodically been reported, including on Crystal Lake, Keller Lake, and Twin Lakes. Generally, these high-water issues have not threatened habitable structures. In addition to flooding adjacent to waterbodies, excessive runoff can overwhelm storm sewer infrastructure, resulting in localized nuisance flooding issues (e.g., standing water in streets, flooding in backyard swales). The BDWMO member cities have prepared local water management plans containing

more detailed information regarding high water levels, localized flooding issues, and associated management actions.

The performance standards of the BDWMO and member cities include stormwater volume and rate control requirements to limit negative flooding impacts. Performance standards include criteria for minimum building elevations relative to the 100-year flood levels.



- County Boundary
- Municipal Boundary
- FEMA 100-Year Flodplain



FEMA FLOODPLAINS
BDWMO Watershed
Management Plan

Data Source: National Flood Hazard Layer, Federal Emergency Management Agency.

FIGURE 2-13

2.11 Natural Communities and Rare Species

Through its Natural Heritage and Nongame Research Program (NHNRP), the MDNR collects, manages, and interprets information about rare natural features, native plants and plant communities, and nongame animals, including endangered, threatened, and special concern species. As part of the NHNRP, the MDNR maintains the Natural Heritage Information System (NHIS) as a statewide database of these resources. The MDNR limits publication of spatial attributes and locations of these items to protect rare features or species from damage or collection. Additional information about rare, threatened, and endangered species is available from the NHNRP at: <https://www.dnr.state.mn.us/nhnrp/index.html>

The MDNR's Minnesota County Biological Survey for Dakota County (1994) identifies pre-settlement vegetation. Prior to settlement, the BDWMO was covered by a mixture of brush prairie, oak openings and barrens, aspen-oak land, and upland deciduous forest known as the "Big Woods." Elm, sugar maple, and basswood are representative Big Woods tree species.

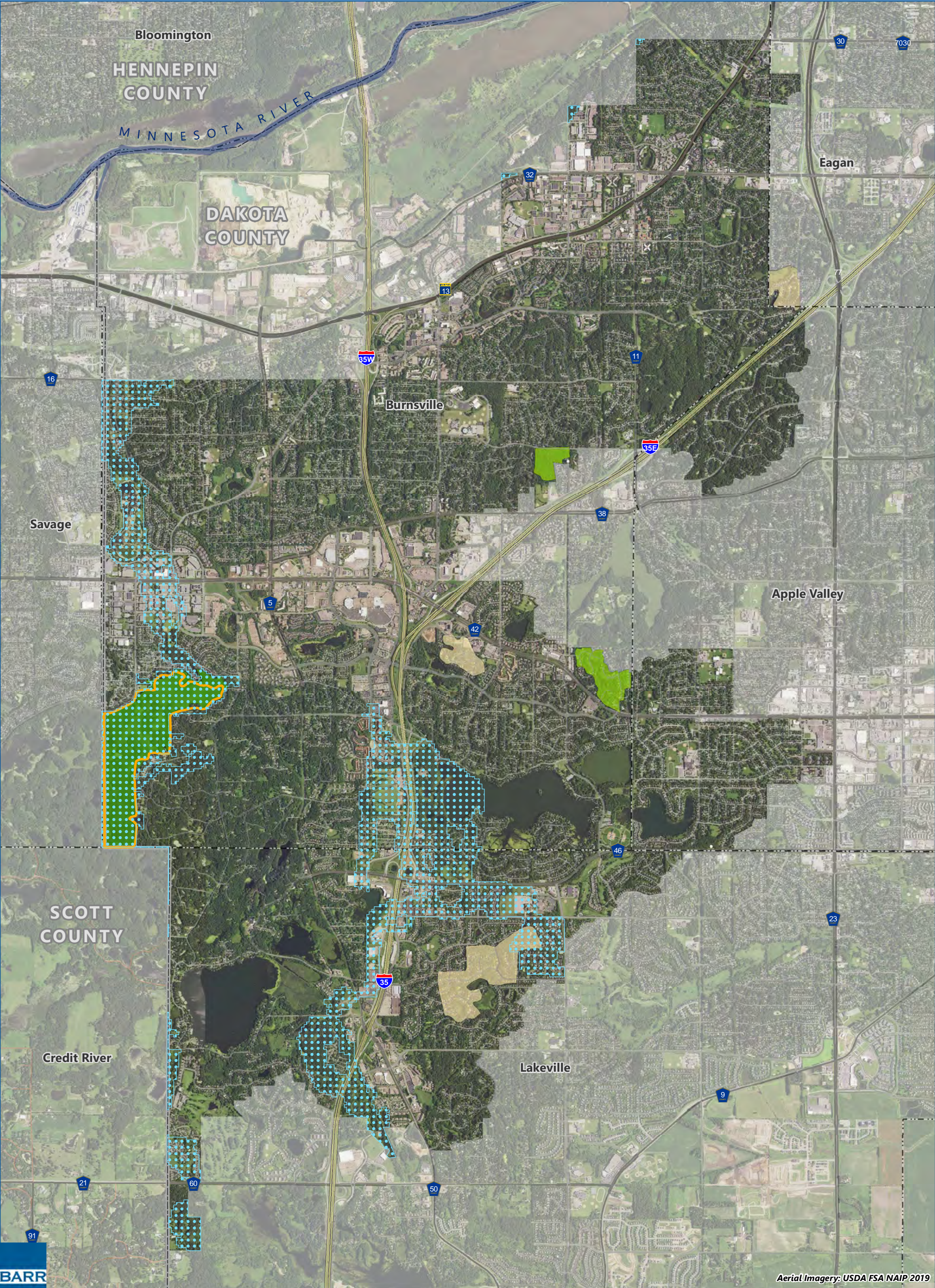
The Minnesota County Biological Survey also identifies sites of biodiversity significance. Several sites of moderate and outstanding biodiversity significance are present within the BDWMO (see Figure 2-14). Areas of moderate biodiversity occur in a residential neighborhood located south of Alimagnet Lake and a small undeveloped area north of Wolk Park, both in the City of Burnsville. A large area of outstanding biodiversity occurs along the western edge of the BDWMO, within the Murphy-Hanrehan Park Reserve. The Black Dog Scientific and Natural Area (SNA), calcareous fens and additional rare plants and animals are located just outside BDWMO, in the LMRWD. Additional information is available from the Minnesota Biological Survey at: <https://www.dnr.state.mn.us/mbs/index.html>

Significant portions of the BDWMO are classified as ecological corridors (see Figure 2-14). The MDNR has prioritized these areas for the implementation of conservation actions in cooperation with private partners.

The BDMWO member cities have also identified and prioritized natural and rare features for local management. The *City of Burnsville Natural Resources Master Plan* (2022) defined several resource management areas (RMUs) within the BDWMO as high priority sites. Sites with a high number of native communities, sites with rare species, and/or sites with complete community structure were given this designation. These include:

- Crystal Lake, Keller Lake, Lac Lavon, and neighboring areas (Crystal/Keller RMU)
- Cam Ram Wetland, nearby areas, and Horseshoe Lake (Southwest RMU)
- Park within the City Center RMU
- Terrace Oaks Park and neighboring areas (Terrace Oaks RMU)
- Sunset Pond and nearby areas (Sunset RMU)

Within Lakeville, Kingsley Lake and the surrounding area are a significant biological resource. The lake includes floating bogs with natural plant communities and is home to nesting loons (possibly the farthest south). In Apple Valley, the open space located at 160th Street and Hanover Path is a high-quality natural area.

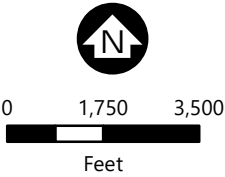


Aerial Imagery: USDA FSA NAIP 2019

- County Boundary
- Municipal Boundary
- River
- Native Plant Community¹
- Ecological Corridor²

- MBS Sites of Biodiversity Significance³**
- Outstanding
 - Moderate
 - Below

Data Sources: 1. Native Plant Communities, Minnesota Department of Natural Resources- Division of Ecological and Water Resources- Biological Survey, 2020.
2. MLCCS Ecological Corridor, Minnesota Department of Natural Resources, 2008
3. MBS Sites of Biodiversity Significance, Minnesota Department of Natural Resources- Division of Ecological and Water Resources- Biological Survey, 2020.



SITES OF BIODIVERSITY SIGNIFICANCE
BDWMO Watershed Management Plan

FIGURE 2-14

2.12 Fish and Wildlife Habitat

Many lakes and the adjacent shorelines provide habitat for fish and wildlife. The MDNR periodically performs fishery surveys on select BDWMO lakes to identify the species and relative quantities present. The MDNR also stocks fish in some BDWMO waterbodies, including:

- Crystal lake with tiger muskellunge and black crappie
- Orchard Lake with tiger muskellunge and walleye
- Lac Lavon with smallmouth bass and lake herring
- Sunset Pond with black crappie, bluegill, northern pike, and yellow bullhead
- Wood Pond with lack crappie, bluegill, walleye, yellow perch, and largemouth bass

The MDNR manages Sunset Pond and Wood Pond as part of its “Fishing in the Neighborhood” (FiN) program. More information is available at: <https://www.dnr.state.mn.us/fishing/fin/index.html>

The MDNR historically stocked Lac Lavon with rainbow trout but discontinued this effort in 2000. While not managed as a fishery, Kingsley Lake is home to nesting loons, a rarity in southern Minnesota. Lake-specific fish stocking and fishery survey information is available from the MDNR LakeFinder website at: <https://www.dnr.state.mn.us/lakefind/index.html>

Apply Valley and Burnsville have stocked fish in Lac Lavon, including 500 walleye and 500 largemouth bass in 2020. The City of Lakeville has managed bullheads in Lee Lake and is planning additional fish stocking to continue to manage the bullhead population.

2.12.1 BDWMO Habitat Monitoring Activities

The BDWMO began implementing a habitat monitoring program for strategic waterbodies within the watershed in 2003. The program includes monitoring of biological and physical indicators, such as upland and aquatic vegetation, buffer zones, erosion, sedimentation, and non-native species as well as recommending management actions based on monitoring results.

The monitoring program was revised in 2010-2011 based on feedback from city staff. The revisions aimed to provide more effective monitoring, more useful and holistic results, and to reduce the monitoring costs. Starting in 2011, the habitat monitoring cycle was revised to include monitoring of each strategic waterbody on a five-year cycle, allowing for more detailed assessment that is used to develop an individual habitat management report for each waterbody. As part of this Plan update, the BDWMO again revised its habitat monitoring program to eliminate assessment of shoreline and upland areas and to incorporate submergent vegetation and algal community monitoring into management level monitoring (see Section 2.8.1.2 and Section 5.1.4).

The BDWMO continually seeks to improve the efficiency and usefulness of its monitoring efforts and may further revise habitat and/or vegetation monitoring activities to better suit the needs of the member cities. Past habitat monitoring reports and a summary of aquatic vegetation monitoring included in the BDWMO annual report are available from the BDWMO website at: <http://www.blackdogwmo.org/index.html>

Table 2-9 Strategic Waterbody Submergent Vegetation Quality

Waterbody	Year of Assessment	Floristic Quality Index (FQI) ¹	Number of Native Species ²
Crystal Lake (19-0027)	2018	20.8	15
Keller Lake (19-0025)	2020	3.0	2
Kingsley Lake (19-0030)	2021	24.8	19
Lac Lavon	2019	17.4	12
Orchard Lake (19-0031)	2017	21.9	16

(1) Minimum submergent vegetation FQI to meet index of biological integrity = 17.8

(2) Minimum number of submergent native species to meet index of biological integrity = 11

2.12.2 Macrophyte Monitoring

Aquatic plants, or macrophytes, are a natural and integral part of most lake communities. A lake's aquatic plants, generally located in the shallow areas near the shoreline of the lake provide habitat for fish, insects, and small invertebrates, provide food for waterfowl, fish, and wildlife, produce oxygen, provide spawning areas for fish, help stabilize and protect shorelines from wave erosion, and provide nesting sites for waterfowl.

Macrophyte surveys have been completed in several the waterbodies within the BDWMO. The BDWMO has calculated floristic quality index (FQI) and number of native species of submergent aquatic vegetation for strategic waterbodies (see Table 2-9). Beginning in 2023, the BDWMO incorporated submerged aquatic vegetation surveys (e.g., point-intercept surveys) into its management level monitoring of strategic waterbodies (see Section 5.1.4).

Curly-leaf pondweed is an invasive aquatic macrophyte that displaces native aquatic species. Because of the timing of its growth and die-back cycle, curly-leaf pondweed can be a significant source of phosphorus in a lake during the mid-summer months. Eurasian watermilfoil is another invasive macrophyte that can displace native species and significantly interfere with the recreational uses of a lake by forming dense mats at the water surface. Curly-leaf pondweed and/or Eurasian watermilfoil have been identified in the following BDWMO waterbodies:

- Curly-leaf pondweed:
 - Crystal Lake
 - Keller Lake
 - Lee Lake
 - Orchard Lake
 - Kingsley Lake
 - Lac Lavon
 - Earley Lake
- Eurasian watermilfoil:

- Crystal Lake
- Keller Lake
- Lac Lavon
- Sunset Pond
- Earley Lake
- Twin Lake

The member cities and the MDNR have periodically managed macrophytes in some BDWMO waterbodies through mechanical harvesting and chemical treatment.

2.12.3 Wetland Health Evaluation Program

Dakota County coordinates the Wetland Health Evaluation Program (WHEP). Through the program, volunteers are trained and work as part of a community-based team to collect data on wetland plants and macroinvertebrates using sampling methods and evaluation metrics developed by the MPCA to evaluate wetland health. The wetland sampling efforts began in 1997 and each BDWMO member city has participated in the program at some point. WHEP monitoring sites within the BDWMO are presented in Figure 2-12, along with the other water quality and quantity monitoring locations. Cities within the BDWMO utilize WHEP data as baseline data for specific sites to monitor changes over time.

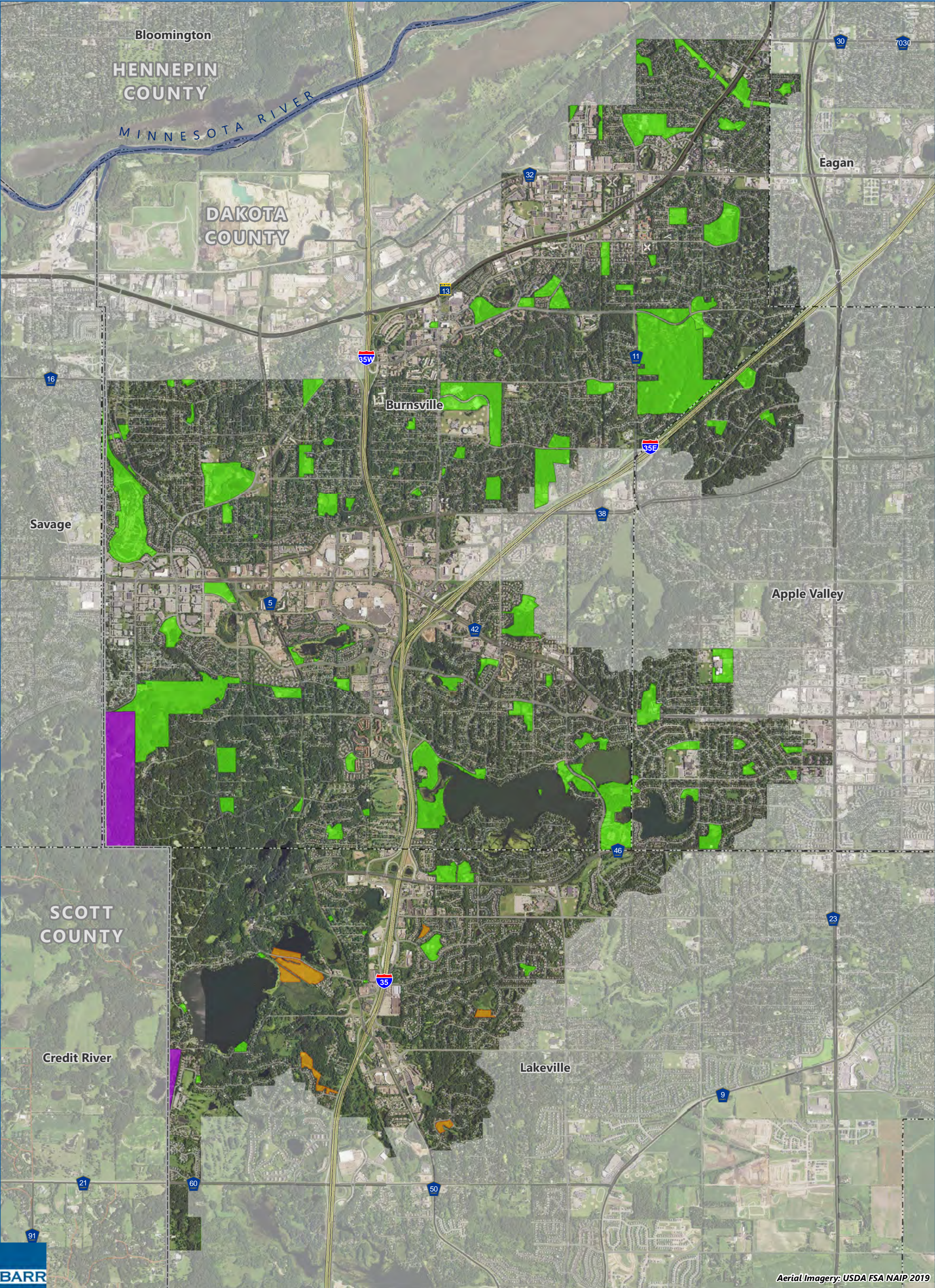
2.13 Open Space and Recreation Areas

Approximately 11% of the watershed is occupied by park, open space, or preserve land uses. Open space and recreational areas are presented in Figure 2-15 and include regional and municipal parks. These areas provide opportunities for residents and people who recreate in the watershed to appreciate and connect with local water and natural resources. Major parks located within the watershed include:

- Terrace Oaks Park
- Crystal Lake West Park
- Lac Lavon Park (Apple Valley)
- Lac Lavon Park (Burnsville)
- Murphy-Hanrehan Park Reserve
- Open space at Hanover Path and 160th Street

Popular recreational opportunities within the BDWMO include activities like boating, fishing, hiking, walking, biking, and others. There are several public water access points within the watershed, including parks and/or public access adjacent to all BDWMO strategic waterbodies. Dakota County Parks maintains a listing and maps of trail systems throughout the county.

Parks and other open spaces may also provide stormwater management opportunities for the BDWMO and its member cities. In addition to providing physical space for BMPs, these spaces are often in an ideal location situated between the non-point pollutant source (e.g., urban development) and the receiving water (e.g., lakes, ponds, wetlands). Implementing BMPs in parks and other areas frequented by the public can further enhance demonstration and education benefits.



County Boundary

Municipal Boundary

River

Recreation/Conservation Areas

City Park

Conservation Area

Regional Park

01,7503,500

Feet

OPEN SPACES AND RECREATIONAL AREAS
BDWMO Watershed Management Plan

FIGURE 2-15

Data Source: Metro Parks Collaborative, 2020

2.14 Pollutant Sources

The sources of water pollution in the BDWMO are many and varied. Potential pollutant sources in the watershed include permitted pollutant sources, potentially contaminated sites, leaking above- and below-ground storage tanks, unsealed wells, non-functioning subsurface sewage treatment systems (SSTS), and non-point sources.

The MPCA maintains a database of potential environmental hazards, which includes permitted sites (air, industrial stormwater, construction stormwater, wastewater discharge), hazardous waste generating sites, leak sites, petroleum brownfields, tank sites, unpermitted dump sites, and sites enrolled in the Voluntary Investigation and Cleanup (VIC) program. This information is available online through the MPCA's What's in My Neighborhood program. Sites identified in this database are presented in Figure 2-16.

The presence of potentially contaminated or hazardous waste sites should be considered as sites are redeveloped and BMPs are implemented. The presence of soil contamination at many of these sites, if not removed, may limit or prevent infiltration as a stormwater management option.

More information about potential pollutant sources is available from the MPCA website:

<http://www.pca.state.mn.us/index.php/data/wimn-whats-in-my-neighborhood/whats-in-my-neighborhood.html>

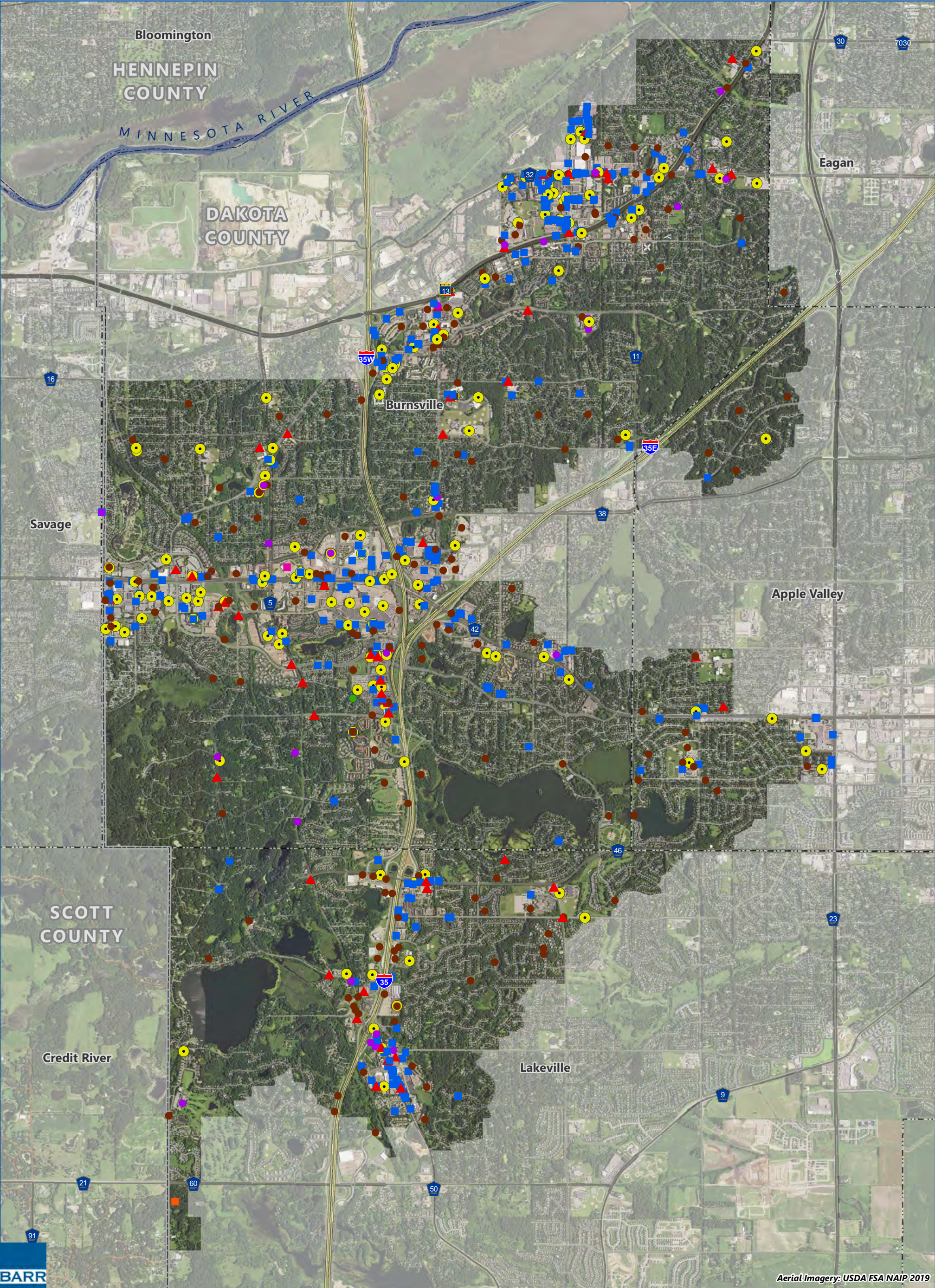
There are approximate 300 properties within the BDWMO that are still served by SSTS. Failing, non-functioning, or substandard SSTS may be a non-point source of pollutants. Improperly sited, installed or maintained systems may achieve inadequate treatment of sewage. Untreated or inadequately treated sewage poses a risk to public health (e.g., contamination of wells) and can leach excess nutrients, contributing to eutrophication if discharged into waterbodies. The MPCA implements an SSTS regulatory program to manage the environmental and public health impacts of SSTS.

In addition to point sources of pollution, stormwater runoff can be a significant source of some pollutants (see Table 2-10). Each city within the BDWMO maintains a stormwater pollution prevention program (SWPPP) which outlines programs and practices to minimize pollutant loading and water quality impacts resulting from stormwater management (see Section 2.7.4).

Table 2-10 Pollutants Commonly Found in Stormwater

Stormwater Pollutant	Examples of Sources	Related Impacts
Nutrients: Nitrogen, Phosphorus	Decomposing grass clippings, leaves and other organics, animal waste, fertilizers, failing septic systems, atmospheric deposition	Algal growth, reduced clarity, other problems associated with eutrophication (oxygen deficit, release of nutrients and metals from sediments)
Sediments: Suspended and Deposited	Construction sites, other disturbed and/or non-vegetated lands, eroding streambanks and shorelines, road sanding	Increased turbidity, reduced clarity, lower dissolved oxygen, deposition of sediments, smothering of aquatic habitat including spawning sites, and benthic toxicity
Organic Materials	Leaves, grass clippings	Algal growth, reduced clarity, other problems associated with eutrophication (oxygen deficit, release of nutrients and metals from sediments)
Pathogens: Bacteria, Viruses	Domestic and wild animal waste, failing septic systems	Human health risks via drinking water supplies, contaminated swimming beaches
Hydrocarbons: Oil and Grease, PAHs (Naphthalenes, Pyrenes)	Tar-based pavement sealant, industrial processes, automobile wear, emissions and fluid leaks, waste oil.	Toxicity of water column and sediment, bioaccumulation in aquatic species and throughout food chain
Metals: Lead, Copper, Cadmium, Zinc, Mercury, Chromium, Aluminum, others	Industrial processes, normal wear of auto brake linings and tires, automobile emissions & fluid leaks, metal roofs	Toxicity of water column and sediment, bioaccumulation in aquatic species and through the food chain, fish kill
Pesticides: PCBs, Synthetic Chemicals	Pesticides (herbicides, insecticides, fungicides, rodenticides, etc.), industrial processes	Toxicity of water column and sediment, bioaccumulation in aquatic species and through the food chain, fish kill
Chlorides	Road salting and uncovered salt storage	Toxicity of water column and sediment
Polycyclic Aromatic Hydrocarbons (PAH's)	Tar based pavement sealant	Carcinogenic to humans
Trash and Debris	Litter washed through storm drain networks	Degradation of the beauty of surface waters, threat to wildlife

Based on *Minnesota Urban Small Sites BMP Manual* (Metropolitan Council, 2001).



County Boundary

Municipal Boundary

River

Potential Pollution Sources

Multiple Programs

Air Quality

Feedlots

Hazardous Waste

Investigation and Cleanup

Solid Waste

Stormwater

Tanks

Water Quality

0

1,750

3,500

Feet

POTENTIAL POLLUTANT SOURCES

BDWMO Watershed Management Plan

FIGURE 2-16

Data Source: What's In My Neighborhood Sites, Minnesota Pollution Control Agency, 2021.

3.0 Priority Issues and Resources

Prioritizing issues and resources to be addressed by the BDWMO is an important step in focusing implementation activities over the life of this Plan (see Section 5.0). The BDWMO designed and carried out a stakeholder engagement plan to gather input on priority issues from various stakeholder groups. BDWMO staff summarized and presented the results of stakeholder input (see Appendix B) to the commissioners who ultimately identified the priority issues and resources to be the focus of this Plan. This section of the Plan summarizes stakeholder input, priority issues (organized generally by topic area), and identification of priority resources (i.e., strategic waterbodies).

3.1 Stakeholder Engagement and Issue Identification

As part of Plan development, the BDWMO commissioners solicited input on issues relevant to the Black Dog watershed through a variety of stakeholder engagement and data review activities sequenced as shown in Figure 3-1 (note that engagement at community/partner events was ultimately not performed to due public health recommendations related to the COVID-19 pandemic).

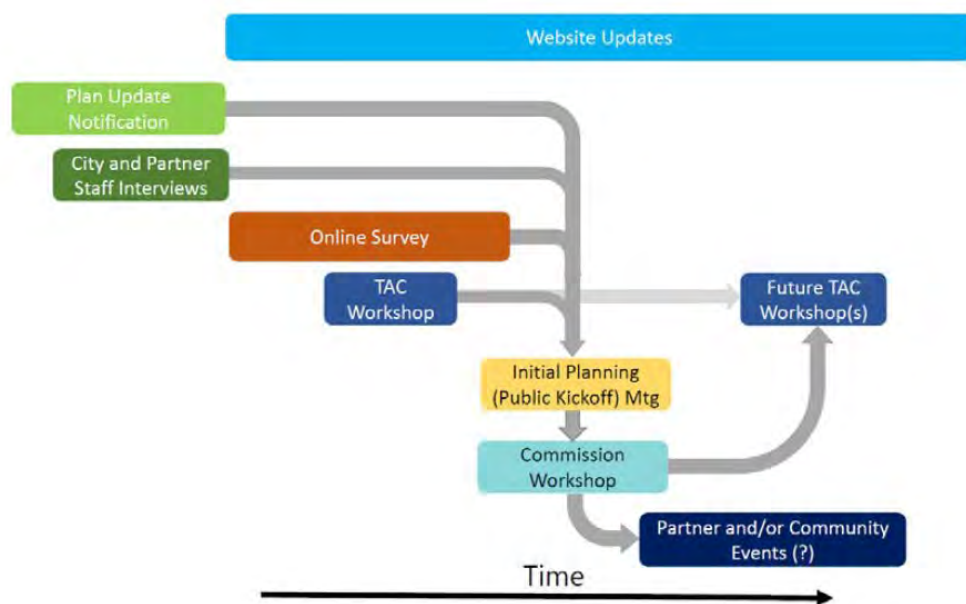


Figure 3-1 Stakeholder engagement workflow

Completed activities included:

- Soliciting responses to the Plan updated notification letter distributed August 20, 2020 (see MN Rules 8410.0045)
- Interviews with member cities and Dakota County
- Technical Advisory Committee (TAC) issue identification meeting on March 12, 2021
- Public kickoff meeting (virtual) hosted April 21, 2021 (see MN Rules 8410.0045)
- Resident survey hosted online from February 2021 through May 2021

- Analysis of water quality and lake characteristics (see Section 2.9)

BDWMO staff summarized the results of member city/partners staff interviews, the online survey, and responses to the Plan update notification letter in individual memoranda to the BDWMO commissioners. These memoranda were appended to a summary memorandum aggregating all stakeholder engagement results that was used to facilitate a BDWMO commissioner issue and prioritization workshop on June 16, 2021. The summary memorandum and attachments are included as Appendix A.

