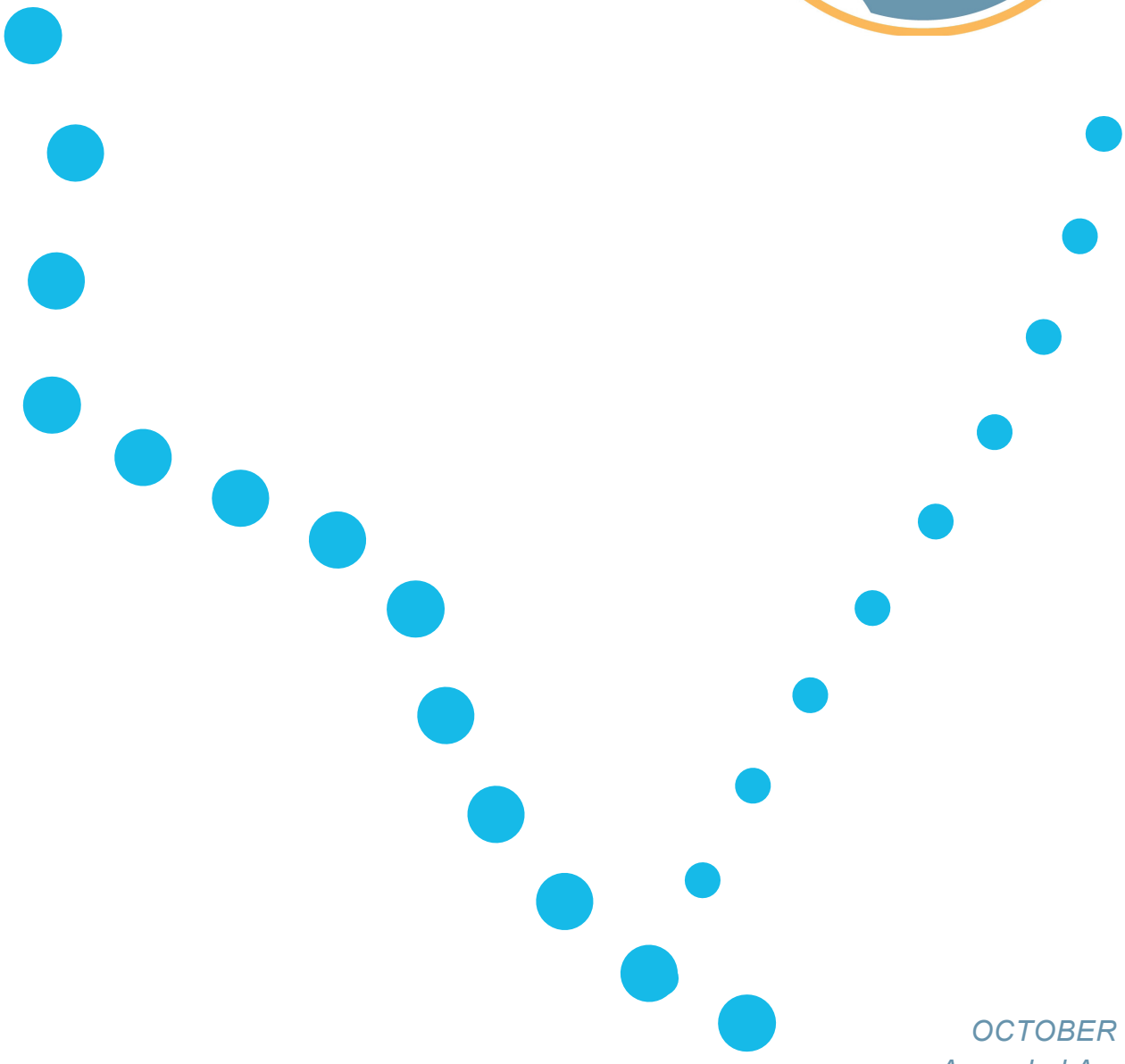
WATERSHED MANAGEMENT PLAN

SOUTH WASHINGTON WATERSHED DISTRICT



OCTOBER · 2016

Amended April 2019

2016

This watershed management plan establishes the goals and programs which form the foundation for managing water resources within the South Washington Watershed District.

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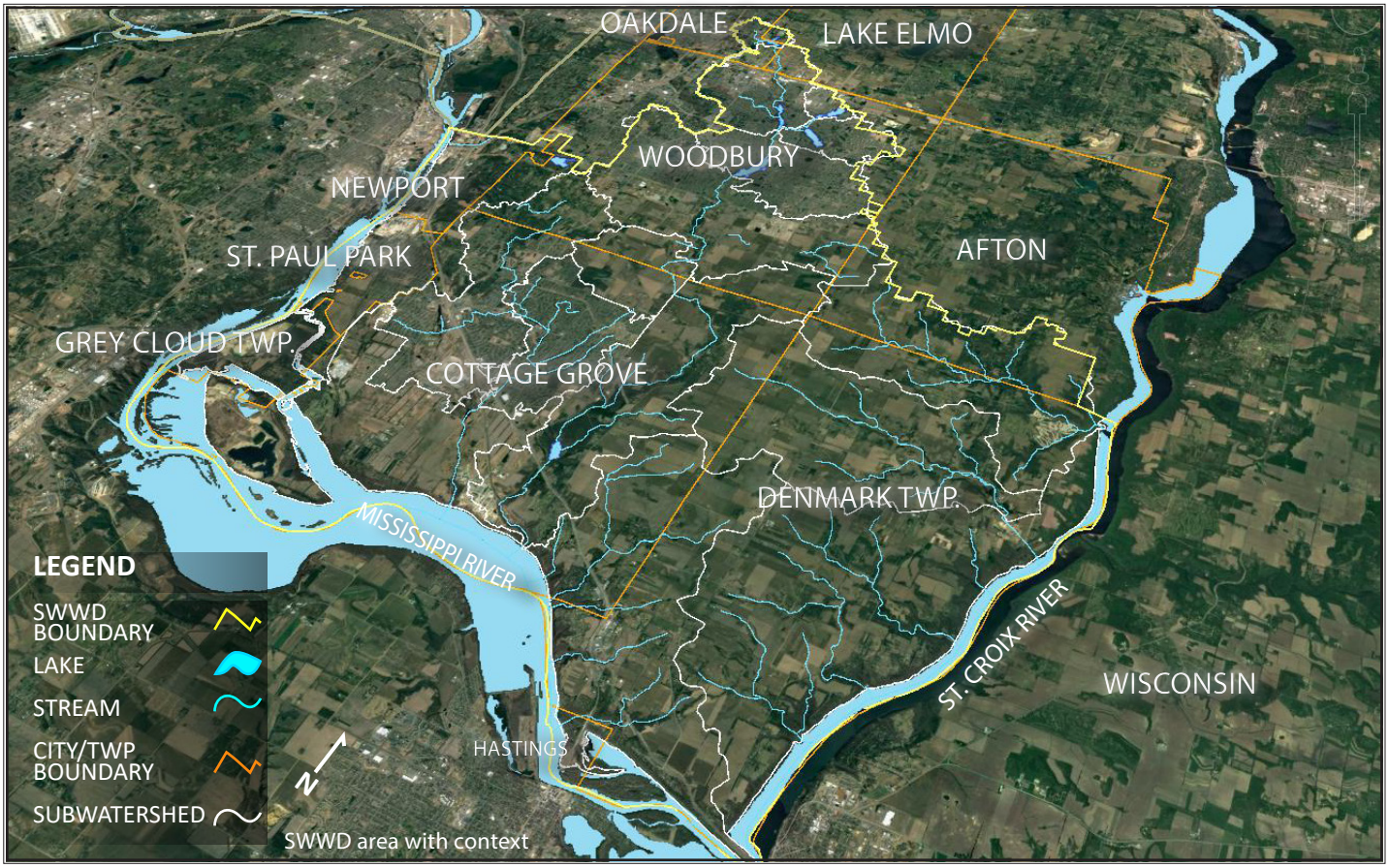


EXECUTIVE SUMMARY

PURPOSE AND HISTORY

The South Washington Watershed District (SWWD) was formed in 1993 as the 42nd Watershed District in the State. At the time, the District's focus was primarily on working with communities to address intercommunity flow between the District's northern watershed including portions of Afton, Lake Elmo, Oakdale, and Woodbury that drain into Cottage Grove. Since that time, the District's focus has expanded to include a wide range of flooding, water quality, natural resource, and groundwater issues as well as emerging issues such as climate change. Additionally, the District has grown geographically, expanding to include the former East Mississippi Watershed Management Organization and a portion of the former Lower St. Croix Watershed Management Organization. The District now covers 110 square miles at the confluence of the Mississippi and St. Croix Rivers, which includes 12 lakes, over 120 miles of piped and natural streams, and over 2,400 acres of wetlands. In addition to the map above, District geographical data is available on the District's interactive web viewer. Additional history and plan context is provided in Part I of the plan.

ISSUES AND GOALS

Drawing on evaluations of past District performance and input of District residents and partners, several issues were identified during development of this Watershed Management Plan. While issues are wide ranging, they can be categorized into several primary areas—Flooding, Watershed Alterations, Groundwater Sustainability, Natural Resources, Climate Change, Information and Education, and Efficiency and Accountability.

Reflecting identified issues, the goals of this plan are also wide ranging. However, each goal can in some way be tied to minimizing effects of flooding, protecting or restoring District land, surface water, and groundwater resources, adapting for climate change, providing education and informational resources, and effectively and efficiently operating the organization. Each of the identified issues and associated goals are detailed in Part II of the plan.

ACTION

To address identified issues and goals, the District operates in four primary program areas—Planning, Regulatory,

Implementation and Maintenance, and Education and Information—in addition to providing for effective and efficient administration of the organization. As part of annual evaluation and reporting processes, the District reviews and adjusts existing programs to ensure it can continue to effectively address identified issues. Each program area is covered in Part III of the plan which also includes the District's long range workplan that projects District expenditures over the life of the plan.

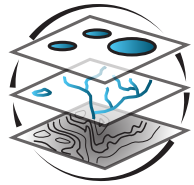
LOCAL GOVERNMENT RESPONSIBILITY

Reflecting the District's mission — *TO MANAGE WATER AND RELATED RESOURCES OF THE DISTRICT IN COOPERATION WITH OUR CITIZENS AND COMMUNITIES* — the District expects Cities and Townships to be active partners in addressing issues identified in this plan. Most notably, the District requires communities to adopt local water management plans that are in conformance with this plan, Minnesota State Rules and Statutes, and Metropolitan Council Water Resources Policy Plan. Additionally, these plans must include a mechanism for measuring and reporting implementation progress. Within 6 months approval of a local plan, communities must also enact local controls which reflect SWWD Rules. Additional information about the District's expectations of communities is in Part III of this plan.

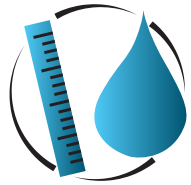
HOW TO USE THIS PLAN

This Watershed Management Plan is structured to provide implementation flexibility, or the ability to respond quickly to new or changing issues, and utilize several web-based, interactive tools. Because of this structure, we strongly recommend that the plan be viewed on the web. The plan is kept intentionally brief so as to provide an accessible, general overview of the District, issues it faces, and its implementation programs. However, the plan is also intended to serve as a navigation tool for citizens, consultants, and municipal and agency staff to quickly and effectively locate existing information related to a specific topic of interest. To facilitate that purpose, we have taken several steps.

- As you read through the plan you will notice several live links. These links will point to related sections of the plan. For instance, for each issue identified in Part II of the plan, there is a section titled Implementation Tools which will include live links to relevant implementation programs in Part III.
- Each Issue and Program section includes a subsection titled Additional Information which points you to all relevant resources that we are aware of. This includes not only SWWD resources (e.g. Guidance Documents) but also those of our local, regional, state, federal, and non-governmental partners that provide information beyond those resources specifically cited in the text.
- In appropriate sections, you will notice several interactive buttons which direct you to interactive resources on the SWWD website, including:



Web Viewer: This resource houses basic District geographical data and provides several basic mapping and ID functions.



Water Quality Monitoring Database: This resource holds all of the District's surface water quality monitoring data and provides basic graphical and statistical functions. It also serves as a portal to download District monitoring data.

Story Maps and Monitoring Reports: These resources provide additional information about District projects including photos and interactive maps as well as annual resource monitoring reports for our primary water resources.

Resource Library: This link houses all District resources, including meeting agendas and minutes, guidance documents, lake management plans, annual reports, etc.

BOARD OF MANAGERS

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ACKNOWLEDGEMENTS

The watershed plan update is a result of many contributors providing valuable input on behalf of their communities, organizations and agencies.

Technical Advisory Committee: Jenifer Sorensen, MNDNR; Sharon Doucette, City of Woodbury; Jessica Collin-Pilarski, Washington County; Ryan Burfeind, City of Cottage Grove; Dan Fabian, BWSR; Jay Riggs, WCD; Joe Mulcahy, Met Council; Chris Zadak, MPCA; Brian Livingston, MPCA

Citizens Advisory Committee: Howard Markus, Lynne Markus, Kevin ChapdeLaine, John Strohfus, Rob Arnold, Jim Levitt, Ken Brittian, Brandon Smith, Joshua McCalvy, Jill Chezik

Powers Lake Fishing Pier

PART I : SWWD INTRODUCTION

SWWD HISTORY AND PLAN CONTEXT

This plan builds on the District's past watershed management plants. This section provides only a summary of District history, land and water resources inventory, and trends. Additional discussion is available in Chapter 8 of the District's 2007 Watershed Management Plan.

The Minnesota Watershed Act, MN Statutes 103D, authorizing Watershed Districts was passed in 1955. Established as local, special-purpose units of government, Watershed District boundaries follow those of a natural watershed. Typically established for flood control or drainage improvement, Watershed Districts are now increasingly focused on water quality issues, particularly in the Minneapolis, St. Paul metropolitan area. The South Washington Watershed District (SWWD) is no different. First established in 1993 for the primary purpose of addressing inter-community flows and flooding concerns, SWWD's focus has grown to include protection and restoration of water resources.

The Cottage Grove Ravine Watershed Management Organization (WMO) was formed in 1984 to help address inter-community flooding concerns. The WMO was based on a joint powers agreement among the cities of Afton, Cottage Grove, Lake Elmo, Oakdale, and Woodbury. A draft watershed management plan for the WMO was completed in April 1988. However, that plan was never approved or adopted by the WMO. The WMO was later disbanded, and, in 1993, the Cottage Grove Ravine Watershed District was formed as the 42nd Watershed District in Minnesota. The District changed its name

Additional information including all references, past plans, and guidance documents is available in the SWWD resource library at www.swwdmn.org/resources

to South Washington Watershed District in 1995. The first SWWD Watershed Management Plan (WMP) was completed and adopted in September, 1997 and later amended in 2002. That first WMP was heavily oriented toward inventory and assessment of District resources.

In April 2003, the SWWD petitioned the Minnesota Board of Water and Soil Resources (BWSR) to enlarge its boundary and include the former East Mississippi Watershed Management Organization (EMWMO) as recommended in the Washington County Water Governance Study (1999). The EMWMO included all or portions of Grey Cloud Island Township, Cottage Grove, Woodbury, St. Paul Park and Newport. The enlargement petition was approved on May 2003 by BWSR.

In 2007, SWWD's second WMP was adopted and later amended in 2009 and 2011. Building on work completed under the first WMP, the second WMP emphasized implementation to address inter-community flow concerns and begin to manage District land and water resources to protect and restore their value to District residents.

In May 2010, the SWWD again petitioned to enlarged its boundary to include 3 additional catchments from the former Lower St. Croix Watershed Management Organization (LSCWMO). The enlargement petition was approved in September 2010 by BWSR, making SWWD one of the few Watershed Districts to manage area within two major watershed basins.

This current WMP once again builds on past work in the District and is intended to serve SWWD for decades to come. It is structured in three parts:

- Part I provides basic information about the District and its resources. We strongly encourage the reader to visit the SWWD website which includes the District's water quality database and web map viewer. Additionally, the website includes the District's resource library which serves as a repository for District plans and reports described throughout this document.

- Part II includes identified issues and goals and serves as the basis for all actions that the District takes. Progress toward achieving goals will be routinely assessed and implementation actions adjusted as necessary. Should additional issues be identified by SWWD they will be incorporated through amendment.

- Part III serves as the District's implementation plan, establishing District programs and documenting the District's Long Range Workplan and Administrative procedures. This part will be routinely updated through amendment to continue to serve the District.

LAND AND WATER RESOURCES

SWWD now covers over 70,000 acres or 110 square miles at the confluence of the Mississippi and St. Croix Rivers (Figure 1). The District includes portions of two major watersheds (Mississippi and St. Croix) encompassing 12 lakes, over 120 miles of piped and natural streams, and over 2,400 total acres of wetlands. SWWD manages those resources in partnership with the County, its Cities and Townships (Figs 1 & 2).

Landforms and water resources in SWWD largely reflect past glacial activity. Glacial processes and runoff from melting glaciers filled pre-glacial bedrock valleys, carved new bedrock valleys, and deposited till and outwash in varying forms across the District. Today, we can see several prominent remnants of that activity on the landscape. Topography data are available on the District's interactive web viewer (upper left button, above).

The Mississippi River which today marks the District's western and southern boundary follows its pre-glacial valley carved into Cambrian and Ordivician bedrock. The valley bordering SWWD predates glaciation. However,

SWWD covers over 110 square miles at the confluence of the Mississippi and St. Croix Rivers.

repeated glaciations and melting shaped the valley that we see today. It was repeatedly scoured during times of melting, most prominently by Glacial River Warren, and filled during times of lower flow. The filled valley now forms the Mississippi River Terrace upon which the modern Mississippi River flows.[1,2] Today the filling process is accelerated by human activity including excessive sediment originating from the Minnesota River Valley, and an extensive lock and dam system. Sedimentation dynamics and patterns are further influenced by ongoing channel dredging to facilitate commerce. It is important

[1] National Park Service. *River of History- A Historic Resources Study of the Mississippi National River and Recreation Area.* By John O. Anfinson. Published by St. Paul District, Corps of Engineers. 2003.
[2] Minnesota Geological Survey. *Educational Series 7-Geologic History of Minnesota Rivers.* By H.E. Wright, Jr. 1990.