The stakeholder engagement and issue identification activities yielded general and specific issues, as well as suggestions for implementation/action. Some of the issues identified through engagement efforts, listed by source, include:

3.1.1 Responses to the Plan update notification letter

Responses to the Plan update notification letter include resource issues and focus areas for Plan development and implementation:

- Resources issues:
 - Chloride reduction
 - Invasive species management
 - Pollution prevention and water quality treatment of stormwater runoff
 - Peak stormwater flow rate and volume reductions
 - Focus on impaired waterbodies (e.g., Keller Lake) and those close to impairment
 - Management of subsurface sewage treatment systems (SSTS)
 - Use of in-lake water quality treatment (e.g., alum treatment)
- Plan development/implementation issues:
 - Increased emphasis on measurable goals
 - Prioritization and targeting of implementation activities
 - Emphasis on collaboration with partners

3.1.2 Member city/partner staff interviews

Barr interviewed member city and partner organization staff to better understand the value of BDWMO services, primary issues facing BDWMO partners, and opportunities to improve working relationships. The interviews identified the following major themes:

- Partners are generally happy with their working relationships with the BDWMO.
- Partners may achieve additional water and natural resource goals with additional capacity/assistance from the BDWMO.
- Partners see opportunities for an increased role of the BDWMO with respect to assisting with project funding (grants, cost-share programs), education, public engagement, and resident water resource programming.

The interviews identified few significant water quality, flooding, or natural area issues that need to be addressed in this Plan; specific issues raised include:

- Aquatic invasive species management
- Localized flooding issues upstream of Crystal Lake
- Erosion resulting from increased precipitation intensity
- Chloride reduction
- Maintenance of private best management practices (BMPs)
- Delisting of Keller Lake

3.1.3 Technical Advisory Committee (TAC) issue identification meeting

The Plan update Technical Advisory Committee (TAC) – comprised of staff of the BDWMO member cities, Dakota County, Dakota SWCD, Metropolitan Council, and State plan review agencies – met on March 12, 2021, to discuss issues to be addressed in the Plan update. Discussion at the TAC meeting largely reiterated the issue topics and resources noted in the responses to the Plan update notification and those noted during the member city and partner staff interviews. Issues specifically noted and discussed by the TAC include:

- Chloride in groundwater
- Groundwater use and overall sustainability
- Keller Lake nutrient impairment
- Protection of existing water quality in Lac Lavon
- Increasing stormwater best management practice maintenance needs
- City monitoring and management of invasive species
- Opportunities for education and resident engagement

3.1.4 Public survey results

The BDWMO commissioners hosted an online survey from February 2021 through May 2021. Eighty-one participants took the online survey. Question 5 of the survey specifically asked participants to identify if they were concerned about 14 water and natural resource issues (e.g., pollutant loading) and to identify additional issues of concern. Issues identified as a concern by the greatest percentage of survey respondents include:

- Pollutants like road salt, fertilizer and heavy metals entering surface water or groundwater (identified by 91% of respondents as a concern)
- Amount of trash in or around the waterbody (90% of respondents)
- Aquatic invasive species (79% of respondents)
- Abundance and diversity of wildlife (72% of respondents)
- Sustainability of groundwater supplies (67% of respondents)

Open-ended responses to other survey questions further demonstrated common interests in protecting and improving the ecological health and functions of local water and natural resources (e.g., wildlife habitat) as well as the community benefits they provide (e.g., recreation, public health, aesthetics).

3.2 BDWMO Issue Prioritization

The BDWMO commissioners participated in a workshop on June 16, 2021, to review issues identified through stakeholder engagement (see Section 3.1 and Appendix B) and discuss priorities to be addressed in the 2023-2032 Watershed Management Plan. There was consensus among commissioners that, overall, the watershed is in good shape with respect to water resource issues, and that the Plan may focus on preservation of existing good conditions while also focusing on remaining restoration needs.

Ultimately, the BDWMO commissioners identified the following priorities for this Plan:

Higher Priority Issues	Lower Priority Issues
<ul style="list-style-type: none">• Water quality, including:<ul style="list-style-type: none">○ Stormwater runoff quality○ In-lake water quality○ Impairments (Keller Lake)• Lake ecology and habitat, including:<ul style="list-style-type: none">○ Habitat quality○ Invasive species management• Groundwater management, including<ul style="list-style-type: none">○ Pollution prevention○ Conservation and sustainability• Education and Engagement	<ul style="list-style-type: none">• Flooding and water levels• Wetland management• Upland and natural area management

Specific elements of the above issue topics are discussed in greater detail in the following sections. The BDWMO commissioners will use issue priority levels as a guide for work planning and allocation of funding. Many of the resource issues identified in this Plan are interrelated (e.g., invasive species can impact water quality; stormwater runoff can pollute groundwater). Thus, many of the goals, policies, and activities included in this Plan address multiple issues.

3.3 BDWMO Resource Prioritization

Concurrent with the stakeholder engagement and issue identification process, the BDWMO commissioners considered which water and natural resources to be prioritized over the life of this Plan. The 2012 BDWMO Watershed Management Plan (2012 Plan) identified **strategic waterbodies** as the focus for BDWMO action based on several criteria. As part of the development of this Plan, BDWMO staff summarized waterbody characteristics including:

- Area
- Littoral Area
- Depth
- Public Waters Index classification
- Direct drainage area
- Total drainage area

- Cities in tributary drainage area
- Downstream resource
- Recent water quality (if known)

The BDWMO commissioners considered and revised criteria to establish strategic waterbodies (see Section 2.9.1, Table 2-6, and Figure 2-8. Although the criteria to establish strategic waterbodies was revised from the 2012 Plan, the list of strategic waterbodies in this Plan remains the same as the 2012 Plan and includes:

- Crystal Lake
- Keller Lake
- Kingsley Lake
- Lac Lavon
- Orchard Lake

Individual strategic waterbodies are described in greater detail in Section 2.7.1 of the Plan. As part of Plan development, the BDWMO commissioners also considered whether other resources should be prioritized for BDWMO action and ultimately chose not to identify additional water or upland resources as strategic (or otherwise prioritized).

3.4 Water Quality Issues

This section describes several of the water quality issues present in the Black Dog watershed, including stormwater runoff quality, pollutant loading, in-lake water quality and lake impairments.

3.4.1 Stormwater runoff and pollutant loading

Over time, development of the Black Dog watershed for residential, commercial, and other land uses has converted much of the naturally vegetated landscape to land uses with greater imperviousness (see Section 2.3). Development and the associated increase in impervious surface (i.e., surfaces through which water cannot infiltrate) results in increased amounts of nutrients, chloride, sediment, and other pollutants carried in stormwater runoff (i.e., pollutant loading, see Table 2-10). Imperviousness and land disturbance (e.g., construction) result in increased stormwater runoff rates and volumes which can contribute to erosion, threaten existing infrastructure, and increase flood risk.

Development also limits the natural ability of the landscape to mitigate the negative environmental impacts of stormwater runoff by reducing infiltration and retention. Infiltration or retention of stormwater runoff is often the most effective means of limiting the impacts of urbanization, as these methods reduce the total volume of runoff to the downstream receiving waterbodies.

The BDWMO, its member cities, partners, and private developers seek to limit negative environmental impacts of stormwater runoff through the construction of best management practices (BMPs) designed to remove pollutants from stormwater. Proper operation and maintenance of these BMPs is necessary to achieve the intended benefits. As stormwater management infrastructure continues to age, maintenance, repair, and eventual replacement of infrastructure may place additional financial burden on cities and

owners of private infrastructure. Monitoring of private stormwater facilities and enforcement of maintenance actions also presents a burden for member city staff capacity.

In areas of concentrated development, existing structures, utilities, and land ownership further restrict the opportunities for the BDWMO, member cities, and partners to implement cost-effective stormwater BMPs. Redevelopment provides an opportunity to retrofit stormwater BMPs in areas that may not currently receive adequate treatment.

3.4.1.1 City MS4 Programs

The Minnesota Pollution Control Agency (MPCA) is the delegated permit authority for the National Pollutant Discharge Elimination System (NPDES) in Minnesota. Through this authority, the MPCA implements the Municipal Separate Storm Sewer System (MS4) permit program designed to reduce the amount of sediment and other pollutants entering state waters from stormwater systems. Cities with populations over 10,000 (or other qualifying criteria) must obtain MS4 permit coverage and develop a stormwater pollution prevention program (MS4 SWPPP) and adopt best practices. The MS4 SWPPP must address the following six minimum control measures:

1. Public education and outreach
2. Public participation
3. Detection and elimination of illicit discharges (non-stormwater discharges to stormwater systems)
4. Construction site runoff controls
5. Post-construction runoff controls
6. Pollution prevention and municipal "good housekeeping" measures (e.g., maintenance)

The regulated entity must identify best management practices (BMPs) they implement to reduce pollutant loading to impaired waters covered by a total maximum daily load (TMDL) study. They must also identify BMPs for each minimum control measure and submit an annual report on the implementation of the MS4 SWPPP.

Each BDWMO member city is an MS4 community and maintains permit coverage under this program. More information is available from the MPCA at: <https://www.pca.state.mn.us/water/municipal-stormwater-ms4>

3.4.1.2 Erosion and Sedimentation

Sediment is a major contributor to water pollution. Stormwater from streets, parking lots, and other impervious surfaces carries suspended sediment consisting of fine particles of soil, dust, and dirt in moving water. Although erosion and sedimentation are natural processes, they are often accelerated by human activities, including construction and redevelopment. Regardless of its source, sediment deposition decreases water depth, degrades water quality, smothers fish and wildlife habitat, and degrades aesthetics. Sediment deposition can also wholly or partially block stormwater infrastructure and contribute to flooding. Sediment deposition in stormwater ponds and wetlands also reduces the storage volume capacity, diminishing water retention and/or water quality functions of these resources.

Suspended sediment, carried in water, clouds lakes and creeks, and disturbs aquatic habitats. Sediment also reduces the oxygen content of water and is a major source of phosphorus, which is frequently bound to the fine particles. Erosion also results in channelization of stormwater flow, increasing the rate of stormwater runoff and further accelerating erosion.

The MPCA implements the NPDES Construction Stormwater General Permit to prevent or limit negative impacts from erosion and sedimentation. The program requires a permit for projects disturbing one acre or more and requires the project proposed develop a Stormwater Pollution Prevention Plan (Construction SWPPP) that includes temporary and permanent erosion controls and water quality treatment practices. More information is available from the MPCA at: <https://www.pca.state.mn.us/water/construction-stormwater>

Within the BDWMO, each member city implements and enforces erosion and sedimentation controls through their local water management plans, ordinances, and/or engineering design standards. Some member city erosion and sediment control regulations apply to much smaller development activities than the one-acre threshold of the NPDES construction permit (see Table 4-1). Member cities may request the BDWMO administrator and/or engineer to review grading and erosion control plans at their discretion.

3.4.1.3 Chloride loading

Chloride loading from runoff carrying road salt applied to roadways, parking lots, sidewalks, and other paved areas throughout the winter months is also a significant pollutant source. The chemical properties of sodium chloride make it effective at melting ice, but these properties also result in the chloride dissolving in water and persisting in the environment. At levels exceeding the water quality standard, chloride is toxic to aquatic life. Water samples from lakes, wetlands, streams, and groundwater show high chloride levels in urban areas across the state, including the Twin Cities Metropolitan Area (MPCA, 2016).

The BDWMO member cities mitigate the environmental impact of their chloride use through practices outlined in their MS4 permits and following guidance in the Twin Cities Metro Area Chloride Management Plan (MPCA, 2016). As of 2022, no waterbodies within the BDWMO are listed as impaired for chloride.

3.4.2 In-lake water quality and impaired waters

The lakes, wetlands, streams, and rivers within and downstream of the BDWMO are valued resources that provide recreational and ecological benefits. Protecting the water quality of these resources by reducing pollutant loading is key to ensuring these benefits. The sources of water pollution in the BDWMO are many and varied. Potential pollutant sources in the watershed include permitted sources, potentially contaminated sites, leaking above- and below-ground storage tanks, unsealed wells, and non-point sources such as stormwater runoff (see Section 3.4.1).

In BDWMO lakes and wetlands, phosphorous is the pollutant of most concern. As total phosphorus (TP) loads increase, it is likely that water quality degradation will accelerate, resulting in unpleasant consequences such as profuse algae growth or algal blooms (reflected in high chlorophyll-*a* concentrations). Algal blooms, overabundant aquatic plants, and nuisance/exotic species, such as Eurasian watermilfoil, purple loosestrife, and curly-leaf pondweed, will flourish and interfere with ecological

function as well as recreational use and the aesthetics of waterbodies. Sediment is also a pollutant of concern. Sediment contributes to poor water clarity that affects vegetation growth and deposits onto stream and lake beds, impacting aquatic habitat. It is also a substrate to which phosphorus and other pollutants bind.

Internal loading of phosphorus from lake sediments under anoxic conditions and aquatic vegetation (e.g., curly-leaf pondweed) can be a major source of nutrients to lakes, leading to water quality issues. These impacts may be amplified in shallow lakes where wind action can mix the resuspended phosphorus into the epilimnion. Internal loading presents a unique problem in that the load is already present in the waterbody, resulting from the cumulative effect of past loading, often from multiple sources.

The BDWMO, Metropolitan Council, and/or member cities perform regular water quality monitoring of strategic waterbodies to identify water quality issues and trends (see Section 5.1.4). Recent water quality data (2012-2021) for BDWMO strategic waterbodies is presented in Table 2-8.

3.4.2.1 Impaired waters and TMDLs

The MPCA is the state regulatory agency primarily tasked with protecting and improving water quality in Minnesota and maintains a list of impaired waters (see Section 2.9.3). For impaired waters, the MPCA partners with local governmental units (like the BDWMO) to perform total maximum daily load (TMDL) studies that estimate pollutant reductions needed to achieve water quality standards (referred to as a waste load allocation, or WLA). WLAs for phosphorus often include reductions in phosphorus loading from the tributary watershed as well as reductions in in-lake phosphorus loading from sediment.

Over the years, several waterbodies within the BDWMO have been listed on the MPCA impaired waters (303(d)) list for a variety of impairments, including excess nutrients (phosphorus). Crystal Lake, Lee Lake, and Earley Lake, once listed as impaired due to excess nutrients, have been “delisted” following improvements in water quality. As of 2022, impaired waters within the BDWMO include:

- **Keller Lake** – listed as impaired for excess nutrients in 2002; this impairment is addressed by the *Crystal, Keller, and Lee Lakes TMDL* (MPCA, 2011)
- **Orchard Lake** and **Lac Lavon** – listed as impaired due to mercury in fish tissue; this impairment is addressed by the statewide mercury TMDL (MPCA, 2008)

In 2021, the BDWMO completed an in-lake alum treatment of Keller Lake to reduce internal loading of phosphorus. The BDWMO and member cities will continue to implement actions to improve Keller Lake water quality, as needed (see Section 5.0). The BDWMO will continue to review completed TMDLs and TMDL implementation plans and incorporate recommended actions into the BDWMO implementation plan, where appropriate.

Current impaired waters listings are available from the MPCA website:

<https://www.pca.state.mn.us/water/minnesotas-impaired-waters-list>

3.5 Lake Ecology and Habitat Issues

In addition to chemical water quality (see Section 3.4.2 and Section 2.9), healthy fisheries, phytoplankton and macroinvertebrate populations, and aquatic vegetation are important components of lake ecological health. Healthy lakes and adjacent shoreline areas provide valuable habitat for many types of wildlife including waterfowl, songbirds, raptors, mammals, fish, and amphibians. Healthy lakes also support intended recreational uses (e.g., fishing, boating, swimming) and aesthetics.

Land surrounding lakes is highly valued, and nearly all the land surrounding BDWMO strategic waterbodies has been developed for public or private use. Development can increase pollutant loading, alter hydrology, and disrupt shoreline areas. Development or alteration of shoreline areas can lead to the loss or degradation of vegetated buffers that provide valuable habitat and filtration and removal of pollutants from runoff before entering lakes (see Section 3.5.1).

Impacts to individual elements of lake ecology can have cascading effects on water quality and overall lake health. For example, pollutant loading can lead to changes in phytoplankton (i.e., algae) communities, resulting in algal blooms that can impact recreation and aesthetics. Water clarity can impact the extent and speciation of aquatic plants, affecting fish habitat. Increases in rough fish population can result in internal loading of phosphorus from disturbed lake sediment).

A comprehensive understanding of the ecological health of strategic waterbodies is limited by incomplete data. The BDWMO and/or its partners monitor aquatic vegetation of strategic waterbodies and seek to add additional monitoring to develop a more complete picture of overall lake health (see Section 5.1.4).

3.5.1 Shoreland Buffers

Buffers are upland, vegetated areas located adjacent to waterbodies. Many of the hydrologic, water quality, and habitat benefits achieved by shoreland areas are directly attributable to or dependent on the presence of buffers. Vegetation and organic debris shield the soil from the impact of rain and bind soil particles with root materials, reducing erosion. Vegetation obstructs the flow of runoff, thereby decreasing water velocities, allowing infiltration, and reducing the erosion potential of stormwater runoff. Leaf litter from vegetation can also increase the organic content of the soil and increase adsorption and infiltration. As a physical barrier, vegetation also filters sediment and other insoluble pollutants from runoff. Vegetation scatters sunlight and provides shade, reducing water temperature in the summer, limiting nuisance algae growth, and reducing the release of nutrients from the sediment. Buffers also have habitat benefits; native plants provide the best food and shelter for native wildlife, fish, and amphibians. Buffers provide needed separation and interspersed areas for animals, to reduce competition and maintain populations.

The presence of adequate buffers is critical to preserving the ecological functions and environmental benefits of strategic and other BDWMO waterbodies. Establishing buffers in developed areas may be difficult, as existing structures may be located within the desired buffer area. Redevelopment offers an opportunity to establish adequate buffers in areas that are already developed.

3.5.2 Aquatic Invasive Species (AIS)

The term “invasive species” describes plants, animals, or microorganisms that are non-native and that 1) cause or may cause economic or environmental harm or harm to human health, or 2) threaten or may threaten natural resources or the use of natural resources in the state (Minnesota Statutes Chapter 84D.01). Aquatic invasive species (AIS) is a term given to invasive species that inhabit lakes, wetlands, rivers, or streams and overrun or inhibit the growth of native species.

The presence of AIS can impair the ecological, aesthetic, and recreational functions of aquatic, wetland and shoreland areas. AIS pose a threat to natural resources and local economies that depend on them. Under direction from the Minnesota Legislature, the MDNR established the Invasive Species Program in 1991. The program is designed to implement actions to prevent the spread of invasive species and manage invasive aquatic plants and wild animals (Minnesota Statutes 84D).

The BDWMO and/or its member cities monitor waterbodies for aquatic invasive plants. Curly-leaf pondweed and Eurasian watermilfoil are present in several BDWMO waterbodies (see Section 2.12.2). Curly-leaf pondweed is of special concern due to its potential as a source of internal phosphorus loading. This submersed aquatic plant grows vigorously during early spring, outcompeting native species for nutrients. After curly-leaf pondweed dies out in early to mid-summer, decay of the plant releases nutrients and consumes oxygen, exacerbating internal sediment release of phosphorus. This process may promote algal blooms, which may further inhibit native macrophytes by reducing water clarity and blocking sunlight necessary for growth.

Invasive aquatic animals present in the BDWMO include goldfish found in Keller Lake in 2021. Like carp, goldfish feeding techniques disrupt shallow-rooted plants, which can reduce water clarity and possibly release phosphorus bound in sediment, leading to increased algal blooms and a decline in native aquatic plants. Goldfish are often introduced to lakes through the release of pets. Goldfish and other invasive fish may spread between lakes by the accidental inclusion and later release of live bait and by migration through natural or built channels as adults.

Zebra mussels have not been identified in BDWMO waterbodies but are present in several surrounding watersheds. Zebra mussels can cause problems for lakeshore residents and recreationists by clogging water intakes and attaching to motors and possibly clogging cooling water areas. Zebra mussel shells can cause cuts and scrapes if they grow large enough on rocks, swim rafts and ladders. Zebra mussels can also attach to native mussels, killing them. Zebra mussels filter plankton from the surrounding water, which can result in improved water clarity and result in more aquatic vegetation. In large populations, zebra mussel filter feeding could impact the food chain, reducing food for larval native fish. Zebra mussels are typically spread as adult mussels attached to boats or aquatic plants, or as larvae carried in bait buckets, bilges, or any other water moved from an infested lake or river.

Additional information about AIS is available from the MDNR at:

<https://www.dnr.state.mn.us/invasives/ais/index.html>

3.6 Groundwater Issues

Maintaining clean, safe groundwater supplies is critical to human and environmental health and to the economic and social vitality of communities. Many residents within the BDWMO obtain their drinking water from municipal groundwater wells (Lakeville, Eagan, and Apple Valley) and private domestic wells.

Groundwater quality in northwestern Dakota County is generally good (Dakota County, 2020). However, surficial groundwater within the BDWMO is sensitive to contamination (see Figure 2-6). Potential sources of contamination include leaking underground storage tanks, unsealed wells, failing or non-performing subsurface sewage treatment systems (SSTS), infiltration of contaminated surface water, and others (see Section 2.14). Owners of private wells may not be aware of water quality issues (which may include elevated concentrations of nitrates, arsenic, and the presence of pesticides) due to the lack of any required testing.

Prevention of groundwater contamination through best management practices is critical to preserving existing groundwater quality. Once contaminated, groundwater may remain contaminated for long periods of time. Groundwater clean-up is expensive and technically complex, even when feasible. Increased public awareness of the importance of drinking water protection on the public's general health and well-being is critical to promote practices that protect the quality of groundwater.

While the BDWMO and member cities promote infiltration as a preferred method of stormwater treatment, it may have negative consequences in areas with vulnerable groundwater resources. To protect these resources, member cities require that infiltration practices be implemented with consideration of guidance provided by the MPCA MS4 general permit (2020, as amended), NPDES General Construction Stormwater permit (2018, as amended) and Minnesota Stormwater Manual.

Groundwater is a finite resource with inputs and outputs. The input is generally rainwater and snowmelt that seeps into the ground (recharge). The outputs can be groundwater that is pumped out for human use and groundwater that naturally discharges to lakes, wetlands, and streams. The inputs and outputs need to be managed to ensure a sustainable groundwater supply. Development generally results in more impervious area and more compacted soils decreasing opportunities for infiltration and recharge. Development often parallels population increases that may lead to additional groundwater use.

The Metropolitan Council estimated the impact to the Prairie du Chien-Jordan aquifer below the BDWMO under several future scenarios in its *Regional Drinking Waters Supply, Groundwater Recharge and Stormwater Capture and Reuse Study – Southeast Metro Study Area* (2016). In that study, continued development of groundwater resources is estimated to result in aquifer drawdown in the south and east portions of the BDWMO. In Burnsville, aquifer levels are expected to rebound due to the recent transition of municipal drinking water from groundwater to surface water sources.

Various agencies are responsible for aspects of managing groundwater quality and quantity in the BDWMO including the MDNR, Minnesota Department of Health (MDH), MPCA, and Dakota County. Because of the number of agencies already involved in and responsible for groundwater management, the BDWMO has emphasized a support and assistance role to address groundwater issues.

3.7 Education and Public Engagement Issues

Education and public engagement are important avenues to protecting natural and water resources. Pollution prevention and other behaviors practiced by residents can cumulatively mitigate negative impacts to resources, limiting the need for expensive restoration action. Through communication and engagement, the BDWMO and member cities can empower local advocates for watershed stewardship who are examples in their neighborhoods and communities. Outreach and engagement can also strengthen relationships between the BDWMO and the communities the BDWMO and its partners serve.

The input received throughout the issue identification process highlighted continued priorities of education and outreach to achieve BDWMO goals. Challenges include engaging a population of residents with diverse uses of water, diverse values and ideas about water, and varying capacity for action. Residents may lack the time, information, or financial resources to become aware of and engage in stewardship practices or participate in available programs. Over time, the BDWMO's population has grown more racially and ethnically diverse (see Section 2.3). Cultural and/or language barriers may limit the effectiveness of education and engagement strategies that do not consider such differences.

Engagement with schools provides an avenue to reach large groups of residents but is challenging because there are multiple school districts within the BDWMO with different curricula. Cooperation with county partners may overcome these issues. Generally, partners identified collaboration between the BDWMO, member cities, and Dakota County SWCD as an opportunity to effectively achieve shared water resource education goals.

Potential water resource management issues identified for increased focus through education and outreach include, but are not limited to:

- Chloride and salt application
- Buffers and shoreline management
- Groundwater conservation
- Opportunities for residential cost-share BMPs

The BDWMO continues to maintain and update its website as a primary means of sharing information and engaging residents and other stakeholders. The BDWMO website is located at: <https://blackdogwmo.org/>

3.8 Lower Priority Issues

3.8.1 Flooding and Water Quantity Issues

In a natural, undeveloped setting, pervious ground cover allows water, including stormwater runoff, to infiltrate the soil. Land development and increased impervious areas alter natural drainage patterns and increase the rate and volume of stormwater runoff. The additional volume of runoff can increase water levels in ponds, lakes, streams, and wetlands, which increases the potential for erosion and flooding. It also causes large, flashy flows in storm sewers, which increases the potential for flooding and property damage. Increased precipitation also results in high water tables and increased groundwater flow to springs, potentially threatening the stability and capacity of downstream structures.

Managing the risk of flooding is a focus of the BDWMO and its cities due to the potential threat to public health and safety, infrastructure, and the environment. In addition to property damage, flooding may cause other impacts that are harder to quantify, including the following:

- Flooding of roads making them impassable to emergency vehicles and residents
- Shoreline erosion
- Destruction or alteration of riparian habitats
- Restricted recreational use of waterbodies, trails, and adjacent lands
- More strain on budgets and personnel for repairing flood-damaged facilities and controlling public use of facilities during flooding events

The Federal Emergency Management Agency (FEMA) has identified areas prone to flooding during 100-year flood events to assist cities and residents in managing flood risk. FEMA-mapped floodplains within the BDWMO are generally limited to areas surrounding lakes, ponds, and streams and may not reflect localized flood risk related to stormwater conveyance systems (see Figure 2-13).

During plan development, member cities did not identify intercommunity or significant local flood risk issues needing BDWMO assistance. Member cities have identified minor local flooding issues (e.g., temporary backyard flooding). Many of these local issues are described in the member city local water management plans.

While there are few existing flood risk issues, precipitation patterns are trending towards larger, more intense storms (see Section 2.1.2). NOAA's 2013 assessment of climate trends for the Midwest found that precipitation amounts are predicted to increase significantly over what is historically used in floodplain assessments and infrastructure design (NOAA, 2013). Stack et al. (2014) estimates that mid-21st century 24-hour precipitation events with a 1% chance of occurring in a given year (i.e., 100-year event) may exceed 10 inches in Minnesota, a significant increase over current design values (approximately 7.4" in the BDWMO for the 100-year event, see Section 2.1.1). Understanding the hydrologic response of the watershed to large precipitation events is critical to identifying areas of flood risk and evaluating strategies to reduce flood risk or damages.

Existing development throughout much of the BDWMO limits the available physical space for capital improvements to address local flooding issues. Appropriate rate and volume controls applied throughout the watershed are necessary to minimize future flooding issues. Regulatory controls implemented by member cities (e.g., floodplain ordinances) include criteria intended to limit adverse impacts to floodplains and minimize flooding. The negative impacts of flooding may be further minimized by thoughtful management of the floodplain achieved through education and other activities.

3.8.2 Wetlands Management Issues

Healthy wetland systems are critical components of the hydrologic system and positively affect soil health, groundwater, surface water quality and quantity, wildlife, fisheries, aesthetics, and recreation. The ability of

wetlands to attenuate runoff and filter pollutants are important for protecting the water quality and ecological health of downstream resources. Overloading wetlands beyond their natural capacity with water, sediment, or nutrients can diminish their effectiveness in providing these benefits. The capacity of wetlands to perform these functions is linked to the presence of vegetated buffers (see Section 3.5.1).

Development of the watershed for residential, commercial, and other land uses (see Section 2.3) has resulted in the loss of many wetland areas and/or the degradation of remaining wetlands through hydrologic alteration and increased pollutant loading. Despite historical impacts, many wetland areas remain. Most remaining wetlands are concentrated in the southwestern and northeastern portions of the BDWMO (see Figure 2-9). Remaining wetland areas include large wetland complexes south of Kingsley Lake and in the Murphy-Hanrehan Park Reserve.

Within the watershed, member cities protect wetlands from further loss and degradation through administration of the Wetland Conservation Act (WCA) and local development standards (see Table 4-2). Member cities require vegetated buffers around wetlands to promote wetland health and the associated hydrologic, water quality, and habitat benefits.

Achieving no net loss of wetland area and function within the watershed is a goal of the BDWMO and member cities. This is a challenging task as the member cities face continued development pressure and there are few opportunities for wetland mitigation or banking (creating new wetlands to offset losses) within the watershed or surrounding area. Preserving and restoring existing wetland areas is an interest of member cities and the BDWMO. However, there are limited opportunities, funding, and staff capacity to perform these activities – resulting in the classification of wetland management as a lower priority issue for this Plan.

3.8.3 Upland and Natural Area Issues

Prior to development, the BDWMO was covered by a mixture of brush prairie, oak openings and barrens, aspen-oak land, and upland deciduous forest of elm, sugar maple, and basswood trees (see Section 2.11). Much of the landscape has been altered to accommodate residential, commercial, and other land uses. The remaining upland (i.e., non-wetland or shoreland) open spaces are important resources. These areas include native species that provide wildlife habitat benefits, infiltrate stormwater, filter pollutants, and mitigate suburban heat island impacts, among others. The loss or degradation of these areas limits the ability of the landscape to perform these functions. These areas also provide recreational opportunities for residents and visitors linked to community well-being and overall quality of life.

Much of the natural areas present within the BDWMO are located in municipal or regional parks and preserve areas (see Figure 2-15). Some include rare and diverse species and features (see Figure 2-14). During Plan development, stakeholders identified the preservation, restoration, and expansion of natural areas as a priority, citing the loss of such areas over time and the difficulty in recreating these resources. The BDWMO and member cities recognized the link between upland and natural areas and water resources management and generally support the protection and improvement of these areas. Diverse municipal needs (e.g., parks and recreation services), limited improvement opportunities, and capacity limitations, however, were considered in assigning a lower priority to this issue in this Plan.