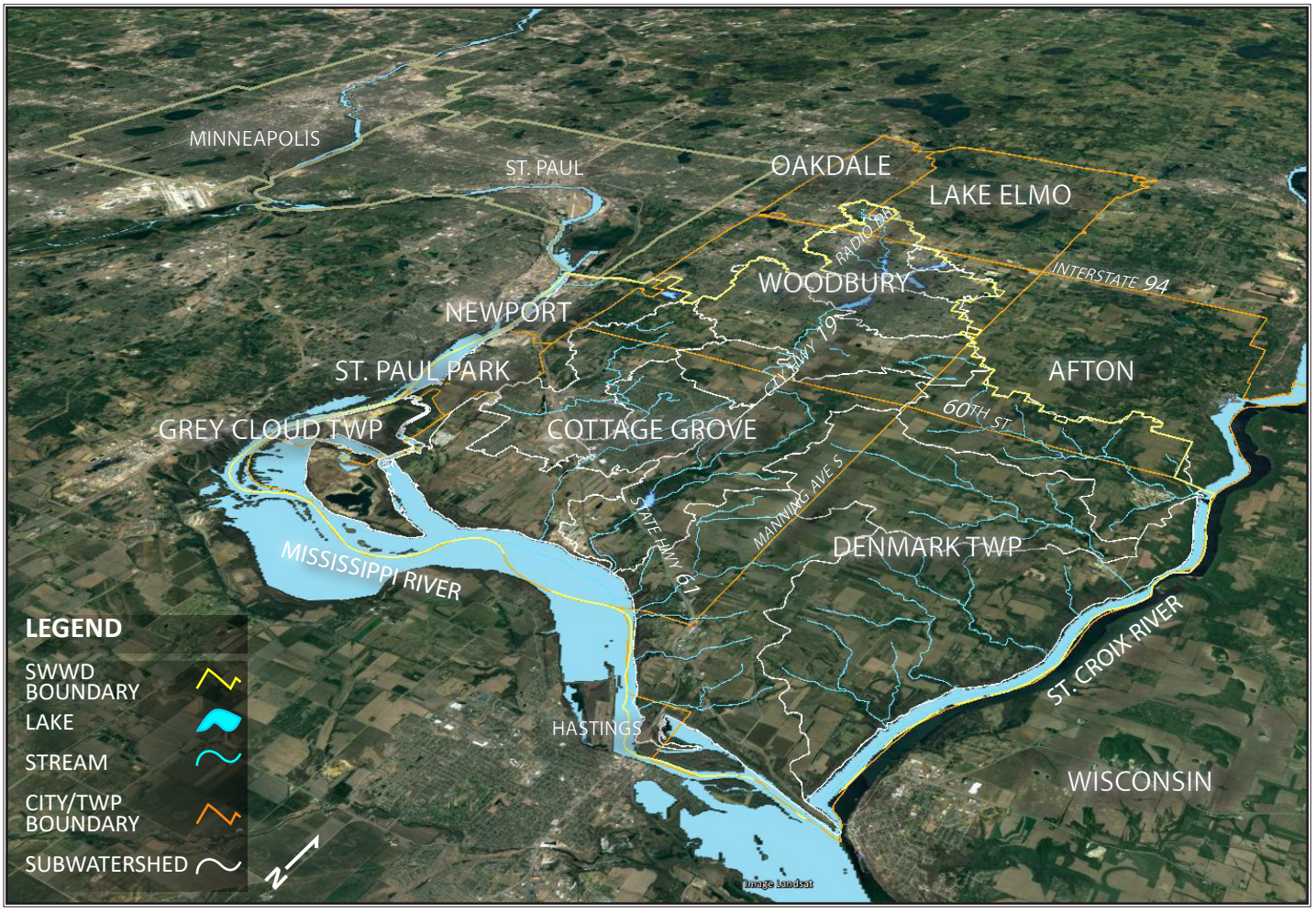


Figure 1: SWWD area with context

The District includes portions of two major watersheds -Mississippi and St. Croix- encompassing 12 lakes, over 120 miles of piped and natural streams, and over 2,400 total acres of wetlands.

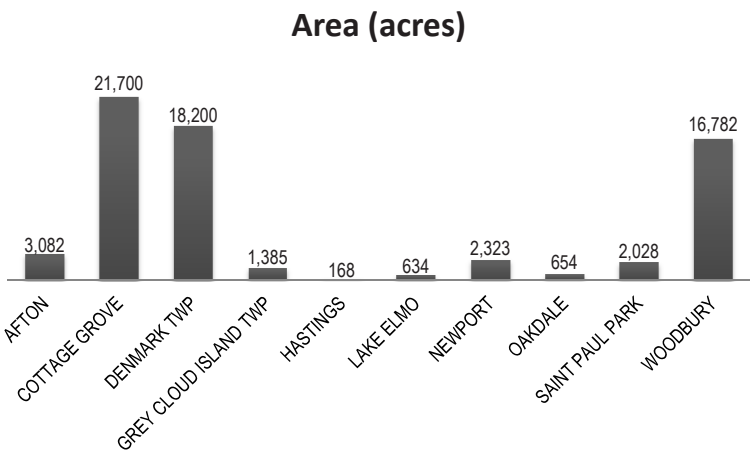


Figure 2: Area of municipalities within SWWD

to recognize, however, that the river does illustrate the success of the Federal Clean Water Act having recovered from a past marked by discharge of untreated sewage and industrial waste.[1] The river now serves as a multi-billion dollar commerce transit-way, critical flyway, and recreation attraction.

Lake St. Croix, forming the lower portion of the St. Croix River marks the District's Eastern boundary. It is formed by a natural impoundment at Pt. Douglass and the confluence with the Mississippi River which causes the river to slow, widening and deepening upstream. The river was formed by outflow of Glacial Lake Duluth which carved the valley through the Cambrian bedrock and into the underlying basalt. Today, much of the valley carved by glacial outflow has partially filled, forming the St. Croix River Terrace, upon which the modern day Lake St. Croix lies.[2]

Like the Mississippi River, the St. Croix played a prominent role in the settlement and transformation of the region. Long used as a conduit to transport logs from the Northwoods of Minnesota and Wisconsin to mills in and around Stillwater (upstream of SWWD), there are ongoing efforts to address pollution and sedimentation caused by industry's occupancy of the river and the substantial land use changes in the basin. Reflecting that history, the St. Croix is listed as an impaired Water by the Minnesota Pollution Control Agency. Despite those challenges though, the river exhibits relatively high water quality as compared to other metropolitan resources and the Mississippi River and provides extensive habitat for native communities. The river is now a tourism and recreation attraction. That value is reflected with inclusion in the original National Wild and Scenic Rivers Act of 1968 and Lower St. Croix National Scenic Riverway Act of 1972, designation as an Outstanding Resource Value Water, and in the numerous State and local parks dotting the valley on both sides of the river.

Several of SWWD's lakes are also remnants of past glacial activity and found exclusively in the Lake Elmo-Cottage Grove Outwash Plain. The District's most prominent lakes—the Woodbury chain and Ravine Lake—overlie a bedrock valley through the central portion of the District. As the more recent glaciers retreated, that bedrock valley was filled in with sand and rock. It is likely that the District's lakes were formed by glacial fragments (ice blocks) which were left buried in the filled bedrock valleys and melted to form the existing lake basins. Today, these lakes are an important recreational asset to residents of the District and are extensively used for active and passive recreation. Many of those lakes are currently listed as impaired, a reflection of changing land use and cover and a focus of District management efforts.

After decades of declining water quality, SWWD lakes are stabilizing and in some cases improving. Excess nutrients in stormwater overwhelmingly drive water quality degradation in SWWD. The source of those nutrients in SWWD is primarily erosion. Concentrations of nutrients peaked in the early 2000s and have since been slowly declining. That decline is a reflection of implementation efforts of the District and its local partners, increased enforcement of water quality development rules, and slowing rates of development. SWWD lakes are beginning to reflect the improvement in stormwater quality. Most notably, Armstrong and Ravine Lakes have shown substantial improvement over the past few years. Colby Lake which has been the focus of extensive watershed restoration work should also begin to show rapid improvement. Additional information is included in the Primary Water Resources of the District profile figures, pg 16-22. Up to date lake and stormwater data is always available through SWWD's online database which also provides basic graphical functions.

SWWD's streams are concentrated on the bluffs along the Mississippi and St. Croix Rivers which were left largely untouched by the latest glaciation. What now makes up Trout Brook, O'Conner's Creek and several smaller unnamed streams are the result of centuries of stream action carving valleys through the bluff. Those large, broad valleys are now home to unique and important habitats, especially where the valley floors now intersect groundwater which provides cold water. The watersheds draining to the streams are generally rural with a strong agricultural influence. As a result, the biggest issue causing concern for the streams is runoff and field erosion early in the season before crops are fully canopied. Exacerbating that dynamic has been the recent trend of more intense early season rainfall which has driven a decline in water quality in Trout Brook over the past 5 years despite ongoing

Excess nutrients in stormwater overwhelmingly drive water quality degradation in SWWD.

[3] Minnesota Geospatial Information Office. *Digital Soil Mapping in Minnesota (Includes Soil Survey).* Available at http://www.mngeo.state.mn.us/chouse/soil.html#printed. Accessed 6/30/2016.

[4] Washington County Historical Society. *Community Histories.* Available at http://wchsmn.org/research/community-histories/. Accessed 7/5/2016.

watershed and riparian restoration work.

Soils in SWWD are all derived from glacial alluvium or till deposited along the Mississippi and St. Croix valleys. Soil types that dominate the Mississippi River drainage area of the District are of the Antigo-Chetek-Mahtomedi and Sparta-Dickman-Hubbard map unit, and are formed predominantly in outwash under deciduous hardwood forest or prairie. The Antigo-Chetek-Mahtomedi soils are well drained to excessively drained, medium textured to coarse textured soils, typical on low convex side slopes or knolls, crests and side slopes. The Sparta-Dickman-Hubbard soils are somewhat excessively drained and are coarser textured soils than the Antigo type. These soils occupy broad flats and knolls. The Copaston-Sparta map unit is well drained and excessively drained medium textured to coarse textured and dominate the soil types along the Mississippi River primarily on the historic river terrace.[3]

In the eastern portion of the watershed that drains to the St. Croix River common soil types include the Ostrander-Baytown-Ripon map unit and the Waukegan-Baytown-Ripon map unit. Both map units are formed in a silty mantle over bedrock or over glacial till or outwash. Soils are well drained and medium textured in upland areas of the watershed.[3] Soils map layers are available on the District's web viewer.

Wetlands, once common in portions of the District with dense soils have succumbed to development. However, what remains provides an important ecological, aesthetic, recreational, and economic resource. SWWD recognizes that value and actively works to protect what remains of this valuable resource through development standards and its role in administering the State's Wetland Conservation Act (WCA). The District also has prepared a wetland management plan which identifies several wetlands with high restoration potential.

Large-scale settlement and thus land use and cover changes began with the treaties of 1837 which purchased the territory between the St. Croix and Mississippi Rivers from the Dakota and Ojibwe. Grey Cloud island with a history of native settlement quickly became a center for trade along the Mississippi River. At the confluence of the Mississippi and St. Croix, Pt. Douglas (today part of Denmark Township) served and supported logging activity in the St. Croix basin and was the start of Military Road which crosses the District en route to Fort Snelling. Throughout the District, trees were cleared and land was utilized for row crops. [1,4] Figure 3 includes additional historical influences.

The shift from the River Transportation era to the Railroad Transportation Era saw a shift from Grey Cloud and Pt. Douglas to rail cities such as Newport and St. Paul Park.

FIGURE 3: LAND, WATER AND ORGANIZATIONAL TIMELINE SHAPING SWWD

- **10,000 BCE** ST. CROIX MORAINE - TRENDING SW TO NE PARTS OF THE COUNTY HUMMOCKY TERRAIN (SILT AND CLAY SOILS) FORMED FROM THE SUPERIOR AND DEMOINES GLACIAL LOBES; GLACIAL OUTWASH FORMING VALLEYS AND RAVINES (SAND AND GRAVEL SOILS) OF THE SOUTH-EASTERN PORTION OF THE COUNTY.
- **1838** FIRST EUROPEAN SETTLERS TO DENMARK TWP.
- **1839** MN TERRITORY CREATED/ WASHINGTON COUNTY ESTABLISHED
- **1850** MILITARY ROAD AUTHORIZED
- **1869** ST. CROIX LOGGING ERA BEGINS
- **1974** 'CITYHOOD' FOR WOODBURY AND COTTAGE GROVE
- **1984** COTTAGE GROVE WMO CREATED (CGWMO)
- **1985** LOWER ST. CROIX WMO (LSCWMO) CREATED
- **1993** (CGWMO) REORGANIZED AS COTTAGE GROVE RAVINE WD (CGRWD)
- **1995** CGRWD RENAMED AS SWWD
- **2003** SWWD EXPANDED TO INCLUDE EAST MISSISSIPPI WMO
- **2010** SWWD EXPANDED TO INCLUDE LSCWMO

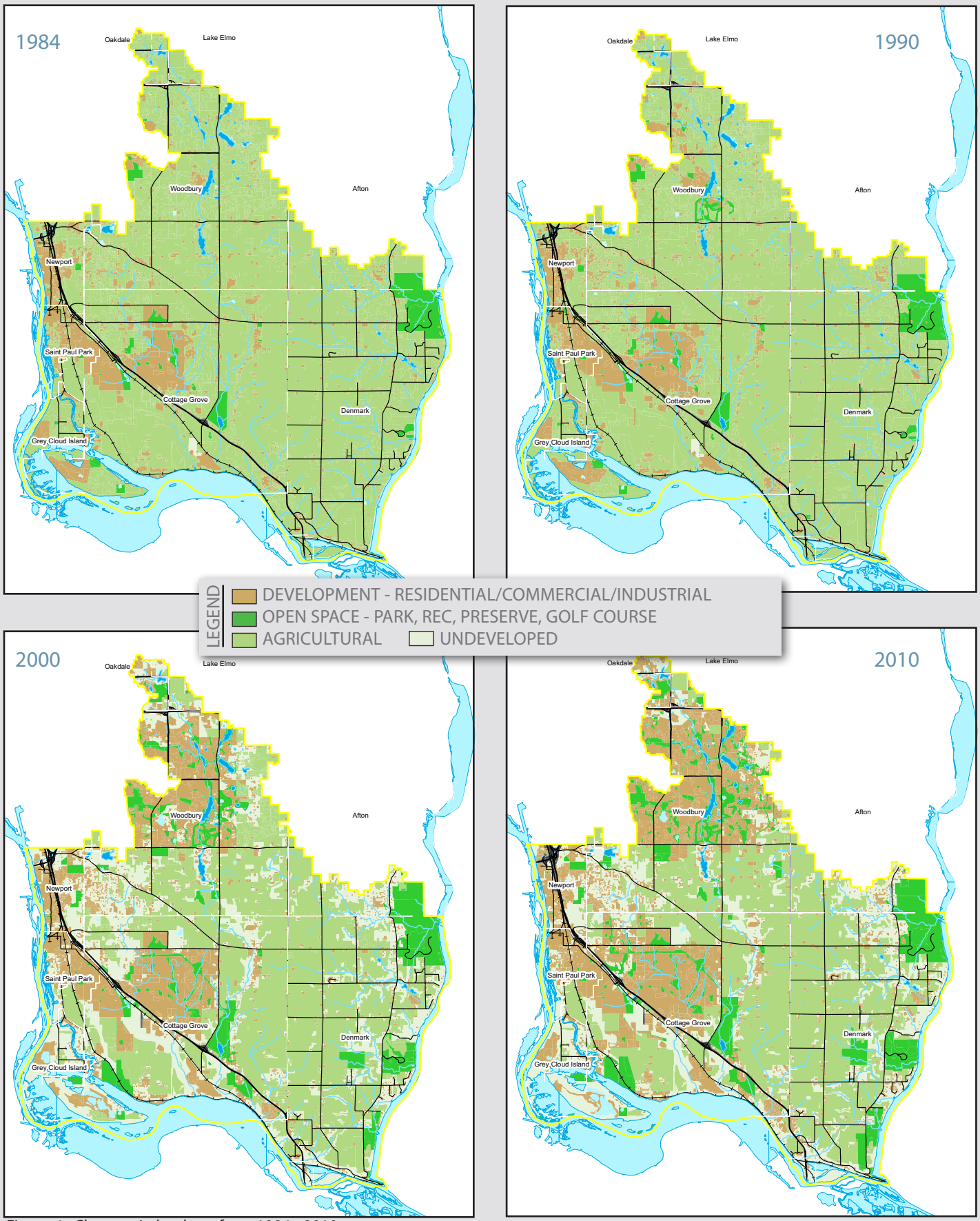


Figure 4: Changes in land use from 1984 - 2010

Continued population growth and the eventual shift to the Automobile Transportation Era brought development to farming communities like Woodbury, Cottage Grove, and Oakdale and former resort areas like Lake Elmo. Today, SWWD includes industrial river towns along the Mississippi River bluff, picturesque townships and farmland, and one of the fastest growing communities in the State, all of which face unique resource and management challenges. [1,4] Figure 4 shows land use change from 1984 - 2010. As shown, the map shifts from green hues to brown reflecting a conversion from vegetative cover to impervious cover which results in increased rates and volumes of stormwater runoff. Development and associated land cover change are expected to continue to change into the future as reflected by the Met Council's projected 2040 Metropolitan Urban Service Area.

While the District works to address water resource impacts related to past development, it also maintains a strong focus on preventing issues from ongoing development and land use changes. Development has greatly altered historic drainage and runoff patterns. Those changes are reflected in increasing flood levels in lakes, streams, and ponds throughout the District. SWWD supplies its District modeling to the Federal Emergency Management Agency (FEMA) which compiles flood maps.

SWWD recognizes municipalities as the land use authority in the District. However, it also views its role of planning and resource protection as integral to municipal planning and development processes. SWWD fills a local planning void by taking a regional and resource based focus. Its systematic and iterative process of assessment, planning, and implementation ensures that planned growth is accommodated and that resources are protected and restored.

To support ongoing development, municipalities rely on a growing system of stormsewer, ponds, and related infrastructure to move and treat runoff. That system is regulated by the Minnesota Pollution Control Agency (MPCA) through their Municipal Separate Stormsewer System (MS4) program. SWWD supports MPCA's work as a regulated MS4. SWWD's MS4 program and responsibilities are laid out in the District's Stormwater Pollution Prevention Plan (SWPPP).

The MPCA also regulates pollutant sources and wastewater discharges both of which are present throughout the District. While the District is usually not directly involved in addressing regulated pollutants or wastewater, known sites routinely intersect District projects and must be considered. Known sites are mapped in the MPCA's What's in My Neighborhood tool.

All residents in the District, and Washington County, rely on groundwater for drinking water. The quantity and quality of that groundwater, like that of District surface waters, is shaped by the regions geologic characteristics.[6]

Advancing and retreating marine seas left behind a sequence of limestone, sandstone, and shale bedrock layers dating back to the Paleozoic Era (570 to 245 million years ago). Following these events, the bedrock was subjected to a long period of erosion. Following that period of erosion, a series of glaciers advanced and retreated across the county shaping the bedrock and leaving in their wake formations of clay, silt, sand, and gravel on top of bedrock formations. [6] Resulting layers of bedrock, sands and gravels, and silt form the various aquifers lying beneath the District and are responsible for its characteristically high infiltration rates and recharge potential.[4] The bedrock configurations that make groundwater abundant also make it highly sensitive to pollution through high infiltration rates and presence of karst features, and pollution. Further, quantities of groundwater are a growing concern. Increasing populations are increasing pumping from aquifers while simultaneously reducing chances for recharge. Still somewhat unknown, is how threats to groundwater translate to surface water resources which to date have been the focus of District management efforts.

-SWWD mission statement -

"To manage water and related resources of the District in cooperation with our citizens and communities"

In addition to challenges posed by development, the District also faces several confounding impacts from a changing climate. Data clearly shows that Minnesota's climate is changing; annual temperature and precipitation is increasing, precipitation is getting more intense, snow and ice are melting sooner, and the growing season is increasing[7]. All of these changes have serious consequences for the District. First and foremost, plans

[5] South Washington Watershed District. *DRAFT Comprehensive Wetland Management Plan.* 2002.

[6] Washington County. *Groundwater Plan, 2014-2024.* 2014.

[7] Minnesota Department of Natural Resources, State Climatology Office. *Climate of Minnesota.* Available at http://www.dnr.state.mn.us/climate/index.html

and infrastructure in the District were developed and designed based on several assumptions. While the District and its communities have always been conservative in their assumptions (i.e. planning for large events), many of those assumptions are no longer valid. Translated, that means stormwater infrastructure is undersized, buildings are too close to lakes and streams, and algae have more time to proliferate in lakes, making them unusable.

The natural and development history of the District as well as current pressures from ongoing development and climate change determine quality of terrestrial and aquatic habitat in the District. While the District borders the wild and scenic St. Croix River with extensive and abundant native fish communities, it is also home to several impaired waters which support only highly pollution tolerant fish and plant species which are generally undesirable to District residents. Likewise, those influences have created a fractured terrestrial landscape which has largely pushed native wildlife communities out of the District. What remains, including threatened and endangered species, is generally concentrated in parks and other open spaces. Those remaining remnants provide valuable recreational opportunities for residents. The Minnesota Department of Natural Resources has developed a Recreational Compass tool to direct residents to recreational opportunities. The Department of Natural Resources also operates the State's programs to protect those remaining habitats and threatened and endangered species.

To address challenges it faces, SWWD focuses on cooperative implementation in partnership with other local, regional, and State agencies. That approach is reflected in the District's mission statement.

In practice, SWWD works closely with State and Local agencies to quickly identify issues and ensure uniform protection of water resources throughout the District. As a Watershed District, through programs identified in this plan, SWWD is uniquely able to quickly respond to emerging issues and often serves as the lead for local action.

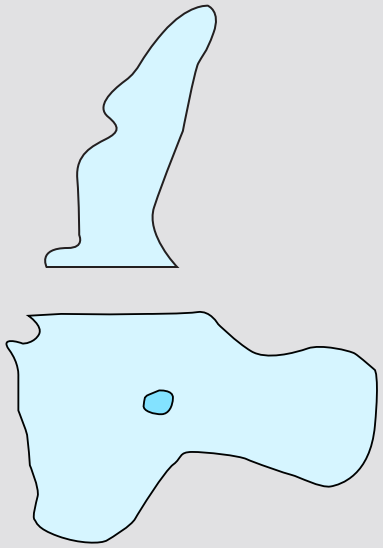
PRIMARY WATER RESOURCES OF THE DISTRICT

Figure 5: Shows the primary water resources, major subwatersheds and municipalities of the District. Subwatershed information key is below. Detailed information of each water resources is provided on the following pages.

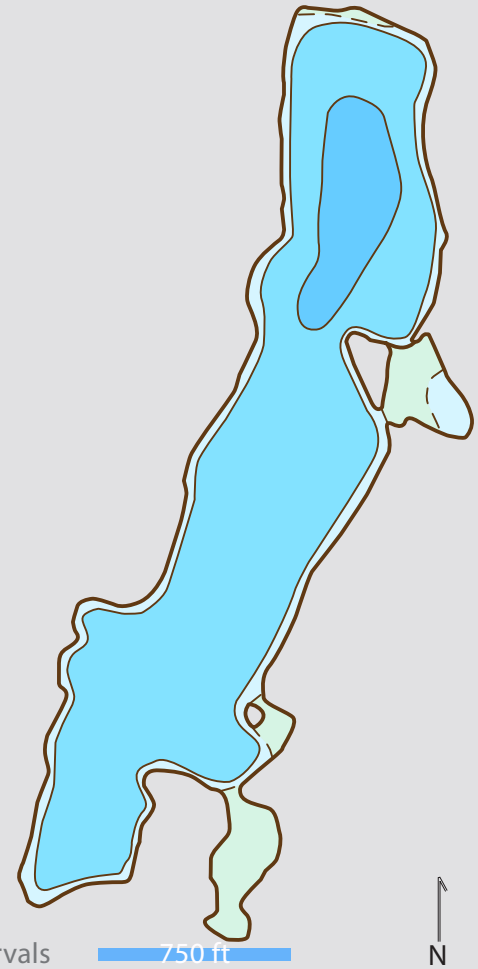
Subwatersheds Key		
1 - Armstrong	7 - East Mississippi	13 - O'Connors
2 - Wilmes	8 - West Draw	14 - Cottage Grove South
3 - Markgrafs	9 - Central Draw Storage Facility	15 - Lower Mississippi
4 - Powers	10 - East Ravine	16 - Saint Croix
5 - Colby	11 - Trout Brook	
6 - Bailey	12 - Central Draw	

This section provides general information about the District's primary surface water resources. For each resource, this section provides basic bathymetry information, impairment status, relevant water quality goals, and current water quality status. This information is updated annually, following completion of the District's annual monitoring reports. Information includes both state and SWWD goals. SWWD goals were established in the 2007 Watershed Management Plan and are provided here to give an indication of progress since 2007. The State goal is what is being pursued through current SWWD programs. Click on interactive tabs for more information on each resource. Additional information is available in Part II: Issues and Goals - Watershed Alterations.

PRIMARY WATER RESOURCES OF THE DISTRICT



5 ft gradient intervals 750 ft N



5 ft gradient intervals 750 ft N

ARMSTRONG LAKE, OAKDALE

ID: 82-0116
Waterbody Area: 39 acres
Watershed Area: 566 acres
Mean Depth: 3 feet
Max Depth: 5 feet

Water Quality:
3-year Average TP Concentration: ~~59~~ 57 ppb
Goal TP Concentration:
60 ppb (State of MN),
66 ppb (SWWD)

Period of Record Trend:

IMPROVING

COLBY LAKE, WOODBURY

ID: 82-0094
Waterbody Area: 68 acres
Watershed Area: 2,839 acres
Mean Depth: 7 feet
Max Depth: 11 feet

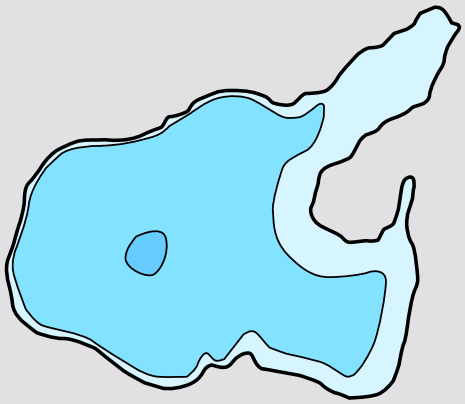
Water Quality:
3-year Average TP Concentration: ~~128~~ 100 ppb
Goal TP Concentration:
60 ppb (State of MN),
107 ppb (SWWD)

- IMPAIRED WATER -

Period of Record Trend:

IMPROVING

PRIMARY WATER RESOURCES OF THE DISTRICT



5 ft gradient intervals 750 ft N

LA LAKE, WOODBURY

ID: 82-0097
Waterbody Area: 45 acres
Watershed Area: 81 acres
Mean Depth: 6 feet
Max Depth: 10 feet
Water Quality:
3-year Average TP Concentration: ~~57~~ 45 ppb
Goal TP Concentration:
60 ppb (State of MN),
60 ppb (SWWD)

- IMPAIRED WATER -

Period of Record Trend:

STEADY

5 ft gradient intervals 750 ft N

MARKGRAFS LAKE, WOODBURY

ID: 82-0089
Waterbody Area: 46 acres
Watershed Area: 436 acres
Mean Depth: 5 feet
Max Depth: 8 feet

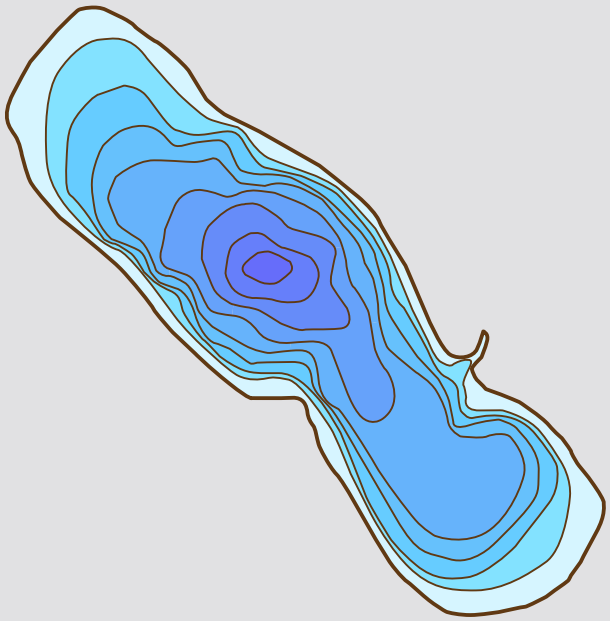
Water Quality:
3-year Average TP Concentration: ~~113~~ 125 ppb
Goal TP Concentration:
60 ppb (State of MN),
85 ppb (SWWD)

- IMPAIRED WATER -

Period of Record Trend:

DECLINING

PRIMARY WATER RESOURCES OF THE DISTRICT



5 ft gradient intervals — 750 ft — N

POWERS LAKE, WOODBURY

ID: 82-0092
Waterbody Area: 56 acres
Watershed Area: 1384 acres
Mean Depth: 16 feet
Max Depth: 41 feet

Water Quality:
3-year Average TP Concentration: ~~30~~ 32 ppb
Goal TP Concentration:
40 ppb (State of MN),
29 ppb (SWWD)

Period of Record Trend:

STEADY

5 ft gradient intervals — 750 ft — N

RAVINE LAKE, COTTAGE GROVE

ID: 82-0087
Waterbody Area: 25 acres
Watershed Area: 802 acres
Mean Depth: 7 feet
Max Depth: 16 feet

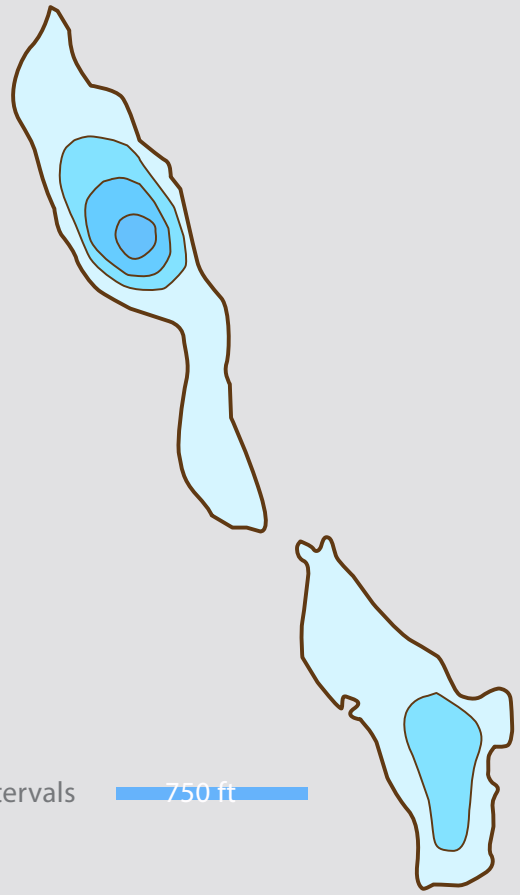
Water Quality:
3-year Average TP Concentration: ~~46~~ 48 ppb
Goal TP Concentration:
60 ppb (State of MN),
66 ppb (SWWD)

- IMPAIRED WATER -

Period of Record Trend:

IMPROVING

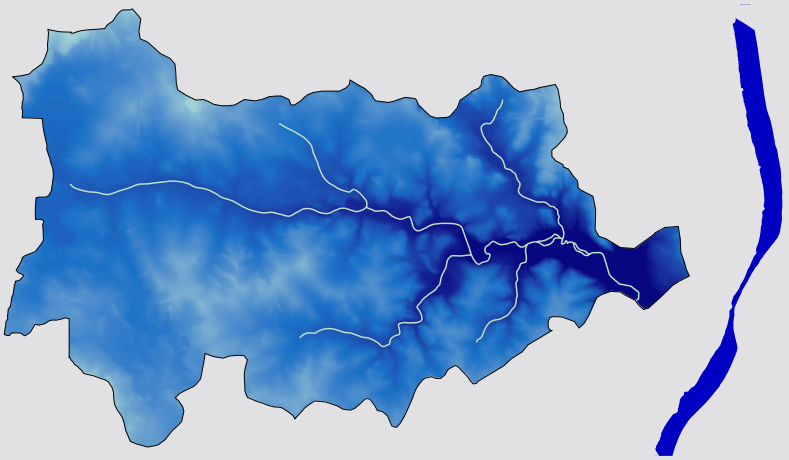
PRIMARY WATER RESOURCES OF THE DISTRICT



5 ft gradient intervals

750 ft

N



10 ft gradient intervals

7500 ft

N

WILMES LAKE, WOODBURY

ID: 82-0090

Waterbody Area: 30 acres

Watershed Area: 3,242 acres

Mean Depth: 5 feet

Max Depth: 18 feet

Water Quality:

3-year Average TP Concentration: ~~74~~ 67 ppb

Goal TP Concentration:

60 ppb (State of MN), 54 ppb (SWWD)

- IMPAIRED WATER -

Period of Record Trend:

IMPROVING

O'CONNORS CREEK, DENMARK TWP.

ID: 82-0020 (LAKE); 07030005-608 (STREAM)

Waterbody Area: 23 acres

Waterbody Length: xxx ft

Watershed Area: 2,435 acres

Mean Depth: N/A

Max Depth (Lake): 11 feet

Water Quality:

3-year Average TP Concentration: ~~34~~ 39 ppb

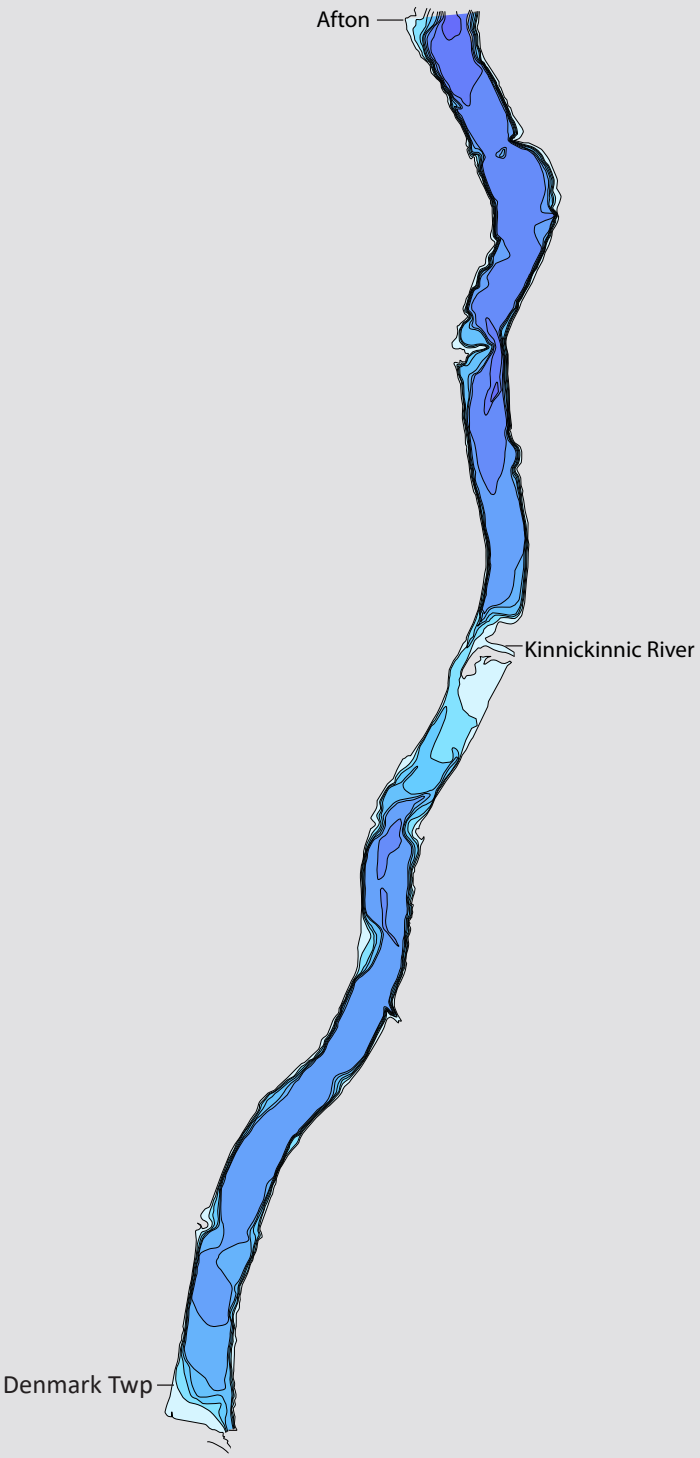
Goal TP Concentration:

Lake: 60 ppb (State of MN), Stream: 100 ppb (State of MN)

Period of Record Trend:

STEADY

PRIMARY WATER RESOURCES OF THE DISTRICT



LAKE ST. CROIX, AFTON & DENMARK TWP.