4.0 Goals and Policies

This section sets goals and policies that reflect the mission of the BDWMO and the vision for its water resources. The section also sets goals for specific waterbodies, managing stormwater runoff, controlling erosion, preserving wetlands, enhancing wildlife habitat and recreational opportunities, education and public involvement, performance evaluation, and financing of the implementation program. The goals are followed by policies that provide specific methods of achieving the goals and serve as decision making guidelines.

4.1 Water Quality

4.1.1 Goals

- A. Maintain or improve water quality in BDWMO strategic waterbodies to meet applicable state standards or existing 10-year (2012 – 2021) summer average water quality, if better than state standards, including:
 - Keller Lake – 60 ug/L total phosphorus, 20 ug/l chlorophyll *a*, and 1.0 meter Secchi disc transparency (i.e., applicable state shallow lake water quality standards for eutrophication)
 - Crystal Lake – 26 ug/L total phosphorus, 13 ug/l chlorophyll *a*, and 2.1 meter Secchi disc transparency
 - Kingsley Lake – 17 ug/L total phosphorus, 2.3 ug/l chlorophyll *a*, and 3.0 meter Secchi disc transparency
 - Lac Lavon – 13 ug/L total phosphorus, 2.9 ug/l chlorophyll *a*, and 4.2 meter Secchi disc transparency
 - Orchard Lake – 21 ug/L total phosphorus, 6.2 ug/l chlorophyll *a*, and 2.5 meter Secchi disc transparency
- B. Cooperate with member cities to achieve stormwater sediment loading goals consistent with member city MS4 permits to protect and improve local water resources and the Minnesota River.
- C. Cooperate with member cities to achieve stormwater phosphorus loading goals consistent with member city MS4 permits to protect and improve local water resources and the Minnesota River.
- D. Work with member cities to reduce chloride loading relative to current conditions through practices consistent with the Twin Cities Metropolitan Area Chloride Management Plan (MPCA, 2016) and Minnesota Statewide Chloride Management Plan (MPCA, 2021).

4.1.2 Policies

1. The BDWMO and member cities will cooperate to manage strategic waterbodies. The BDWMO identified and will maintain a list of “strategic waterbodies.” The BDWMO defined strategic

waterbodies as those meeting specific criteria (see Section 2.9.1 and Table 2-6) and include the following waterbodies:

- Crystal Lake
- Orchard Lake
- Keller Lake
- Kingsley Lake
- Lac Lavon

2. All waterbodies in the BDWMO will be classified and managed according to either the BDWMO waterbody classification system or the city's wetland classification system (see member city local water management plans). The BDWMO classifies strategic waterbodies; member cities classify all other waterbodies. The BDWMO waterbody classification is described in Section 2.9.1 and Table 2-7 and includes the following classifications:

- **Category I** – these waterbodies support swimming and other direct contact recreational activities. These waterbodies have the highest/best water quality and are usually the most popular waterbodies with the public.
- **Category II** – these waterbodies support indirect recreational activities (e.g., boating and fishing). These waterbodies have poorer water quality than Category I waterbodies but are still popular with the public.
- **Category III** – these waterbodies provide wildlife habitat, aesthetic enjoyment, and possibly warm-water fishing. These waterbodies may have poorer water quality than Category I and II waterbodies and typically are not viewed as swimmable
- **Category IV** – waterbodies in this category are typically water quality ponds used as nutrient and sediment traps to reduce downstream loading of sediment and/or phosphorus and other nutrients that contribute to degradation of water quality.

3. The BDWMO will cooperate with the affected communities and the MPCA in developing TMDLs and associated implementation plans for impaired waterbodies within the BDWMO, as needed. BDWMO roles may include financial support, technical assistance, developing the TMDL and/or implementation plan, and other appropriate activities.
4. The BDWMO will monitor the water quality, algal community, aquatic vegetation, and other ecological factors in its strategic waterbodies per the scope and schedule described in Section 5.1.4 of this Plan, as amended. The BDWMO will prepare a report summarizing the results of the previous year's monitoring; the report will include available data regarding other biological indicators, such as fisheries. The BDWMO will post these reports on its website. The BDWMO will make monitoring data publicly available and provide data to the MPCA.
5. The BDWMO will assess BDWMO data and publicly available (e.g., CAMP monitoring) data to calculate and annually assess water quality and water quality trends compared to BDWMO goals

for strategic waterbodies. When statistically significant trends (see Section 5.1.4) are identified, the BDWMO will coordinate with member cities to identify appropriate follow-up actions, if needed.

6. The BDWMO may recommend actions or projects for strategic waterbodies, as necessary, following the identification of impairment(s) or statistically significant degrading trends in water quality. These projects will be included or added to the BDWMO CIP. Member cities will perform actions or projects recommended by the BDWMO. If a city does not include a recommended action or project for a strategic resource in its CIP within 18 months, the BDWMO may undertake the recommended action or project. In this situation, the BDWMO will assess the project costs back to the affected member cities, in accordance with the joint powers agreement. In accordance with the joint powers agreement, any member city may appeal cost allocation decisions made by the BDWMO.
7. The BDWMO will limit its water quality management roles not explicitly defined in this Plan and associated implementation schedule to those involving intercommunity watersheds, or those requested by the affected member cities.
8. The BDWMO will continue to cooperate with the member cities and other partners, as appropriate, to implement projects to address water quality issues in strategic waterbodies. BDWMO involvement may include assisting in allocating project costs among the member cities, technical assistance/review, public engagement, seeking and managing grants, and other roles, as appropriate.
9. Member cities (or other MS4s) shall be responsible for the implementation of BMPs that will help achieve the wasteload allocations required by TMDLs. The BDWMO will fund and implement internal load reduction projects stemming from TMDLs for lakes with intercommunity shoreline (see also Section 4.7.4, Policy 71).
10. The BDWMO will partner with the Dakota County SWCD or other organizations to sponsor and implement small-scale water quality improvement projects through existing cost share and assistance programs (e.g., Dakota County Landscaping for Clean Water program).
11. Member cities are responsible for managing “non-strategic” waterbodies. City management of these waterbodies may include classifying, monitoring, tracking trends, conducting studies, and implementing water quality management actions. Relevant activities shall be reported in the city’s local water management plan.
12. Member cities shall limit chloride use to the extent practicable through implementation of practices recommended in the Twin Cities Metropolitan Area Chloride Management Plan, Minnesota Statewide Chloride Management Plan, and/or other relevant guidance.
13. Member cities are encouraged to maximize the use of infiltration techniques to address water quality issues, consistent with the guidance and limitations detailed in the Minnesota Stormwater Manual, NPDES Construction Stormwater General Permit, and MS4 General Permit.

14. The member cities are encouraged to provide or require (e.g., during redevelopment) pretreatment of stormwater runoff for existing inlets to the stormwater system that receive direct stormwater runoff (i.e., no pretreatment) and are likely to see the greatest benefit from water quality improvement BMPs.
15. The member cities shall share with the BDWMO water quality, algal community, aquatic vegetation, and other ecological data for the BDWMO strategic waterbodies, as available.
16. The BDWMO will work with member cities to identify water quality improvement opportunities in redevelopment areas and help secure funding for such projects, as requested.

4.2 Water Quantity and Flooding

4.2.1 Goals

- E. Achieve no net increase in intercommunity peak stormwater flow rates.
- F. Reduce the number and/or flood risk of habitable structures within the floodplain in cooperation with member cities.

4.2.2 Policies

17. The BDWMO will serve as a facilitator for intercommunity water quantity issues (issues where the tributary watershed spans more than one city or outflows cross city/county/WMO boundaries). As facilitator, the BDWMO will assist in fairly allocating costs among the member cities for intercommunity flood risk reduction projects (see Financing Policies, Section 4.7.4, Policy 68).
18. Member cities shall maintain or strengthen existing volume control performance standards applicable to development and redevelopment projects.
19. The BDWMO encourages cities to promote the use of low impact development (LID) to reduce stormwater runoff volume (including opportunities to reduce impervious surfaces) and amend local development regulations (e.g., zoning/subdivision ordinances) remove/reduce obstacles to LID practices, consistent with practices identified in the Minnesota Stormwater Manual, "Complete Streets" design approach, or similar guidance.
20. The BDWMO encourages the member cities to reduce peak discharge rates wherever possible, beyond minimum required performance standards (see Section 4.9.1 – BDWMO Performance Standards).
21. The BDWMO encourages the member cities to incorporate multi-stage outlets into their pond designs to control flows from smaller, less frequent storms and help maintain base flows in downstream open channels. The BDWMO will cooperate with member cities to identify or evaluate designs intended to achieve this goal.
22. Member cities shall evaluate the impact of increasing the drainage area to landlocked basins, including effects on flooding, as part of project review. Member cities shall consider the effects of

water level fluctuations on trees, vegetation, erosion, and public safety when considering proposed changes to the hydrology of landlocked basins.

23. Member cities shall estimate and consider the water quality and flood risk impacts of proposed outlets from landlocked basins on intercommunity flows and/or strategic waterbodies prior to construction of the outlets. If analyses indicate adverse effects on water quality or increased flood risk, the city must consult with the BDWMO prior to construction.
24. Member cities shall consider the effects of events larger than the 100-year event, prolonged periods of wet conditions, high runoff volume events (e.g., snowmelt events that last for many weeks), and potential impacts of climate change when setting minimum building elevations. Higher minimum building elevations should be considered for structures adjacent to ponding areas with large tributary watersheds and for structures adjacent to landlocked basins.
25. The BDWMO encourages member cities to reduce stormwater discharge rates and volumes within trout stream and fen watersheds whenever possible, with the goal of reducing discharge rates to pre-development levels (or lower).

4.3 Erosion/Sedimentation

4.3.1 Goals

- G. Limit and/or decrease erosion and sedimentation through continued implementation of local controls consistent with minimum state standards.
- H. Cooperate with member cities to achieve stormwater sediment loading goals consistent with member city MS4 permits to protect and improve local water resources and the Minnesota River.

4.3.2 Policies

26. The BDWMO will facilitate intercommunity erosion and sediment control projects by performing studies, preliminary designs, feasibility reports, and calculating the cost apportionment between cities, as requested by the cities.
27. The BDWMO requires conveyance system discharges to be designed to prevent or minimize the potential for bank, channel, or shoreline erosion.
28. Member cities shall consider the following in the design and construction of shoreline stabilization measures, in addition to standard engineering and economic criteria:
 - unique or special site conditions,
 - energy dissipation potential,
 - preservation of ecological functions and habitat, and
 - use of natural materials, bioengineering methods, and aesthetics.

-
29. Member cities shall continue managing erosion and sediment control through local regulatory controls consistent with their NPDES MS4 permit and the NDPEs Construction Stormwater General Permit. Procedures for reviewing, approving, and enforcing erosion and sediment control plans shall be described in local water management plans.

4.4 Wetland Management

4.4.1 Goals

- I. Promote improving the ecological function of wetlands for water retention, recharge, soil conservation, habitat, aesthetics, and water quality improvement through education and outreach and support of member city actions.
- J. Pursue no net loss of wetlands in the BDWMO through continued City implementation of the Wetland Conservation Act (WCA), participation in technical evaluation panels (TEPs), and other wetland management roles.

4.4.2 Policies

- 30. The BDWMO defers local governmental unit (LGU) authority for administering the WCA to member cities and MnDOT (which administers the WCA within its right-of-way). The BDWMO will not seek to manage individual wetlands. In compliance with WCA, LGUs must protect wetlands from impacts in the following order: avoid, minimize, mitigate.
- 31. Member cities will maintain local official controls to protect and manage wetlands at least as stringent as current performance standards (see Table 4-2), including minimum wetland buffer widths based on protection level or management classification and limits on water level bounce during storm events depending upon wetland protection level or management classification.
- 32. Member cities' official controls to protect and manage wetlands shall be based on comprehensive wetland management plans or wetland functions and values assessments.
- 33. Member cities shall maintain an inventory of wetlands, including assessment of functions and values, either as part of a comprehensive wetland management plan or on an as-needed basis (e.g., as part of development/redevelopment project review).
- 34. Member cities shall use a wetland classification system similar to MnRAM3 for wetland management purposes.
- 35. The member cities may request that the BDWMO classify and set goals for specific wetlands; the BDWMO commissioners will decide whether to take on the responsibility, if requested.

4.5 Shoreland, Habitat and Open Space Management

4.5.1 Goals

- K. Promote improved shoreline integrity and the ecological functions of healthy shorelines through education, cost-share, and support of member city actions.

- L. Maintain or improve the ecological and habitat quality of BDWMO strategic waterbodies to achieve applicable standards for floristic quality index (FQI ≥ 17.8) and native species diversity of submerged vegetation (at least 11 species).
- M. Support member city and partner actions to prevent the increase or reduce the occurrence of aquatic invasive species within BDWMO strategic waterbodies.

4.5.2 Policies

- 36. The BDWMO promotes the protection of non-disturbed shoreland areas, restoration of disturbed shorelines, and the establishment of vegetated buffers along shorelines through support of existing cost-share programs, technical assistance for member cities, and pursuit of grant and cost-share funding for shoreline restoration projects.
- 37. The BDWMO will consider publicly available data to identify "reference lakes" to establish habitat, fishery, and/or other ecological health goals for strategic waterbodies.
- 38. Member cities shall minimize impacts to and will restore to the extent practicable shoreline vegetation during and after construction projects.
- 39. The BDWMO will coordinate and collaborate with member cities, Dakota SWCD, and other partners to encourage public and private landowners to maintain wetlands and open space areas for the benefit of wildlife through education and by providing information on various grant and cost-share programs.
- 40. The BDWMO encourages member cities to address disturbed shoreland areas in local water management plans. This may include identification, ranking, and mapping of disturbed shoreland areas.
- 41. Member cities shall maintain and enforce official controls addressing shoreland areas consistent with state requirements.
- 42. Member cities shall manage all Category I-III waterbodies (see Table 1-7) to preserve and promote biodiversity, habitat quality, and ecological functions.
- 43. Member cities shall consider opportunities to maintain, restore, or enhance natural areas, wetlands, and/or habitat functions as part of stormwater infrastructure projects, redevelopment, or other appropriate projects:
- 44. Member cities shall consider opportunities to enhance recreational functions of natural areas and waterbodies, where appropriate, as part of stormwater infrastructure projects, redevelopment, or other appropriate projects
- 45. The BDWMO will support member city and partner actions to preserve and enhance recreational opportunities within the BDWMO.

4.6 Groundwater

4.6.1 Goals

- N. Promote the protection of groundwater quality and quantity through annual collaboration with Dakota County, Minnesota Department of Natural Resources, and/or other agencies managing groundwater.
- O. Promote groundwater conservation and water reuse through education and outreach activities.

4.6.2 Policies

- 46. The BDWMO encourages member cities to provide increased green space, grassed waterways, native vegetation, and infiltration facilities wherever such actions are possible consistent with guidance and restrictions of the Minnesota Stormwater Manual, NPDES Construction Stormwater General Permit, and MS4 General Permit.
- 47. The BDWMO will work with member cities, Dakota County, and other partners in efforts to promote awareness of groundwater resource issues through public education programs, data sharing, and other information programs.
- 48. The BDWMO will support Dakota County in the implementation of the Dakota County 2020-2030 Groundwater Plan, through participation in planning efforts, data sharing, technical assistance, or other appropriate actions, as requested.
- 49. The BDWMO and member cities shall promote groundwater conservation and small-scale water reuse (e.g., rain barrels) through education and outreach and support of local cost-share programs (e.g., Dakota SWCD Landscaping for Clean Water program).
- 50. The BDWMO encourages member cities to protect recharge areas and groundwater resources from potential sources of contamination, including contamination associated with the infiltration of stormwater, through appropriate spill and contamination prevention measures and other activities consistent with member city MS4 permits.
- 51. Member cities shall continue their management programs and ordinances pertaining to subsurface sewage treatment systems (SSTS), consistent with state and local rules and shall follow the Metropolitan Council's Waste Discharge Rules regarding requirements and timing of connections to sanitary sewer service.

4.7 Administration

4.7.1 Goals

- P. Promote local connection to water resources by delegating day-to-day management and regulation of the BDWMO's water resources to the member cities.

- Q. Promote efficient and consistent management of water and natural resources by coordinating staff and financial resources to address common goals while maintaining regulation at the local level.
- R. Minimize duplication and redundancy of regulatory efforts by delegating regulatory authority to member cities and establishing standards complementary to and consistent with State and Federal requirements.

4.7.2 Project Review Policies

- 52. The BDWMO will continue to review projects and programs of member cities as requested by member cities, or if projects warrant such consideration (e.g., TMDL studies, projects with intercommunity impacts, stormwater management and wetland ordinance revisions), and will provide comments to the member cities within a deadline specified by the city.
- 53. Member cities shall inform the WMO of their plans to implement projects identified in TMDL implementation plans.
- 54. The BDWMO will review any proposed changes to the intercommunity stormwater system to ensure that they are consistent with an approved local water management plan.
- 55. The BDWMO will consult with Scott WMO when reviewing proposed changes to the intercommunity stormwater system in the portion of the BDWMO tributary to the Credit River.
- 56. The BDWMO will review and approve revisions to local water management plans to ensure the local plan is consistent with the BDWMO plan, Minnesota Rules 8410, and Minnesota Statutes 103B.
- 57. The BDWMO requires member cities to inform the BDWMO regarding revisions to their comprehensive plans that affect water management. The BDWMO requires that stormwater management elements of the city comprehensive plans conform to the BDWMO plan.

4.7.3 Evaluation and Accountability Policies

- 58. The BDWMO will submit an annual report to BWSR summarizing prior year activities and implementation progress consistent with Minnesota Rules 8410. At least biennially, the BDWMO will assess progress made toward BDWMO goals.
- 59. The BDWMO, member cities, and Dakota County SWCD will meet at least annually to align the BDWMO implementation schedule with member city capital improvement programs, as needed, and establish a work plan for the coming year.
- 60. The BDWMO will use an evaluation concept that includes trend analysis, performance analysis, and quantitative metrics of the water resource health (e.g., water quality data) of the BDWMO's strategic waterbodies. This information will be presented in the annual report and newsletter.

- Trend analyses will demonstrate water quality and other significant trends at the BDWMO's strategic waterbodies (see Section 5.1.4.1).
 - Water quality and other quantitative data will be used to detect conditions that may call for additional management action (see Section 5.1.4.1).
61. The BDWMO will work with member cities to evaluate the implementation of capital improvement projects, programs, and other implementation items.
62. Member cities shall continue to share information with the BDWMO regarding monitoring/surveying of strategic waterbodies or MDNR public waters within the BDWMO and any management actions or projects performed for those waterbodies.

4.7.4 Financing Policies

63. The BDWMO will pay for implementation program elements through either the BDWMO general fund (the annual contributions of its member cities), partner cost sharing, or grant funding, in accordance with the joint powers agreement.
64. The BDWMO will apportion the operation and maintenance costs associated with BDWMO improvement projects according to the BDWMO joint powers agreement.
65. The BDWMO will continue to fund lake monitoring (see Section 5.1.4) and tracking of trends for the strategic waterbodies through the BDWMO general fund.
66. The BDWMO will fund diagnostic feasibility studies for strategic waterbodies through the BDWMO general fund.
67. The BDWMO will allocate the costs of intercommunity flood control projects on a case-by-case in cooperation with member cities, based on hydrology (e.g., stormwater runoff rates), and consistent with the methods described in the BDWMO joint powers agreement.
68. In general, the BDWMO will fund more detailed monitoring, survey, and technical analysis required to prepare diagnostic-feasibility studies, only when necessary to meet or maintain a BDWMO goal for a strategic waterbody.
69. The BDWMO will allocate the cost of water quality improvement projects on a case-by-case basis in cooperation with member cities to ensure equitable contributions from member cities and consistent with the BDWMO joint powers agreement. For strategic waterbodies where the tributary watershed is completely contained within one city, the costs of water quality improvement projects will be paid for by the individual city.
70. The BDWMO will fund internal load reduction projects stemming from TMDLs, WRAPS, or similar studies for strategic waterbodies with intercommunity shoreline (Crystal Lake, Keller Lake, and Lac Lavon). The capital project costs will be apportioned among the member cities as specified in the BDWMO joint powers agreement (excluding the City of Eagan).

-
71. The BDWMO will seek grant funding for BDWMO-implemented projects or programs.
 72. The BDWMO will work with member cities to pursue and execute grants sought by the member cities. The BDWMO may serve as the grant applicant, act as a fiscal agent for its member cities for grants that require WMO sponsorship, or assist member cities acting as the applicant, and may provide funds for preparing grant applications.
 73. Member cities may enter into individual joint powers agreements with one another regarding cost allocations for lake improvement projects, as an alternative to using the methods set forth in the BDWMO joint powers agreement.

4.8 Education and Public Involvement

4.8.1 Goals

- S. Increase awareness and knowledge of community members regarding water resources and stormwater management through actions coordinated with member cities, Dakota SWCD, and other partners, including:
 - presentations at K-12 schools
 - electronic newsletters/social media posts presenting information on priority issues
 - resource clean-up events or similar volunteer activities
- T. Increase community capacity to implement water and natural resource stewardship action through:
 - increased participation in volunteer activities
 - increased participation in small-scale BMP cost share projects
 - consistently providing data through accessible media

4.8.2 Policies

74. The BDWMO will continue to publish a watershed annual report for public distribution that summarizes its activities.
75. The BDWMO will maintain its web site (<https://blackdogwmo.org/>). The website will be updated with meeting agendas, project updates and reports, annual reports, and educational links.
76. The BDWMO will cooperate with cities and other partners to leverage social media, partner websites, email, and other digital media to communicate with the public.
77. The BDWMO will coordinate with member cities to use survey results (when available) or other available public feedback (e.g., public meetings) to assess the success of education and engagement activities.

-
78. The BDWMO will cooperate with member cities and other partners to identify, organize, and implement volunteer activities aimed at water and natural resource stewardship (e.g., shoreline cleanup, adopt-a-drain).
 79. The BDWMO will continue to advertise and support resident participation in BMP cost-share programs (e.g., Dakota SWCD's Landscaping for Clean Water program).
 80. The BDWMO will coordinate and communicate with lake homeowner associations and other appropriate citizen groups as needed. Communication efforts could include distributing BDWMO annual reports, lake water quality reports, meeting notices, and meeting agendas to these groups.
 81. The BDWMO will coordinate with member cities to identify and take advantage of opportunities to engage residents at public events, as appropriate.
 82. The BDWMO will convene technical and/or citizen advisory committees on an as-needed basis. The technical advisory committee will meet at least annually (see Section 5.1.3.1).
 83. The BDWMO encourages the member city technical staff and the agency representatives to attend the BDWMO meetings and provide the BDWMO with updates and provide input on technical issues.
 84. The BDWMO will continue to emphasize partnerships and collaborative roles with member cities, Dakota SWCD, and other organizations to achieve shared educational and water quality goals, including through engagement with K-12 schools.
 85. The member cities will seek citizen assistance in maintaining monitoring programs that rely on volunteers (e.g., CAMP, see Section 2.8.2).
 86. Member cities shall continue to perform public education and outreach activities outlined in their NPDES MS4 permits.

4.9 BDWMO Performance Standards

The BDWMO requires the policies, standards and criteria presented in this section, or an approved equivalent, to be incorporated into each city's local water management plan during the local plan's next revision. The BDWMO expects that member cities will implement the standards within two years of approval of the BDWMO Plan, regardless of the local plan revision schedule.

4.9.1 Performance Standards

1. Member cities shall maintain or strengthen stormwater management, erosion and sediment control, wetland, floodplain and shoreland official controls. Member cities shall notify the BDWMO of updates to relevant local controls. The BDWMO reserves the right to review these regulations or other regulations affecting the BDWMO water resources for compliance with this Plan.

2. The BDWMO requires that any project disturbing more than 1 acre (or part of a larger project exceeding 1 acre of land disturbance) shall be subject to/trigger the appropriate member city's local performance standards for rate control, volume control, and permanent water quality treatment, as shown in Table 4-1.
3. The BDWMO requires that all new, reconstructed, or redeveloped stormwater management facilities (e.g., pipes, ponds, treatment facilities) conform to the policies presented in this Plan.
4. For new, reconstructed, or redeveloped stormwater discharge points/outfalls, member cities must provide pretreatment of stormwater prior to its discharge to category I-III waterbodies and wetlands, the Black Dog Fen, and trout streams.
5. The City of Lakeville shall restrict the Orchard Lake outlet to maintain its peak outflow at 65 cfs to help prevent capacity and erosion problems downstream in the City of Credit River and the City of Savage.
6. The BDWMO requires that the level of protection along all trunk conveyors, streams, and channels and around all wetlands, ponds, detention basins, and lakes resulting from new development be based on the current critical-duration 100-year flood. Member cities shall strive to meet this standard for redeveloped/reconstructed systems.
7. The BDWMO requires that new non-trunk stormwater facilities provide discharge capacity for the critical-duration runoff event that is not less than the current five-year frequency event, preferably the current 10-year frequency event (level of service). Member cities shall strive to meet this standard for redeveloped/reconstructed systems.
8. Where proposed development, redevelopment, and infrastructure projects are unable to meet the performance standards documented in this Plan, member cities shall seek input from BDWMO regarding project acceptability.
9. Member cities shall ensure that proposed development, redevelopment, and/or infrastructure projects will not increase downstream flood risk relative to existing conditions.
10. Member cities shall incorporate emergency overflow structures (i.e., swales, spillways), where feasible, into pond outlet structure designs to minimize flood risk resulting from storms larger than the 100-year event or plugged outlet conditions.
11. Member cities shall secure easements or fee title to the stormwater system as areas develop or redevelop.
12. Member cities shall require maintenance agreements for privately owned stormwater facilities that identify maintenance activities and the responsible party.
13. Member cities shall require minimum building elevations (including basement) at least one foot above the critical 100-year flood elevation for structures adjacent to inundation areas.

-
14. The BDWMO requires the following rate control standards:
- For new development and redevelopment, the peak stormwater runoff rate shall not exceed the existing peak rate for the 2-year, 10-year, and the 100-year storm events. "Subwatershed" may be the project site or may be an area of greater size for which an approved local water management plan meets this criterion.
 - Analysis of peak stormwater rates shall be performed using a hydrograph method based on sound hydrologic theory and Atlas 14 (or more recent) precipitation data.
 - Rates may be further restricted when the capacity of the downstream conveyance system is limited.
15. Member cities shall be responsible for operating and maintaining city-owned stormwater facilities to achieve the intended water quality improvement, flood risk reduction, and other beneficial functions originally intended.
16. Structural BMPs that treat stormwater shall conform to standard engineering practices documented in the Minnesota Stormwater Manual or equivalent design standard.
17. Member cities will maintain local official controls to protect and manage wetlands at least as stringent as current performance standards (see Table 4-2), including minimum wetland buffer widths based on protection level or management classification and limits on water level bounce during storm events depending upon wetland protection level or management classification.

Table 4-1 Summary of BDWMO member city performance standards

	Apple Valley	Burnsville	Eagan	Lakeville
Stormwater Management Performance Standards				
Threshold(s)	<ul style="list-style-type: none"> Volume control: Varies Rate control: All developments and re-development activities Water quality: All developments with activity of 0.2 acres or more 	Any project resulting in 0.5 acre or more of disturbance or 5,000 square feet or more of new impervious surface.	Required for building, grading, and excavation permits, or for any activity that results in 10,000 square feet of new or fully reconstructed impervious surfaces.	1 acre or more of new impervious surface.
Rate Control	No increase over existing condition for the 2-yr, 10-yr and 100-yr events. City can enforce more stringent rate control if the capacity of the downstream system is more limited	No increase over existing condition for the 2-yr, 10-yr and 100-yr events using Atlas 14 rainfall depths and MSE 3 distribution ⁽¹⁾ .	No increase over existing condition for the 2-yr, 10-yr and 100-yr events.	No increase over existing condition for the 1-yr, 10-yr and 100-yr events.
Volume Control	<ul style="list-style-type: none"> All developments - Infiltrate 0.5 inches from the area of development Sites with over 0.2 acres - achieve no-net-increase in average annual runoff volume compared to the pre-development condition Sites with one acre or more of new impervious surfaces - keep runoff volume for the 2-yr-24 hr storm at or existing the runoff volume for the existing condition 	Infiltrate 1.1 inches from impervious surface for new development or 1.1 inches from reconstructed surface if more than 50% of site is redeveloped. Infiltrate 0.55 inch from impervious surface from redevelopment projects with less than or equal to 50% of site being redeveloped ⁽²⁾ .	Infiltrate 1.1 inches from new and/or fully reconstructed impervious surfaces. For linear projects, infiltrate 0.55 inches of runoff from new and/or fully reconstructed surfaces or 1.1 inches from net increase in impervious area	Infiltrate (or retain) 1.0 inch of runoff from all new impervious surface ⁽³⁾ .
Water Quality	No net increase in total suspended solids and total phosphorus compared to the pre-development site condition for projects creating 0.2 acres or more of impervious surface	Standard met if above volume control standard is met. Otherwise, for new development, 75% total phosphorus removal, and for redevelopment, 60% total phosphorus removal.	If cannot meet above, then retain 0.55 inches of runoff and remove 75% total phosphorus. If still not possible, remove volume to maximum extent possible and remove 60% total phosphorus.	Measures shall meet the standards for the NPDES Construction Permit. Using infiltration/filtration methods to meet these standards count toward volume control standards.
Erosion and Sediment Control Performance Threshold				
Erosion and Sediment Control Threshold	Movement of 20 cubic yards or 3,500 square feet of soil, loss of 10% or more of significant trees, or any other activity that changes the existing or natural contour of land which changes drainage.	Movement of 90 cubic yards or more of soil or installation of 5,000 square feet of impervious surface.	Disturbance of 10,000 square feet or change in drainage pattern.	Movement of 50 cubic yards of soil
Lowest Floor Elevation				
Minimum Building Elevation Standards	<p>The lowest floor shall be based on nearby waterbodies as follows:</p> <ul style="list-style-type: none"> Waterbody with piped outlet - Low floor must be minimum of 3 feet above the outlet elevation and 2 feet above the 1% flood elevation Waterbody without piped outlet - Low floor must be a minimum of 5 feet above the 1% flood elevation Creeks or waterbodies within floodplain zoning district - Low floor must be 2 feet above the 1% flood elevation Subsurface stormwater BMPs - Low floor must be a minimum of 3 feet above the 1% flood elevation 	<p>Low building elevation shall be set to the higher of the following:</p> <ol style="list-style-type: none"> Low floor elevation must be one foot above the base flood elevation (1% chance flood) according to the city's flood insurance rate map. Low floor shall be two feet or more above the 100-yr-24 hour event as determined by technical evaluation by qualified engineer or hydrologist 	<p>The lowest floor (including basement) shall be:</p> <ul style="list-style-type: none"> At least 2 feet above the regulatory flood protection elevation (i.e., 3 feet above the 100-year flood elevation) At least 3 feet above the seasonal high local groundwater elevation At least 1 foot above the stormwater facility emergency overflow elevation 	All structures, including accessory structures, shall be such that the lowest floor of the lowest enclosed area (including basement and crawl space) is no less than two feet above the regulatory flood protection elevation (100-year flood elevation).