ID: 07030005

Waterbody Area: xx acres

Watershed Area (SWWD Portion): 7560 acres

Mean Depth: xx feet

Max Depth: 71 feet

Water Quality:

Annual Average TP Concentration: ~~41~~ 40 ppb

Goal TP Concentration:

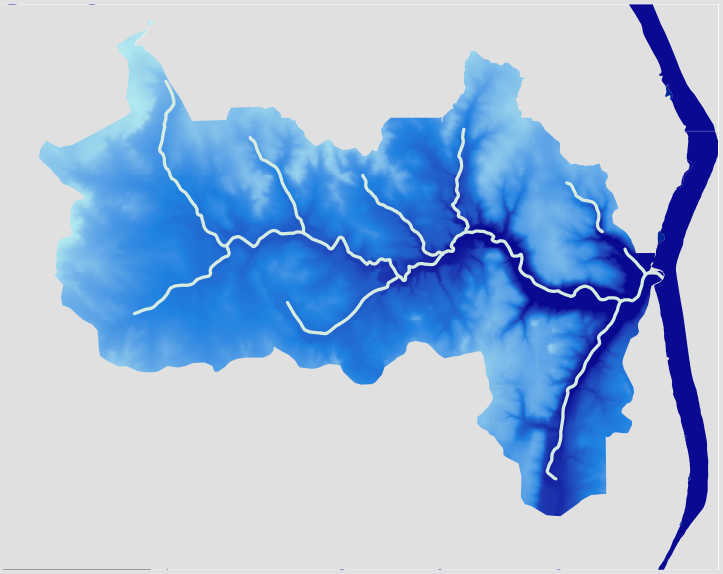
40 ppb (State of MN)

- IMPAIRED WATER -

Period of Record Trend:

IMPROVING

PRIMARY WATER RESOURCES OF THE DISTRICT



5 ft gradient intervals

7500 ft

N

TROUT BROOK, AFTON & DENMARK TWP.

ID: 07030005-568

Waterbody Length: xx feet

Watershed Area: 2,240 acres

Mean Depth: 5 feet

Max Depth: 8 feet

Water Quality:

Annual Average TP Concentration: ~~37~~ 53 ppb

Goal TP Concentration: 100 ppb (State of MN),

- IMPAIRED WATER -

Period of Record Trend:

DECLINING

5 ft gradient intervals

12,000 ft

N

MISSISSIPPI RIVER - POOL 2

NEWPORT, ST. PAUL PARK, GREY CLOUD ISLAND TWP., COTTAGE GROVE

ID: 07010206

Waterbody Area: xx acres

Watershed Area (SWWD Portion): 19,371 acres

Mean Depth: N/A

Max Depth: N/A

Water Quality:

Annual Average TP Concentration: ~~Unknown~~ 150-200 ppb

Goal TP Concentration: 100 ppb (State of MN)

- IMPAIRED WATER -

Period of Record Trend:

IMPROVING


Mooers Lake Slough - Mississippi River

PART II: ASSESSMENT OF ISSUES AND MEASURABLE GOALS

ISSUE IDENTIFICATION

Development of past plans included extensive public participation processes to identify District issues. That work has served as the basis for District programs and projects since the 2007 Watershed Management Plan (WMP) was adopted. Beginning in 2013, several efforts were made to evaluate the status and success of existing District efforts and identify current and emerging issues all of which have led to the development of this current WMP.

In 2013, the SWWD Board of Managers held a workshop to discuss the status of the 2007 Plan and discuss changing and emerging issues. As a result of that workshop, SWWD identified the need for a Plan amendment. Ultimately, however, the District decided to delay that amendment in deference to two pending actions at the State level—a state led assessment of District performance and update to MN Rule 8410 which governs Twin Cities metropolitan Watershed Districts.

The Board of Water and Soil Resources (BWSR) supports Minnesota's counties, watershed districts and soil and water conservation districts that deliver water and related land resource management projects and programs. In 2007 BWSR set up a Performance Review and Assessment Program (PRAP) to systematically review the performance of these local units of government to ensure their effective operation. Each year BWSR staff conducts routine reviews of several of these local conservation delivery entities. In 2014 BWSR completed a PRAP assessment of SWWD. The conclusion of that assessment was:

> "The South Washington Watershed District (SWWD) is an effective agent for positive water resource management in a complex metropolitan environment. The district's systematic, deliberate approach to project development, as set out in their management plan and management processes, is impressive. The confidence that the cities within the district have in the organization's capabilities is evidenced by the gradual expansion of the district's jurisdiction as neighboring watershed management organizations have dissolved. The SWWD has been aggressive at applying the various tools and authorities available to a metro area watershed district in its pursuit of effective local water and resource management. In general, the partner organizations find the SWWD

good to work with and recognize the quality of its efforts. If there are any areas for improvement in the district's working relationship with its partners they would be in the area of improved communication about changing timelines or follow-through on projects or programs. The district meets an impressive 93 percent of BWSR's benchmark performance standards. This rate of compliance shows organizational sophistication, attention to detail in overall district management, and a commitment to service for the people who live in the district and to the resources they depend upon."

In 2015, BWSR adopted an update to MN Rule 8410. That update resulted in several changes to what is and is not required in Watershed Management Plans. Ultimately, the revised rules allow for a condensed format that provides a more intuitive and user friendly document. With those changes, SWWD decided to undertake a Plan update process which resulted in creation of this Plan. Consistent with the revised (2015) MN Rule 8410.0045, subpart 4, SWWD requested input from State and local review agencies regarding agency resource priorities and perceived issues in SWWD.

Building on input received from review agencies, SWWD engaged both a Citizen and Technical Advisory Committee. Those committees are formed, respectively, by District residents and representatives from municipalities and State and local agencies. Both committees were heavily leaned on to identify and evaluate issues presented in this section and develop implementation priorities and actions presented in Part III. Additional information about the issues and goals identification process is included in Appendix 1. The following Issues and Goals are the result of the aforementioned process and reflect the priority resource issues of the District. Order does not convey importance.

Washington County has recently shifted to a Results Based Accountability (RBA) approach in setting up County programs. RBA starts with an end goal and works backwards to develop quantifiable indicators and programs. RBA also sets up a routine evaluation mechanism which along with a willingness to adapt strategies and programs helps to ensure that an organization is making progress toward its goals. Ultimately, utilizing an RBA approach increases accountability. This section is organized to generally follow a Results Based Accountability approach. Each issue statement is followed by the desired outcome (goals/results), implementation progress indicators, and associated implementation programs. Additionally, each issue includes a section with live links to additional information from SWWD and its partners.

Ravine Lake Fishing Pier

ISSUES AND GOALS: FLOODING

FLOOD DAMAGE REDUCTION AND MITIGATION

Issue: There are several areas within the District which are at risk for flooding during and following large precipitation and/or extended wet periods. Known areas are listed below.

1. Wilmes Lake: Wilmes Lake is affected by volume driven residential flooding during large, infrequent rainfall events. SWWD and the City of Woodbury have worked to flood-proof residences and continue to seek additional means to alleviate flooding risk. Additionally, to prevent upstream development from exacerbating the issue, SWWD has set an inter-community flow limit at Interstate 94 where runoff from Oakdale and Lake Elmo flows into Woodbury. That limit is 406 cfs for a 6.3 inch, 24 hour event.

2. City of Newport riverfront: A portion of Newport lies behind an uncertified and aging levy. The City has been working with affected landowners to purchase the properties with SWWD assistance. SWWD will continue to work with Newport as new flood concerns arise along the riverfront.

3. Cottage Grove Central Draw: The District's Central Draw subwatershed is fully developed. Most of that development predated modern stormwater development

Figure 6: Known flood risk areas in SWWD

ISSUES AND GOALS: FLOODING

FLOOD DAMAGE REDUCTION AND MITIGATION (CONTINUED)

standards. As a result, much of the existing stormwater infrastructure is undersized. As part of its Central Draw Storage Facility Overflow project, SWWD has worked with the City of Cottage Grove to address and alleviate some of those issues while providing a route from the Central Draw Storage Facility through the Central Draw to the Mississippi River. The District will continue to work with the City to address remaining issues.

4. West Draw: As the West Draw subwatershed continues to develop concerns have risen about increasing inter-community flows from Woodbury into Cottage Grove. SWWD has worked with the Cities to identify flow limits and ensure that limits are met as development continues. The current inter-community flow limit is 25 cfs. That limit is likely too low given more recent improvements to the downstream system. The District will work with the Cities to revise that limit.

Flooding at Cottage Grove Ravine Regional Park

5. Clear Channel/TH61: The Clear Channel Pond in Cottage Grove is undersized. Under flood conditions, the pond overflows into St. Paul Park, impacting that community and transportation infrastructure. SWWD is working with the City of Cottage Grove to expand storage and alleviate flooding issues.

6. Ravine Park: The existing park road routinely floods due to inadequate infrastructure. SWWD and Washington County are working to reconstruct the roadway and lake outlet in 2017 to alleviate the issue as part of the District's Central Draw Storage Facility Overflow project.

SWWD has historically led or participated in these regional or inter-community flooding issues while assisting municipalities with their efforts to address more localized issues. Working with its Municipalities, SWWD defines inter-community flow limits where cross boundary flows contribute to flooding concerns. Then to meet those limits, SWWD works with Municipalities on source reduction and continues with identification and protection of critical storage locations and floodplains as a means to reconstruct or mimic a more natural hydrograph. Several critical storage locations were identified in the previous WMP. However, since that time, District data has been incorporated into FEMA floodplain mapping. Following that process, the District now utilizes FEMA mapping to identify critical storage locations. Those locations and the storage they provide is protected through regulatory programs at the District, Cities, and State.

If source reduction approaches are not adequate or feasible, the District pursues mitigation measures ranging from flood-proofing property and infrastructure to support for property buyouts. It is the District's typical practice to opportunistically manage floodplains for multiple, nondevelopment uses (e.g. greenspace, recreation, and habitat).

Goal: Minimize existing and future potential damages to property, public safety, and water resources due to flood events.

Implementation Indicators:

- Prevent increases in runoff from development activity through development and enforcement of District Rules;
- Prevent increases in flooding risk due to development (e.g. Wilmes, Ravine, and O'Conner's Lakes);
- Achieve no net loss in inventoried key flood storage areas;
- Achieve progress towards identified inter-community flow limits as development occurs;
- Maintain implementation flexibility (program framework and funding) to respond to identified flood damage reduction/mitigation needs that may arise.

Implementation Tools:

Planning, Regulatory, Implementation and Maintenance

Additional Information:

2007 SWWD Watershed Management Plan, Chapter 3, Assessment of Issues

ISSUES AND GOALS: FLOODING

CENTRAL DRAW STORAGE FACILITY AND OVERFLOW

Issue: One of the primary reasons SWWD was formed was to identify, design, and construct an outlet for the District's Northern Watershed (see Figure 7) which includes one of the fastest growing communities in the State. At the time, runoff from the Northern Watershed collected at Bailey Lake which had no controlled outlet.

East Ridge Regional Pond

Communities in the District recognized that Bailey Lake would not be adequate to contain all of the runoff from the watershed when it was fully developed. Since that time, SWWD and its partners have been working to construct the Central Draw Storage Facility (CDSF), which includes 1800 acre feet of storage on 250 acres near the outlet of Bailey Lake. A City of Woodbury lift station pumps water from Bailey Lake to the CDSF. With the size of the CDSF and rate and volume restrictions on development draining to Bailey Lake, the system should be adequate to retain the runoff for a 6.3", 24 hour rainfall event. However, because of uncertainty in design, a recent trend of extreme precipitation events and the degree of safety necessary for flooding situations, SWWD is in the process of constructing a controlled overflow out of the CDSF to the Mississippi River. The overflow project is being implemented in 5 phases. Phases I (pipe connection under CSAH 19) and II (stream stabilization between Ravine Lake and Mississippi River) are complete.

Goal: Complete establishment of a controlled overflow from SWWD's Northern Watershed to the Mississippi River

Implementation Indicators:

- Phase III, modification of the Ravine Lake outlet by 2017;
- Phase IV, stabilization of Ravine Park by 2018
- Phase V, construction of remaining pipe sections by 2019;
- Completion of functioning overflow system by January 1, 2020 as specified in SWWD/Lower St. Croix WMO consolidation agreement, unless otherwise agreed to by Cottage Grove, Woodbury, and SWWD.

Implementation Tools: Implementation and Maintenance

Overflow Phase II Streambank Stabilization

Additional Information:

Central Draw Overflow Basis of Design Report

SWWD Greenway Plan

CDSF and Overflow Environmental Assessment Worksheet

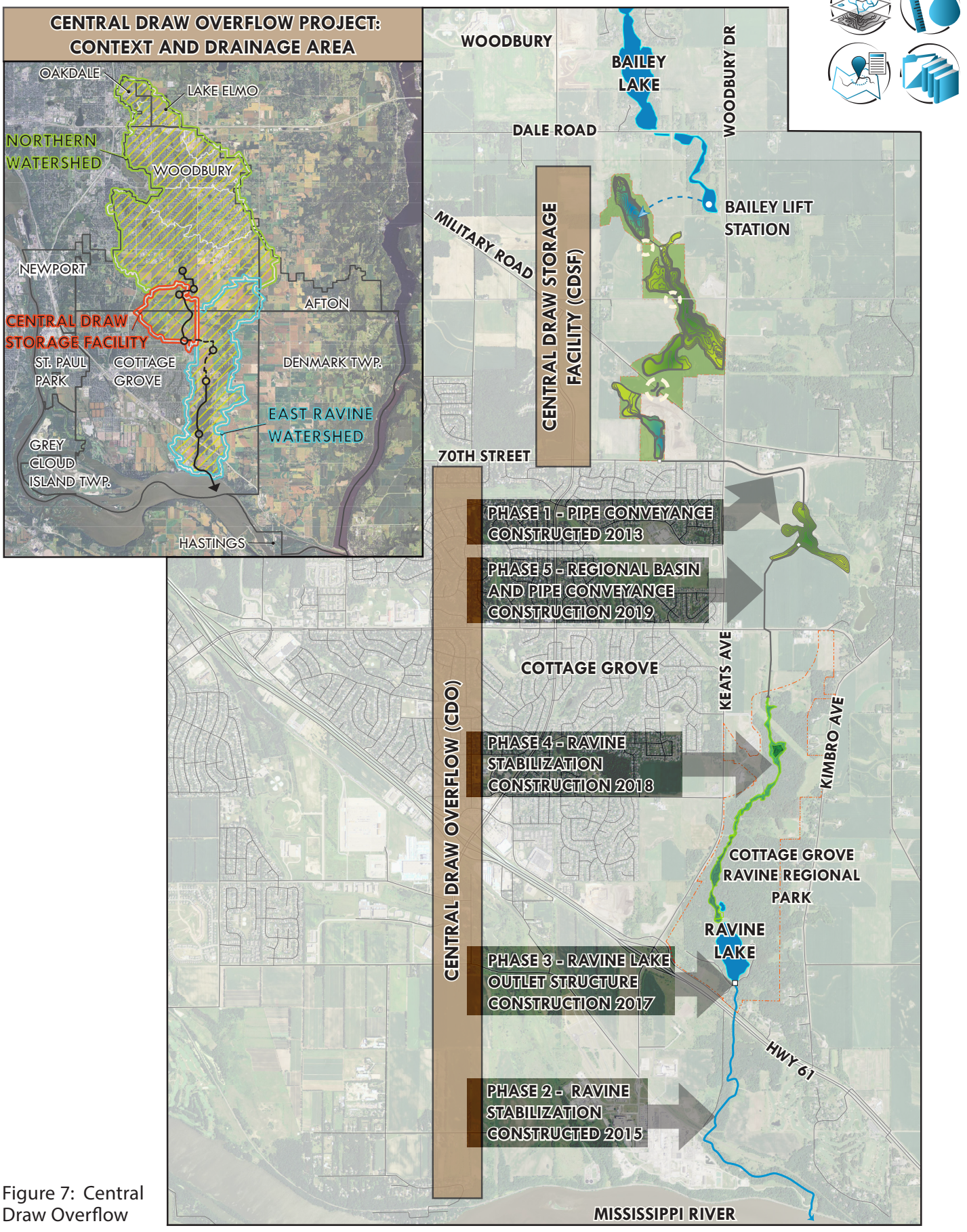


Figure 7: Central Draw Overflow

ISSUES AND GOALS: WATERSHED ALTERATIONS

SURFACE WATER DEGRADATION AND IMPAIRMENT

Issue: District water resources are significantly affected by land use and changes in land cover. What was once wetland, prairie, savanna, and forest is now suburban development and agriculture, both of which pose several challenges. Both increase rate and volume of runoff (Fig 8) to district resources, carrying with it sediment, debris, and nutrients which degrade or impair natural aquatic systems. Each requires very different approaches to address, however. Suburban development is highly regulated and results in highly impervious areas with fragmented open space and high infrastructure costs. Agricultural lands have comparatively low regulation and result in significant land cover changes over large land areas with comparatively low infrastructure costs. These differences create a dynamic where it is easier to implement more costly improvements in suburban areas through regulation than in agriculture lands through voluntary implementation. Cost effective implementation requires overcoming that dynamic.

SWWD believes in proactively coordinating with its constituents for long-term surface water planning and implementation of projects toward the protection and restoration of District resources. Key to that function is management planning. SWWD systematically assesses its resources through its monitoring and modeling efforts. Building on those efforts, the District then develops management plans focused on protection or restoration, depending on impairment status. The management plans are developed and adopted by the District as guidance documents. Following an adaptive management approach, SWWD routinely revisits completed plans to evaluate progress and re-assess strategies in light of new or changing information. Although exact practices may not currently be known or may change, the process for identifying and implementing those practices as well as the funds to do so are explicit within this WMP. Once practices and strategies are defined as part of a completed management plan, that plan will be adopted as a guidance document as specified in this WMP and consistent with MN Rule 8410.0140.

SWWD management plans and guidance documents cite two different water quality goals for lakes--the applicable State standard and SWWD's 2007 WMP goal. SWWD goals were developed for District managed resources in 2007 based on broadscale watershed and in-lake modeling. Those goals were thought at the time to represent what was feasible through watershed management. Since

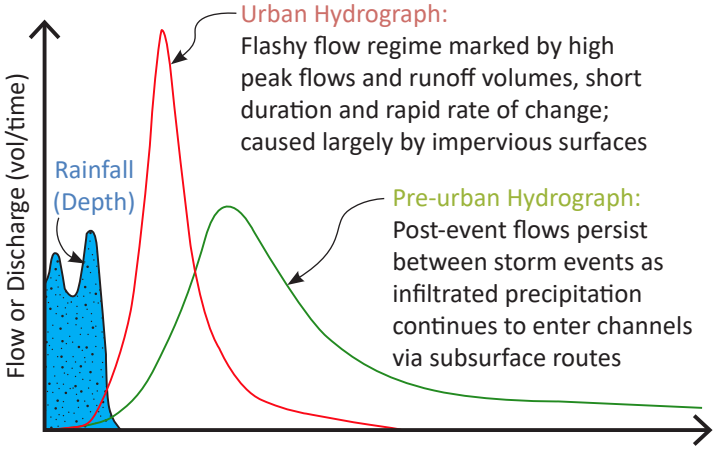


Figure 8: Streamflow and land-use change relationships

that time, SWWD has refined its management approach which now uses finer modeling techniques and follows a robust retrofit analysis and implementation process. All current management plans are developed based on the State standard. SWWD goals are still documented in SWWD management plans as a means to show progress against SWWD's initial resource goals.

SWWD recognizes the inherent difficulty for local agencies in addressing emerging, widespread contaminants and impairments of regional resources extending beyond local jurisdictions. Clear, existing examples include the Mississippi River turbidity impairment, Lower St. Croix excess nutrients impairment, and widespread Metro area chloride contamination. For these larger and more widespread resources and impairments the District recognizes the importance of planning at a level broader than the District but continues to place high value and importance on local implementation. SWWD will assist in implementation of TMDLs for State or regional resources or impairments which extend beyond District boundaries. Likewise, SWWD will evaluate potential impact of emerging contaminants and seek guidance from State and Regional agencies in addressing those impacts.

Goal: Protection and restoration of District resources to meet local resource goals and State standards.

Implementation Indicators:

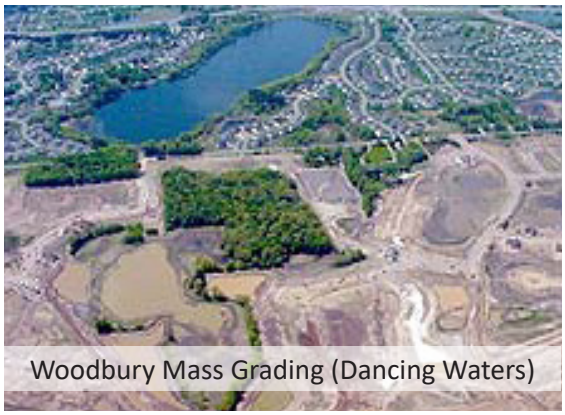
- Adoption of completed TMDLs for Statewide and Regional resources for which implementation actions are identified for SWWD;
- Colby Lake: Restore Colby Lake to state eutrophication standards by reducing the ~~growing season total~~ annual

ISSUES AND GOALS: WATERSHED ALTERATIONS

SURFACE WATER DEGRADATION AND IMPAIRMENT (CONTINUED)

phosphorus load by ~~156 kg~~ 1,303 lbs/yr (63%).

- Wilmes Lake: Restore North and South Wilmes Lake to state eutrophication goals by reducing the ~~growing season total~~ annual phosphorus load by ~~49 and 12 kgs~~ 265 (26%) and 108 (14%) lbs/yr, respectively.
- Powers Lake: Protect Powers Lake from exceeding state eutrophication standards by maintaining existing watershed phosphorus load.


Woodbury Mass Grading (Dancing Waters)

- Armstrong Lake: Protect Armstrong Lake from exceeding state eutrophication standards by reducing the ~~growing season total~~ annual phosphorus load by ~~5 kg~~ 89 lbs/yr (23%).
- Markgrafs Lake: Restore Markgrafs Lake to state eutrophication standards by reducing the ~~growing season total~~ annual phosphorus load by ~~48 kg~~ 209 lbs/yr (63%).
- Ravine Lake: Restore Ravine Lake to state eutrophication standards by reducing the ~~growing season total~~ annual phosphorus load by ~~22 kg~~ 141 lbs/yr (35%) at full build-out through enforcement of established total phosphorus loading standards.
- La Lake: Restore La Lake to state eutrophication standards by reducing annual phosphorus load by 17 lbs/yr (28%).
- Mississippi River: Meet proposed TMDL loading rate of 154 lbs/ac/yr of Total Suspended Solids;
- Lake St. Croix: Achieve 36%, or approximately 315 kg of total phosphorus load reduction for Trout Brook as specified in the Lake St. Croix TMDL.
- No net loss in wetland acreage or function;
- Protect/promote soil health as part of District projects and through District rules as a means to limit hydrological impacts of land alteration.
- Continue existing Incentive programs to encourage voluntary implementation of BMPs;
- Coordinate CIP plan with municipalities through engagement of a standing Technical Advisory Committee and implementation of the District's CCIP program;
- Evaluate impact of emerging contaminants and identify District programs or actions to control or mitigate that risk.

Implementation Tools: Planning, Regulatory, Implementation and Maintenance

Additional Information:

SWWD Colby Lake Modeling Report

SWWD Armstrong, Markgrafs, and Wilmes Lakes Modeling Report

Grey Cloud Slough Restoration Feasibility Report

LSCWMO O'Conner's Lake and Stream Management Plan

SWWD Powers Lake Modeling Report

SWWD Ravine Lake Modeling Report

LSCWMO Trout Brook Management Plan

SWWD Afton Alps Retrofit Feasibility Study

SWWD Wetland Management Plan

MPCA Metro Area Chloride Project

South Washington Watershed District Lake Management Plan, 2018

ISSUES AND GOALS: WATERSHED ALTERATIONS

EROSION


Newport Ravine Before Stabilization


Newport Ravine After Stabilization

Issue: Bluffs, streambanks, and shorelands are highly susceptible to erosion. Further, once erosion begins, it typically becomes severe due to highly erosive soils and high velocities and concentration of flows commonly seen at these features. One of the simplest ways to prevent erosion of bluffs, streambanks, and shorelands, is to maintain a buffer which prevents erosion in two ways; (1) by intercepting and slowing velocity of runoff and minimizing concentration of flow, and (2) by increasing stability of native soils. Most of SWWD's lakes and streams carry the State's shoreland designation which subjects adjoining lands to Municipal and/or County shoreland ordinances. Those ordinances have long carried buffer requirements. On top of those requirements, the State has now added additional legislation meant to increase compliance enforcement.

Under new legislation, the MnDNR is required to map public waters requiring buffers, the Washington Conservation District will be required to inspect lands along identified waters to determine compliance, and land use authorities are given enforcement responsibility. SWWD will work with its local partners to develop local programs and partnerships to implement the new buffer legislation.

Also integral to maintaining streambank and shoreland erosion is mitigation of changing hydrologic conditions resulting from development, resource use, or climate. Increases in runoff rates and/or volume may increase in-channel flows beyond what the channel is capable of conveying. Likewise, changes in surface water levels or artificial increase in wave-action may expose bare or unstable soils to erosive forces.

Finally, while construction site erosion and sediment control is a focus of the MN Pollution Control Agency and Municipalities, it remains a concern. Erosion of active construction sites is inevitable. However through use of identified best management practices (BMPs) the extent of that erosion and its impact on District resources can be minimized. SWWD assists its Municipalities in ensuring that construction sites comply with established erosion and sediment control standards and utilize appropriate BMPs.

Goal: Prevent resource degradation of District resources from bluff, streambank, shoreland, and construction site erosion.

Implementation Indicators:

- In partnership with State and Municipal programs, promote and ensure erosion and sediment control compliance at active construction sites.
- Develop and implement buffer regulatory measures to comply with State requirements;
- Establish and maintain a 50 foot, permanently vegetated buffer along all bluffs, ravines, lakes, and streams;
- Identify and prioritize actively eroding ravines and address as budget allows;
- Maintain and enforce rules which prevent increased channel instability due to development;

Implementation Tool: Planning, Implementation and Maintenance, Regulatory

Additional Information:

Washington Conservation District

MnDNR Buffers

WCD/SWWD Ravine Inventory and Assessment

ISSUES AND GOALS: GROUNDWATER SUSTAINABILITY

SUPPLY

Issue: Groundwater supply is a known issue for South Washington County with documented regional aquifer depletion. The MnDNR North & East Metro Groundwater Management Area Plan provides a breakdown of groundwater use by category (Figure 9). The breakdown includes water use across the entire North & East area (roughly, Washington, Ramsey, and SE Anoka Counties) which share groundwater resources. Of particular concern in Southern Washington County is the amount of water used for irrigation (golf course, landscape, and agricultural) and pollution containment.

SWWD views supply as a Municipal issue, however it does value its role, as identified in the Washington County Groundwater Plan, in preserving groundwater quality and quantity. And, although many questions remain about how much water can be sustainably withdrawn from aquifers there is consensus on the need for conservation. SWWD is committed to implementing and improving conservation efforts to ensure long term viability of groundwater resources in South Washington County.

Goal: Implement conservation efforts to ensure long term viability of groundwater resources in South Washington County.

Implementation Indicators:

- Participate in development of a county-wide groundwater monitoring effort as identified in the County Groundwater Plan;
- Maintain rules and permitting program necessary to adequately protect groundwater resources, protect recharge potential, and promote low impact development as identified in the County Groundwater Plan;
- Implement conservation actions identified through regional planning efforts identified in the County Groundwater Plan;
- Incentivize practices that reduce demand on groundwater supply;
- Promote and incentivize feasible re-use of water;
- Promote use of infiltration as a tool for recharge where appropriate;
- Evaluate feasibility of active recharge.

Implementation Tool: Planning, Implementation and Maintenance

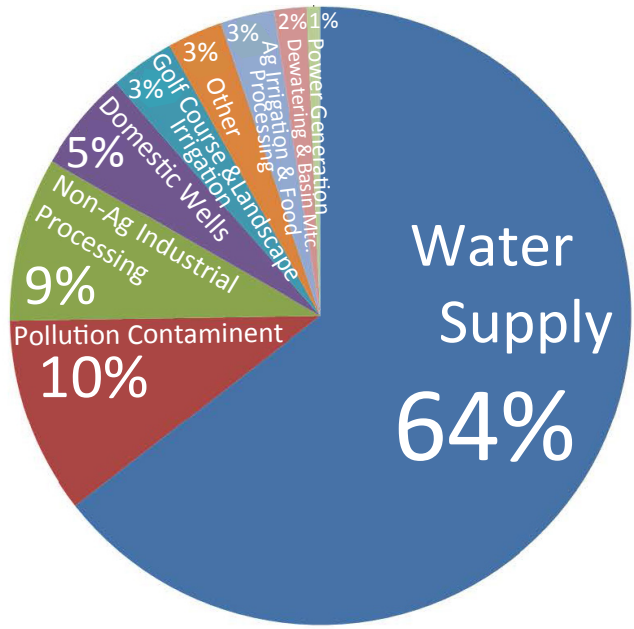


Figure 9: Groundwater use by category [North and East Metro Groundwater Study (2014)]

Additional Information:

MnDNR North and East Metro Groundwater Management Area

Washington County Groundwater Plan

ISSUES AND GOALS: GROUNDWATER SUSTAINABILITY

PROTECTION (POLLUTION PREVENTION)

Issue: District residents rely on groundwater for 100% of their water supply. Because of that, SWWD and its local partners--led by the Washington County Groundwater Plan--place great emphasis on protecting groundwater resources from potential pollution. Those efforts include wellhead protection (Municipalities), special well construction areas (Lake Elmo/ Oakdale), reducing nitrates from agricultural operations, and pollution remediation (3M). SWWD is committed to preventing pollution from stormwater BMPs and local operations (i.e. Large scale infiltration, de-icing operations, karst, etc.). Additionally, there are several known connections between surface water and groundwater resources in the District. SWWD is committed to continued assessment of those connections and the risks associated with them in partnership with the County and State partners.

Dancing Waters Sinkhole

Despite high interest in local implementation and known issues, there are many unknowns. There is a great need for coordination of local implementation efforts and resource assessment. While the District views that coordination and assessment as primarily a State and County responsibility, it is committed to participating. Until those opportunities present themselves, SWWD will continue to focus on pollution prevention. As planning efforts are realized at the State and County levels, this plan will be amended as necessary to ensure District capacity to implement identified actions.

De-icing Equipment Upgrades

Goal: Protect groundwater resources through pollution prevention and management of surface water groundwater interactions.

Implementation Indicators:

- Continue enforcement of existing karst rules;
- Consider pollution potential in siting and design of District funded stormwater BMPs;
- Utilize alternative compliance sequencing for meeting District development rules in areas where infiltration is not appropriate;
- Participate in State and regional efforts to quantify risks to groundwater resources from de-icing operations;
- Supplement County incentive programs to prevent pollution from septic systems and abandoned wells;
- Incentivize road authority upgrades to de-icing operations to prevent overuse of road salt;
- Continue groundwater quality monitoring at District regional infiltration facilities sufficient to identify potential impacts to groundwater from large scale infiltration practices.
- Consider additional protection of surface water features with potential to impact groundwater quality with guidance from State Agencies.

Implementation Tool: Planning, Regulatory, Implementation and Maintenance

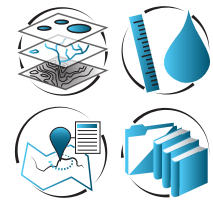
Additional Information:

Washington County Groundwater Plan

MPCA Road Salt and Water Quality

MDA Nitrogen Fertilizer Management Plan

ISSUES AND GOALS: NATURAL RESOURCES




Ravine Lake

Issue: Several of the issues facing District resources are caused by changes to the landscape. Loss of unique or rare habitats, threats to pollinators, habitat fragmentation, and changes in land use and land cover all encroach on District resources and decrease habitat diversity and ecological resilience. That change often translates as decreased groundcover density and quality causing increases in runoff volumes and rates as well as sediment and nutrient concentrations and degraded aquatic habitat. Therefore, one of the simplest solutions for the District's resource issues is protection and restoration of native terrestrial habitat.

Aquatic habitat is essential to healthy lakes and streams. Aside from watershed influences which can increase productivity in lakes and streams and bury habitat features in sediment, aquatic habitat is also strongly affected by invasive aquatic plant species and unbalanced fish communities which favor fish like black bullhead and sunfish which may increase disturbance of lake sediments.

SWWD is committed to preserving and where feasible restoring native terrestrial and aquatic habitat. Every effort will be made in District projects and programs to achieve that result.

The District has already taken several steps toward addressing this issue under its 2007 WMP. Those steps include restoration of over 200 acres of prairie as part of the District's Central Draw Storage Facility and Greenway, promotion of native vegetation in its cost share programs, use of native vegetation in its own projects, and partnership with MnDNR and City of Woodbury to begin aeration and fish stocking at Colby Lake.

Goal: Protect, restore, and reconstruct native terrestrial and aquatic habitat for the benefit of resource management.


Rich Fen at Ravine Lake

Implementation Indicators:

- Participate in development of regional programs to address spread and management of invasive terrestrial and aquatic invasive species;
- Implement local actions identified in regional planning efforts;
- Avoid impacts to rare, unique, and high quality habitats as part of all District projects;
- Maintain natural buffers or riparian areas on all District water resources;
- Promote use of site appropriate native plants as part of District funded projects;
- Promote compliance with guidance for pollinator friendly design practices as part of District funded projects;
- Consider preservation or restoration of native habitat and benefits to pollinators and other wildlife in allocation of incentive funding.
- Evaluate potential credit mechanisms to incentivize developers to maintain mature trees during development within 3 years;
- Implement habitat improvement practices identified in completed Resource Management Plans.