Notes:

(1) Projects in the Vermillion River Watershed and sites that discharge to Black Dog Fen must also not increase the discharge rate for the 1-year event

(2) Projects in the Vermillion River Watershed that create 1 or more acre of new impervious surface, must control volume to the predevelopment volume for the 2-yr event (2.75 inches)

(3) 1.5 inch is required in the South Creek drainage district (trout stream tributary)

(4) Infiltration/filtration are the preferred methods for satisfying water quality requirements of the NPDES construction permit. Ponds allowed if no net increase in the temp of discharge for the 2-yr event, and it is designed for zero discharge for the 2-yr event, or the volume control requirements are met and ponds are designed to limit temp increases.

Table 4-2 BDWMO member city wetland management performance standards

	Apple Valley		Burnsville		Eagan		Lakeville		
	Mgmt Class	Standard	Mgmt Class	Standard	Mgmt Class	Standard	Mgmt Class	Standard	
Buffers	Average/Minimum (ft)		Average/Minimum (ft)		Minimum (ft)		Minimum (ft)		
	Protect	50/30	Protect	50/30	Protect (W1)	50	Preserve	50/30	
	Manage 1	40/30	Improve	35/25	Priority (W2)	40	Manage 1	40/30	
	Manage 2	30/25	Manage 1	25/20	Priority A (W3)	40	Manage 2	30/25	
	Manage 3	25/16.5	Manage 2	20/20	Manage (W4)	30	Manage 3	25/16.5	
	Redevelop	16.5/16.5			Manage A (W5)	20	Restore	25	
					General Use (W6)	None			
Hydrology									
	Protect	Maintain existing hydrologic conditions for: • Bounce (10-yr) • Inundation (1, 2 & 10-yr)	Protect	Maintain existing conditions if no stormwater inflow, or: • Bounce = Existing + 6" • Inundation: - 1 & 2 yr = Existing + 1 day - 10-yr = Existing + 3 days • Outlet control = no change	Protect (W1)	None	Preserve	Maintain existing conditions for bounce (2-yr), if feasible	
	Manage 1	• Bounce = Existing + 6" • Inundation: - 1 & 2 yr = Existing + 1 day - 10-yr = Existing + 7 days	Improve	• Bounce = Existing + 9" • Inundation: - 1 & 2 yr = Existing + 1 day - 10-yr = Existing + 5 days • Outlet control = no change	Priority (W2)	None	Manage 1	• Bounce = Existing + 6", if feasible	
	Manage 2	• Bounce = Existing + 12" • Inundation: - 1 & 2 yr = Existing + 2 day - 10-yr = Existing + 14 days	Manage 1	• Bounce = Existing + 12" • Inundation: - 1 & 2 yr = Existing + 5 day - 10-yr = Existing + 15 days • Outlet control = Existing + 24"	Priority A (W3)	None	Manage 2	• Bounce = Existing + 12", if feasible	
	Manage 3	• Bounce = Existing + 48" • Inundation: - 1 & 2 yr = Existing + 7 day - 10-yr = Existing + 21 days	Manage 2	See City of Burnsville local water management plan	Manage (W4)	None	Manage 3	None	
					Manage A (W5)	None	Restore	• Bounce = Existing + 12", if feasible	
					General Use (W6)	None			
	Water Quality								
		Protect	NPDES standards	Protect	New Development: treat to 90% TSS & 60% TP removal, 1.0-inch infiltration volume where allowed. Redevelopment: treat to 70% TSS & 30% TP removal, 0.5 inch infiltration volume where allowed.	Protect (W1)	Retain 1.1 inches of runoff from new and/or reconstructed impervious surfaces, or: 1. Retain 0.55 inches of runoff and remove 75% TP 2. Retain as much volume as possible and remove 60% TP	Preserve	Minimize impacts and restore to the extent practical
Manage 1		Improve		Priority (W2)		Manage 1			
Manage 2		Manage 1		Priority A (W3)		Manage 2			
Manage 3		Manage 2		Minimum of grit removal.	Manage (W4)	Manage 3		None	
					Manage A (W5)	Restore		Minimize impacts and restore to the extent practical	
					General Use (W6)				

Notes:

See member city ordinances and/or local water management plans for most current standards;

TP = total phosphorus; TSS = total suspended solids

5.0 Implementation Program

The BDWMO implementation program summarizes the activities the BDWMO plans to perform (alone or in collaboration with partners) over the next 10 years. The implementation program includes administrative activities, programs (e.g., monitoring), studies, and projects necessary to pursue BDWMO goals. Methods for prioritizing and funding programs, projects, and capital improvements are also discussed in this section.

5.1 BDWMO Roles and Responsibilities

The roles and responsibilities of the BDWMO are described in this section, subdivided into the following categories:

- Administration
- Engineering and planning
- Monitoring
- Education and outreach
- Projects, studies, and capital improvements

The BDWMO is not a permitting authority. The member cities are responsible for primary management of stormwater and water resources within their boundaries through local controls and processes. In turn, the BDWMO ensures that the member cities adopt and implement the policies and performance standards in the BDWMO Plan.

The member cities will continue as the local government units (LGUs) responsible for administering the Wetland Conservation Act (WCA) within their boundaries and will continue to implement and enforce their existing local controls related to water resource management. Mn/DOT serves as the LGU for the WCA within its right-of-way. The member cities, other units of government, and private parties are responsible for maintaining their respective stormwater systems.

5.1.1 Administration

The BDWMO's administration activities include work performed to satisfy Minnesota Rules for watershed management organizations and those that pertain to the organization, administration, and operation of the BDWMO. This includes time and expenses for an administrator, recording services, and legal counsel. This category also includes activities related to annual work planning, reporting, and progress assessment, as well as activities performed in pursuit of external funding (e.g., grant) opportunities.

5.1.2 Engineering and planning

Engineering and planning activities include work performed by the BDWMO administrator and/or BDWMO engineer(s) to address technical issues identified by the commissioners, member cities, partners, or other stakeholders, as needed. This category also includes BDWMO review and comment on member city local water management plans (see Section 5.5) and ordinances, coordination with partner planning efforts, and updates and amendments to the BDWMO Watershed Management Plan (this document).

5.1.3 Education and Outreach Program

Education activities include those activities performed by BDWMO staff and in cooperation with member cities, Dakota County SWCD, and other partners. These activities are identified in Table 5-2. The BDWMO carries out much of its educational programming through the member cities and Dakota County SWCD. Member cities distribute articles and newsletters that address water and natural resource information, including, but not limited to:

- Pollution prevention stewardship practices
- Wetland protection
- Invasive species prevention and management
- Groundwater quality
- Water conservation
- Hazardous waste disposal
- Reducing winter salt application
- Small-scale BMP cost-share opportunities

Consistent with Minnesota Rules 8410.0160, the BDWMO maintains a website that contains the BDWMO meeting information, commissioner and staff contact information, monitoring reports and studies, planning documents, annual reports, and links to additional information. The BDWMO website is: <https://blackdogwmo.org/>

Through the implementation of this Plan, the BDWMO seeks to expand its cooperative roles with Dakota County SWCD and member cities to engage residents and stakeholders through:

- Presenting water resource related programming in K-12 schools
- Recruiting volunteers water resource management activities (e.g., citizen monitoring, shoreline cleanup)
- Engaging residents at community events to share information
- Supporting workshops for design of residential stormwater BMPs and other stewardship activities

The BDWMO will continue to prepare an annual newsletter summarizing the relevant BDWMO and member city activities from the prior year. The BDWMO posts the newsletter on its website and member cities advertise/distribute the newsletter through their respective social media and electronic communication resources.

5.1.3.1 Technical Advisory Committee

The BDWMO encourages member city staff to regularly attend and contribute to BDWMO commissioner meetings. The BDWMO also convenes a larger technical advisory committee (TAC), as needed, to receive input and/or technical assistance on selected issues, studies, and projects. In addition to member city staff, the TAC includes, but is not limited to:

- Minnesota Board of Water and Soil Resources (BWSR)
- Minnesota Pollution Control Agency (MPCA)

-
- Minnesota Department of Natural Resources (MDNR)
 - Metropolitan Council Environmental Services
 - Dakota County (Environmental and Groundwater divisions)
 - Dakota County Soil and Water Conservation District

The BDWMO commissioners may invite additional stakeholders to participate in the TAC, as appropriate. In addition to meetings of the larger TAC (or in coordination with those meetings), the BDWMO will convene a “local” TAC consisting of member city and Dakota County SWCD staff at least annually to align the BDWMO implementation schedule with member city capital improvement programs and establish a work plan for the coming year.

5.1.4 Monitoring Program

The BDWMO cooperates with member cities and state and regional partners to monitor the water resources within the watershed. The different monitoring programs active within the watershed are summarized in Section 2.8. BDWMO monitoring efforts are focused on water quality and ecology of strategic waterbodies. Partner monitoring includes lake levels (MDNR, member cities), wetland health (Dakota County), and others (see Section 2.8 and Section 2.12.3),

Specifically, the BDWMO plans to perform management-level monitoring of strategic waterbodies on a 5-year rotating schedule as presented in Table 5-1. With this Plan update, the scope of management level monitoring has been revised to include:

- Water chemistry monitoring from May through September; parameters include:
 - phosphorus
 - chlorophyll-a
 - transparency (Secchi depth)
 - chloride
 - depth profiles of phosphorus, temperature, dissolved oxygen, and conductivity
- Aquatic vegetation point intercept surveys (early season and late season)
- Phytoplankton monitoring

In years between BDWMO management-level monitoring, the BDWMO funds monitoring of strategic waterbodies through the Metropolitan Council’s Citizen Assisted Monitoring Program (CAMP) or similar program(s). The BDWMO will continue to use management-level monitoring results, CAMP monitoring results, and other publicly available data (e.g., fisheries data) to assess water quality trends. The BDWMO annually publishes a monitoring report summarizing the results of the previous year’s BDWMO monitoring efforts.

Table 5-1 BDWMO strategic waterbody monitoring schedule (2023-2032)

Waterbody	Year									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Crystal Lake	O,C	O,C	X	O,C	O,C	O,C	O,C	X	O,C	O,C
Keller Lake	X	O,C	O,C	O,C	O,C	X	O,C	O,C	O,C	O,C
Kingsley Lake	O,C	O,C	O,C	O,C	X	O,C	O,C	O,C	O,C	X
Lac Lavon	O,C	O,C	O,C	X	O,C	O,C	O,C	O,C	X	O,C
Orchard Lake	O,C	X	O,C	O,C	O,C	O,C	X	O,C	O,C	O,C

X = Management-level monitoring performed by BDWMO

O = Citizen-assisted monitoring program (Metropolitan Council) or similar (e.g., member city)

C = Chloride monitoring via BDWMO, Metropolitan Council, and/or member cities

5.1.4.1 Water quality trend analysis and goal evaluation

The BDWMO has established lake water quality goals for strategic waterbodies based on state water quality goals or existing water quality data (see Section 4.1.1). To assess progress towards goals, the BDWMO annually reviews water quality data to identify trends in summer (June-September) averages of total phosphorus, chlorophyll-a, and Secchi depth transparency. The BDWMO performs a regression analysis using data from the most recent 10-year period and identifies trends that are significant at the 90th percentile.

The BDWMO also uses the presence of statistically significant trends as an indicator to assess whether resource-specific water quality goals are being met (see Section 4.1.1). For water quality goals based on existing 10-year (2012 – 2021) summer average water quality, the BDWMO will use the trend analysis performed every year to identify the presence or absence of statistically significant degrading water quality trends as a first step to evaluate if current water quality deviates from the goal values. If a statistically significant degrading trend is identified, the BDWMO will use a t-test (or other similarly appropriate statistical test) to evaluate whether the 10-year average water quality is significantly different from the goal values.

If a statistically significant degrading (i.e., increasing phosphorus or chlorophyll, decreasing transparency) trends are identified, the BDWMO will assess the need to additional management actions. Potential BDWMO actions to address degrading water quality trends may include (in order of approximate level of effort):

- More frequent management-level monitoring or more intensive monitoring
- Studies and/or modeling to identify drivers of the degrading trend (e.g., pollutant loading)
- Design and implementation of programs or projects to address water quality drivers

5.1.5 Projects, Studies, and Capital Improvements

Projects, studies, and capital improvements known at the time of Plan development are identified in Table 5-2. Several of these activities are likely to be implemented in cooperation with the Dakota SWCD and/or

member cities as partners. The BDWMO seeks to utilize BWSR Clean Water Fund Watershed-Based Implementation Funding (WBIF) to support some of these projects, as well as competitive grants, city cost-share, and BDWMO funds. For projects with intercommunity drainage areas and/or intercommunity impacts, project costs will be apportioned consistent with the BDWMO joint powers agreement (JPA) or individual agreements acceptable to all contributors.

Since the adoption of the 2012 Plan, the BDWMO and its member cities have completed several projects to address the nutrient impairments of Crystal, Keller, and Lee Lakes, including projects identified in the *Crystal, Keller, and Lee Lakes Nutrient Impairment TMDL Implementation Plan and Earley Lake Protection Plan* (MPCA, 2011). These projects have improved water quality and resulted in the delisting of Crystal Lake and Lee Lake. The BDWMO and member cities continue to seek opportunities to implement water quality improvement projects within the watersheds of strategic waterbodies.

Specific project opportunities not yet identified are likely to arise during the life of this Plan. The BDWMO has attempted to include placeholder costs for these opportunities, where appropriate. The BDWMO will coordinate with member cities at least annually to clarify these opportunities and will perform Plan amendments (see Section 5.6), as needed, to incorporate future projects. Additional project definition (e.g., feasibility studies) may be required prior to adding potential projects to the implementation schedule.

The BDWMO does not implement an operations and maintenance (O&M) program as it does not own stormwater management infrastructure. The BDWMO requires member cities to maintain city-owned infrastructure and require maintenance agreement from developers detailing O&M responsibilities for privately owned stormwater infrastructure (see Section 5.5).

5.2 Implementation Schedule

5.2.1 Implementation Plan Structure

The BDWMO's implementation schedule is organized into the following major categories:

- Administration and Engineering
- Education and Public Involvement
- Monitoring
- Projects, studies, and capital improvements

Proposed activities are listed and described in Table 5-2 according to the above categories. Table 5-2 includes the following planning-level information:

- Activity category
- Activity title
- Priority level (see Section 5.2.2)
- Goals addressed by the activity (see Section 4.0)
- Potential partners
- Estimated total cost over the 10-year Plan life (planning level)

Estimate costs broken down by year of planned implementation are presented in Table 5-3. Various implementation activities that have been completed since the development of the 2012 BDWMO Plan are presented in Section 1.2.2.

5.2.2 Prioritization and Targeting

The BDWMO has prioritized issues and resources to leverage finite staff and financial resources most effectively. Through the implementation of this Plan, the BDWMO will focus on its five strategic waterbodies and their respective watersheds, including:

- Crystal Lake
- Keller Lake
- Kingsley Lake
- Lac Lavon
- Orchard Lake

The BDWMO has classified activities presented in Table 5-2 as having “high” or “medium” priority with consideration for several factors.

High Priority – high priority activities include those actions necessary for the BDWMO to exist and operate, activities required by Minnesota Statute 103B and Minnesota Rules 8410 (e.g., plan development, annual reporting), and activities that primarily address high priority issues identified in Section 2.0 and strategic waterbodies.

Medium Priority – medium priority activities include those that are not required by statute or rule and are not essential to addressing high priority issues identified in Section 2.0 and strategic waterbodies.

This classification system is qualitative and intended to serve as a guide for annual work planning and budgeting. Activities in the annual work plan may be accelerated, delayed, or delegated relative to the 10-year implementation schedule. For example, activities led by member cities or other partners may be implemented earlier or later than planned due to changing partner priorities, funding, and schedules. Factors considered in the development of the annual work plan may include the following:

- Annual budget commitments from previous years (i.e., ongoing responsibilities)
- Available revenues, grants, and cost-share funding (e.g., from cities or agencies)
- Activity priority
- Feasibility considerations
- Risk (of performing or not performing the activity)
- Results of monitoring or studies
- Input from member cities, TAC, and other partners

The implementation schedule (Table 5-2) is a statement of intent by the BDWMO. Final decisions on implementation activities rest with the BDWMO commissioners to budget for and authorize via the annual work plan. During implementation, the commissioners may add additional projects, programs, studies, or

other activities to Table 5-2 via a Plan amendment (see Section 5.6), as needed. The commissioners will give priority to projects according to factors including:

- Drainage to strategic waters
- Estimated pollutant reduction achieved by the project
- Potential to address multiple issues/goals
- Opportunities for partner cooperation (e.g., City, landowner)
- Anticipated funding availability

Table 5-2 BDWMO Implementation Schedule (with activity descriptions) - 60-day review draft

Category	Activity ID	Activity	Activity Description	Primary Plan Goal(s)	Funding Source	Priority Level	Partners	BDWMO Costs	Estimated Grant Funds	Total 10-year cost
Administration and Engineering	AE-1	General Administration	Administration includes services of a contracted administrator as well as recording, financial, and legal services. The BDWMO administrator will lead budgeting, preparing agendas and meeting packets, facilitating meeting discussions, correspondence, fielding questions or requests from agencies or residents, annual work planning (in cooperation with City/Dakota SWCD staff), and other miscellaneous administration tasks not specifically addressed via other activities in this table.	Many, J, P	General Fund	High		\$ 190,000	\$ -	\$ 190,000
	AE-2	Legal, audit, and insurance	This includes fees for legal services, audit services, and annual insurance costs	Many	General Fund	High		\$ 91,000	\$ -	\$ 91,000
	AE-3	Annual Report to BWSR	Annual reporting to the MN Board of Water and Soil Resources required by MN Rules 8410.0150.	Many	General Fund	High		\$ 21,000	\$ -	\$ 21,000
	AE-4	Biennial progress review	BDWMO staff will assess the level of progress achieved on each of the BDWMO's adopted goals at least biennially (including meeting with City/Dakota SWCD staff). The assessment will consider measurable aspects of each goal (e.g., water quality data), outputs of relevant implementation activities, and qualitative assessment, where appropriate.	Many	General Fund	High	Cities, Dakota SWCD	\$ 6,000	\$ -	\$ 6,000
	AE-5	Grant review and application	BDWMO staff will annually review grant opportunities and prepare applications, as appropriate, to fund BDWMO and/or member city projects. Important grant sources include the MDNR, MPCA, BWSR, and federal sources.	Q	General Fund	Medium	Cities	\$ 20,000	\$ -	\$ 20,000
	AE-6	Review and revise Joint Powers Agreement (JPA)	The BDWMO operates under a joint powers agreement signed by the member cities. The current agreement will expire January 1, 2030 and will need to be renewed or updated prior to expiration. See Section 12 subd. 1 of JPA.	P, R	General Fund	High	Cities	\$ 1,000	\$ -	\$ 1,000
	AE-7	Review funding mechanisms and member city dues	The BDWMO commissioners will review whether the current funding structure is sufficient to support implementation, is appropriate relative to tax burden, and if changes are necessary	Q	General Fund	Medium	Cities	\$ 1,000	\$ -	\$ 1,000
	AE-8	General Engineering	BDWMO engages its engineering consultant to provide technical assistance, review, analyses, or other services as needed to accomplish implementation tasks not otherwise identified within this table. This includes BDWMO staff review of the following for consistency with BDWMO requirements: - updates to City official controls - proposed changes to intercommunity stormwater systems - specific projects as requested by member cities	E, F, G, H	General Fund	High		\$ 310,000	\$ -	\$ 310,000
	AE-9	Review of Local Water Management Plans (LWMPs)	BDWMO staff will review, comment upon and recommend approval of local water management plans. BDWMO Board of Commissioners has the authority to approve local water management plans per MN Rules 8410.	G, P	General Fund	High	Cities	\$ 12,000	\$ -	\$ 12,000
	AE-10	BDWMO Watershed Management Plan update	Approximately 2-3 years before expiration of this plan, the BDWMO will begin the Plan update process. The BDWMO may initiate Plan amendments to revise this implementation schedule or other Plan content, as needed.	Many	General Fund	High	Cities, Agencies	\$ 104,000	\$ -	\$ 104,000
Education and Public Involvement	ED-1	Website Administration	The BDWMO maintains a website. BDWMO staff and/or partners will post relevant news, meeting dates, permit applications, studies/planning documents, and links to partner websites.	S	General Fund	High	Dakota SWCD	\$ 35,000	\$ -	\$ 35,000
	ED-2	Prepare and publish annual report (newsletter) to BDWMO website	BDWMO staff will prepare an annual newsletter targeted to a public audience. The newsletter will be published on the BDWMO website.	S, T	General Fund	High		\$ 45,000	\$ -	\$ 45,000
	ED-3	Coordination with Dakota SCWD and member cities for K-12 programming	BDWMO staff will coordinate with and/or provide financial support to member cities and Dakota SWCD to develop K-12 educational programming and present material at schools within the watershed.	S	General Fund	High	Cities, Dakota SWCD	\$ 34,000	\$ -	\$ 34,000
	ED-4	Coordinate with member cities to develop and distribute educational information	BDWMO staff will coordinate with member cities and Dakota SWCD staff to distribute educational information related to priority issues via partner social media, websites, newsletters, and other media. Topics include, but are not limited to: - wetland protection and buffers - water conservation - invasive species prevention - winter salt use best practices	I, K, O, S	General Fund	High	Cities, Dakota County, Dakota SWCD	\$ 10,000	\$ -	\$ 10,000
	ED-5	Sponsor workshops to support resident/ landowner stewardship practices	The BDWMO will provide financial support to fund training/workshops to support landowner natural resource stewardship activities (e.g., Dakota SWCD's Landscaping for Clean Water or similar programs)	K, O, T	General Fund	High	Cities, Dakota SWCD	\$ 120,000	\$ -	\$ 120,000
	ED-6	Coordinate with partners to identify and support volunteer efforts	BDWMO staff will work with member cities to identify and facilitate opportunities for volunteers to participate in water quality monitoring, resource clean up, and other education opportunities	I, T	General Fund	Medium	Cities, Dakota SWCD	\$ 25,000	\$ -	\$ 25,000
Monitoring	MN-1	Management level monitoring of strategic waterbodies and reporting	The BDWMO funds management level monitoring of its five strategic waterbodies on a 5-year rotating basis: Crystal Lake, Keller Lake, Kingsley Lake, Lac Lavan, and Orchard Lake. Monitoring includes water chemistry (including chloride), aquatic vegetation, and phytoplankton. BDWMO staff assesses monitoring results for trends and develops a monitoring report for each lake.	A	General Fund	High	Cities	\$ 342,000	\$ -	\$ 342,000
	MN-2	CAMP monitoring of strategic waterbodies	The BDWMO works with member cities to financially support annual water quality monitoring of strategic waterbodies through the Metropolitan Council's Citizen Assisted Monitoring Program (CAMP)	A	General Fund	High	Met Council, Cities	\$ 40,000	\$ -	\$ 40,000
	MN-3	Chloride monitoring of strategic waterbodies	The BDWMO works with member cities to fund annual chloride monitoring of strategic waterbodies if not included in CAMP monitoring (see item MN-2).	D	General Fund	High	Cities	\$ 15,000	\$ -	\$ 15,000
	MN-4	Identification of reference lakes for water quality and ecological health benchmarks	BDWMO staff will work with member cities to identify potential reference lakes to assess/develop ecological health benchmarks for strategic waterbodies	L	General Fund	Medium	Cities, MDNR, MPCA	\$ 4,000	\$ -	\$ 4,000
	MN-5	Review of ecological health monitoring strategy	BDWMO staff will work with member cities and other partners to review and revise, as needed, ecological health monitoring parameters.	L	General Fund	Medium	Cities, MDNR, MPCA	\$ 8,000	\$ -	\$ 8,000

Table 5-2 BDWMO Implementation Schedule (with activity descriptions) - 60-day review draft

Category	Activity ID	Activity	Activity Description	Primary Plan Goal(s)	Funding Source	Priority Level	Partners	BDWMO Costs	Estimated Grant Funds	Total 10-year cost
Projects/ Programs	Watershed-wide projects/programs									
	PP-1	Implement small and medium-scale private stormwater BMPs	Provide financial support and/or technical assistance for projects including shoreline restoration, erosion control, and stormwater management. The BDWMO will fund cost-share grants for small-scale projects. Funding for medium-scale projects will be sought through other grant sources. Project funding and technical assistance will be administered through the Dakota County SWCD or City cost share programs.	A, B, C	General Fund	High	Cities, Dakota County, SWCD, private Dakota County, MDNR, MDH	\$ 140,000	\$ 100,000	\$ 240,000
	PP-2	Groundwater protection planning and technical assistance	BDWMO staff will coordinate with MDNR, MDH, Dakota County, and other agencies in an advisory capacity to address groundwater quality and quantity issues.	O	General Fund	High	MDNR, MDH	\$ 10,000	\$ -	\$ 10,000
	PP-3	Chloride education and outreach for landowners	Develop or obtain chloride educational materials for property owner and service companies; perform site visit outreach to promote lower salt use practices in areas of high-density land use	D	General Fund	High	Cities, MPCA	\$ 5,000	\$ -	\$ 5,000
	Crystal Lake Watershed projects/programs									
	CL-1	Crystal Lake watershed stormwater quality BMPs	Construct BMPs to improve stormwater quality within the Crystal Lake watershed. Priority opportunities include Crystal Beach Park and impervious areas (parking lots, roads) adjacent to Crystal Lake shoreline.	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²	\$ -
	CL-2	Crystal Lake shoreline native buffers	Create or restore native buffer along degraded portions of Crystal Lake shoreline, prioritizing conversion of turf grass to native plants at Crystal Beach Park, continued buckthorn removal, and buffer management (e.g., Crystal Lake West Park).	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²	\$ -
	CL-3	Crystal Lake aquatic plant management	Aquatic plant (macrophyte) management to control curlyleaf pondweed, Eurasian watermilfoil, or other AIS (littoral areas or whole lake treatments) and establish and/or promote native aquatic vegetation.	K, L, M	Partners, Grants	Medium	Cities, Dakota County, MDNR	TBD ¹	TBD ²	\$ -
	Keller Lake Watershed projects/programs									
	KL-1	Keller Lake watershed stormwater quality BMPs implementation	Implement stormwater quality improvement BMPs identified in the Keller Lake subwatershed assessment (City of Apple Valley, 2017) and/or similar studies, prioritizing areas that are currently untreated.	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²	\$ -
	KL-2	Keller Lake shoreline native buffers	Create or restore native buffer along degraded portions of Keller Lake shoreline.	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²	\$ -
	KL-3	Keller Lake aquatic plant management	Aquatic plant (macrophyte) management to control curlyleaf pondweed, Eurasian watermilfoil, or other AIS, and activities to reestablish and promote native plant community consistent with the MDNR-approved Keller Lake aquatic plant management plan.	K, L, M	Partners, Grants	Medium	Cities, Dakota County, MDNR	TBD ¹	TBD ²	\$ -
	Kingsley Lake Watershed projects/programs									
	KG-1	Kingsley Lake watershed stormwater quality BMPs	Construct BMPs to improve stormwater quality within the Kingsley Lake watershed. Priority opportunities include direct discharges adjacent to Highway 5 with little or no existing treatment.	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²	\$ -
	KG-2	Kingsley Lake shoreline native buffers	Create or restore native buffer along degraded portions of Kingsley Lake shoreline.	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²	\$ -
	KG-3	Kingsley Lake aquatic plant management	Aquatic plant (macrophyte) management to control curlyleaf pondweed, Eurasian watermilfoil, or other AIS (littoral areas or whole lake treatments) and establish and/or promote native aquatic vegetation.	K, L, M	Partners, Grants	Medium	Cities, Dakota County, MDNR	TBD ¹	TBD ²	\$ -
	Lac Lavon Watershed projects/programs									
	LL-1	Lac Lavon watershed stormwater quality BMPs	Construct BMPs to improve stormwater quality within the Lac Lavon watershed. Priority opportunities include direct discharges with no existing treatment.	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²	\$ -
	LL-2	Lac Lavon shoreline native buffers	Create or restore native buffer along degraded portions of Lac Lavon shoreline. Activities include invasive species management on shoreline (buckthorn and purple loosestrife).	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²	\$ -
	LL-3	Lac Lavon aquatic plant management	Aquatic plant (macrophyte) management to control curlyleaf pondweed, Eurasian watermilfoil, or other AIS (littoral areas or whole lake treatments) and establish and/or promote native aquatic vegetation.	K, L, M	Partners, Grants	Medium	Cities, Dakota County, MDNR	TBD ¹	TBD ²	\$ -
	Orchard Lake Watershed projects/programs									
	OL-1	Orchard Lake watershed stormwater quality BMPs	Construct BMPs to improve stormwater quality within the Orchard Lake watershed. Priority opportunities include direct discharges with no existing treatment.	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²	\$ -
	OL-2	Orchard Lake shoreline native buffers	Create or restore native buffer along degraded portions of Orchard Lake shoreline (shoreline mostly privately owned).	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²	\$ -
	OL-3	Orchard Lake aquatic plant management	Aquatic plant (macrophyte) management to control curlyleaf pondweed, Eurasian watermilfoil, or other AIS (littoral areas or whole lake treatments) and establish and/or promote native aquatic vegetation.	K, L, M	Partners, Grants	Medium	Cities, Dakota County, MDNR	TBD ¹	TBD ²	\$ -
Notes:										
(1) Local funding assumed to be provided by City/partners with no direct cost to BDWMO unless otherwise specified					Administration & Engineering		\$ 756,000	\$ -	\$ 756,000	
(2) BDWMO may apply for and administer (if fiscal agent) CWF, WBIF, and/or other grant funding to support City cost-share projects					Education & Outreach		\$ 269,000	\$ -	\$ 269,000	
(3) Grant funding sources include an estimated approximately \$375,000 in WBIF over 10 years; the allocation of WBIF to specific projects remains TBD					Monitoring		\$ 409,000	\$ -	\$ 409,000	
					Projects ³		\$ 155,000	TBD ³	\$ 255,000	
					Total		\$ 1,589,000	\$ -	\$ 1,689,000	
					Inflation (3%) Adjusted Total		\$ 1,946,408	\$ -	\$ 1,707,634	

Table 5-3 BDWMO Implementation Schedule (estimated costs by year) - 60-day review draft

Category	Activity ID	Activity	Primary Plan Goal(s)	Funding Source	Priority Level	Partners	BDWMO Costs	Estimated Grant Funds	Total 10-year cost	Total 10-year cost	Estimated Cost by Year (Planning Level) - presented in 2022 dollars									
											2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Administration and Engineering	AE-1	General Administration	Many, J, P	General Fund	High		\$ 190,000	\$ -	\$ 190,000	\$ 190,000	\$ 19,000	\$ 19,000	\$ 19,000	\$ 19,000	\$ 19,000	\$ 19,000	\$ 19,000	\$ 19,000	\$ 19,000	\$ 19,000
	AE-2	Legal, audit, and insurance	Many	General Fund	High		\$ 91,000	\$ -	\$ 91,000	\$ 91,000	\$ 8,000	\$ 8,000	\$ 13,500	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 13,500	\$ 8,000	\$ 8,000
	AE-3	Annual Report to BWSR	Many	General Fund	High		\$ 21,000	\$ -	\$ 21,000	\$ 21,000	\$ 3,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000
	AE-4	Biennial progress review	Many	General Fund	High	Cities, Dakota SWCD	\$ 6,000	\$ -	\$ 6,000	\$ 6,000		\$ 2,000		\$ 1,000		\$ 1,000		\$ 1,000		\$ 1,000
	AE-5	Grant review and application	Q	General Fund	Medium	Cities	\$ 20,000	\$ -	\$ 20,000	\$ 20,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000
	AE-6	Review and revise Joint Powers Agreement (JPA)	P, R	General Fund	High	Cities	\$ 1,000	\$ -	\$ 1,000	\$ 1,000							\$ 1,000			
	AE-7	Review funding mechanisms and member city dues	Q	General Fund	Medium	Cities	\$ 1,000	\$ -	\$ 1,000	\$ 1,000					\$ 1,000					
	AE-8	General Engineering	E, F, G, H	General Fund	High		\$ 310,000	\$ -	\$ 310,000	\$ 310,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000
	AE-9	Review of Local Water Management Plans (LWMPs)	G, P	General Fund	High	Cities	\$ 12,000	\$ -	\$ 12,000	\$ 12,000						\$ 12,000				
	AE-10	BDWMO Watershed Management Plan update	Many	General Fund	High	Cities, Agencies	\$ 104,000	\$ -	\$ 104,000	\$ 104,000		\$ 2,000			\$ 2,000			\$ 20,000	\$ 50,000	\$ 30,000
Education and Public Involvement	ED-1	Website Administration	S	General Fund	High	Dakota SWCD	\$ 35,000	\$ -	\$ 35,000	\$ 35,000	\$ 3,500	\$ 3,500	\$ 3,500	\$ 3,500	\$ 3,500	\$ 3,500	\$ 3,500	\$ 3,500	\$ 3,500	\$ 3,500
	ED-2	Prepare and publish annual report (newsletter) to BDWMO website	S, T	General Fund	High		\$ 45,000	\$ -	\$ 45,000	\$ 45,000	\$ 4,500	\$ 4,500	\$ 4,500	\$ 4,500	\$ 4,500	\$ 4,500	\$ 4,500	\$ 4,500	\$ 4,500	\$ 4,500
	ED-3	Coordination with Dakota SCWD and member cities for K-12 programming	S	General Fund	High	Cities, Dakota SWCD	\$ 34,000	\$ -	\$ 34,000	\$ 34,000	\$ 5,000	\$ 5,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000
	ED-4	Coordinate with member cities to develop and distribute educational information	I, K, O, S	General Fund	High	Cities, Dakota County, Dakota SWCD	\$ 10,000	\$ -	\$ 10,000	\$ 10,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000
	ED-5	Sponsor workshops to support resident/ landowner stewardship practices	K, O, T	General Fund	High	Cities, Dakota SWCD	\$ 120,000	\$ -	\$ 120,000	\$ 120,000	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000
	ED-6	Coordinate with partners to identify and support volunteer efforts	I, T	General Fund	Medium	Cities, Dakota SWCD	\$ 25,000	\$ -	\$ 25,000	\$ 25,000	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500
Monitoring	MN-1	Management level monitoring of strategic waterbodies and reporting	A	General Fund	High	Cities	\$ 342,000	\$ -	\$ 342,000	\$ 342,000	\$ 35,000	\$ 35,000	\$ 35,000	\$ 33,000	\$ 33,000	\$ 35,000	\$ 35,000	\$ 35,000	\$ 33,000	\$ 33,000
	MN-2	CAMP monitoring of strategic waterbodies	A	General Fund	High	Met Council, Cities	\$ 40,000	\$ -	\$ 40,000	\$ 40,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000
	MN-3	Chloride monitoring of strategic waterbodies	D	General Fund	High	Cities	\$ 15,000	\$ -	\$ 15,000	\$ 15,000	\$ 1,500	\$ 1,500	\$ 1,500	\$ 1,500	\$ 1,500	\$ 1,500	\$ 1,500	\$ 1,500	\$ 1,500	\$ 1,500
	MN-4	Identification of reference lakes for water quality and ecological health benchmarks	L	General Fund	Medium	Cities, MDNR, MPCA	\$ 4,000	\$ -	\$ 4,000	\$ 4,000	\$ 4,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	MN-5	Review of ecological health monitoring strategy	L	General Fund	Medium	Cities, MDNR, MPCA	\$ 8,000	\$ -	\$ 8,000	\$ 8,000	\$ -	\$ 3,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,000	\$ -	\$ -

Table 5-3 BDWMO Implementation Schedule (estimated costs by year) - 60-day review draft

Category	Activity ID	Activity	Primary Plan Goal(s)	Funding Source	Priority Level	Partners	BDWMO Costs	Estimated Grant Funds	Total 10-year cost	Total 10-year cost	Estimated Cost by Year (Planning Level) - presented in 2022 dollars										
											2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	
Projects/ Programs	Watershed-wide projects/programs																				
	PP-1	Implement small and medium-scale private stormwater BMPs	A, B, C	General Fund	High	Cities, Dakota County, SWCD, private Dakota County, MDNR, MDH	\$ 140,000	\$ 100,000	\$ 240,000	\$ 240,000	\$ 24,000	\$ 24,000	\$ 24,000	\$ 24,000	\$ 24,000	\$ 24,000	\$ 24,000	\$ 24,000	\$ 24,000	\$ 24,000	
	PP-2	Groundwater protection planning and technical assistance	O	General Fund	High	Cities, Dakota County, MDNR, MDH	\$ 10,000	\$ -	\$ 10,000	\$ 10,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	
	PP-3	Chloride education and outreach for landowners	D	General Fund	High	Cities, MPCA	\$ 5,000	\$ -	\$ 5,000	\$ 5,000	\$ 2,000	\$ 1,000	\$ 1,000	\$ 1,000							
	Crystal Lake Watershed projects/programs																				
	CL-1	Crystal Lake watershed stormwater quality BMPs	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²	\$ -	\$ -											
	CL-2	Crystal Lake shoreline native buffers	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²	\$ -	\$ -											
	CL-3	Crystal Lake aquatic plant management	K, L, M	Partners, Grants	Medium	Cities, Dakota County, MDNR	TBD ¹	TBD ²	\$ -	\$ -											
	Keller Lake Watershed projects/programs																				
	KL-1	Keller Lake watershed stormwater quality BMPs implementation	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²													
	KL-2	Keller Lake shoreline native buffers	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²	\$ -	\$ -											
	KL-3	Keller Lake aquatic plant management	K, L, M	Partners, Grants	Medium	Cities, Dakota County, MDNR	TBD ¹	TBD ²	\$ -	\$ -											
	Kingsley Lake Watershed projects/programs									\$ -	\$ -										
	KG-1	Kingsley Lake watershed stormwater quality BMPs	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²	\$ -	\$ -											
	KG-2	Kingsley Lake shoreline native buffers	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²	\$ -	\$ -											
	KG-3	Kingsley Lake aquatic plant management	K, L, M	Partners, Grants	Medium	Cities, Dakota County, MDNR	TBD ¹	TBD ²	\$ -	\$ -											
	Lac Lavon Watershed projects/programs																				
	LL-1	Lac Lavon watershed stormwater quality BMPs	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²	\$ -	\$ -											
	LL-2	Lac Lavon shoreline native buffers	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²	\$ -	\$ -											
	LL-3	Lac Lavon aquatic plant management	K, L, M	Partners, Grants	Medium	Cities, Dakota County, MDNR	TBD ¹	TBD ²	\$ -	\$ -											
	Orchard Lake Watershed projects/programs																				
	OL-1	Orchard Lake watershed stormwater quality BMPs	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²	\$ -	\$ -											
	OL-2	Orchard Lake shoreline native buffers	A, B, C	Partners, Grants	Medium	Cities, Dakota SWCD	TBD ¹	TBD ²	\$ -	\$ -											
	OL-3	Orchard Lake aquatic plant management	K, L, M	Partners, Grants	Medium	Cities, Dakota County, MDNR	TBD ¹	TBD ²	\$ -	\$ -											
	Notes:				Administration & Engineering			\$ 756,000	\$ -	\$ 756,000	\$ 756,000	\$ 63,000	\$ 66,000	\$ 67,500	\$ 63,000	\$ 65,000	\$ 75,000	\$ 63,000	\$ 88,500	\$ 112,000	\$ 93,000
	(1) Local funding assumed to be provided by City/partners with no direct cost to BDWMO				Education & Outreach			\$ 269,000	\$ -	\$ 269,000	\$ 269,000	\$ 28,500	\$ 28,500	\$ 26,500	\$ 26,500	\$ 26,500	\$ 26,500	\$ 26,500	\$ 26,500	\$ 26,500	\$ 26,500
	(2) BDWMO may apply for and administer (if fiscal agent) CWF, WBIF, and/or other funding sources				Monitoring			\$ 409,000	\$ -	\$ 409,000	\$ 409,000	\$ 44,500	\$ 43,500	\$ 40,500	\$ 38,500	\$ 38,500	\$ 40,500	\$ 40,500	\$ 45,500	\$ 38,500	\$ 38,500
(3) Grant funding sources include an estimated approximately \$375,000 in WBIF funding				Projects ³			\$ 155,000	TBD ³	\$ 255,000	\$ 255,000	\$ 27,000	\$ 26,000	\$ 26,000	\$ 26,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	\$ 25,000	
				Total			\$ 1,589,000	\$ -	\$ 1,689,000	\$ 1,689,000	\$ 163,000	\$ 164,000	\$ 160,500	\$ 154,000	\$ 155,000	\$ 167,000	\$ 155,000	\$ 185,500	\$ 202,000	\$ 183,000	
				Inflation (3%) Adjusted Total			\$ 1,946,408	\$ -	\$ 1,707,634	\$ 1,946,408	\$ 163,000	\$ 168,920	\$ 170,274	\$ 168,280	\$ 174,454	\$ 193,599	\$ 185,078	\$ 228,142	\$ 255,888	\$ 238,773	

5.3 Funding Sources

The BDWMO joint powers agreement calls for implementation activities (see Table 5-2) to be funded through either the BDWMO general fund or the BDWMO capital improvement fund. The proposed funding method varies by the specific activity.

5.3.1 BDWMO General Fund

Per the BDWMO JPA, each member city contributes annually to the BDWMO general fund. The annual contribution amount is split such that 50 percent of the total is apportioned based on the area within the BDWMO and 50 percent is apportioned based on the taxable market value. The BDWMO uses the general fund for administrative costs, monitoring, education, studies, and planning projects, including the development of this Plan.

5.3.2 BDWMO Capital Improvement Fund

The BDWMO JPA calls for the establishment of a capital improvement fund for each capital improvement project ordered by the Commission not paid for out of the BDWMO general fund. Capital improvement funds may be accumulated over time to pay for large future projects. Project costs paid out of capital improvement funds are apportioned with consideration for stormwater runoff generation, pollutant loading, or other factors as allowed by the JPA.

5.3.3 Ad Valorem Taxing Authority

Minnesota Statute 103B.251 allows WMOs to certify capital improvements to the county for payment, if those improvements are included in the WMO's watershed management plan. The county then issues bonds and levies an ad valorem tax on all taxable property in the WMO (or subwatershed unit of the WMO) to pay for the projects. This process requires sufficient lead time and coordination with the County, as formal County approval of any amendments to a WMO's plan and associated levy amounts is required.

A WMO may also raise funds through direct ad valorem taxation (Minnesota Statutes 103B.241), but only if the WMO is specifically listed as a special taxing district in Minnesota Statutes 275.066. If a WMO is given taxing authority, the WMO may also accumulate funds to finance improvements as an alternative to issuing bonds (Minnesota Statutes 103B.241).

Historically, the BDWMO has not used this method to fund improvements and is not currently listed as a special taxing district per MS 275.066.

5.3.4 Member City Funding

Funding mechanisms available to the member cities include:

- City General Funds
- Special Assessments
- Ad Valorem Taxes
- Stormwater Utilities

- Development Fees
- Tax Increment Financing

Additional information about member city funding mechanisms is available in member city local water management plans.

5.3.5 Grant Funding and Partner Cost-share

BWSR Clean Water Fund (CWF) grants and other competitive grants provide an opportunity for the BDWMO to offset the cost of large studies, non-structural projects, and capital improvements. Such opportunities must be identified in the BDWMO implementation schedule (see Table 5-2). The BDWMO will continue to seek and apply for grants to offset project costs when project or program goals align with funding opportunities.

In addition to competitive grants, BWSR's Watershed Based Implementation Funding (WBIF) is expected to become the primary mechanism through which BWSR distributes Clean Water Fund grants. The WBIF program will supply a steady source of grant funding allocated every 2 years to metro watersheds including the Black Dog watershed. The BDWMO will work with other WBIF-eligible units of government within the watershed (e.g., cities, Dakota County, Dakota SWCD) to equitably allocate those dollars among competing projects and partners. Additional information is available from BWSR at:

<https://bwsr.state.mn.us/watershed-based-implementation-funding-program>

The BDWMO has collaborated with member cities and other partners to successfully complete water and natural resources improvement projects through cost-share opportunities. Without cost-sharing, such projects may otherwise be cost-prohibitive. Examples of past cost-share partnerships include Dakota County SWCD's Landscaping for Clean Water.

5.4 Reporting and Assessment

5.4.1 Annual Reporting

The BDWMO is responsible for evaluating progress towards achieving its goals and reporting annually to BWSR, per [Minnesota Rules 8410.0150](#). Within the first 120 days of the calendar year, the BDWMO must submit to BWSR an activity report for the previous calendar year. Reporting requirements specified in [Minnesota Rules 8410](#) will be followed. Generally, the BDWMO's annual report includes:

- An assessment of the previous year's annual work plan that indicates whether the planned activities were performed
- A work plan and budget for the current year specifying which activities will be undertaken
- At a minimum of every 2 years, an evaluation of progress on goals and the implementation actions, including the capital improvement program, to determine if amendments to the implementation actions are necessary
- A summary of significant trends identified in monitoring data

The BDWMO will meet with its local TAC (see Section 5.1.3.1) to review member city compliance with the goals, policies, and performance standards established in this Plan. This effort may include:

- Evaluation of the status of local water plan adoption and local implementation of activities required by the watershed management organization
- Review of member city ordinance/local controls and any revisions addressing water resources (e.g., wetlands, erosion and sediment control), including their enforcement

If annual review of member city practices reveals implementation inconsistent with the BDWMO Plan, the BDWMO will take administrative or legal action to ensure that BDWMO policies and performance standards are being implemented by the member cities.

5.4.2 Evaluation of Progress

The BDWMO and the member cities will work together to achieve the goals established in this Plan. Biennially, the BDWMO will perform a more detailed evaluation to assess the level of progress achieved on each of the BDWMO's adopted goals (see Section 4.0). The format of this evaluation will be based on the organization of BDWMO goals, cross referenced to the most applicable implementation activities and the associated outputs.

The BDWMO's water quality goals for strategic waterbodies have a clear, quantifiable metric to assess achievement or progress (i.e., water chemistry data). Some BDWMO goals are more qualitative in nature and progress may not be accurately measured by strictly quantitative metrics. Thus, the BDWMO's progress may include quantitative values and/or qualitative (narrative) discussion of progress towards each goal. The measurable outputs of the implementation activities most directly correlated with each goal will also be reported.

Results of the biennial progress assessment may be used for annual work planning and identifying potential amendments to the implementation schedule. The BDWMO anticipates that BWSR will perform a Level II PRAP review during the life of this Plan. The results of the Level II PRAP will be incorporated into the assessment of progress, as applicable.

5.5 Local (City) Water Management

The BDWMO maintains a highly cooperative relationship with the member cities. Member city natural resources staff regularly attend BDWMO commissioner meetings and were actively involved in the development of this Plan. The relationship between the BDWMO and its member cities are a core strength upon which the successful implementation of this Plan depends.

This section summarizes the regulatory responsibilities of the member cities, requirements for local water management planning, and impacts on of this Plan on local governments.

5.5.1 City Regulatory Framework

The BDWMO member cities manage the impacts of development and redevelopment on water resources through their official controls (e.g., ordinances, design manuals), local water management plans (LWMPs) and Municipal Separate Storm Sewer System (MS4) permits.

Each member city is a regulated MS4 under the Clean Water Act and is required to maintain coverage under the MS4 General Permit, issued by the State of Minnesota. The MS4 General Permit requires each regulated MS4 to develop a Storm Water Pollution Prevention Program (MS4 SWPPP) that addresses how the MS4 will reduce the amount of sediment and other pollutants entering waters from stormwater systems. Member cities are also responsible for maintaining their stormwater infrastructure and for implementing programs to require and enforce the maintenance of private stormwater infrastructure. Information regarding municipal stormwater responsibilities and the MS4 program is available from the MPCA at: <https://www.pca.state.mn.us/water/municipal-stormwater-ms4>

Each member city maintains local ordinances (or other official controls) regulating land development, natural resource protection, and stormwater management within their jurisdiction. Local performance standards and official controls must be consistent with (or more stringent than) the BDWMO performance standards included in this Plan (see Section 4.9). Select local performance standards are summarized in Table 4-1 and Table 4-2.

The BDWMO assumes that the member cities will continue to be the permitting authority for all land alteration activities. To continue as the permitting authority, the local government must outline its permitting process in its LWMP, including the preliminary and final platting process. The BDWMO may appeal a member city's approval of a project if the BDWMO believes the project is not consistent with the LWMP or BDWMO Plan.

The BDWMO reviews updates to LWMPs and updates to member city official controls to confirm they are consistent with the BDWMO Plan (see Section 5.5.2). Within 30 days of the BDWMO commissioners' adoption of this Plan, the BDWMO will notify each member city of the requirements regarding revision of local controls. If updates to local controls are necessary to be consistent with this Plan, member cities shall initiate those updates within 180 days of adoption of this Plan (and any future Plan amendments, as needed). If the BDWMO determines that a member city is out of compliance with this Plan, the BDWMO will coordinate with member city staff to clarify the source of the issue and determine a schedule to achieve compliance.

5.5.2 Local Water Management Plans

Each BDWMO member city is required to complete a local water management plan (LWMP) that conforms to [Minnesota Statutes 103B.235](#), [Minnesota Rules 8410.0160](#), and is consistent with the current BDWMO Plan. [Minnesota Rules 8410.0160](#) and [Minnesota Statutes 103B.235](#) Subd. 2 include specific requirements for LWMP content, review, approval, and adoption. LWMPs must be adopted no more than two years prior to the adoption of a local comprehensive plan and extensions of local comprehensive plans due dates do not alter the LWMP schedule. The status of member city LWMPs is presented in Table 5-4.

The policies, goals, and performance standards established in each city's LWMP must be consistent with this Plan. The section of the LWMP covering assessment of problems must include those problems identified in the BDWMO Plan that affect the city. The corrective action proposed must consider the individual and collaborative roles of the city and the BDWMO. In addition to LWMP content required per [Minnesota Rules 8410.0160](#) and [Minnesota Statutes 103B.235](#) Subd. 2, the BDWMO requires that LWMPs include the following:

- Water quality management actions performed or proposed by the member cities for strategic and non-strategic waterbodies and MDNR public waters (see Section 4.1.2, policy 14).
- Maps of the existing stormwater system, as defined in the MPCA's NPDES Municipal Separate Storm Sewer System (MS4) General permit. The cities may use maps prepared for their respective MS4 permits.
- A list or map that identifies water quality issues, if known, and actions to address these issues.
- Description of operating and maintenance procedures for the cities' stormwater management system (or reference to the city's MS4 general permit stormwater pollution prevention program, or SWPPP).
- The 100-year flood peak flow rates at each intercommunity conveyor and overflow point included in the city's stormwater system.
- Maps and tables (or references to online resources) documenting the following information (to the level necessary to achieve the goals of the member city and the BDWMO):
 - subwatershed locations and sizes
 - drainage patterns
 - outlet elevations and existing or known future outlet information
 - Hydrologic and hydraulic information for the 5-year (or 10-year) and 100-year events:
 - existing or known future water levels
 - existing or known future flow rates
 - runoff volumes
 - live storage volumes
- Maps showing subwatersheds tributary to either the Black Dog fen wetland complex or the nearby trout streams

Table 5-4 Local Water Plan Status

City	Date of BDWMO Approval	Date of City Adoption
Apple Valley	July 18, 2018	November 29, 2018
Burnsville	September 20, 2017	--
Eagan	December 19, 2018	March 2, 2020
Lakeville	February 20, 2019	October 7, 2019

5.5.2.1 Local Water Management Plan Review and Approval

LWMPs must be submitted to the BDWMO for review and approval per the requirements of Minnesota Statutes 103B.235. BDWMO staff will review the LWMP following the process and schedule described in Minnesota Statutes 103B.235. Upon BDWMO approval of the local plan, the city must adopt and implement its LWMP within 120 days and amend its official controls within 180 days of plan approval, as needed. Member cities shall notify the BDWMO within 30 days of LWMP adoption and adoption of revised official controls, if needed.

If a member city later wishes to amend its LWMP, it must submit the proposed amendment to the BDWMO for review following the procedure described in Minnesota Rules 8410.0160. Member cities are encouraged to consult with the BDWMO staff early on in their local planning process. The BDWMO will work closely with member cities in local plan preparation, review, and implementation.

5.5.3 Impact on Local Governments

The BDWMO seeks to limit additional requirements imposed upon member cities while accomplishing BDWMO goals. Many of the activities in the BDWMO implementation schedule (see Table 5-2) elements will be implemented by (or in partnership with) the member cities. The BDWMO Plan will have a financial impact to the member cities and residents that reside within the watershed.

Some of the implementation activities reflect the goals, policies, and requirements of state and regional units of government that member cities must address regardless (e.g., MS4 permit requirements). In addition, all the performance standards included in this Plan (see Section 4.9) are currently implemented by the member cities through their existing regulatory programs. Therefore, the implementation of regulatory standards is not expected to create additional cost or burden to member cities. The BDWMO is not increasing the wetland regulation burden for the member cities because they are already acting as the LGU for the Wetland Conservation Act.

There will be continued cost and effort placed on the member cities and the BDWMO to address water quality protection and restoration issues in the BDWMO. Ongoing monitoring of strategic waterbodies will be implemented by the BDWMO and the member cities and the results will be used to inform future actions.

The BDWMO implementation schedule (see Table 5-2) includes activities to be performed by the BDWMO and member cities. These activities will be funded through funds provided by member cities and augmented with Watershed-Based Implementation Funds (WBIF). The BDWMO developed the implementation schedule with consideration for existing skills, services, and capacity of member cities and partners to promote efficiency, limit costs, and maximize productive collaboration.

5.6 Plan Amendment Procedures

This Plan will guide BDWMO activities through 2032, or until superseded by adoption of a subsequent Plan. During this time, the BDWMO may revise its Plan through an amendment procedure, as needed. Amendments to this Plan will follow the procedures described in this section and will proceed in

accordance with the process provided in [Minnesota Rules 8410.0140](#) and [Minnesota Statutes 103B.231](#). Plan amendments may be proposed by any person to the BDWMO, but only the commissioners may initiate the amendment process. All recommended plan amendments must be submitted to the BDWMO in writing, along with a statement of the problem and need, the rationale for the amendment, and an estimate of the cost. Amendments identified by BDWMO staff and member city staff will similarly be presented to the commissioners for approval.

The BDWMO anticipates that only significant changes or additions to goals, issues, administrative procedures, or implementation (i.e., programs, projects, and capital improvements) will prompt an amendment to the Plan, although final discretion resides with the commissioners. Minnesota Rules 8410.0140 subp. 1a defines changes that do not require an amendment (e.g., reformatting/reorganization of the plan, clarification of existing plan goals or policies, and adjustment to how the BDWMO will carry out program activities within its discretion).

Amendments to this Plan are subject to the review process provided in [Minnesota Statutes 103B.231](#) subd. 11, except when the proposed amendments are determined to be minor-amendments by satisfying all the following criteria:

- A. BWSR has either agreed that the amendments are minor or failed to act within five working days of the end of the 30-day comment period specified in item B (unless an extension has been mutually agreed upon);
- B. The BDWMO has sent copies of the amendments to the plan review authorities for review and comment allowing at least 30 days for receipt of comments, has identified that the minor amendment procedure is being followed, and has directed that comments be sent to the BDWMO commissioners;
- C. No county board has filed an objection to the amendments with the BDWMO and BWSR within the comment period specified in item B (unless an extension is mutually agreed upon);
- D. The BDWMO has held a public meeting to explain the amendments and published a legal notice of the meeting twice, at least seven days and 14 days before the date of the meeting; or
- E. The amendments are not necessary to make the Plan consistent with an approved and adopted Dakota County groundwater plan.

Draft and final amendments will be formatted and distributed consistent with the requirements of [Minnesota Rules 8410.0140](#), subparts 4 and 5, respectively.

Approximately 2 years prior to the expiration date of this Plan, the BDWMO will begin the process of updating its Plan (unless a revised schedule is developed by BWSR in accordance with [Minnesota Statutes section 103B.231](#), subdivision 3a).

6.0 References

- Balaban, N.H., Hobbs, H.C.. (1990). C-06 Geologic atlas of Dakota County, Minnesota. Minnesota Geological Survey. <https://conservancy.umn.edu/handle/11299/58494>
- Black Dog Watershed Management Organization (BDWMO). 2003. *Crystal and Keller Lake Use Attainability Analysis Diagnostic Feasibility Study*. Prepared by Barr Engineering Co.
- Black Dog Watershed Management Organization (BDWMO). 2012. *Black Dog Watershed Management Organization Watershed Management Plan*. Prepared for Barr Engineering Co.
- City of Burnsville. 2007. *Twin and Earley Lake Use Attainability Analysis Diagnostic Feasibility Study*. Prepared by Barr Engineering Co.
- City of Burnsville. 2008. *Wood Pond Use Attainability Analysis Diagnostic Feasibility Study*. Prepared by Barr Engineering Co.
- City of Burnsville. 2022. *Natural Resources Master Plan*. Prepared by Resource Environmental Solutions, LLC.
- City of Lakeville. 1998. *Orchard Lake Diagnostic-Feasibility Study: Water Quality Issues and Potential Restorative Measures*. Prepared by Barr Engineering Co.
- Dakota County. June 2019. *Dakota County 2040 Comprehensive Plan*.
<https://www.co.dakota.mn.us/Government/Planning/CompPlan/Pages/default.aspx>
- Dakota County Environmental Resources Department. 2020. *Ambient Groundwater Quality Study 1999-2019 Dakota County*.
<https://www.co.dakota.mn.us/Environment/WaterResources/WellsDrinkingWater/Documents/AmbientGroundwaterStudy2019.pdf>
- Dakota County. January 2021. *Dakota County, Minnesota Groundwater Plan 2020-2030*.
<https://www.co.dakota.mn.us/Environment/WaterResources/Groundwater/Pages/groundwater-plan.aspx>
- Metropolitan Council. 2001. *Minnesota Urban Small Site BMP Manual, Stormwater Best Management Practices for Cold Climates*. Prepared by Barr Engineering Co.
- Metropolitan Council. April 2016. *Regional Drinking Water Supply, Groundwater Recharge and Stormwater Capture and Reuse Study – Southeast Metro Study Area*. <https://metro council.org/Wastewater-Water/Publications-And-Resources/WATER-SUPPLY-PLANNING/OTHER/Regional-Drinking-Water-Supply-2016.aspx>
- Minnesota County Biological Survey, Department of Natural Resources. 1997. *Minnesota County Biological Survey Map Series No. 16, Dakota County, Minnesota*.
- Minnesota Climatology Working Group. 2021 (accessed). Gridded Precipitation Dataset. Online available at: http://climateapps.dnr.state.mn.us/gridded_data/precip/monthly/monthly_gridded_precip.asp

-
- Minnesota Department of Natural Resources. 2021 (accessed). LakeFinder website:
<https://www.dnr.state.mn.us/lakefind/index.html>
- MDNR. 2021 (accessed). Past Climate Data from National Weather Service Reporting Stations. Online available at: https://www.dnr.state.mn.us/climate/historical/acs_stn_meta.html
- MDNR. 2021 (accessed). Climate Change and Minnesota. Online available at:
https://www.dnr.state.mn.us/climate/climate_change_info/index.html
- Minnesota Pollution Control Agency (MPCA), 2008. *Minnesota Statewide Mercury Total Maximum Daily Load Study*.
- Minnesota Pollution Control Agency (MPCA). 2011. *Crystal, Keller, and Lee Lakes Nutrient Impairment Total Maximum Daily Load Implementation Plan and Earley Lake Protection Plan*. Prepared by MPCA and Barr Engineering Co.
- Minnesota Pollution Control Agency (MPCA), 2015. *South Metro Mississippi River Total Suspended Solids Total Maximum Daily Load Study*. Prepared by MPCA and LimnoTech.
- Minnesota Pollution Control Agency (MPCA). February 2016. *Twin Cities Metropolitan Area Chloride Total Maximum Daily Load Study*. Prepared by MPCA and LimnoTech.
<https://www.pca.state.mn.us/sites/default/files/wq-iw11-06e.pdf>
- Minnesota Pollution Control Agency (MPCA). February 2016. *Twin Cities Metropolitan Area Chloride Management Plan*. <https://www.pca.state.mn.us/sites/default/files/wq-iw11-06ff.pdf>
- Minnesota Pollution Control Agency (MPCA). 2022 (as revised). *Minnesota Stormwater Manual*.
https://stormwater.pca.state.mn.us/index.php/Main_Page
- Minnesota Pollution Control Agency (MPCA). 2022. Draft 2022 Impaired Waters 303(d) List.
<https://www.pca.state.mn.us/water/minnesotas-impaired-waters-list>
- Minnesota Pollution Control Agency (MPCA), February 2020. *Lower Minnesota River Watershed Total Maximum Daily Load Study Part II—Northern Watersheds: Riley-Purgatory-Bluff Creek and Nine Mile Creek Watersheds*. Prepared by MPCA and Barr Engineering Co.
- Minnesota Pollution Control Agency (MPCA), April 2021. *Lake Pepin and Mississippi River Eutrophication Total Maximum Daily Load Study*. Prepared by MPCA and LimnoTech.
- Minnesota Pollution Control Agency (MPCA). 2021. *Minnesota Statewide Chloride Management Plan*.
- Minnesota Pollution Control Agency (MPCA). 2021 (accessed). Environmental Data Access (EDA) website:
<https://www.pca.state.mn.us/eda-surface-water-data>
- Moore, T.L., Gulliver, J.S., Stack, L., and Simpson, M.H., 2016. "Stormwater management and climate change: vulnerability and capacity for adaptation in urban and suburban contexts," *Climatic Change*, Springer, vol. 138(3), pages 491-504, October.