Implementation Tool: Implementation and Maintenance, Regulatory, Planning

Additional Information:

MDA Pollinators

ISSUES AND GOALS: CLIMATE CHANGE

Issue: Minnesota's climate is changing (Fig 10)—precipitation patterns are increasingly variable with extremes (i.e. Drought and flooding) more common, growing seasons are expanding, winters are warmer and thereby increasing stress on infrastructure due to increasing freeze/thaw patterns and fostering increased survival of damaging pests. These changes are also reflected in risks to District resources. More frequent precipitation extremes will increase fluctuations in lake levels and increase rates of runoff and flow in streams. Those changes are reflected in increasing field and streambank erosion and increased demand on regional water supply provided by already stressed aquifers. Depressed water levels in lakes, streams, and wetlands during prolonged droughts will result in changing surface water/groundwater interactions. And, increasing growing seasons will result in prolonged nuisance algae conditions in already impaired waters.

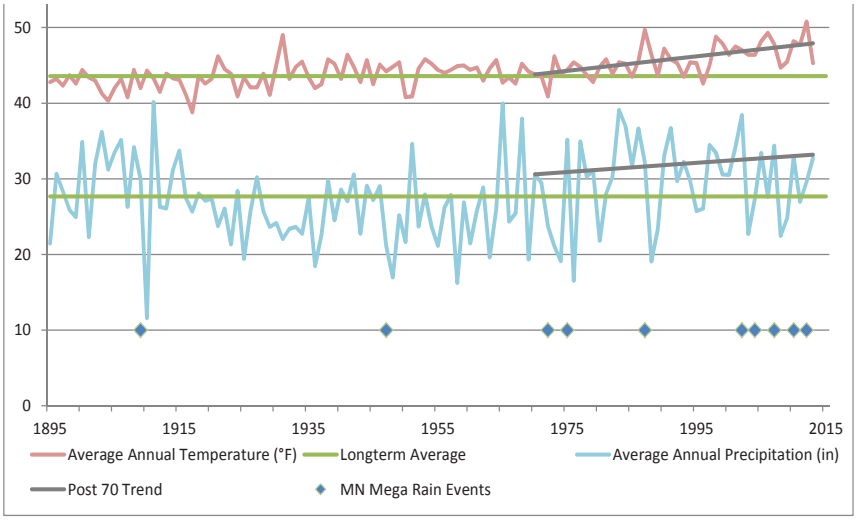


Figure 10: Minneapolis/St. Paul precipitation and temperature trends, NOAA National Climate Data Center

While efforts at the national and international level have traditionally focused on mitigation of climate change, SWWD and other State and Local agencies are increasingly focused on climate adaptation. Through adaptation, SWWD and its partners and residents can prepare for anticipated challenges to ensure healthy resources and sustained water supply.

Goal: Facilitate increased resilience of District resources and public infrastructure through development of information and strategies and implementation of accepted climate adaptation practices.

Implementation Indicators:

- Consider adaptive capacity—ability of a system to adjust to climate change to mitigate potential damages, take advantage of opportunities, or cope with consequences—of District systems and resources in developing projects and management plans;
- Require use of up to date hydrologic data for meeting District development and redevelopment standards;
- Utilize District surface water modeling and County Groundwater model to explore changes in surface water/groundwater interactions as a result of predicted changes in hydrologic conditions and water demand;
- Utilize District CCIP or similar program framework to assist Cities in adapting their infrastructure systems to increase resiliency—capability to anticipate, prepare for, respond to, and recover from significant threats with minimum damage to social well-being, the economy, and the environment;
- Promote use of alternative landscapes which require less water;
- Promote water re-use where feasible to reduce demand on aquifers;
- Work with local partners to improve delivery of soil conservation programs to prevent increased field erosion from changing precipitation patterns.

Implementation Tool: Planning, Education, Implementation and Maintenance

Additional Information:

MPCA Climate Change

Wisconsin Initiative on Climate Change Impacts

SWWD Climate Resiliency Plan

ISSUES AND GOALS: INFORMATION AND EDUCATION

RESOURCE ASSESSMENT

Issue: The District utilizes an adaptive management approach to watershed and resource management. Key to that approach is reliable and relevant feedback data that accurately characterize District resources and changes in water quality and quantity. To manage District resources, the District must first have an accurate view of the state of those resources. The District's monitoring program is key to those assessments and facilitate efforts to identify trends, problem areas, and emerging concerns. That data is also used to calibrate the District's models which guide implementation.

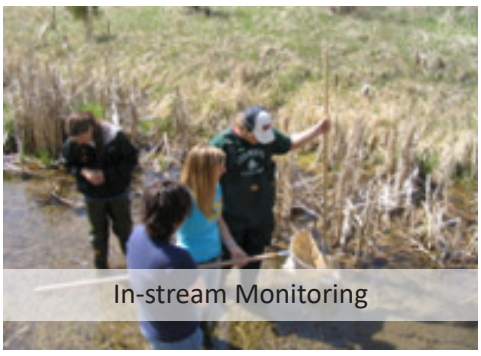

Typical Monitoring Installation

Goals:

- In partnership with Local, State, and Regional partners, operate a monitoring program adequate to establish baseline water quality and quantity measures and identify long-term trends.
- Operate a monitoring program adequate to detect changes in loading rates as a result of District implementation actions.

Implementation Indicators:

- Maintain equipment inventory to quickly establish additional monitoring locations in response to identified resource concerns;
- Biennially, complete trend analyses for all lakes and Regional Assessment Locations and complete a review of the District's Monitoring Plan;
- Expand groundwater monitoring program in partnership with Washington County, MnDNR, MDH, and MPCA to adequately characterize groundwater resources in the District;


In-stream Monitoring

Implementation Tools: Implementation and Maintenance

Additional Information:

SWWD Monitoring Plan

Washington Conservation District

ISSUES AND GOALS: INFORMATION AND EDUCATION

DISTRICT-WIDE HYDROLOGIC MODELING

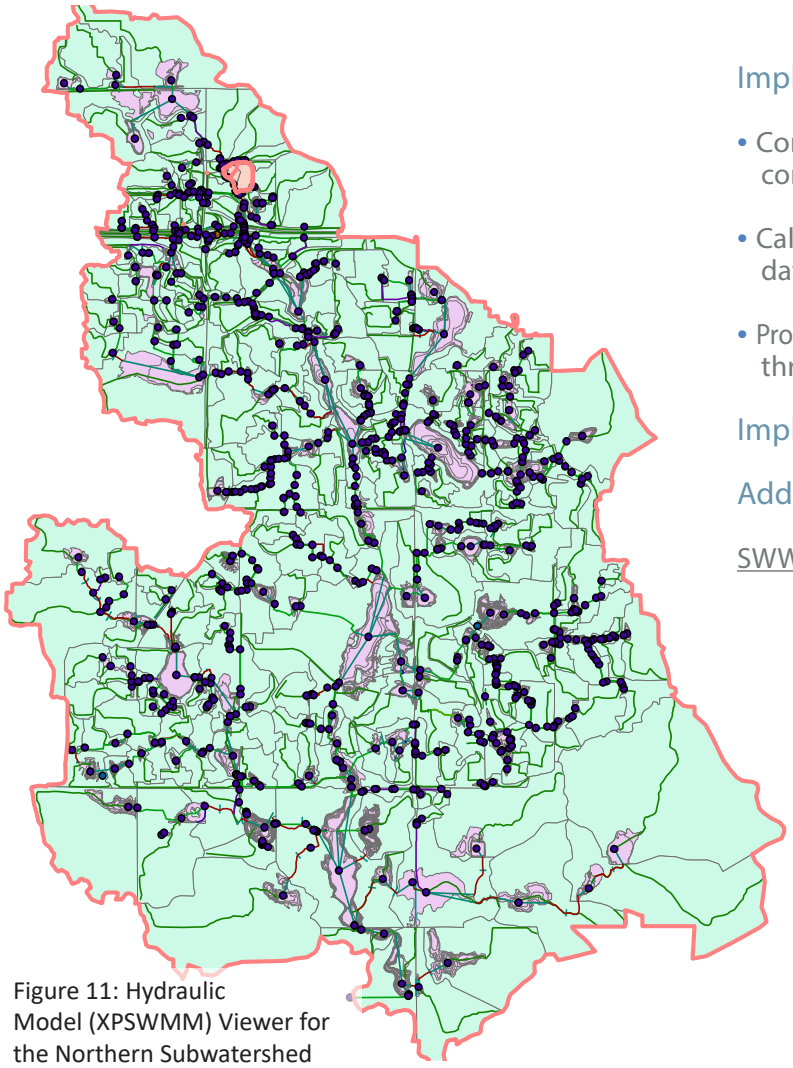


Figure 11: Hydraulic Model (XPSWMM) Viewer for the Northern Subwatershed

Issue: Nearly all resource management decisions now require some degree of modeling on the front end to ensure that efforts are targeted and cost-effective. Additionally, SWWD and its partners rely on modeling for predictive analysis of changing conditions (i.e. Planned development, climate change). SWWD believes that modeling is best initiated and maintained at the watershed level. Figure 11 shows a sample of the District's modeling. Modeling data is housed in a Geographical Information System interface. Figure 12 shows the current status of District modeling efforts.

Goal: Maintain updated, District-wide hydrological modeling to inform District and Municipal management of resources and infrastructure.

Implementation Indicators:

- Complete development of subwatershed models to complete District-wide coverage within 6 years;
- Calibrate completed models to collected monitoring data once every 3 years.
- Promote use of District models and modeling specifications through dissemination on SWWD website.

Implementation Tool: Planning

Additional Information:

SWWD Modeling Spec/Library

Subwatershed	Model	Last Update
Northern Watershed	Existing	~~2013~~2017
Northern Watershed	Ultimate Buildout	2009
West Draw	Existing	2013
West Draw	Ultimate Buildout	2013
East Ravine	Existing	2003
East Ravine	Ultimate Buildout	2009
Central Draw	Existing	2011
East Mississippi	Existing	~~Anticipated~~ 2018
Trout Brook	PTMAPP	~~Anticipated~~ 2018
O'Conner's	PTMAPP	~~Anticipated~~ 2018
St. Croix Bluffs	PTMAPP	~~Anticipated~~ 2018
Mississippi Bluffs	PTMAPP	~~Anticipated~~ 2018

Figure 12: Subwatershed Hydrologic Modeling Timeline

ISSUES AND GOALS: INFORMATION AND EDUCATION

RESEARCH

Issue: Information and dissemination of information is essential to effective implementation of District's adaptive management approach in addressing resource issues. SWWD continuously strives to develop and improve information and refine delivery methods. Several knowledge gaps have been identified and are grouped into the following categories:

- Effective incorporation of emerging Best Management Practices into existing Public Works systems and management paradigms
- Methods for source reduction in agriculture land use
- Alternative crops and buffers
- Evaluation of emerging Best Management Practices
- Refinement of existing Best Management Practices
- Integration of water quality and habitat Best Management Practices
- Effective incentives for implementation of various Best Management Practices
- Control of invasive and unwanted species
- Impacts of regional infiltration on groundwater

SWWD will pursue collaborative research opportunities to address known gaps in knowledge. SWWD's primary tool for disseminating information is its website. The District's website includes interactive mapping and water quality database applications. Additionally, the website serves as a resource library for all documents identified in this plan. It is the District's intention to serve as a primary source for information related to condition and management of resources within the District. To facilitate that role, SWWD will continue to develop web applications and evaluate new technologies for incorporation into the District's website.

Goal: Work with local and regional partners to advance knowledge of watershed management issues.

Implementation Indicators:

- Further identify and refine research and information needs as ongoing role of Technical Advisory Committee;
- Pursue research opportunities to provide for identified information needs;
- Biannually publish a summary of completed and ongoing research efforts as part of annual reporting.
- As part of annual reporting, review existing District web tools for improvements and incorporation of new technologies.

Implementation Tool: Education and Information

Additional Information:

East Metro Water Resources Education Partnership

MDA Agricultural BMP Handbook

ISSUES AND GOALS: INFORMATION AND EDUCATION

EDUCATION

Issue: Informed residents and cities are essential for establishment of reasonable resource expectations and successful implementation of District programs. Since it formed, the District has been working to educate its constituents about the direct and indirect impacts they and their actions have on District resources. Those efforts continue and now involve more partners. SWWD and other water management organizations in the County have long pooled resources toward a shared education program. Increasingly, Municipalities are joining that effort as a means to achieve their own resource goals and comply with State permit requirements. It is the District's intention to continue to work jointly with its partners to develop and deliver a coordinated, comprehensive education program. To that end, SWWD maintains its partnership and involvement in the East Metro Water Resources Education Program (EMWREP).

Construction of a Learning Center at the District's Central Draw Storage Facility (CDSF) was identified in the CDSF management plan. ~~The center would provide for multiple uses including education, trailhead facilities, and neighborhood gathering space. SWWD will explore the need for that facility and opportunities for shared use with Washington County, City of Woodbury, and Non-governmental organizations.~~ A conceptual plan for a future learning center was completed in 2018 and includes a three season shelter, restrooms, and interpretive signage. The passive use facility would double as a trailhead for a future County regional trail.

Goal: Heighten the awareness of key constituencies within the District, sufficient to modify behavior to improve the recognition and implementation of District policies, programs, and activities.

Implementation Indicators:

- Actively participate in regional education efforts as an active partner in the East Metro Water Resources Education Partnership (EMWREP);
- Develop District facilities for use as interpretive and educational sites as user demand grows with development (i.e. Signage trails, programming at CDSF);
- Evaluate the need and opportunity for shared Learning Center at the Central Draw Storage Facility;
- Develop shared interpretive and educational programming through EMWREP for use at Municipal and District facilities focused on identified District issues;
- Engage local public, private, and NGO partners to develop experiential programming for children;
- Maintain a website to disseminate consistent information and coordinate program implementation;
- Utilize existing Municipal committee structure to educate residents and disseminate information as part of the District's Citizen Advisory Committee;
- Develop a mechanism to gauge effectiveness of educational programming efforts.

Implementation Tool: Education and Information

Additional Information:

East Metro Water Resources Education Partnership

SWWD Glacial Valley Interpretive Area schematic plan

Volunteer Tree Planting at SWWD Prairie

ISSUES AND GOALS: EFFICIENCY AND ACCOUNTABILITY

PROGRESS EVALUATION

Issue: SWWD utilizes an adaptive management approach to managing its resources. Likewise, it utilizes a results based accountability (RBA) approach to evaluating District programs. Key to both is routine evaluation of progress. SWWD is committed to routine, objective evaluation of District programs and projects.

A RBA approach relies on the establishment of clear, measurable goals and objectives, documentation of strategies (i.e. Management plans and other guidance documents), collection of data, objective performance evaluation, and willingness to modify programs as necessary. The format of this plan establishes a process for SWWD to carry out a RBA evaluation approach.

Identified issues establish an overriding goal or result that the District is pursuing. To aid in measuring progress toward goals, several implementation indicators are also established. Progress toward implementation indicators is assumed to indicate progress toward the goal. Programs are established similarly to facilitate evaluation of program performance. However, instead of goals and implementation indicators, programs are built around a purpose and performance measures.

Progress toward addressing identified issues and goals and program performance are evaluated annually as part of the District's annual reporting. Additional information about reporting can be found in Part III: Administration. Sample evaluation forms can be found in Appendix B.

Goal: Utilize a Results Based Accountability approach in evaluating and refining implementation strategies for achieving resource goals and to evaluate and improve program performance.

Implementation Indicators:

- Ongoing development and use of documented strategies and actions (i.e. Management plans and other guidance documents) to achieve established resource goals;
- Incorporate strategy documentation, progress evaluation, and annual workplan into annual report;
- Amend Watershed Plan as necessary to provide the District with programs and tools necessary to implement identified strategies.

Implementation Tool: Planning, Implementation and Maintenance

Additional Information:

Annual Reports will be available on the SWWD website

ISSUES AND GOALS: EFFICIENCY AND ACCOUNTABILITY

UNIFORM STANDARDS

Issue: SWWD believes that primary control and determination of appropriate land use is the responsibility of municipalities. Likewise, the District believes the permitting process is best performed at the municipal level. However, one of the primary purposes of Watershed Districts is to manage resource issues that cross municipal boundaries or otherwise become too big for individual jurisdictions to address. Additionally, the District views its water resources as regional resources and values its role in preventing impacts to those resources from development. SWWD's primary tool for addressing these issues is uniform design standards—Rules—which are required by MN 103D.341. Municipalities within the District are required to adopt controls to enforce those standards.

Ultimately, the District believes that standards based on local resource goals and that consider variability in soil and land cover conditions are best. However, the District does recognize the difficulty for municipalities, residents, and businesses to navigate standards across Watershed District boundaries. To the extent possible, SWWD will seek to achieve uniformity in Standards across District boundaries, although varying resource issues may make that infeasible.

Finally, the District recognizes its responsibility in implementing State programs (e.g. TMDLs) and permits (e.g. MS4) and seeks to simplify the inherent overlap of regulatory jurisdictions and eliminate duplication of efforts where possible.

Goal: Establish and maintain District controls necessary to achieve established District resource goals, comply with mandated permits and programs, and maximize regulatory consistency with neighboring jurisdictions.

Implementation Indicators:

- Regularly review and update District Rules as necessary to keep pace with changing resource issues and mandated regulatory programs;
- Ensure uniform MS4 program coverage across District using a documented cooperative approach;
- Work with neighboring Watershed Districts to develop uniform standards where possible;
- Require municipal adoption of District Rules within 2 years of any completed update;
- Prevent degradation of resources.

Implementation Tool: Planning, Regulatory

Additional Information:

SWWD 2007 Watershed Management Plan, Chapter 6, Standards

SWWD Rules

Washington County Water Governance Study

SWWD Stormwater Pollution Prevention Plan

ISSUES AND GOALS: EFFICIENCY AND ACCOUNTABILITY

COLLABORATION AND COORDINATION OF EFFORTS

Issue: Minnesota is advanced in management of water resources. However, the framework of local, regional, and state jurisdictions which empower Minnesota to respond to water resource issues also results in a high degree of overlap in regulatory jurisdictions and responsibilities. That overlap can lead to confusion and duplication of efforts. The District's own shortcomings in communication were identified in the recent PRAP. As such, improving collaboration and coordination of efforts is a priority for the District.