-
- National Oceanic and Atmospheric Administration. 2013. *Atlas 14 Volume 8 - Precipitation-Frequency Atlas of the United States, Midwestern States*.
- National Oceanic and Atmospheric Administration (NOAA). 2013. *Regional Climate Trends and Scenarios for the US National Climate Assessment – Part 3 Climate of the Midwest US. Technical Report NESDIS 142-3*.
- Natural Resource Conservation Service (NRCS). 2021 (accessed). Web Soil Survey.
<https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>
- Stack LJa, Simpson MHB, Gruber Jb, Moore TLc, Yetka Ld, Eberhart Le, Gulliver Jc, Smith Jf, Mamayek Td, Anderson Md, Rhoades Jb. 2014. *Long-term climate information and forecasts supporting stakeholder-driven adaptation decisions for urban water resources: Response to climate change and population growth*. Final project report: Sectoral Applications Research Program FY2011, Climate Program Office, National Oceanic and Atmospheric Administration
- State of Minnesota, Stormwater Advisory Group, 1997. *Stormwater and Wetlands: Planning and Evaluation Guidelines for Addressing Potential Impacts of Urban Stormwater and Snow Melt Runoff on Wetlands*. June 1997.
- U.S. Army Corps of Engineers. *U.S. Army Corps of Engineers Wetlands Delineation Manual*, 1987.
- U.S. Department of Commerce, Weather Bureau, 1961. *“Technical Paper No. 40. Rainfall Frequency Atlas of the United States.”*
- U.S. Environmental Protection Agency, 1988. *Stormwater Management Model, Version 4: User’s Manual*.
- United States Department of Agriculture – Soil Conservation Service (USDA SCS). 1975. *Hydrology Guide for Minnesota*.
- United States Department of Agriculture – Soil Conservation Service (USDA SCS). 1983. *Soil Survey of Dakota County, MN*.

Appendices

Appendix A – Joint Powers Agreement

Appendix B – Summary of Stakeholder Engagement Activities

Appendix A

BDWMO Joint Powers Agreement

2010

REVISED AND RESTATED

JOINT POWERS AGREEMENT

FOR THE

BLACK DOG WATERSHED

MANAGEMENT ORGANIZATION

**2010
REVISED AND RESTATED
JOINT POWERS AGREEMENT
FOR THE BLACK DOG WATERSHED
MANAGEMENT ORGANIZATION**

The parties to this Agreement are cities which have land in the Black Dog Watershed. This Agreement is made pursuant to the authority conferred upon the parties by Minn. Stat. §§ 471.59 and 103B.201, et. seq.

1. NAME. The parties hereby create and establish the Black Dog Watershed Management Organization.

2. GENERAL PURPOSE. The purpose of this Agreement is to provide an organization to regulate the natural water storage and retention of the Black Dog watershed to (a) protect, preserve, and use natural surface and ground water storage and retention systems; (b) minimize public capital expenditures needed to correct flooding and water quality problems; (c) identify and plan for means to effectively protect and improve surface and ground water quality; (d) establish more uniform local policies and official controls for surface and ground water management; (e) prevent erosion of soil into surface water systems; (f) promote ground water recharge; (g) protect and enhance fish and wildlife habitat and water recreational facilities; and (h) secure the other benefits associated with the proper management of surface and ground water.

3. DEFINITIONS.

Subdivision 1. "*Commission*" means the organization created by this Agreement, the full name of which is "Black Dog Watershed Management Organization". It shall be a public agency of its members.

Subdivision 2. "*Board*" means the board of commissioners of the Commission.

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

Subdivision 4. "*Governmental Unit*" means any city which is a signatory to this Agreement.

Subdivision 5. "*Member*" means a governmental unit which enters into this Agreement.

Subdivision 6. "*Black Dog Watershed*" or "*Watershed*" means the area contained within a line drawn around the extremities of all terrain whose surface drainage is within the mapped areas delineated on the map filed with the Board of Water and Soil Resources pursuant to Minn. Stat. § 103B.211, Subd. 2 attached hereto as Exhibit "A".

4. MEMBERSHIP. The membership of the Commission shall consist of the following governmental units:

Group A: City of Burnsville

Group AA: City of Apple Valley
City of Eagan

Group AAA: City of Lakeville

No change in governmental boundaries, structure, organizational status or character shall affect the eligibility of any governmental unit listed above to be represented on the Commission, so long as such governmental unit continues to exist as a separate political subdivision.

5. ADVISORS.

Subdivision 1. The Dakota County Soil and Water Conservation District shall be requested to appoint a non-voting advisory member to the Commission. The District shall not be required to contribute funds for the operation of the Commission except as provided in Minn. Stat. § 103B.251, but may provide technical services.

Subdivision 2. Citizen Advisory Committee. The Commission may establish a citizen advisory committee ("CAC") from the public at large to provide input on watershed management plan revisions and other matters as deemed appropriate. The CAC shall be appointed by the Commission considering individuals nominated by each member community.

6. BOARD OF COMMISSIONERS.

Subdivision 1. The governing body of the Commission shall be its Board which shall consist of five (5) commissioners. The Board of Commissioners on behalf of its member communities shall comply with the notice requirements of Minn. Stat. § 103B.227. All vacancies shall be filled within ninety (90) days after they occur. Notices of all vacancies shall be published in a newspaper of general circulation in the Watershed at least fifteen (15) days before the appointment is made. For purposes of appointing commissioners, each member in Group AA shall appoint a delegate. Group AA delegates shall meet upon ten (10) days' notice at a time and place selected by the City Clerk of Apple Valley and shall appoint one commissioner. . The delegates shall select a commissioner by majority vote. Tie votes shall be broken by the flip of a coin. Voting may also take place by mailed ballot, fax, e-mail, telephone calls, or any combination of these methods. In the alternative to appointing a delegate to vote on its behalf, a city council may vote directly. The City Council of Burnsville shall appoint three (3) commissioners. The City Council of Lakeville shall appoint 1 (1) commissioner. Vacancies in

office shall be filled for the remainder of the term by the governing bodies who made the appointment.

Subdivision 2. The term of each commissioner shall be three (3) years and until their successors are selected and qualify.

Subdivision 3. A commissioner may not be removed from the Board prior to the expiration of his or her term unless the commissioner consents in writing or unless removed in accordance with Minnesota Rule 8410.0040.

Subdivision 4. Commissioners shall serve without compensation from the Commission, but this shall not prevent a governmental unit from compensating a commissioner for serving on the Board.

Subdivision 5. At the first Board Meeting each year, the Board shall elect from its commissioners a chair, a vice chair, a secretary/ treasurer, and such other officers as it deems necessary to conduct its meetings and affairs. The Commission may adopt rules and regulations governing its meetings. Such rules and regulations may be amended from time to time at either a regular or a special meeting of the Commission provided that at least ten (10) days' prior notice of the proposed amendment has been furnished to each person to whom notice of the Board meetings is required to be sent.

Subdivision 6. Each group shall appoint one alternate commissioner. The alternate commissioner shall be selected in the same manner as regular commissioners. The term of the alternates shall be three (3) years and until their successors are selected and qualify. In the absence of a regular commissioner, the alternate may vote and act in a commissioner's place. The alternate, however, shall have only one vote even if more than one regular commissioner from the group is absent.

Subdivision 7. Decisions by the Commission shall require a majority vote of all commissioners except that a decision to order a capital improvement project shall require a two-thirds (2/3) favorable vote.

7. POWERS AND DUTIES OF THE COMMISSION.

Subdivision 1. The Commission, acting by its Board of Commissioners:

- (a) Shall prepare and adopt a watershed management plan meeting the requirements of Minn. Stat. § 103B.231;
- (b) Shall review and approve local water management plans as provided by Minn. Stat. § 103B.235;
- (c) Shall exercise the authority of a watershed district under Minn. Stat. Chapter 103D to regulate the use and development of land when one or more of the following conditions exist:
 - (1) The local government unit exercising planning and zoning authority over the land under Minn. Stat. §§ 366.10 to 366.19, 394.21 to 394.37, or 462.351 to 462.364 does not have a local water management plan approved and adopted in accordance with requirements of § 103B.235 or has not adopted the implementation program described in the plan.
 - (2) An application to the local governmental unit for a permit for the use and development of land, requires an amendment to, or variance from, the adopted local water management plan or implementation program of the local unit.
 - (3) The local governmental unit has authorized the Commission to require permits for the use and development of land.
- (d) The Commission must publish and distribute a newsletter at least annually to watershed residents. The newsletter must explain the watershed's programs and list offices and telephone numbers.

Subdivision 2. The Commission shall use the city staff of Burnsville for assistance. Burnsville may pass through the direct cost, including salary and benefits, to the Commission and the Commission shall reimburse the City.

Subdivision 3. The Commission shall meet at least annually. Meeting notices shall be placed on a bulletin board at the Burnsville City Hall at least three (3) days before each meeting. Any office supplies the Commission needs shall be furnished by Burnsville. The direct cost for the supplies shall be billed to the Commission.

Subdivision 4. The Commission may cooperate or contract with the State of Minnesota or any subdivision thereof or federal agency or private or public organization to accomplish the purposes for which it is organized.

Subdivision 5. The Commission may order any governmental unit to carry out the local water management plan, including any capital improvement identified therein, which has been approved by the Board.

Subdivision 6. The Commission may acquire, operate, construct and maintain only the capital improvements, if any, delineated in the watershed management plan adopted by the Board which the plan states will be constructed by the Board.

Subdivision 7. The Commission may contract for or purchase such insurance as the Board deems necessary for the protection of the Commission.

Subdivision 8. The Commission may establish and maintain devices for acquiring and recording hydrological and water quality data within the watershed.

Subdivision 9. The Commission may enter upon lands within or without the watershed to make surveys and investigations to accomplish the purposes of the Commission.

Subdivision 10. The Commission may provide any member governmental unit with technical data or any other information of which the Commission has knowledge which will assist the governmental unit in preparing local water management plans within the watershed.

Subdivision 11. The Commission may accumulate reserve funds for the purposes herein mentioned and may invest funds of the Commission not currently needed for its operations.

Subdivision 12. The Commission may collect money, subject to the provisions of this Agreement, from its members and from any other source approved by a majority of its Board.

Subdivision 13. The Commission may make contracts, employ consultants, incur expenses, and make expenditures necessary and incidental to the effectuation of its purposes and powers.

Subdivision 14. The Commission shall cause to be made an annual audit of the books and accounts of the Commission and shall make and file a report to its members at least once each year including the following information:

- (a) The financial condition of the Commission;
- (b) The status of all Commission projects and work within the watershed;
- (c) The business transacted by the Commission and other matters which affect the interests of the Commission. Copies of the report shall be transmitted to the Clerk of each member governmental unit.

Subdivision 15. The Commission's books, reports, and records shall be available for and open to inspection by its members at all reasonable times.

Subdivision 16. The Commission may recommend changes in this Agreement to its members.

Subdivision 17. The Commission may exercise all other powers necessary and incidental to the implementation of the purposes and powers set forth herein.

Subdivision 18. Each member reserves the right to conduct separate or concurrent studies on any matter under study by the Commission.

Subdivision 19. The Board may investigate on its own initiative or upon petition of any member, complaints relating to water pollution, as defined in the Commission's adopted water management plan, in the watershed. Upon a finding that the watershed is being polluted, the Board may take appropriate action to alleviate the pollution and to assist in protecting and improving the water quality of surface water in the watershed.

Subdivision 20. The Board must solicit proposals for all legal, engineering, auditing, and other technical services in accordance with Minn. Stat. § 103B.227.

Subdivision 21. The Board shall coordinate its planning activities with contiguous watershed management organizations and counties conducting water planning and implementation under Minn. Stat. Chapter 103B.

Subdivision 22. The Board shall file an annual report with the Board of Water and Soil Resources including a financial report on administration, projects, or other expenditures.

Subdivision 23. The Commission shall adopt an annual work plan.

Subdivision 24. The Commission shall designate an official newspaper.

8. POWERS AND DUTIES OF THE OFFICERS OF THE BOARD OF COMMISSIONERS.

Subdivision 1. It shall be the duty of the Chairperson of the Board of Commissioners to:

- (a) Attend and preside at meetings of the Board;
- (b) Assist in the preparation of meeting agendas and the annual work plan;

- (c) See that orders and resolutions of the Board are carried into effect;
- (d) Sign and execute documents as may be required for the Board's exercise of its powers, except in cases in which the authority to sign and execute is required by law to be exercised by another person; and
- (e) Such other duties applicable to the office as necessary to fulfill the powers and duties of the Board of Commissioners as set forth in the Agreement.

Subdivision 2. It shall be the duty of the Vice Chairperson of the Board of

Commissioners to:

- (a) Perform the duties of the Chairperson in his or her absence; and
- (b) Perform other duties as assigned from time to time by the Board of Commissioners;

Subdivision 3. It shall be the duty of the Secretary/Treasurer of the Board of

Commissioners to:

- (a) Keep and post a true and accurate record of the proceedings of all meetings of the Commission and Board of Commissioners;
- (b) Keep a record of all amendments, alterations, and additions to the Joint Powers Agreement;
- (c) Prepare and process all correspondence as needed;
- (d) Prepare and file all reports and statements as required by law and this Agreement;
- (e) Keep all financial accounts of the Commission, and prepare and present to the Board of Commissioners a full and detailed statement of the assets and liabilities of the Commissioner's financial accounts; and
- (f) Perform other duties as assigned from time to time by the Board of Commissioners.

9. CONSTRUCTION OF IMPROVEMENTS.

Subdivision 1. The members acknowledge that most of the needed storm water drainage system is already in place. Any additional facilities which are needed shall be

constructed by the member unit where the additional improvement is constructed, not by the Commission, unless the improvement is designated in the Board's watershed management plan for construction by the Board.

Subdivision 2. Before ordering an improvement, the Board shall secure from an engineer a preliminary report advising it whether the proposed improvement is feasible and as to whether it shall best be made as proposed or in connection with some other improvement and the estimated cost of the improvement as recommended. The Board shall then hold a public hearing on the proposed improvement after mailed notice to the Clerk of each member governmental unit and published notice in the Board's official newspaper. The Commission shall not be required to mail notice except by notice to the Clerk. The notice shall be mailed not less than forty-five (45) days before the hearing, shall state the time and place of the hearing, the general nature of the improvement, the estimated total cost, and the estimated cost to each member governmental unit.

If the Board orders the construction of an improvement, the order shall describe the improvement, shall designate the engineers to prepare plans and specifications, and shall designate who will contract for the improvement. The Board may not proceed with the project unless it receives written approval from the governing bodies of at least three (3) member governmental units approving the project.

Subdivision 3. Contract for Improvements. All improvement contracts ordered by the Board shall be let in accordance with State statutory requirements. The bidding and contracting of the work shall be let by any one of the member governmental units as determined by the Board of Commissioners after compliance with the statutes.

Subdivision 4. Supervision. All improvement contracts shall be supervised by the entity awarding the contract. Representatives of the Commission shall have the right to enter upon the place or places where the improvement work is in progress for the purpose of making reasonable tests and inspections.

Subdivision 5. Land Acquisition. The Commission shall not have the power of eminent domain. All easements or interest in land which are necessary will be negotiated or condemned in accordance with Minn. Stat. Chapter 117 by a governmental unit or by the entity awarding the contract as directed by the Board, and each member agrees to acquire the necessary easement or right-of-way or partial or complete interest in land upon order of the Board to accomplish the purposes of this Agreement. All reasonable costs of the acquisition, including attorney's fees, shall be considered as a cost of the improvement. If a member governmental unit determines it is in the best interests of that member to acquire additional lands, in conjunction with the taking of lands for storm and surface drainage or storage, for some other purposes, the costs of the acquisition shall not be included in the improvement costs of the ordered project.

10. FINANCES.

Subdivision 1. The Commission funds may be expended by the Board in accordance with this Agreement in a manner determined by the Board. The Board may designate one or more national or state bank or trust companies authorized to receive deposits of public monies to act as depositories for the Commission funds. In no event shall there be a disbursement of Commission funds without the signature of at least two (2) Board members. The treasurer shall be required to file with the Board a bond in the sum of at least \$10,000 or

such higher amount as shall be determined by the Board. The Commission shall pay the premium on the bond.

Subdivision 2. General Fund. Each member shall contribute each year to a general fund. The annual contribution by each member shall be based fifty percent (50%) on taxable market value and fifty percent (50%) on the basis of area in accordance with the following formula:

Annual Watershed Levy = L

Taxable Market Value of a
Member's Property in the Watershed = MV

Taxable Market Value of All Property in the Watershed = TV

Acres of Property a Member Has in the Watershed = A

Total Acres in Watershed = TA

Member Required Contribution = C

$$\frac{1}{2} L \times \frac{MV}{TV} + \frac{1}{2} L \times \frac{A}{TA} = C$$

Subdivision 3. On or before July 1 of each year, the Board shall adopt a budget for the ensuing year and decide upon the total amount necessary for the general fund. On or before July 1, the budget shall be sent to the Clerk of each member governmental unit, together with a statement of the proportion of the budget to be provided by each member. The Board shall, upon notice from any member received prior to August 1, consider objections to the budget. After considering the objections, the Board may amend the budget. The budget may not be adopted if the governing bodies of three (3) or more member units object to it.

Subdivision 4. Capital Improvement.

- (a) An improvement fund shall be established for each improvement project ordered by the Commission not paid for out of the general fund.
- (b) Each member agrees to pay its proportionate share of the cost of the improvement in accordance with the determination of the Board as set forth herein. The Board, in its discretion, may require members to make advance payments based upon estimated costs, subject to adjustment to reflect actual costs, or may bill the members as costs are actually incurred. Members agree to pay billings within thirty (30) days of receipt. The Board or the member awarding the contract shall advise other contributing members of the tentative time schedule of the work and the estimated times when the contributions shall be necessary.

Subdivision 5. All capital improvement costs of improvements designated in the Board's adopted watershed management plan for construction by the Board not paid for out of the general fund shall be apportioned on the following bases:

- (1) The ratio of taxable market value of each member within the boundaries of the benefited area to the total taxable market value within the entire benefited area;
- (2) The ratio of storm water runoff produced by each member within the boundaries of the benefited area to the total runoff of storm water produced by the entire benefited area;
- (3) The ratio of targeted pollutants, as identified by the Board, from a member community to the total targeted pollutants contributed by all member communities. If more than one pollutant is targeted, the percentage of the ratio given to each pollutant shall be determined by the Board. This may only be used in conjunction with projects that are intended to improve water quality;
- (4) Pursuant to Minn. Stat. § 103B.251.
- (5) A combination of the above apportionment methods;

Subdivision 6. Any member governmental unit aggrieved by the determination of the Board as to the allocation of the costs of an improvement shall have thirty (30) days after the Board resolution ordering the improvement to appeal the determination. The appeal shall be in writing and shall be addressed to the Board asking for arbitration. The determination of the member's appeal shall be referred to a Board of Arbitration. The Board of Arbitration shall consist of three (3) persons: one to be appointed by the Board of Commissioners, one to be appointed by the appealing member governmental unit, and the third to be appointed by the two so selected. In the event the two persons so selected do not appoint the third person within fifteen (15) days after their appointment, then the chief judge of the District Court of Dakota County shall have jurisdiction to appoint, upon application of either or both of the two earlier selected, the third person to the Board. The third person selected shall not be a resident of any

member governmental unit and shall be a person knowledgeable in the subject matter. The arbitrators' expenses and fees, together with other expenses, not including counsel fees, incurred in the conduct of the arbitration shall be divided equally between the Commission and the appealing member. Arbitration shall be conducted in accordance with the Uniform Arbitration Act, Minn. Stat. Chapter 572.

11. SPECIAL ASSESSMENTS. The Commission shall not have the power to levy special assessments.

12. DURATION.

Subdivision 1. Each member agrees to be bound by the terms of this Agreement until January 1, 2020, and it may be continued thereafter upon the agreement of all the parties.

Subdivision 2. This Agreement may be terminated prior to January 1, 2020, by the written agreement of a majority of the members.

Subdivision 3. In addition to the manner provided in Subdivision 2 for termination, any member may petition the Board to dissolve the Agreement. Upon thirty (30) days' notice in writing to the Clerk of each member governmental unit, the Board shall hold a hearing and upon a favorable vote, the Board may by resolution recommend that the Commission be dissolved. The resolution shall be submitted to each member governmental unit and if ratified by a majority of the governing bodies of all eligible members within sixty (60) days, the Board shall dissolve the Commission following 90 days notice to Dakota County and the Minnesota Board of Water and Soil Resources, and allowing a reasonable time to complete work in progress and to dispose of personal property owned by the Commission.

13. DISSOLUTION. Upon dissolution of the Commission, all property of the Commission shall be sold and the proceeds thereof, together with monies on hand, shall be

distributed to the eligible members of the Commission. Such distribution of Commission assets shall be made in proportion to the total contribution to the Commission required by the last annual budget.

14. EFFECTIVE DATE. This revised Agreement shall be in full force and effect when all five (5) members, delineated in paragraph 4 of this Agreement, have executed this Agreement. All members need not sign the same copy. The signed Agreement shall be filed with the City Clerk of the City of Burnsville. Prior to the effective date of this revised Agreement, any signatory may rescind their approval.

IN WITNESS WHEREOF, the undersigned governmental units, by action of their governing bodies, have caused this Agreement to be executed in accordance with the authority of Minn. Stat. § 471.59.

Approved by the City Council
_____, 20__

CITY OF LAKEVILLE

BY: _____

ATTEST: _____

Approved by the City Council
Jan 19, 2010

CITY OF BURNSVILLE

BY: *[Signature]*
ATTEST: *[Signature]*

Approved by the City Council
_____, 20__.

CITY OF EAGAN

BY: _____

ATTEST: _____

Approved by the City Council
_____, 20__.

CITY OF APPLE VALLEY

BY: _____

ATTEST: _____

Approved by the City Council
_____, 20__.

CITY OF BURNSVILLE

BY: _____

ATTEST: _____

Approved by the City Council
_____, 20__.

CITY OF EAGAN

BY: _____

ATTEST: _____

Approved by the City Council
January 28, 2010.

CITY OF APPLE VALLEY

BY: Mary Hamann-Roland
Mary Hamann-Roland, Mayor

ATTEST: Pamela J. Gackstetter
Pamela J. Gackstetter, City Clerk

Approved by the City Council
_____, 20__.

CITY OF BURNSVILLE

BY: _____

ATTEST: _____

Approved by the City Council
January 19, 20__.

CITY OF EAGAN

BY: *Mto Aguirre*

ATTEST: *Maria Petersen*

Approved by the City Council
_____, 20__.

CITY OF APPLE VALLEY

BY: _____

ATTEST: _____

distributed to the eligible members of the Commission. Such distribution of Commission assets shall be made in proportion to the total contribution to the Commission required by the last annual budget.

14. EFFECTIVE DATE. This revised Agreement shall be in full force and effect when all five (5) members, delineated in paragraph 4 of this Agreement, have executed this Agreement. All members need not sign the same copy. The signed Agreement shall be filed with the City Clerk of the City of Burnsville. Prior to the effective date of this revised Agreement, any signatory may rescind their approval.

IN WITNESS WHEREOF, the undersigned governmental units, by action of their governing bodies, have caused this Agreement to be executed in accordance with the authority of Minn. Stat. § 471.59.

Approved by the City Council
_____, 20__.

CITY OF LAKEVILLE

BY: _____

ATTEST: _____

Approved by the City Council

7/19, 2010

CITY OF LAKEVILLE

BY:

ATTEST:

Approved by the City Council
_____, 20__.

CITY OF BURNSVILLE

BY: _____

ATTEST: _____

Approved by the City Council
_____, 20__.

CITY OF EAGAN

BY: _____

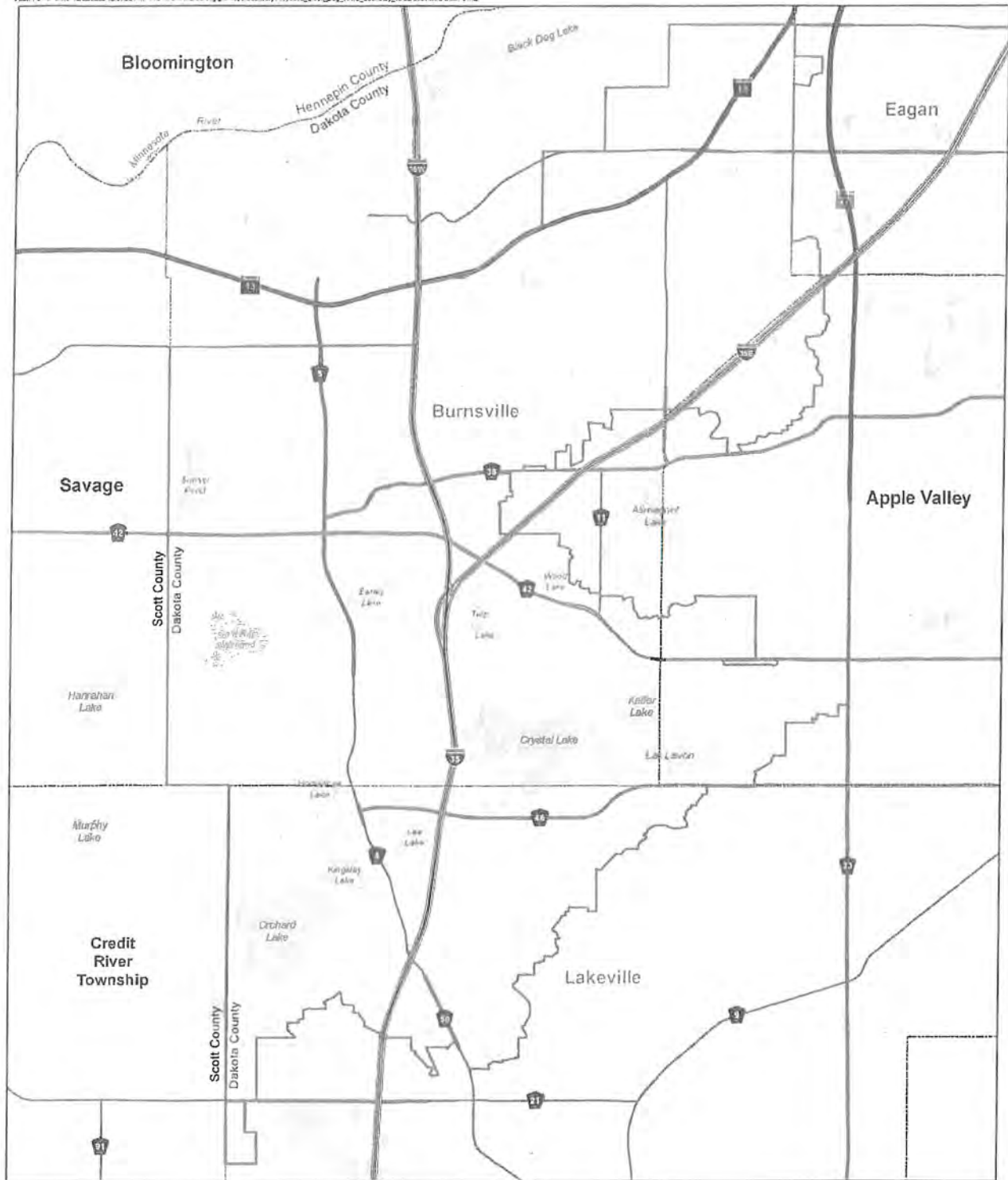
ATTEST: _____

Approved by the City Council
_____, 20__.

CITY OF APPLE VALLEY

BY: _____

ATTEST: _____



- Black Dog WMO Boundary
- Municipal Boundary
- Interstate Highway
- US Highway
- State Trunk Highway
- County State-Aid Highway
- Municipal State-Aid Street
- Major River
- Dakota County Parcel

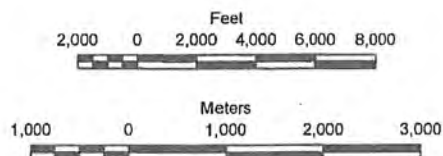


EXHIBIT A to JOINT POWERS AGREEMENT
BLACK DOG WMO BOUNDARY
December 2009



**AMENDMENT TO JOINT POWERS AGREEMENT
BLACK DOG WATERSHED MANAGEMENT ORGANIZATION**

THIS AMENDMENT is made by the **CITY OF LAKEVILLE**, a Minnesota municipal corporation, the **CITY OF BURNSVILLE**, a Minnesota municipal corporation, **CITY OF EAGAN**, a Minnesota municipal corporation, and the **CITY OF APPLE VALLEY**, a Minnesota municipal corporation, collectively "the Parties." This Amendment is effective when all the Parties have signed it.

1. Background. The Parties entered into a Revised and Restated Joint Powers Agreement for the Black Dog Watershed Management Organization in 2010 ("Agreement"). The Agreement expired on January 1, 2020, but Paragraph 12, subd. 1, provided that the Agreement may continue after its expiration by agreement of all parties. The Parties agreed to continue the Agreement pending formal approval of a renewed joint powers agreement by the Parties.

2. Renewal of the Agreement. The Agreement, attached hereto as *Exhibit A*, is incorporated in and made a part of this Amendment. The parties agree that the Agreement shall be renewed and be in full force and effect, as amended herein.

3. Amendment. Paragraph 12 of the Agreement is amended to provide as follows:

12. DURATION.

Subdivision 1. Each member agrees to be bound by the terms of this Agreement until January 1, 2030, and it may be continued thereafter upon the agreement of all the parties.

Subdivision 2. This Agreement may be terminated prior to January 1, 2030, by the written agreement of a majority of the members.

Subdivision 3. In addition to the manner provided in Subdivision 2 for termination, any member may petition the Board to dissolve the Agreement. Upon thirty (30) days' notice in writing to the Clerk of each member governmental unit, the Board shall hold a hearing and upon a favorable vote, the Board may by resolution recommend that the Commission be dissolved. The resolution shall be submitted to each member governmental unit and if ratified by a majority of the governing bodies of all eligible members within sixty (60) days, the Board shall dissolve the Commission following 90 days notice to Dakota County and the Minnesota

Board of Water and Soil Resources, and allowing a reasonable time to complete work in progress and to dispose of personal property owned by the Commission.

IN WITNESS WHEREOF, the undersigned have caused this Amendment to be executed by their duly authorized officers by authority of their respective governing bodies.

Approved by the City Council
_____, 20__.

CITY OF LAKEVILLE

BY: _____

ATTEST: _____

Approved by the City Council
_____, 20__.

CITY OF BURNSVILLE

BY: _____

ATTEST: _____

Approved by the City Council
_____, 20__.

CITY OF EAGAN

BY: _____

ATTEST: _____

Approved by the City Council
September 24, 2020.

CITY OF APPLE VALLEY

BY: Mary Hannah Roland
Mary Hannah Roland, Mayor

ATTES: Pamela J. Gackstetter
Pamela J. Gackstetter, City Clerk

Board of Water and Soil Resources, and allowing a reasonable time to complete work in progress and to dispose of personal property owned by the Commission.

IN WITNESS WHEREOF, the undersigned have caused this Amendment to be executed by their duly authorized officers by authority of their respective governing bodies.

Approved by the City Council
_____, 20__.

CITY OF LAKEVILLE

BY: _____

ATTEST: _____

Approved by the City Council
_____, 20__.

CITY OF BURNSVILLE

BY: _____

ATTEST: _____

Approved by the City Council
September 1, 20*20*.

CITY OF EAGAN

BY: *W. Maguire*

ATTEST: *Chuck M. [Signature]*

Approved by the City Council
_____, 20__.

CITY OF APPLE VALLEY

BY: _____

ATTEST: _____

IN WITNESS WHEREOF, the undersigned have caused this Amendment to be executed by their duly authorized officers by authority of their respective governing bodies.

Approved by the City Council
September 8, 2020.

CITY OF LAKEVILLE

BY: [Signature]

ATTEST: [Signature]

Approved by the City Council
September 22, 2020

CITY OF BURNSVILLE

BY: [Signature] City Manager

[Signature] Mayor

Approved by the City Council
, 20__.

CITY OF EAGAN

BY: _____

ATTEST: _____

Approved by the City Council
_____, 20__.

CITY OF APPLE VALLEY

BY: _____

ATTEST: _____

Appendix B

Summary of Stakeholder Engagement Activities

Memorandum

To: Black Dog Watershed Management Organization (BDWMO) Commissioners
From: Greg Williams, PE, Barr Engineering Co.
Subject: Summary of issue identification activities to inform BDWMO Watershed Management Plan update
Date: June 8, 2021
Project: 23191455
c: Daryl Jacobson, BDWMO Administrator

Requested BDWMO Commission actions:

1. Review this memorandum and attached stakeholder engagement activity summaries.
2. Consider and revise, as needed, the criteria to establish strategic waterbodies and, if possible, identify strategic waterbodies for the 2022 Plan.
3. Consider whether additional resources or areas should be identified as a priority for BDWMO management.
4. Consider approving the recommended issue prioritization scheme.

1.0 Background

The Black Dog Watershed Management Organization (BDWMO) commissioners are in the process of updating the BDWMO Watershed Management Plan (Plan). Identifying priority issues and resources to be addressed by the Plan is an important step as it focuses subsequent Plan development efforts and, ultimately, Plan implementation actions. The stakeholder engagement plan developed by the BDWMO commissioners includes several activities intended to identify and prioritize issues and resources. These activities include:

- Soliciting responses to the Plan update notification
- Interviews with member city and partner staff
- Technical Advisory Committee (TAC) meeting
- Online survey
- Plan initiation (public kickoff) meeting

Several of these activities have been summarized in prior memoranda provided to the Commissioners (see attached). In addition, Barr Engineering Co. (Barr) reviewed the discussion of issues from the 2012 BDWMO Watershed Management Plan (2012 Plan); this information was presented at the public kickoff meeting. Barr also reviewed and presented the criteria to establish "strategic waterbodies" (i.e., resource prioritization) to the Commissioners at the May 19, 2021 BDWMO meeting.

2.0 Summary of Issue Identification Results

2.1 Responses to the Plan Update Notification

Responses to the Plan update notification letter identified several focus areas related to natural resources as well as topics related to BDWMO operations (i.e., how the Plan is implemented). Resource issues identified include:

- Groundwater sustainability
- Chloride reduction
- Invasive species management
- Pollution prevention and water quality treatment of stormwater runoff
- Peak stormwater flow rate and volume reductions
- Focus on impaired waterbodies (e.g., Keller Lake) and those close to impairment
- Management of subsurface sewage treatment systems (SSTS)
- Use of in-lake water quality treatment (e.g., alum treatment)

Additional focus areas more closely related to “how” the Plan is implemented include:

- Increased emphasis on measurable goals
- Prioritization and targeting of implementation activities
- Emphasis on collaboration with partners

2.2 Member City and Partner Interviews

Barr interviewed member city and partner organization staff to better understand the value of BDWMO services, primary issues facing BDWMO partners, and opportunities to improve working relationships. The interviews identified the following major themes:

- Partners are generally happy with their working relationships with the BDWMO.
- Partners may achieve additional water and natural resource goals with additional capacity/assistance from the BDWMO.
- Partners see opportunities for an increased role of the BDWMO with respect to assisting with project funding (grants, cost-share programs), education, public engagement, and resident water resource programming.

The interviews identified few significant water quality, flooding, or natural area issues that need to be addressed in the next Plan; specific issues raised include:

- Aquatic invasive species management
- Localized flooding issues upstream of Crystal Lake
- Erosion resulting from increased precipitation intensity
- Chloride reduction

- Maintenance of private best management practices (BMPs)
- Delisting of Keller Lake

2.3 Technical Advisory Committee (TAC) Meeting

The Plan update Technical Advisory Committee (TAC) – comprised of staff of the BDWMO member cities, Dakota County, Dakota SWCD, Metropolitan Council, and State plan review agencies – met on March 12, 2021 to discuss issues to be addressed in the Plan update. Discussion at the TAC meeting largely reiterated the issue topics and resources noted in the responses to the Plan update notification and those noted during the member city and partner staff interviews.

Issues specifically noted and discussed by the TAC include:

- Chloride in groundwater
- Groundwater use and overall sustainability
- Keller Lake nutrient impairment
- Protection of existing water quality in Lac Lavon
- Increasing stormwater best management practice maintenance needs
- City monitoring and management of invasive species
- Opportunities for education and resident engagement

2.4 Online Survey Results

The BDWMO Commissioners hosted an online survey from February 2021 through May 2021. Eighty-one participants took the online survey. Question 5 of the survey specifically asked participants to identify if they were concerned about 14 water and natural resource issues (e.g., pollutant loading) and to identify additional issues of concern. Issues identified as a concern by the greatest percentage of survey respondents include:

- Pollutants like road salt, fertilizer and heavy metals entering surface water or groundwater (identified by 91% of respondents as a concern)
- Amount of trash in or around the water body (90% of respondents)
- Aquatic invasive species (79% of respondents)
- Abundance and diversity of wildlife (72% of respondents)
- Sustainability of groundwater supplies (67% of respondents)

Open-ended responses to other survey questions further demonstrated common interests in protecting and improving the ecological health and functions of local water and natural resources (e.g., wildlife habitat) as well as the community benefits they provide (e.g., recreation, public health, aesthetics).

2.5 Public Kickoff Meeting

The BDWMO Commissioners hosted a public kickoff meeting consistent with Minnesota Rules 8410.0045 on April 21, 2021. Barr presented Information on prior engagement and issue identification activities at the public meeting. No new issues were identified at the public meeting.

3.0 Resource Prioritization

There are many waterbodies located within the BDWMO. We recommend that the Commissioners prioritize resources of local significance to leverage the funding and staff capacity of the BDWMO more effectively. In the 2012 Plan, prioritization included the identification of five strategic waterbodies.

3.1 Strategic Waterbodies

Strategic waterbodies (as defined in the 2012 Plan) are waterbodies of broad watershed significance that are important to a larger population than just the municipalities in which they are located. For the 2012 Plan, waterbodies were required to meet four of the following five criteria to be classified as “strategic”:

- Major subwatershed includes more than one city (i.e., intercommunity drainage area)
- Important recreational resource (i.e., swimming, boating, or adjacent park) or wildlife/natural resource
- Discharges to a downstream resource of significance (e.g., Minnesota River)
- Surface area of at least 50 acres
- Average or better water quality (grade of “C” or better based on three years of CAMP water quality grades)

Table 1 presents the criteria to define strategic waterbodies from the 2012 Plan as applied to several BDWMO waterbodies. Note that Table 1 presents the water quality criterion as evaluated in the 2012 Plan and also re-evaluated using more recent data (i.e., 2017-2019 CAMP data). In the 2012 Plan, waterbodies meeting 4 of the 5 criteria were classified as strategic waterbodies. Application of the 2012 strategic waterbody criteria updated for recent water quality results in the same strategic waterbodies classification as when the 2012 data was used.

Presently, the BDWMO takes a lead role in managing the strategic waterbodies while the member cities are primarily responsible for managing non-strategic lakes, ponds, and wetlands in the BDWMO, including Sunset Pond, Earley Lake, Lee Lake, Wood Pond and Twin Lake.

We recommend that Commissioners consider and revise, as needed, the criteria to establish strategic waterbodies. For example, we recommend eliminating the water quality criterion, as both high quality waters (e.g., Lac Lavon) and impaired waters (e.g., Keller Lake) were identified as priorities by stakeholder engagement efforts. Possible criteria to consider include:

- Waterbody size (e.g., greater than 50 acres)
- Public access or presence of adjacent parks/public land/natural areas

- Intercommunity drainage area (total watershed, direct watershed, or “major” watershed – see Figure A-2 of draft Land and Water resources inventory)

We recommend avoiding criteria based on subjective measures such as “recreational significance” or “ecological significance” in favor of more objective criteria that may achieve the same classifications. The commissioners may also consider using some criteria as “deal-breakers” and others as secondary criteria. For example: “strategic waterbodies must be 50 acres and size and meet one of the following additional criteria...”

Table 1 Strategic Waterbody Criteria (updated with recent water quality results)

Waterbody (bold indicates Strategic Waterbody based on existing criteria)	Criteria to be classified as BDWMO Strategic Waterbody (2012)					Has average or higher water quality (2017-2019) ⁴
	Major sub-watershed includes multiple cities	Important regional resource for recreation ¹ , or wildlife/natural resources	Directly discharges into a significant downstream resource ²	Surface area at least 50 acres	Has average or higher water quality (2012 Plan) ³	
Crystal Lake (19-0027)	X	X		X	Yes (B-C-C)	Yes (B-B-C)
Keller Lake (19-0025)	X	X	X	X	No (D-D-F)	No (C-D-C)
Kingsley Lake (19-0030)		X	X	X ⁵	Yes (A-A-A)	Yes (A-A-A)
Lac Lavon	X	X		X	Yes (A-A-A)	Yes (A-A-A)
Orchard Lake (19-0031)	X ⁶	X		X	Yes (B-A-B)	Yes (A-A-A)
Sunset Pond	-- ⁷	X		X	Yes (D-A-B)	Yes (B-NA-NA)
Earley Lake (19-0033)		X			Yes (C-B-C)	Yes (NA-NA-B)
Horseshoe Lake (19-0032)	X				Unknown	Unknown (NA-NA-NA)
Lee Lake (19-0029)			X		Yes (A-A-A)	Yes (C-C-B)
Twin Lakes (19-0028)		X			Yes (C-B-C)	Yes (B-B-B)
Wetland 19-0381 (CamRam)		X		X	Unknown	Unknown (NA-NA-NA)
Wood Lake (19-0024)		X		X	Yes (C-C-C)	Yes (C-C-B)

Note(s):

- (1) Recreational factors include swimming, boating, or adjacent regional park
- (2) Significant downstream resources include Minnesota River, trout streams, or others identified as significant
- (3) Based on average of “C” or better from CAMP monitoring as reported in the 2012 Plan
- (4) Based on average of “C” or better from 2017, 2018, and 2019 CAMP monitoring letter grades
- (5) Including wetland areas around lake
- (6) Tributary watershed to Orchard Lake includes portion of Credit River Township (outside of jurisdictional boundary)
- (7) Only receives a very minor amount of runoff from the City of Savage

A table (Table 1-5 from the draft Land and Water Resources Inventory) containing select waterbody characteristics is attached to this memorandum to inform potential strategic waterbody criteria. In

considering strategic waterbodies, note that respondents to the online survey also identified the following lakes as resources of concern in addition to all of the existing strategic waterbodies: Sunset Pond, Earley Lake, and Lee Lake.

3.2 Other Priority Resources

In addition to a determination of priority waterbodies, the Commissioners may choose to prioritize other resources for emphasis during Plan implementation, such as wetlands and/or upland areas. The 2012 Plan did not specifically identify any non-lake resources as priority resources.

Participants in the online survey generally identified wetlands, ponds, and shoreline areas as important but did not identify specific resources. Several survey respondents identified the Minnesota River as an important resource despite its location downstream of the BDWMO's jurisdictional boundary. TAC discussion did not specifically identify any non-lake priority areas; city staff noted that many natural areas of high value are associated with city parks. **We recommend that Commissioners consider whether additional resources or areas be identified as a priority for BDWMO implementation.**

4.0 Recommendations for Issue Prioritization

The Commissioners hold the final authority to establish priority issues and resources for the 2022 BDWMO Plan. The stakeholder engagement activities summarized in this memorandum and documented in its attachments may inform those decisions. Based on the information gathered to date and the past and present operations of the BDWMO, we recommend the Commissioners consider the following issue and prioritization scheme as a basis for discussion:

Highest Priority Issues:

- Water Quality, including
 - Stormwater runoff quality
 - In-lake water quality
 - Impairments
- Ecological Health, including:
 - Habitat quality
 - Invasive species management
- Groundwater management, including
 - Pollution prevention
 - Conservation and sustainability
- Education and Engagement

Lower priority issues:

- Flooding and water levels
- Wetland management
- Upland/natural area management

5.0 Attachments

- *2022 Watershed Management Plan Update – Partner interview summary* (memorandum from Barr Engineering Co. dated October 13, 2020)

To: Black Dog Watershed Management Organization (BDWMO) Commissioners
From: Greg Williams, PE, Barr Engineering Co.
Subject: Summary of issue identification activities to inform BDWMO Watershed Management Plan update
Date: June 8, 2021
Page: 7

- *Summary of Responses to Notification of 2022 BDWMO Plan Update (to date)* (memorandum from Barr Engineering Co. dated October 13, 2020)
- *Results of the BDWMO Watershed Management Plan update resident survey* (memorandum from Barr Engineering Co. dated June 4, 2021)
- Table 1-5 Summary of BDWMO PWI and Physical Characteristics (from draft Land and Water Resources Inventory section of the 2022 BDWMO Plan)



Memorandum

To: Commissioners, Black Dog Watershed Management Organization (BDWMO)
From: Karen Chandler and Greg Williams
Subject: 2022 Watershed Management Plan Update – Partner interview summary
Date: October 13, 2020
Project: 23190374.20 PLAN

At the June 17, 2020 BDMWO Commission meeting, the Commissioners authorized Barr Engineering Co. (Barr) staff to interview staff of BDWMO member cities and partners. The purpose of the interviews is to inform Plan development by better understanding the value of BDWMO services, primary issues facing BDWMO partners, and opportunities to improve working relationships. Barr staff contacted the following individuals:

- Samantha Berger (City of Apple Valley) – interviewed on September 16, 2020
- Jessica Schaum (City of Apple Valley) – interviewed on September 16, 2020
- Eric Macbeth (City of Eagan) – interviewed on September 21, 2020
- Ann Messerschmidt (City of Lakeville) – interviewed on September 23, 2020
- Mac Cafferty (City of Lakeville) – interviewed on September 23, 2020
- Caleb Ashling (City of Burnsville) – interviewed on September 24, 2020
- Jill Trescott (Dakota County) – interviewed on October 7, 2020
- Daryl Jacobson (City of Burnsville) – interview not completed
- Lindsey Albright (Dakota SWCD) – deferred to Brian Watson (Dakota SWCD) – interview not completed

The following memorandum summarizes the interviews and is organized by interview question (**bold text**). Responses are paraphrased for summary purposes and may not be attributed to individual interviewees. We recommend that this summary be provided to interview participants to confirm the accuracy and completeness of the responses. Major themes are summarized at the end.

Requested BDWMO Commission action:

1. Review the summarized interview responses and be prepared to discuss highlights.
2. Authorize distribution of interview summary to participants for review.

Interview Response Summary

1. **With regard to BDWMO programs and services (e.g., water quality monitoring, habitat monitoring, technical assistance):**
 - **Which services do you find the most helpful/useful (e.g., monitoring, education, capital improvements, cost-share grant assistance, forum for intercommunity issues)?**

To: Commissioners, Black Dog Watershed Management Organization (BDWMO)
From: Karen Chandler and Greg Williams
Subject: 2022 Watershed Management Plan Update – Partner interview summary
Date: October 13, 2020
Page: 2

- BDWMO member cities see value in small-scale and large-scale financial assistance from the BDWMO. This includes funding for Landscaping for Clean Water, studies and investigations, as well as capital projects.
- Water quality monitoring is also useful, but opinions were mixed on how much more value it adds than CAMP (Met Council) water quality monitoring.

• **Overall, would you prefer the BDWMO to do more or less? What would you like to see the BDWMO do more or less of?**

- The habitat monitoring, while very detailed, lacks practical usefulness. Greater value could be derived from habitat monitoring if the deliverable was more accessible and actionable (e.g., handouts for shoreline landowners in critical areas, or list of prioritized improvements).
- Member cities saw an opportunity for more resident outreach and communication from the BDWMO. This could include more branded educational materials, targeted mailings, sponsored events, and other activities that make residents more connected to water resources and more aware of the BDWMO.
- Member cities see value in expanding financial support for Landscaping for Clean Water, Adopt-a-drain, or similar programs. Implementing a resident cost-share program could increase outreach.
- Member cities see an opportunity for more educational program support. City staff are very busy, and see value in leveraging BDWMO volunteers, staff, or consultants to host or participate in interactive education. Activities could include clean-up days, storm drain stenciling, etc. Providing educational materials is useful, but cities are more limited by staff time.

2. What education and public engagement activities performed by the BDWMO are the most beneficial? What additional or expanded education or public engagement services would you like to see the BDWMO perform?

- Support for Landscaping for Clean Water is the most beneficial educational service (see also response to question 1).

What additional or expanded education or public engagement services would you like to see the BDWMO perform?

- See also response to question 1.
- Ideas for expanded education and engagement activities include
 - Targeted mailings in coordination with City communication efforts (e.g., mailing to lakeshore residents)
 - Education materials (e.g., fact sheets) that could be provided to cities and distributed through City social media and other channels. Cities could release pieces of annual report over time, tailored to individual cities.
 - Participating in (or organizing) watershed or lake group clean-up days
 - Attendance/participation at public events (e.g., home and garden show)

3. Are there practices or programs implemented by other watershed management organizations/watershed districts that you think should be implemented in the BDWMO?

To: Commissioners, Black Dog Watershed Management Organization (BDWMO)
From: Karen Chandler and Greg Williams
Subject: 2022 Watershed Management Plan Update – Partner interview summary
Date: October 13, 2020
Page: 3

- Other WMOs are involved in Master Water Stewards. It was suggested that the BDWMO explore whether this program could increase BDWMO volunteer capacity (Eagan has had mixed results).
- VLAWMO allows residents to check out different equipment, educational materials, and games to promote resident understanding of water resource issues.
- Member cities suggested greater use of social media and branding to increase awareness of the BDWMO.
- With little staff capacity, the BDWMO could create boards or displays that summarize the organization that could be brought to City (or other partner) events.
- VRWJPO has been successful in pursuing larger grants which are distributed to Cities to complete the project. The BDWMO would apply for and manage the grant while cities would manage design, construction.
- Other WMOs employ or contract with an education coordinator to carryout education and engagement activities.

4. What are your organization's primary concerns regarding water quality, such as:

- **Water quality of specific water bodies (Keller and Lac Lavan)**
 - **Pollutant loading hot spots**
- Getting impaired waters de-listed is a priority.
 - Member cities identified a focus on water quality protection, as current water quality is fairly good.
 - Multiple member cities noted aquatic invasive species control as a water quality concern (e.g., Keller Lake, Crystal Lake).
 - Salt reduction was noted as a priority.
 - Member cities noted that significant water quality improvement needs are currently few.
 - Additional resources for private water quality BMP management was noted as an area of city focus.
 - Interviewees wondered if there was a way for the BDWMO to assist cities with ongoing monitoring of BMP practices (e.g., iron-filtration trenches, rain gardens, detention basin systems). Cities will be installing more and more complicated practices and tracking performance is overwhelming.

5. What are your organization's primary concerns regarding water quantity or flooding, such as:

- **Flooding at specific locations**
 - **Excessive flow rates and/or erosion**
 - **High or low water levels**
 - **Structures in the floodplain**
- Eagan is performing city-wide hydrologic and hydraulic modeling that may identify specific issues, but presently no issues within the BDWMO are identified.
 - The oldest parts of Apple Valley are located in the BDWMO. Storm sewers will be upgraded with retrofits over time, but the city is unaware of significant issues.
 - The City of Lakeville is aware of localized flooding issues upstream of Crystal Lake in the Shady Oak Park area and upstream of Lee Lake. These issues are the result of ponds and conveyances designed with older design criteria. The City is conducting a feasibility study to

To: Commissioners, Black Dog Watershed Management Organization (BDWMO)
From: Karen Chandler and Greg Williams
Subject: 2022 Watershed Management Plan Update – Partner interview summary
Date: October 13, 2020
Page: 4

address these issues. Lakeville has performed some pond improvements, with more work planned.

- There are no specific flooding issues in Burnsville. Generally, there is concern about increased erosion due to increased precipitation intensity. Burnsville has performed some modeling of future precipitation impacts on water surface elevations in Crystal and Keller Lakes.

6. What are your organization's primary concerns regarding wetlands, habitat, or natural areas? What role, if any, would you like to see the BDWMO assume in managing, protecting, or restoring these resources?

- Member cities generally seek to maintain and protect wetlands, but there are generally few resources for enhancement or restoration. Cities may be able to identify opportunities if additional resources were available.
- Member cities have an idea of aquatic invasive species present in lakes, but do not know the extent of AIS present in wetlands.
- While cities generally perform AIS surveys and management actions, interviewees wondered if there is a role for the BDWMO for more regular assessment and/or management of AIS in strategic waterbodies.
- Some cities are investigating and managing terrestrial invasive species.
- Member cities noted that a useful part of habitat monitoring is noting areas where city can improve buffers; additional detail may assist in planning City actions.

7. What are your organization's primary concerns regarding stormwater management, such as:

- **Inspection, maintenance, and repair of your stormwater system**
- **Future capacity issues resulting from growth or climate change**
- **Implementation or enforcement of local stormwater controls**
- **Stormwater utility and/or other funding mechanisms**
- **Regulatory compliance (e.g., MS4 permit)**
- Member cities noted all of the above examples as concerns
- Member cities wondered if the BDWMO could help fund stormwater management actions (e.g., pond cleanouts) in any way. Member cities noted that high cost of addressing infrastructure needs may be prohibitive.

8. What are your organization's primary concerns regarding groundwater resources, such as:

- **High or low groundwater levels**
- **Adequacy for drinking water supply**
- **Groundwater/surface water interaction issues**
- **Well-head protection and groundwater quality**
- **Effects of infiltration practices on groundwater**
- Member cities cited no major concerns with respect to groundwater.
- Member cities noted that additional education about, and promotion of, groundwater conservation practices would be beneficial.
- Dakota County anticipates increased coordination with partners like the BDWMO in the implementation of the new Groundwater Plan and noted chloride as an area of emphasis

To: Commissioners, Black Dog Watershed Management Organization (BDWMO)
From: Karen Chandler and Greg Williams
Subject: 2022 Watershed Management Plan Update – Partner interview summary
Date: October 13, 2020
Page: 5

9. How would you characterize your organization's working relationship with the BDWMO?

- **Are there any barriers limiting the effectiveness of this relationship?**
- **What changes would you recommend to improve the working relationship between the WMO and your organization?**
- Interviewees universally noted the good working relationship between the BDWMO and their organization; several appreciated the informal, easy-going nature of the relationship.
- Member city staff benefit by attending the BDWMO Commissioners' meetings and recommended that there be a standing agenda item for staff to share member city updates.
- No interviewees identified specific barriers to collaboration.

10. Is there anything else you would like to share with the BDWMO or would like the BDWMO to consider during the planning process?

- Interviewees had the following recommendations:
 - Prioritize projects and activities so there is clear guidance during staff/Commissioner turnover and/or changes in funding/capacity
 - Include "placeholder" projects to secure funding for opportunities that are not yet identified but may occur during the life of the Plan.
 - Print posters or signage and post them at natural areas where people might see them while using the resources.
 - Coordinate with member cities to leverage their social media presence.

Major Themes

Barr identified the following themes among the interview responses:

- Partners are generally happy with their working relationships with the BDWMO.
- There are few significant water quality, flooding, or natural area issues that need to be addressed in the next Plan – although AIS management was noted as a recurring issue.
- Partners may achieve additional water and natural resource goals with additional capacity/assistance from the BDWMO.
- Partners see opportunities for an increased role of the BDWMO with respect to assisting with project funding (grants, cost-share programs), education, public engagement, and resident water resource programming.



Memorandum

To: Commissioners, Black Dog Watershed Management Organization (BDWMO)
From: Karen Chandler and Greg Williams
Subject: Summary of Responses to Notification of 2022 BDWMO Plan Update (to date)
Date: October 13, 2020
Project: 23190374-2020-PLAN
c: Daryl Jacobson, BDWMO Administrator

On behalf of the Black Dog Watershed Management Organization (BDWMO) and consistent with Minnesota Rules 8410.0045, Barr Engineering Co. (Barr) distributed a notice of the Plan update on August 6, 2020. The notice was distributed to additional parties on August 20, 2020. The notice was sent to Plan review authorities including the member cities, Dakota County, Dakota Soil and Water Conservation District (SWCD), adjacent watershed management organizations, and state agencies. The notice requested that Plan review authorities provide the following information by October 19, 2020:

- Priority issues and expectations for BDWMO involvement in these issues
- Summaries of relevant water management goals]
- Pertinent water resources information

As of October 13, 2020, the following organizations responded to the notification letter:

- Dakota County
- Dakota Soil and Water Conservation District (SWCD)
- Minnesota Department of Natural Resources (MDNR)
- Minnesota Board of Water and Soil Resources (BWSR)
- Metropolitan Council

The comments provided in response to the Plan notification letter are summarized in this memorandum; complete materials provided in response to the notice of Plan update are attached. The responses received thus far identify both general and specific issues related to resources as well as process. Some items noted by multiple responding entities include:

- An emphasis on measurable goals and assessment of progress
- Increased focus on groundwater sustainability
- Implementation actions that are prioritized and targeted to address issues

To: Commissioners, Black Dog Watershed Management Organization (BDWMO)
From: Karen Chandler and Greg Williams
Subject: Summary of Responses to Notification of 2022 BDWMO Plan Update (to date)
Date: October 13, 2020
Page: 2

Dakota County

The Dakota County letter noted that the updated County Groundwater Plan (to be finalized by the end of 2021) contains a list of prioritized strategies to address groundwater issues. Issues and strategies for which the BDWMO may support or cooperate include:

- Provide feedback on an Agriculture Chemical Reduction Effort (ACRE)
- Consider development of a local chloride reduction plan
- Consider participation in a County-wide water supply/conservation initiative and partnering with the County on water conservation programs and projects.
- Considering partnering with the County on water reuse projects.
- Consider any updates to wetland protection and management plans, as needed. Consider partnering with the County for wetland retention and restoration activities as well as partnerships to improve groundwater quality that may impact wetlands, fens, or trout streams.
- Consider partnering with the County to expand groundwater conservation and pollution prevention education and outreach efforts.

Dakota County also noted that changes to BDWMO standards and policies may be needed to support the following goals and strategies from the County Groundwater Plan related to:

- Reducing agricultural contamination
- Preventing groundwater pollution from stormwater
- Preventing pollution by minimizing impacts of aggregate mining on groundwater quality
- Supporting alternative water supplies

Dakota County identified specific wildlife conservation considerations addressing herptiles, birds, insects and vegetation. Dakota County requested the BDWMO consider supporting the following recommendations in the Plan update.

- Additional native plantings – Promote developmental design criteria that limits turfgrass installations and supports establishments of small prairies or pollinator plantings
- Invasive species control – Support organizations and agencies in the identification and eradication of invasive species (both terrestrial and aquatic)
- Stormwater treatment BMPs with pollinator plantings – Consider incentivizing stormwater best management practices that incorporate native plantings to support wildlife habitat

(Note: the BDWMO discussed the draft County Groundwater Plan at their July 15, 2020 meeting; see July 7, 2020 memo from Barr for more information.)

Dakota Soil and Water Conservation District

Dakota SWCD identified the following three priority issues for the BDWMO Plan update:

To: Commissioners, Black Dog Watershed Management Organization (BDWMO)
From: Karen Chandler and Greg Williams
Subject: Summary of Responses to Notification of 2022 BDWMO Plan Update (to date)
Date: October 13, 2020
Page: 3

- Identify those water bodies that are “nearly or barely” impaired and focus on keeping them from being impaired or work toward getting them delisted
- Reduce peak flow and volume of surface water runoff in areas experiencing flooding
- Seek implementation activities that provide multiple benefits to water resources

Dakota SWCD noted the State emphasis on the use of Prioritized, Targeted and Measurable (PTM) criteria for the development of Plan goals and objectives. Dakota SWCD recommends that the BDWMO and SWCD collaborate to develop a PTM approach to goals and objectives that may be useful for both organizations (noting that consultation with BWSR may be required).