SWWD believes implementation is generally best achieved at local levels of government and approaches this issue from two distinct angles; (1) addressing challenges of multiple, overlapping regulatory jurisdictions through collaboration and coordination of efforts and (2) pursuing opportunities to leverage existing local planning efforts and combining implementation programs and projects to gain economy of scale.

Goals:

- Limit duplication of planning and implementation efforts by the District and its State and Local partners by improving collaboration and coordination of efforts.
- Create efficiencies in implementation through partnerships

Implementation Indicators:

- Collaborate and coordinate agency efforts through engagement of a standing Technical Advisory Committee;
- Incorporate local input into District planning efforts through engagement of a standing Citizens Advisory Committee
- Inform State and Regional agencies and organizations of local efforts through participation in their advisory committees;
- Combine local implementation to gain economy of scale;
- Incorporate implementation actions identified in regional planning efforts into District programs.

Implementation Tool: Planning, Education and Information, Implementation and Maintenance

Additional Information:

Locally Driven Watershed Restoration

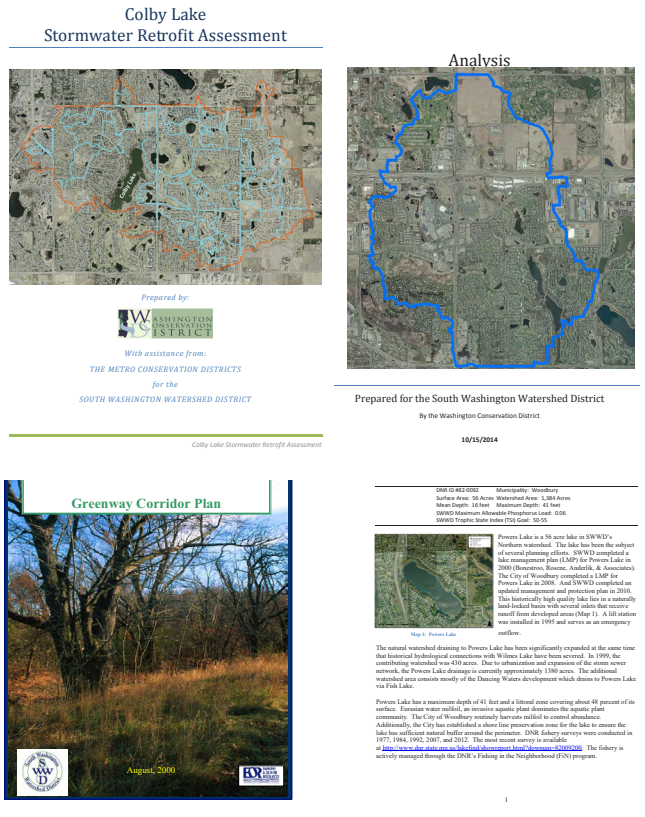
PART III: IMPLEMENTATION

PROGRAMS

Several Watershed District programs are specifically required under MN Rule 8410 and the District's Municipal Separate Storm Sewer System (MS4) permit. While the District takes seriously its general roles and responsibilities, it tailors those programs to first address priority issues identified through the aforementioned public process. The following programs reflect that commitment and are intended to establish the programmatic framework to facilitate a community response to issues currently identified in this plan and others that emerge during the course of implementation. That focus is reflected in the District's mission statement

-SWWD mission statement -

To manage water and related resources of the District in cooperation with our citizens and communities.



Example Watershed Plan Guidance Documents

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PURPOSE: TO PROVIDE CURRENT, SOUND GUIDANCE FOR IMPLEMENTATION

Adaptive Management is an iterative, systematic process for continually improving management strategies and practices by learning from the outcomes of previously employed actions. SWWD is committed to using an adaptive management approach to watershed management as a means to managing uncertainty. The use of an iterative decision making process enables the District to work toward its goals while maximizing information gathering to better inform future efforts. This approach is highly valuable in that it facilitates District action despite varying levels of uncertainty that is characteristic of environmental systems. With additional information, strategies and practices are modified as necessary to best manage the watershed. Through its various planning efforts, SWWD evaluates resource issues, risks, and uncertainty in formulating a strategy or identifying practices to address identified issues. The District routinely collects information to evaluate success of implemented practices and better informed understanding of resource issues. Using that information, the District re-visits planning efforts to revise strategies as necessary.

Additionally, several new District-led planning efforts are planned over the life of this Plan to address identified issues related to water quality, flooding, climate change, and natural resources. The scope and purpose of those plans are briefly described below.

RESOURCE MANAGEMENT PLANS

The District has completed resource management plans for several of its lakes and streams (Figure 13). Plans will be completed for all remaining resources within 6 years of adoption of this WMP. All completed resource management plans will be evaluated at a minimum of every 3 years. The purpose of the District's resource management plans is to identify improvements and actions necessary to achieve the District's resource goals. Generally, the plans include extensive watershed and in-lake modeling with subsequent cost/benefit analysis of potential practices and actions.

Resource	Current Management Plan	Subwatershed Retrofit Analysis
Armstrong Lake	~~2012~~2018	~~2016~~2018
Colby Lake	~~2011~~2018	2011
La Lake	~~2020~~2018	2022
Markgrafs Lake	~~2020~~2018	2016
Powers Lake	~~2012~~2018	2011
Ravine Lake	~~2011~~2018	2022
Wilmes Lake	~~2013~~2018	2014
O'Conners Creek	2012	2022
Lake St. Croix	2007	by others -2013
Trout Brook	2009	2012
Mississippi River	by others	2010, 2017

Figure 13: Resource Management Plans status table

FLOOD DAMAGE REDUCTION & MITIGATION PLAN

SWWD has historically assisted City led efforts in responding to flooding issues within the District (i.e. Wilmes Lake, Newport). Those efforts will continue with a primary focus on communities bordering the Mississippi River. These communities are vulnerable to ever increasing flood levels and aging infrastructure. The purpose of the flood damage reduction and mitigation plan is to identify vulnerable communities and establish District tools to reduce or mitigate flood damage.

Additional related work includes routine development

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and maintenance of watershed wide modeling, review and refinement of identified key flood storage locations (FEMA floodplains), and review and update of inter-community flow limits.

CLIMATE ADAPTATION PLAN

Impacts of climate change on District resources and infrastructure was identified as a priority issue during development of this Plan. While extensive work continues at scales much larger than the District to predict how climate will continue to change and identify potential impacts, work remains to downscale that work to develop actionable strategies for the District. ~~No later than 2022, the District will complete a Climate Adaptation Plan to guide District efforts to increase resiliency of District resources and infrastructure. This planning effort will include scenario modeling to identify impacts from predicted increases in extreme temperature and precipitation events.~~In 2017, SWWD engaged its communities and citizens to develop a Climate Resiliency Plan. That plan establishes resiliency priorities and identifies actions and strategies to build resiliency of District resources.

NATURAL RESOURCES

The District has long had programs in place to facilitate natural resource protection and restoration. However, implementation has been slow due, in part, to nonexistent or outdated plans and limited coordination with Cities. To improve and guide implementation, SWWD intends to pursue several natural resource planning efforts during the life of this WMP. Highest priority items include revisions to the District's existing greenway plan, completion of a ravine survey and assessment, and update of the District's Wetland inventory. Subsequent planning efforts will include evaluation of aquatic habitat of District resources and in-lake restoration plans.

The District's existing Greenway Plan was completed in 2000. While that plan remains valuable, it was completed prior to expansion of the District. Revision of the plan will expand existing identified corridors to the full District in cooperation with Cities and Washington County parks. The planning effort will also include substantial coordination with Cities and Washington County to identify approaches to establishing and protecting identified corridors.

Prior watershed inventory and modeling work has shown that ravine erosion (as opposed to bed or bank erosion) is a significant contributor to known sediment and nutrient levels in the District's water resources. Response to stabilize ravines is well established and relatively inexpensive. However, to date, there is little planning completed to guide that response. In partnership with MnDNR and Washington Conservation District, SWWD will complete a ravine inventory, rank the inventoried ravines based on erosion potential and downstream impact, and document standard stabilization practices to be used. Focus of this planning effort will be watersheds drained by natural streams and those with direct drainage to the Mississippi and St. Croix Rivers. Ravines in SWWD's lake watersheds will be assessed as part of lake management planning.

SWWD worked to develop a wetland inventory and management plan prior to expanding into the East Mississippi and Lower St. Croix management units. That inventory requires updating to include changes over the past decade and new areas now within SWWD jurisdiction.

Several of SWWD's completed lake management plans call for reductions of in-lake nutrient loading. To facilitate those reductions, SWWD intends to implement more extensive in-lake restoration efforts to improve aquatic habitat and foster more balanced fish and plant communities. SWWD will complete an aquatic habitat restoration plan to establish implementation tools to address in-lake deficiencies.

GROUNDWATER

SWWD does not lead groundwater assessment or planning efforts as the issues extend far beyond the District's jurisdiction. However, the District recognizes its role in supporting those efforts through resource assessment and regulation. This plan identifies the need for a strategic assessment plan and regulatory coordination plan to ensure that groundwater resources are adequately monitored and managed. SWWD will engage its partners to develop both plans.

GUIDANCE DOCUMENTS

All completed plans will be adopted as Guidance Documents to this Watershed Management Plan. In a process established under its 2007 WMP, SWWD uses Guidance Documents to respond to new and changing

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information. Guidance documents are expected to provide significant assistance towards addressing an issue or topic and must meet the following criteria to be considered for adoption as a guidance document.

- The product should have a direct relationship with the WMP content. The relationship may be identified as an overlap with issues, policies/actions, programs, or more broadly, a management area. Included are plans which further direct already identified funds toward cost effective implementation.
- The product should follow due diligence during development to include some form of input and/or review by one or more member cities, and public input process. This will depend on the level of technical content within the product, with which the public may not be familiar. Due diligence may take the form of a District initiated Technical Advisory Committee and review by the district's standing Citizen Advisory Committee.
- The product content should provide adequate specificity in describing desired processes, outcomes or recommendations so that implications of the proposed Guidance Document are clear to the Board and others.

Any products proposed as Guidance Documents will be adopted through minor amendment to this Plan as specified in the following section and MN Rule 8410.0140, unless otherwise directed by BWSR. Similarly, updates or adjustments to adopted Guidance Documents will also be adopted as minor Plan amendments.

Capital improvement projects proposed in a Guidance Document and approved as a WMP amendment, shall be programmed into the Annual Work Plan and Budget for implementation. The SWWD Board shall determine the priority of any proposed projects based on data specific to the issue provided in the Guidance Document, and the priorities of the WMP.

Known stakeholders will receive formal written notice (electronic or mailed) regarding updates or availability of new materials.

Adopted guidance documents:

- Greenway Corridor Plan (2000)
- Comprehensive Wetland Management Plan (2002)
- O'Connors Stream and Lake Management Plan (2007)
- Trout Brook Management Plan (2009)
- Highway 61 Corridor Subwatershed Retrofit Analysis (2010)
- Colby Lake Water Quality Modeling Project (2011)
- Powers Lake Management Plan (2011)
- Powers Lake Subwatershed Retrofit Analysis (2011)
- Colby Lake Subwatershed Retrofit Analysis (2011)
- Grey Cloud Slough Restoration - Feasibility Study (2012)
- Armstrong, Wilmes, Markgrafs Modeling Report (2012)
- Trout Brook Watershed Improvements - Afton Alps (2012)
- Central Draw Storage Facility (CDSF) Basis of Design Report (2013)
- Ravine Lake Water Quality Modeling and Management Report (2013)
- Ravine Park Stabilization and Outlet Concept Design (2014)
- Wilmes Lake Subwatershed Retrofit Analysis (2014)
- Washington County Groundwater Plan (2015)
- North & East Metro Groundwater Management Area Plan (2015)
- Monitoring Plan (2009)
- SWWD Climate Resiliency Plan (2017) (http://www.swwdmn.org/wp-content/uploads/2018/03/FINAL_SWWD-Climate-Resiliency-Plan-3_26_2018.pdf)
- East Mississippi/Newport Subwatershed Assessment (2018) (http://www.swwdmn.org/wp-content/uploads/2018/08/East-Mississippi-Subwatershed-Retrofit-Analysis-Report_Final_red.pdf)

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- Armstrong Lake Subwatershed Assessment (2018) (http://www.swwdmn.org/wp-content/uploads/2018/09/Armstrong-Lake-Subwatershed-Retrofit-Analysis-Report.pdf)
- Trout Brook Ravines Assessment (2018) (http://www.swwdmn.org/wp-content/uploads/2017/08/Trout-Brook-Ravine-SWA.pdf)
- Learning Center Conceptual Design (2018) (http://www.swwdmn.org/wp-content/uploads/2018/09/170469-20180223-SWWD-Summary-Report_FINAL.pdf)
- SWWD Lakes Management Plan (2018) (https://www.swwdmn.org/watershed-guidance-documents/draft-2018-lakes-management-plan/)

AMENDMENTS TO THIS PLAN

Consistent with MN Rule 8410.0140, this plan extends through 2026. However, as previously described, this plan is intended to serve SWWD for decades to come with regular amendment. We do not expect Part I to require frequent amendment. Part II includes identified issues and goals and serves as the basis for all actions that the District takes. At a minimum, issues and goals will be evaluated every 5 years. Results of that evaluation will be incorporated into this plan by amendment or update, as necessary. Part III serves as the District's implementation plan, establishing District programs, Long Range Workplan, and Administrative procedures. Effectiveness of implementation actions identified under Part III will be evaluated at a minimum of every two years. It is the District's intention that Part III of the plan will be regularly amended to reflect the District's ongoing planning work.

Amendments will not be required for the following:

- Formatting or reorganization of the plan
- Revision of procedures meant to streamline administration of the plan
- Clarification of existing plan goals or policies
- Inclusion of additional data not requiring interpretation, including incorporation of updated Guidance Documents
- Updated costs estimates incorporated into the long range workplan not exceeding 25% of total cost
- Expansion of public process
- Adjustments to how SWWD carries out program activities within its discretion

Should the plan be modified without amendment, the District will distribute copiesof the changes to all past recipients of the District's plan within 30 days of adoption. Upon adoption, SWWD will post the current version on its website along with a strikeout/underline version which will be posted for a minimum of 60 days. Hard copies of the revised plan will be distributed upon request.

Should an amendment be required but deemed minor, SWWD will complete an amendment following MN Rule 8410.0140 subp. 2. Generally, to adopt changes to this plan through minor amendment, SWWD will distribute the proposed amendment to review authorities for a 30 day review and comment period. The amendment can then be adopted so long as BWSR has agreed that the amendment is minor or failed to act within 5 working days of the end of the review period, no county has filed an objection to the amendment, SWWD has held a public meeting to explain the amendment having published notice of the meeting at least 7 and 14 days before the date of the meeting, and changes are not necessary to make the plan consistent with an approved and adopted county groundwater plan.

All other changes requiring amendment will follow amendment procedures as specified in MN Statute 103B.231, subd. 11 and MN Rule 8410.0140. Completion of any amendment will include public involvement through the District's Citizen and/or Technical Advisory Committees. Upon adoption, the District will distribute copies of the changes to all past recipients of the District's plan within 30 days of adoption. SWWD will post the current version on its website along with a strikeout/underline version which will be posted for a minimum of 60 days. Hard copies of the revised plan will be distributed upon request.

Should the need for substantial modification to issues and goals become necessary following routine Plan review, SWWD will initiate a Plan Update under MN Statutes

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103B.231 and MN Rule 8410.0045. Upon adoption of an update, the plan will extend for 10 years from the date of BWSR Board approval.

ADVISORY COMMITTEES

SWWD utilizes two separate advisory committees to inform its planning efforts—a Citizens Advisory Committee (CAC), and an Ad Hoc Technical Advisory Committee (TAC). Analogous to a municipal planning commission, the CAC is a standing committee appointed by the SWWD Board to assist the District in executing planning efforts, developing implementation programs, evaluating District implementation progress, and serving as a link between the District and its Cities and Townships. SWWD attempts to maintain a CAC membership consisting of at least one member from each City and Township in the District and members covering a broad range of viewpoints including agriculture, sportsman's organizations, and local governments (SWCD, Cities). CAC members are appointed to 3 year terms. There is no limit on number of terms. CAC members are responsible for electing its officers.

The District TAC is formed to provide technical expertise to specific planning and project development efforts and to ensure that District efforts are consistent with other local and state efforts. TAC composition varies by purpose, but typically consists of local and state agency staff. The TAC is formed through invitation of District staff and meets as necessary for the completion of its intended purpose.

MODELING

SWWD's planning program also includes District modeling efforts. The District routinely develops and maintains watershed and resource models. Those models are developed at the subwatershed level and used to guide District management efforts. As such, model development and maintenance is integral to all other planning efforts. SWWD leads development of surface water related modeling.

The County Groundwater Plan identifies the need to update groundwater modeling. While the District will not lead that effort, it will participate through Staff involvement and funding support.

Performance Measures:

- Maintain up to date planning documents necessary to guide District Implementation
- Complete SWWD Flooding Emergency Response Plan within 6 years;
- Complete development of subwatershed hydrologic models within 6 years;
- Update/calibrate completed hydrologic models every 3 years
- Review and update inter-community flow limits within 3 years (modeling);
- Complete resource management plans for all lakes and perennial open channel streams within the District within 6 years;
- Re-assess completed management plans at a minimum of once every 3 years to evaluate progress and review and adjust strategies;
- ID excessively eroding bluff ravines within 3 years;
- Update the District's Greenway Plan within 3 years;
- Develop a Climate Adaptation Plan within 6 years;
- Participate in State or Regional planning efforts to coordinate groundwater resource assessment and regulation.
- Work with partners to develop a Strategic Groundwater Assessment Plan to guide and coordinate groundwater monitoring efforts within 3 years;
- Work with partners to develop a Strategic Groundwater Regulatory Coordination Plan within 3 years;
- Update and finalize the Districts Wetland inventory within 3 years.