Dakota SWCD identified the following potential collaboration ideas for implementation:

- Administering and implementing grants
- Education and outreach
- Sub-watershed assessments or feasibility studies
- Technical assistance and project implementation
- Water monitoring

Minnesota Department of Natural Resources

The MDNR noted several general watershed management strategies that it recommends including in the Plan update; the strategies noted are generally consistent with existing BDWMO policy. The MDNR also recommends using its Watershed Health Assessment Framework approach to address resource issues; this framework considers the interdependence of hydrology, biology, connectivity, geomorphology, and water quality.

The MDNR response recommends specific objectives and actions to be included in the Plan to address:

- Groundwater sustainability
- Stormwater management
- Septic systems
- Chloride
- In-lake water quality treatment

Of the specific strategies identified, those related to groundwater and chloride represent a new emphasis relative to the 2012 BDWMO Plan. Strategies related to stormwater, septic systems, and in-lake treatment are generally aligned with current BDWMO and city practice, while providing some additional considerations for in-lake treatment.

The MDNR further provides additional natural resource information and links addressing invasive species, rare animals and plant communities, fens, and forest management.

To: Commissioners, Black Dog Watershed Management Organization (BDWMO)
From: Karen Chandler and Greg Williams
Subject: Summary of Responses to Notification of 2022 BDWMO Plan Update (to date)
Date: October 13, 2020
Page: 4

Minnesota Board of Water and Soil Resources

The BWSR response to the notification letter noted the importance of a coordinated and collaborative planning process that engages local governments and other stakeholders. Regarding Plan content, BWSR emphasized:

- Identifying priority issues,
- Data analysis with trends
- Long- and short-term measurable goals
- Implementation that is targeted and frequently updated

BWSR also cited the following specific recommendations included in the Black Dog WMO's 2017 Level II Performance Review and Assistance Program (PRAP) Summary Report:

- Provide easily accessible water quality data and trends
- Evaluate progress for the implementation of Plan actions a minimum of every two years

With respect to establishing goals and evaluating progress towards goals, BWSR noted that Minnesota Rule 8410.0080 Subp. 1 requires specific measurable goals that address priority Plan issues. Plan goals must contain detail sufficient to provide the direction regarding what the goals should accomplish, provide direction to the WMO's Commission, and allow for the success or failure of the goals to be measured. Goals should identify the extent of progress that will be made to address identified priority issues by the end of the 10-year Plan implementation.

BWSR noted that the Plan update must include the following implementation actions:

- Prioritized implementation program – The implementation program should be clear in identifying what implementation actions the WMO will accomplish in the next ten years regardless of whether or not any new grant funding is received. The implementation program should be both realistic and aspirational.
- Include a procedure to evaluate progress for implementation activities at least every two years.
- Define the process for evaluating implementation of local water plans.
- Define who is responsible for inspection, operation and maintenance of stormwater facilities.
- Define any existing or planned incentive type programs

Metropolitan Council

The Metropolitan Council response to the notification letter references the Metropolitan Council's *Thrive MSP 2040 Regional Development Framework* and the *2040 Water Resources Policy Plan* as guidance documents to inform the BDWMO Plan update. The updated BDWMO plan should include policies related to the protection of area water resources with consideration for the strategies included in the *2040 Water Resources Policy Plan*, with the end goal of water sustainability. The Metropolitan Council also referenced

To: Commissioners, Black Dog Watershed Management Organization (BDWMO)
From: Karen Chandler and Greg Williams
Subject: Summary of Responses to Notification of 2022 BDWMO Plan Update (to date)
Date: October 13, 2020
Page: 5

the need for quantifiable and measurable goals in the BDWMO Plan. The Metropolitan Council noted that the Plan update should, at a minimum, address the following issues:

1. Any problems with lake and stream water quality and quantity, including information on impaired waters in the watershed and the Organization's role in addressing the impairments,
2. Flooding issues in the watershed,
3. Storm water rate control issues in the watershed,
4. Impacts of water management on the recreation opportunities,
5. Impact of soil erosion problems on water quantity and quality,
6. The general impact of land use practices on water quantity and quality,
7. Policies and strategies related to monitoring of area water resources,
8. Policies and strategies related to use of best management practices,
9. Issues concerning the interaction of surface water and groundwater in the watershed,
10. Erosion and sediment control standards and requirements,
11. Volume reduction goals at least as restrictive as requirements in the NPDES construction general permit,
12. Capital improvement plan with itemized list of actions, estimated costs, and timeline, and,
13. Specifics on long-term maintenance of projects identified in the capital improvement plan, including identification of entities responsible for funding and conducting maintenance, as well as how long-term maintenance will be documented.

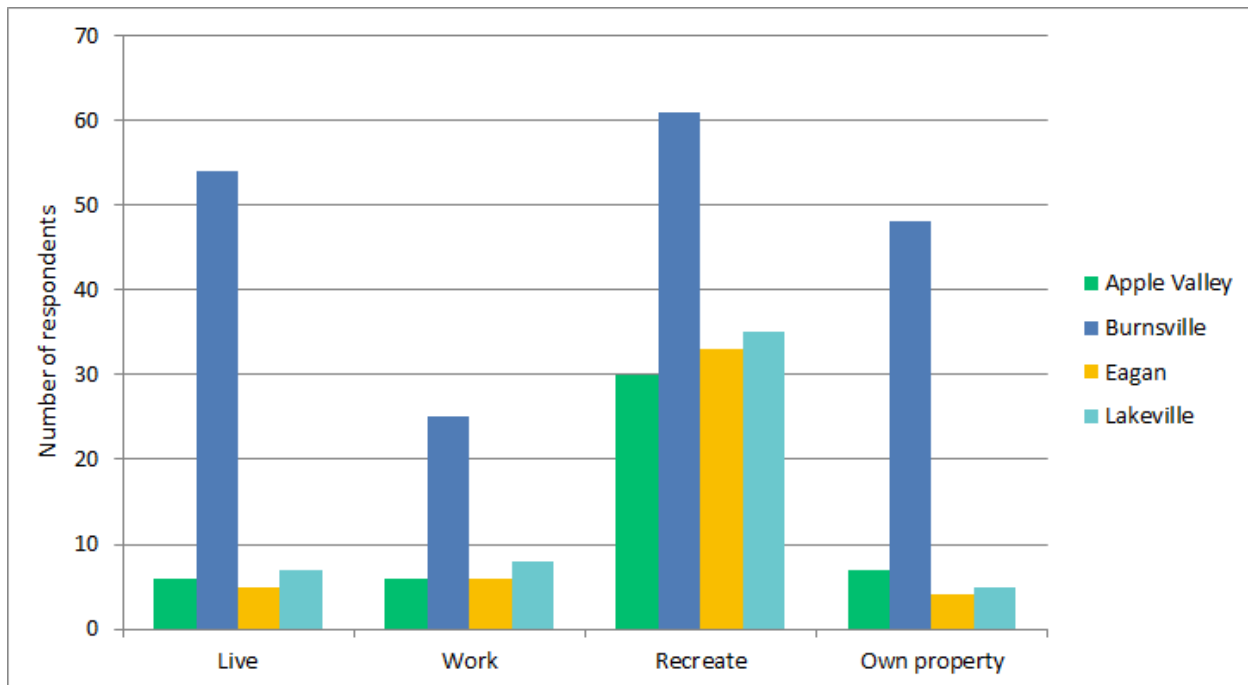
The Metropolitan Council noted that it maintains historical water quality data for several waterbodies within the BDMWO and provided a link to its online water monitoring database.

Memorandum

To: Black Dog Watershed Management Organization (BDWMO) Commissioners
From: Greg Williams, PE, Barr Engineering Co.
Subject: Results of the BDWMO Watershed Management Plan update resident survey
Date: June 8, 2021
Project: 23191455
c: Daryl Jacobson, BDWMO Administrator

The Black Dog Watershed Management Organization (BDWMO) commissioners are in the process of updating the BDWMO Watershed Management Plan (Plan). The Plan update includes several stakeholder engagement activities to garner input from cities, partners, and residents. As part of this effort, an online survey was hosted from February 2021 through May 2021 and completed by 81 participants. This memorandum summarizes the results of the online survey.

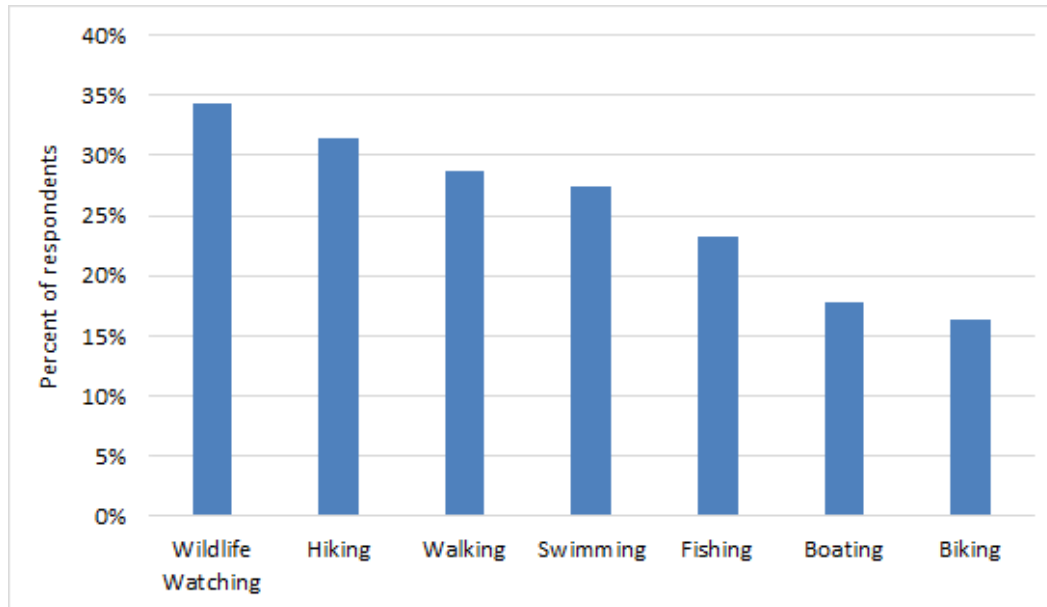
Question 1 – Do you live, work, recreate, or own property within the Black Dog WMO?



Most of the survey respondents (55 of 81, or 68%) live in Burnsville, with the remainder split about equally among the other member cities. This is approximately proportional to the breakdown of land area within the watershed. Property ownership follows a similar pattern. Despite most respondents living in Burnsville, about half of the survey respondents recreate in each of the BDWMO member cities (respondents could select all that apply).

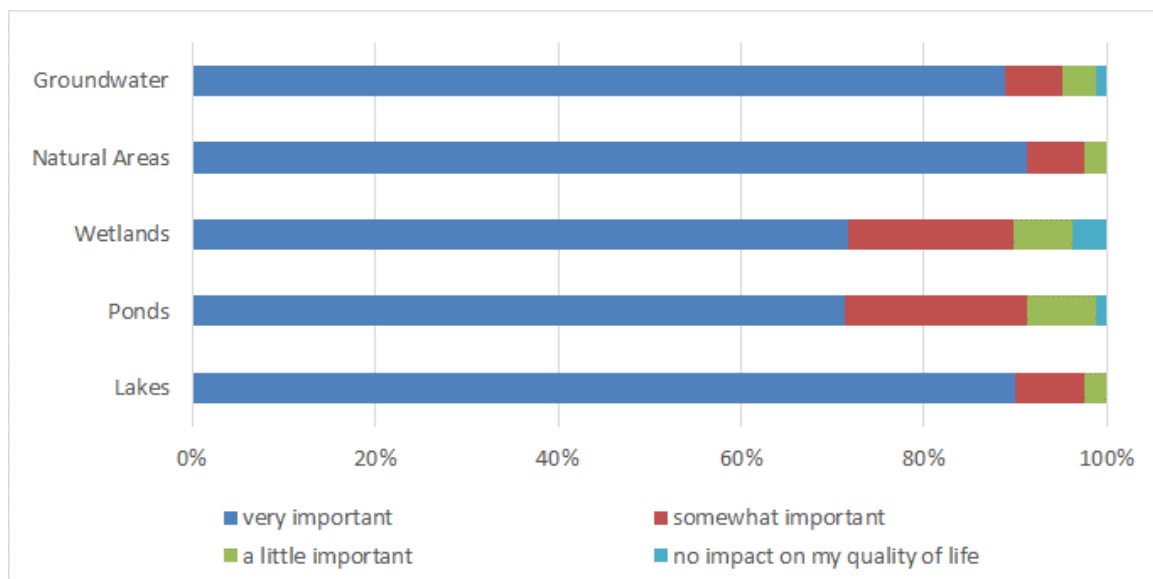
To: Black Dog Watershed Management Organization (BDWMO) Commissioners
From: Greg Williams, PE, Barr Engineering Co.
Subject: Results of the BDWMO Watershed Management Plan update resident survey
Date: June 8, 2021
Page: 2

Question 2 – How do you use the water and natural resources within the Black Dog WMO? (open ended question)



Question 2 asked survey respondents to identify how they use the water and natural resources within the Black Dog WMO. Of 73 open ended responses (90% of survey respondents), 34% said some form of wildlife watching. About 30% of respondents use the resources for hiking or walking. About 28% percent of survey respondents answered that they use the lakes for swimming. Fishing, boating, and biking were also popular responses identified by at least 15% of respondents. Other, less frequently cited responses include picnicking, animal catch and release, and exploring native plants.

Question 3 – How important are each of the following resources to your quality of life in your community?



To: Black Dog Watershed Management Organization (BDWMO) Commissioners
From: Greg Williams, PE, Barr Engineering Co.
Subject: Results of the BDWMO Watershed Management Plan update resident survey
Date: June 8, 2021
Page: 3

Question 3 asked respondents to select how important each of five natural resources are from a list of four levels of importance. Survey responses indicated that most residents consider *all* of the identified resources to be “very important” to quality of life. The results for groundwater, natural areas, and lakes are similar. Wetlands and ponds were viewed as “very important” by fewer survey respondents. Only one survey respondent stated that groundwater or ponds had no impact on quality of life, and three survey respondents stated that wetlands had no impact on quality of life.

Question 4 – How does the health of surface water, groundwater, and natural areas in the Black Dog WMO affect you, your friends, or your community? (open ended question)

Question 4 asked respondents to share how natural resource health affects them in an open-ended question format. Approximately 70% of survey takers answered this question. The level of detail varied among responses, but common themes were apparent.

- 50% of respondents noted that poor water quality negatively impacts the **health of the ecosystem**, including impacts to fish, plants, and other wildlife.
- 25% of respondents noted the connection between natural resource health and **recreation opportunities** (cited activities included swimming, fishing, and walking in nature)
- 25% of respondents identified a connection between **drinking water** and the health of water resources (responses included references to groundwater as well as surface water).
- 23% of respondents made a connection between the health of surface water, groundwater, and natural areas and overall **public health** within the community. Several responses specifically noted that the health of natural resources positively impacts mental health and provides stress relief opportunities.

Other ways that the health of surface water, groundwater, and natural areas impact survey respondents include impacts to resource aesthetics, property values, civic/neighborhood pride, and overall quality of life.

“The health of these resources directly impacts our quality of life and overall health. We live in a beautiful community which is graced with many natural resources which help to sustain a more peaceful state of mind and body.”

Question 5 – What concerns you about the condition of the surface water, groundwater, and natural resources in the Black Dog WMO?

Question 5 asked survey respondents to identify whether they were concerned or not concerned about each of 14 possible issues affecting surface water, groundwater, and natural resources. The question also included an option to identify “other” concerns not listed. Issues identified as a concern by the greatest number of survey respondents include:

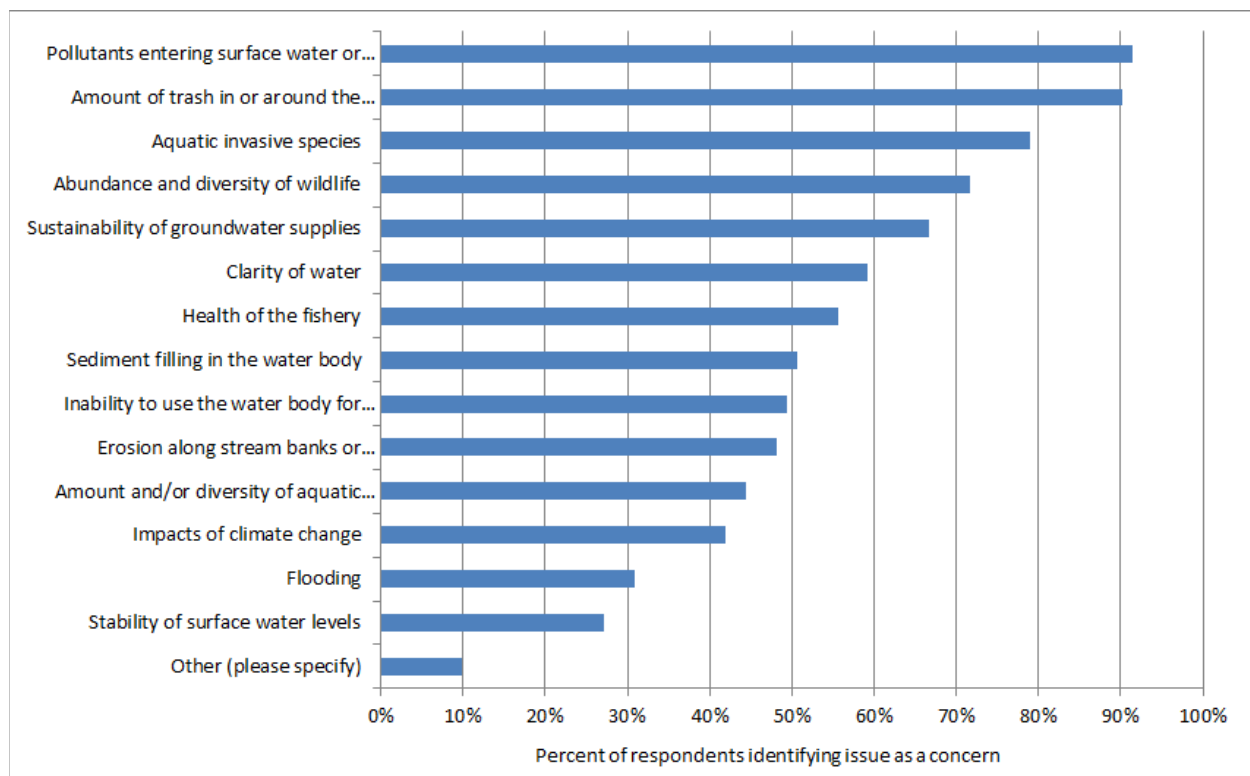
- Pollutants like road salt, fertilizer and heavy metals entering surface water or groundwater (identified by 91% of respondents as a concern)

To: Black Dog Watershed Management Organization (BDWMO) Commissioners
From: Greg Williams, PE, Barr Engineering Co.
Subject: Results of the BDWMO Watershed Management Plan update resident survey
Date: June 8, 2021
Page: 4

- Amount of trash in or around the water body (90% of respondents)
- Aquatic invasive species (79% of respondents)
- Abundance and diversity of wildlife (72% of respondents)
- Sustainability of groundwater supplies (67% of respondents)

About 10% of survey respondents identified an “other” concern. Other concerns include:

- Aesthetics
- Nitrates and heavy metals
- Algae blooms
- Drinking water
- Landfill
- Groundwater for irrigation



Question 6 – Are there specific surface water resources or natural areas in the Black Dog WMO you would like to see improved? If so, how?

Over half (62%) of the survey respondents answered “Yes” to the question asking if there were surface water resources or natural areas they would like to see improved. Question 7 further asked survey respondents to specify which resources and how they should be improved; 39 survey respondents provided this information. Some responses were general (e.g., wetlands), others identified specific

To: Black Dog Watershed Management Organization (BDWMO) Commissioners
From: Greg Williams, PE, Barr Engineering Co.
Subject: Results of the BDWMO Watershed Management Plan update resident survey
Date: June 8, 2021
Page: 5

waterbodies or areas (e.g., Crystal Lake), and some responses identified specific issues in specific resources (e.g., algal blooms in Sunset Pond).

Named resources within the Black Dog WMO cited in the responses to question 7 include:

- Sunset Pond (4 responses)
- Crystal Lake (4 responses)
- Lac Lavon (2 responses)
- Earley Lake (2 responses)
- Orchard Lake (2 responses)
- Keller Lake (2 responses)
- Lee Lake (1 response)

Responses also generally identified wetlands, stormwater ponds, and shoreline areas. Three responses referenced the Minnesota River, located downstream of the watershed.

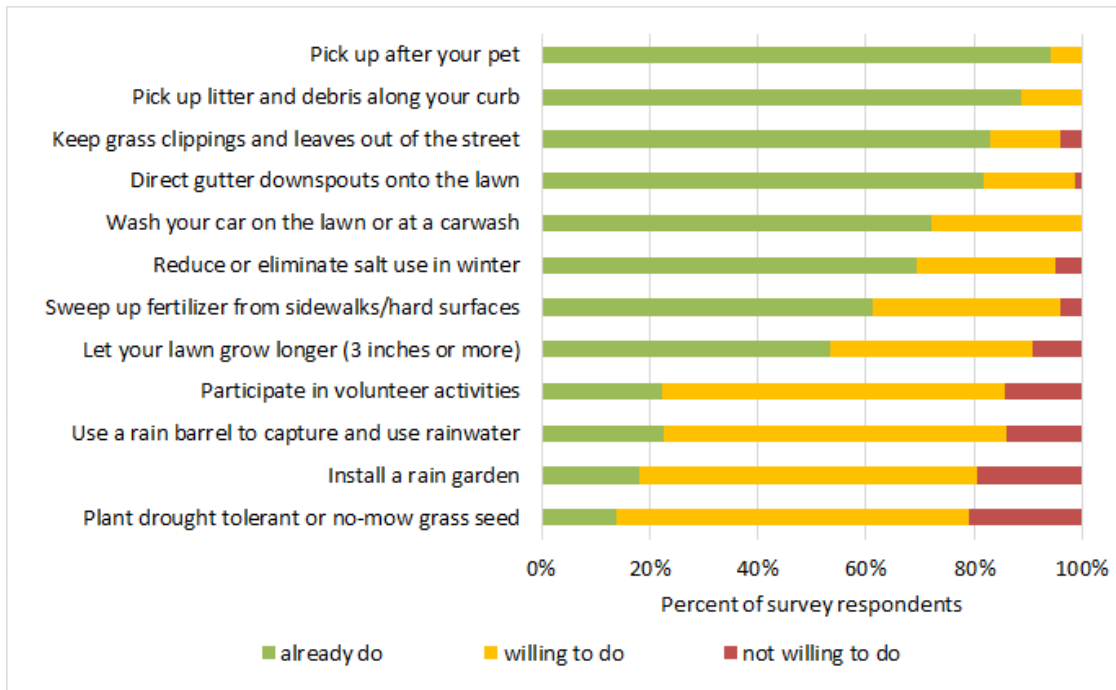
Improvements cited in the open-ended responses to question 7 included:

- Increased water clarity (Crystal Lake, Keller Lake, Orchard Lake)
- Fewer algal blooms (Earley Lake, Crystal Lake, Orchard Lake, Sunset Pond)
- Plant management (Lac Lavon and Earley Lake)
- Reduced/restricted use of salt
- Reduced/restricted use of fertilizer
- Increased/expanded buffers
- Less trash

Question 7 – How willing are you to take the following actions around your home and yard to improve surface water and groundwater quality?

Question 7 asked survey respondents to identify whether they already perform, would be willing to perform, or would not be willing to perform 12 behaviors that contribute to the protection or improvement of surface water and groundwater resources.

To: Black Dog Watershed Management Organization (BDWMO) Commissioners
From: Greg Williams, PE, Barr Engineering Co.
Subject: Results of the BDWMO Watershed Management Plan update resident survey
Date: June 8, 2021
Page: 6



Most survey respondents already perform several simple actions to reduce nutrient loading to natural resources, including picking up after pets, keeping yard waste out of streets, and sweeping up fertilizer. Fewer survey respondents perform actions to retain runoff such as installing a rainwater garden or collecting and reusing rainwater. The survey results indicate that there is broad willingness to perform some of these behaviors, including participating in volunteer activities, and suggests there may be opportunities to leverage community capacity for stewardship during Plan implementation.

Question 7 further asked survey respondents to identify other stewardship behaviors they perform. Examples cited in the open-ended responses include:

- Not fertilizing or applying other products to lawns
- Reducing or eliminating lawn irrigation

Further stakeholder engagement activities should explore the barriers that prevent residents moving from the “willing to do” category to the “already do” category.

Question 8 – Please enter your email address if you would like to receive information about actions you can take to protect and improve water and natural resources

Question 8 asked respondents to provide their contact information if they would like to be contacted with information about actions they can take to protect and improve water and natural resources.

Approximately 85% of survey respondents said they would be interested in receiving this information. These contacts may prove useful in future BDWMO, member city, or other partner education and engagement efforts (e.g., Dakota SWCD Landscaping for Clean Water).

To: Black Dog Watershed Management Organization (BDWMO) Commissioners
From: Greg Williams, PE, Barr Engineering Co.
Subject: Results of the BDWMO Watershed Management Plan update resident survey
Date: June 8, 2021
Page: 7

Conclusions

The responses to the survey indicate that the community places a high value of its local water and natural resources. Responses to the open-ended questions indicate common interests in protecting and improving the ecological health and functions of local water and natural resources, as well as the community benefits they provide (e.g., recreation, public health). The survey indicates that many residents are aware of, and engage in, natural resource stewardship practices and that increased participation is possible. Survey respondents are mostly Burnsville residents, but all member cities are represented.

Table 1-5: Summary of BDWMO PWI and Physical Characteristics

BDWMO Water Body	Municipality	Downstream Receiving Water	MDNR Identification		Physical Characteristics								
			MDNR Public Waters ID Number	PWI Class	Water Area (acre)	Perimeter (mi)	Littoral Area (acre)	Average Depth (feet)	Max Depth (feet)	Direct Watershed Area, including Lake Surface Area (acre)	Total Watershed Area including All Upstream Lakes (acre)	Normal Water Level (ft MSL)	100-Year Flood Elevation (ft MSL)
Lakes													
Crystal	Burnsville & Lakeville	Minnesota River	19-0027	P	292	5.3	208	10	35	2013	3852	933.5	935.8
Keller	Burnsville	Minnesota River	19-0025	P	52	1.2	52.0	4.8	8	1447	1447	934.3	938.6
Orchard	Lakeville	Credit River	19-0031	P	243	4.7	177	10	33	2045	2260	N/A	979.1
Kingsley	Lakeville	Credit River	19-0030	P	51	3.0	51.0	N/A	10.2	216	216	N/A	982.4
Lac Lavon	Apple Valley & Burnsville	Minnesota River	19-0446	N/A	60	2.1	39	N/A	32	184	184	Landlocked	933.1
Sunset Pond	Burnsville	Minnesota River	19-0451	N/A	60.0	2.5	60.0	N/A	10.5	1019	6311	N/A	854.8
Lee	Lakeville	Minnesota River	19-0029	P	19.0	1.2	19.0	7.0	15	206	206	948.5/ 947.0	951.9
Earley	Burnsville	Minnesota River	19-0033	P	23.3	1.1	23.3	3.8	7.8	757	5292	905	910.1
Horseshoe	Lakeville	Credit River	19-0032	P	11.7	0.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Wetlands													
Wood Pond	Burnsville	Minnesota River	19-0024	W	14.0	0.6	14.0	10	14	110	110	1000.9	1003.6
Twin (South)	Burnsville	Minnesota River	19-0028	W	11.7	1.0	11.7	3.6	11	574	4536	918	920.2
Twin (North)					5.1		5.1	6.6	12				
Unnamed (Cam Ram Wetland)	Burnsville	Credit River	19-0380	W	51.2	2.3	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0113	W	5.6	0.5	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0114	W	6.9	0.7	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0115	W	4.7	0.5	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0116	W	4.3	0.5	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0152	W	3.3	0.4	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0170	W	3.0	0.3	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0171	W	1.0	0.2	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0172	W	2.5	0.3	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0174	W	2.2	0.2	--	--	--	--	--	--	--
Unnamed	Burnsville & Eagan	Minnesota River	19-0191	W	8.6	0.8	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0192	W	2.5	0.4	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0193	W	5.7	0.5	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0194	W	2.4	0.3	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0195	W	3.4	0.3	--	--	--	--	--	--	--
Unnamed	Burnsville	Credit River	19-0197	W	0.2	0.1	--	--	--	--	--	--	--

Table 1-5: Summary of BDWMO PWI and Physical Characteristics

BDWMO Water Body	Municipality	Downstream Receiving Water	MDNR Identification		Physical Characteristics								
			MDNR Public Waters ID Number	PWI Class	Water Area (acre)	Perimeter (mi)	Littoral Area (acre)	Average Depth (feet)	Max Depth (feet)	Direct Watershed Area, including Lake Surface Area (acre)	Total Watershed Area including All Upstream Lakes (acre)	Normal Water Level (ft MSL)	100-Year Flood Elevation (ft MSL)
Unnamed	Burnsville	Minnesota River	19-0210	W	4.2	0.3	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0211	W	1.2	0.2	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0359	W	5.7	0.5	--	--	--	--	--	--	--
Unnamed (Goose Lake)	Lakeville	Minnesota River	19-0360	W	5.3	0.4	--	--	--	--	--	--	--
Unnamed	Lakeville	Minnesota River	19-0361	W	3.2	0.3	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0362	W	4.9	0.5	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0363	W	11.4	0.9	--	--	--	--	--	--	--
Unnamed	Burnsville	Minnesota River	19-0364	W	7.3	0.4	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0365	W	2.9	0.3	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0369	W	5.8	0.5	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0371	W	10.1	1.2	--	--	--	--	--	--	--
Unnamed	Burnsville	Credit River	19-0381	W	2.3	0.2	--	--	--	--	--	--	--
Unnamed	Burnsville	Credit River	19-0382	W	2.2	0.4	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0383	W	6.9	0.5	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0384	W	2.4	0.4	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0385	W	3.3	0.3	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0386	W	2.6	0.4	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0387	W	11.2	1.3	--	--	--	--	--	--	--
Unnamed	Lakeville	Credit River	19-0388	W	2.7	0.3	--	--	--	--	--	--	--