PROGRAM: REGULATORY

Land alteration can affect the rate, volume, and quality of surface runoff and lead to degradation of District resources through several mechanisms. Sedimentation in lakes and streams from on-going erosion processes and construction activities reduces the hydraulic capacity of water bodies and degrades water quality. Projects which increase the rate of stormwater runoff or degrade runoff quality increase the need for storage and can aggravate existing water quality problems and contribute to new ones. Projects which fill floodplain or wetland areas can increase the need for storage by reducing stormwater storage and hydraulic capacity of water bodies and degrade water quality by eliminating the filtering capacity of such areas.

PURPOSE: TO LIMIT THE AFFECTS OF LAND ALTERATIONS AND PROTECT THE PUBLIC HEALTH, WELFARE, AND NATURAL RESOURCES OF THE DISTRICT

Established under authorities granted in MN Statute 103D.341, District Rules seek to limit the affects land alterations to protect the public health, welfare, and natural resources of the District, reduce the need for additional storage capacity and the potential need for the construction of systems to convey storm water, preserve floodplains and wetland storage capacity, maintain or improve the chemical and physical quality of the surface and groundwater, reduce sedimentation, preserve the hydraulic and navigational capacity of water bodies, preserve natural shoreland features, and minimize the public expenditure to avoid or correct such problems in the future. Absent from the District's current rules is any regulatory mechanism related to enforcement of the State's new buffer requirements. Once SWWD's responsibilities become clear the District will amend its rules and this Plan as necessary to ensure the District's responsibilities are met and there is an effective and efficient local mechanism to establish and maintain required buffers on Public Waters.

Primary responsibility for management of water quality and stormwater runoff lies with the District. However, the District recognizes that the primary control and determination of appropriate land uses is the responsibility of its municipalities. Accordingly, the District will coordinate development permit application reviews with the municipality where the property is located. The District urges municipalities to develop, as rapidly as possible, a LWMP, providing a coordinated system of managing surface water on a regional or subwatershed basis consistent with District Rules. Where such a municipal plan is adopted, the requirements of the District's Rules which are met by the municipal plan shall be deemed satisfied upon issuance of an appropriate municipal permit. In the absence of a LWMP on a municipal or subwatershed level, or where required by a Municipal LWMP, SWWD will continue to require individual site-by-site SWWD permits for projects involving land alteration.

In addition to establishing and enforcing rules, the District serves as the responsible Local Government Unit (LGU) for administration of the State of Minnesota's Wetland Conservation Act in all portions of the District except the Cities of Oakdale and Hastings. Also excluded from District jurisdiction is all MnDOT right of way as MnDOT serves as the LGU for all MnDOT property. SWWD manages potential impacts to wetlands following WCA rules and

Erosion Control Workshop

PROGRAM: REGULATORY

guidance. Those rules are embedded within SWWD's Rules. Additional guidance for managing wetlands, including methods to determine functions and values is included in the District's Wetland Management Plan. The Wetland Management Plan will be updated as specified under this Plan.

Performance Measures:

- Compliance with District and Municipal Controls. Where the District issues permits, compliance with be evaluated and enforced through the District's permit review and construction inspection procedures. Where the District has deferred to Municipal review and permitting, compliance will be evaluated through routine audit of Municipal review, permitting, and construction inspection procedures as related to specific projects. The performance measure goal is 100% compliance with District and Municipal controls.

- Ensure full coverage of State NPDES program requirements across District and limit duplication of effort through coordination with Cities and local agencies. NPDES program coverage will be reviewed annually as part of MS4 reporting.

- Effectively administer the Wetland Conservation Act to meet the State and SWWD goal of no net loss of wetland acres. To be reviewed annually as part of Wetland Conservation Act LGU reporting.

- Ensure District compliance with State buffer requirements.

Additional Information:

SWWD Rules

Wetland Conservation Act

MPCA MS4 Program

MnDNR Buffers

BWSR Buffers

PROGRAM: IMPLEMENTATION AND MAINTENANCE

MONITORING

SWWD has operated a surface water quality and quantity monitoring program since 1996. SWWD's past Watershed Management Plan and current Monitoring Plan established a framework for characterizing and managing water resources at a regional level. To optimize monitoring efforts for regional assessment, the District has designated key locations at critical crossings and checkpoints throughout the watershed as regional assessment locations (Chapter 6, Section 8 of the SWWD 2007 WMP, Houston Engineering). Locations were chosen to characterize water quality and quantity entering or leaving a region and are included on the District's web viewer. Data collected at these locations is used to identify trends in regional water quality and quantity as well as potential areas for concern, develop and verify regional models, set benchmarks for regional water quality, evaluate effectiveness of District Rules and evaluate regional effects of proposed development projects. Once established, all regional assessment locations are part of the District's permanent monitoring program and will be operated until deemed unnecessary by analysis and modeling.

PURPOSE: TO PROVIDE THE MECHANISM AND RESOURCES TO REVERSE OR ADAPT TO THE IMPACTS OF LAND ALTERATION AND CLIMATE CHANGE

To enhance the SWWD regional assessment framework, the District operates subwatershed assessment sites on a rotating basis. Subwatershed assessment locations are chosen to further define and manage water resources within the major regions of the watershed. Data collected at these locations will be used to identify priority subwatersheds within the larger watershed regions of the District as well as to help calibrate regional models and update maximum allowable load levels corresponding to the contributing areas for each location. Subwatershed assessment sites, once established, are typically operated for a period of 3-10 years depending on District goals and value of the data being collected. All past and current Subwatershed assessment locations are included on the District's web viewer.

The SWWD utilizes three approaches for monitoring of waterbodies throughout the District. First, the District conducts long-term, screening level water quality monitoring of lakes through participation in the Metropolitan Council Citizen-Assisted Lake Monitoring Program (CAMP). By collecting long-term, baseline data for area Lakes, the District can identify trends—both positive and negative—and identify targets for in-depth study. Second, the District undertakes in-depth, assessment level monitoring of priority waterbodies, impaired waters, and others targeted for in-depth study.

In-depth assessment of individual waterbodies becomes necessary when data from screening level monitoring programs indicates impairment or nutrient loading in excess of SWWD or State standards. Assessments will generally last 3-5 years and consist of CAMP monitoring, and a network of automated water quality and quantity monitoring sites at the waterbody's inlets. Automated stations will be operated using the same equipment and procedures used for regional assessment monitoring locations. Data will be used to identify portions of the watershed leading to the impairment or nutrient loading. After subwatershed loading is characterized and mitigation actions taken, CAMP monitoring will continue and automated monitoring sites will be rotated amongst the lake's inlets so that each is monitored at least once every five years. Inlets will be monitored more frequently if poor water quality or high year to year variability in data persists.

Finally, to track habitat changes in response to planned District action and ongoing pressures (i.e. Climate change, development), the District has begun taking vegetation surveys of lakes in the District.

Much of the property in the South Washington watershed is relatively newly developed. As they were built, those developments were subject to peak runoff, runoff volume, and phosphorous loading standards. Developments utilize a variety of stormwater features and BMPs to meet those standards. However, the success of those stormwater features and BMPs at meeting SWWD standards is largely unknown. SWWD will initiate assessments to examine the flow and nutrient reduction capacities of various BMPs. Data will be used to assess reduction in flow rate and volume and phosphorous as well as to better inform engineers and designers of the success of various features

PROGRAM: IMPLEMENTATION AND MAINTENANCE

MONITORING (CONTINUED)

and BMPs in south Washington County.

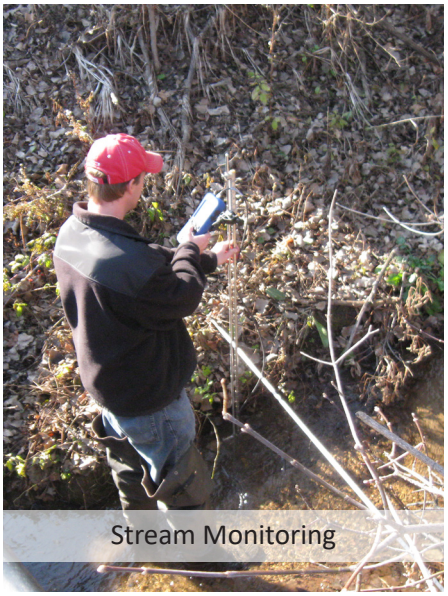
Municipalities within the SWWD rely on groundwater to provide potable water, satisfy water demand for commercial and industrial facilities, and irrigation. Additionally, many surface water features have direct interaction with groundwater. Therefore, management of some surface water resources is also dependent on high quality, sustainable levels of groundwater.

Multiple examinations of groundwater resources have been completed in south Washington County. The extensive, multi-phase Infiltration Management Study (EOR, 2001) was initiated by SWWD in 1997 in order to examine the use of infiltration in stormwater management. The study reported that the utilization of "the natural features of this watershed, such as extensive natural detention areas and high infiltration capacities, is a sound and innovative approach to stormwater management that is foresighted and directed toward the future of more natural, less costly solutions." Additional work by Barr Engineering (2005a and 2005b) led to completion of a groundwater flow model and characterization of infiltration potential throughout the District, noting that the majority of the area served as a recharge area. The SWWD has made it common practice to mitigate for groundwater withdrawals and lost natural groundwater recharge rates by routing water from impervious areas to open areas or infiltration basins. However, the District is also aware that the need to replenish the aquifers must be balanced with the need to prevent potentially degraded water from impacting groundwater quality.

The Cottage Grove Area Nitrate Study (Barr, 2003) found elevated nitrate concentrations in wells throughout the Cottage Grove area. Further, many of those wells were within one mile of a bedrock fault. Investigators concluded that the fault is associated with enhanced recharge through rapid downward percolation of water. Similar faults are located in bedrock throughout south Washington County. The Minnesota Department of Agriculture continues to implement Nitrogen Fertilizer Management Plan activities (monitoring, assessment, and prevention and mitigation activities) in the City of Cottage Grove and Denmark Township.

A literature review conducted for the MPCA (Weiss et al. 2008) indicated mixed results when examining groundwater contamination from infiltrated stormwater. Contamination risk is higher for salts and pathogens, while it is generally lower for other pollutants. However, contamination risk largely depends on soil and geologic characteristics. A major consideration is the presence of karst features that can provide rapid and direct conveyance of stormwater to groundwater.

Currently, the District operates a groundwater level monitoring network and is transitioning to a regional assessment program. The focus of that program to detect effects of stormwater infiltration as the watershed continues to develop. With its partners, SWWD will evaluate the need and feasibility of identifying and monitoring regional groundwater assessment locations throughout the District through development of a Strategic Assessment Plan.


Stream Monitoring

If and when program guidelines are fully established, SWWD will work with MDH and/or a Technical Advisory Committee to identify new sites for expansion of the program leveraging existing groundwater models to optimize placement and existing wells where possible to minimize cost. As part of the process, SWWD will work with partners to refine existing models using SWWD data. All new regional assessment sites will be equipped with automated water level loggers. Existing sites will retrofitted with automated water level loggers as necessary. Data from the regional assessment network will be used to identify trends, assess the sustainability of groundwater resources, and refine and calibrate the South Washington groundwater model (Barr Engineering).

SWWD will investigate trends of degrading groundwater quality or increased fluctuation of groundwater levels using groundwater models developed for south Washington County to target likely causes. The SWWD will then

PROGRAM: IMPLEMENTATION AND MAINTENANCE

MONITORING (CONTINUED)

undertake in-field, in-depth assessment to verify sources and target mitigation strategies.

Performance Measures:

- Survey aquatic vegetation of District Lakes a minimum of every 3 years;
- Annually implement District's monitoring plan;
- Monitor levels and water quality of all publicly accessible lakes annually;
- Monitor established Regional Assessment Locations a minimum of 3 out of every 6 years;
- Implement recommendations of the Strategic Assessment Plan once complete.

Additional Information:

SWWD Monitoring Program Webpage

Washington Conservation District

MDA Township Nitrate Testing

PROGRAM: IMPLEMENTATION AND MAINTENANCE

WATERSHED RESTORATION, RECONSTRUCTION, AND RESILIENCY

PURPOSE: TO PROVIDE THE MECHANISM AND RESOURCES TO REVERSE OR ADAPT TO THE IMPACTS OF LAND ALTERATION AND CLIMATE CHANGE

Several of the priority issues facing the District are caused by changes both inside and outside of the District including land use conversion and climate change. The District's Watershed Restoration, Reconstruction, and Resiliency program provides implementation funds to address problems that these changes cause including altered hydrographs or increase in peak flows as water runs off of the watershed more quickly, stabilization of natural drainage systems to withstand anticipated discharges, protection and restoration of rare and native communities, increasing resiliency of natural and man-made systems against climate changes, reducing habitat fragmentation by creating or maintaining linear corridors, managing invasive species, and protecting groundwater resources.

All implementation under this program will be guided by existing or future guidance documents. Existing guidance documents include the District's Greenway Corridor Plan, Resource Management Plans, and County Groundwater Plan. Future documents will focus on flood damage reduction and mitigation, climate adaptation and resiliency, Agriculture BMP Pilot Program, and natural resources.

Typical Raingarden Installation

This plan will be amended as Guidance Documents are developed and adopted. Funding for implementation under this program is provided for through collection of Stormwater Utility Fees and Levy funds.

SWWD's 1997 Watershed Management Plan and 2000 Greenway Corridor Plan identified the need for a greenway corridor encompassing the major North/South drainage route through the center of the District. As originally conceived the greenway would link Lake Elmo Regional Park with Cottage Grove Ravine Regional Park and the Mississippi River and provide a link to the proposed park on Grey Cloud Island to the West. A major purpose of that plan was to identify missing links in the corridors. To date, SWWD efforts have focused on securing those missing links. That effort has resulted in a nearly complete corridor covering the North/South Drainage. That corridor will be permanently protected with development of Cottage Grove's East Ravine watershed. Future planning efforts will expand the greenway plan to include additional linkages in the District's East Mississippi and Lower St. Croix management areas. The goal of the original plan remains: to create a multipurpose system of open space that provides a physical link to existing natural areas while providing for conveyance of stormwater runoff. The linear system provided by a greenway provides cost effective overland routes for stormwater, maintains natural stream systems, and provides important community amenities including active and passive recreation, fish and wildlife habitat, rare species habitat, groundwater recharge, water quality protection, environmental education, and erosion control.

District resource management plans are developed to identify the source of a resource problem and identify cost-effective practices to address it. Typical scenarios may include excess nutrient loading to a lake caused by development in the watershed or destabilized stream channels caused by drain tiling or other changes in farming practices. Typically, most cost effective solutions are focused on source control and heavily rely on various infiltration practices to keep water and nutrients on the land and help recreate a more natural hydrograph.

Performance Measures:

- Establishment and protection of identified greenway corridors (Greenway Plan);

PROGRAM: IMPLEMENTATION AND MAINTENANCE

WATERSHED RESTORATION, RECONSTRUCTION, AND RESILIENCY (CONTINUED)

Rear Yard Vegetated Swale

- Implementation of completed resource management plans as guided by accompanying retrofit analyses;
- Establishment and protection of vegetated buffers along streams, ravines, bluffs and around lakes and wetlands (Buffers, Part II);
- Stabilization of identified ravines to prevent downstream transport of sediment and nutrients (Ravine Survey and Assessment Plan);
- Implementation of yet to be identified practices to increase resiliency of natural and man-made systems against land use and climate change (Climate Adaptation Plan)
- Implementation of regionally identified strategies to address aquatic and terrestrial invasive species.
- Implement yet to be identified flood damage reduction and mitigation projects and practices (Flood Damage Reduction and Mitigation Plan;
- Identify willing landowners and begin operation of pilot agriculture BMP research program within 6 years;
- Provide adequate funding for local implementation actions identified in the Washington County Groundwater Plan.

Trout Brook Streambank Stabilization

Additional Information:

Washington County Groundwater Plan
SWWD Greenway Plan
SWWD Wetland Management Plan
SWWD Grey Cloud Slough Restoration Feasibility Study
MDA Pollinators Information
MDA Irrigation Information
LSCWMO O'Conner's Lake and Stream Management Plan
SWWD Powers Lake Modeling Report
SWWD Ravine Lake Modeling Report
SWWD Armstrong, Markgrafs, Wilmes Lakes Modeling Report
LSCWMO Trout Brook Management Plan
SWWD Trout Brook Afton Alps Retrofit Report
SWWD 2018 Lakes Management Plan
SWWD Climate Resiliency Plan
SWWD East Mississippi/Newport Subwatershed Assessment
SWWD Armstrong Lake Subwatershed Assessment
WCD Trout Brook Ravines Subwatershed Assessment

Native Buffer Establishment on Stormwater Pond

PROGRAM: IMPLEMENTATION AND MAINTENANCE

INSPECTION AND MAINTENANCE

Communities rely on public watercourses, both natural and piped, for conveyance of stormwater runoff. Additionally, the District and its partners utilize an increasingly long list of BMPs to meet local resource goals. Conveyance systems and physical BMPs need routine inspection and maintenance to ensure long term functionality. The majority of the District is covered by various MS4 permittees. Responsibility for inspection and maintenance lies with the LGU which owns and operates the system/BMP except where other arrangements have been made through agreement. Washington County is typically responsible for inspection and maintenance of systems in the remaining non-MS4 communities.

PURPOSE: TO HELP ENSURE CONTINUED EFFECTIVENESS OF CONSTRUCTED BEST MANAGEMENT PRACTICES

Through the Washington County Water Consortium, SWWD and its local partners have developed a BMP database and have begun an annual inspection program. Through that effort, SWWD tracks performance and maintenance needs of District BMPs. Necessary maintenance will be addressed through enforcement of agreements/permits or as part of the District's annual operation and maintenance program.

Performance Measures:

- Maintain database of all physical BMPs;
- Inspect BMPs at a minimum of 10, 33, and 66% of expected BMP lifetime;
- Perform maintenance or enforce maintenance agreements as necessary to maintain full resource benefits of BMPs.

Additional Information:

Washington County BMP Database

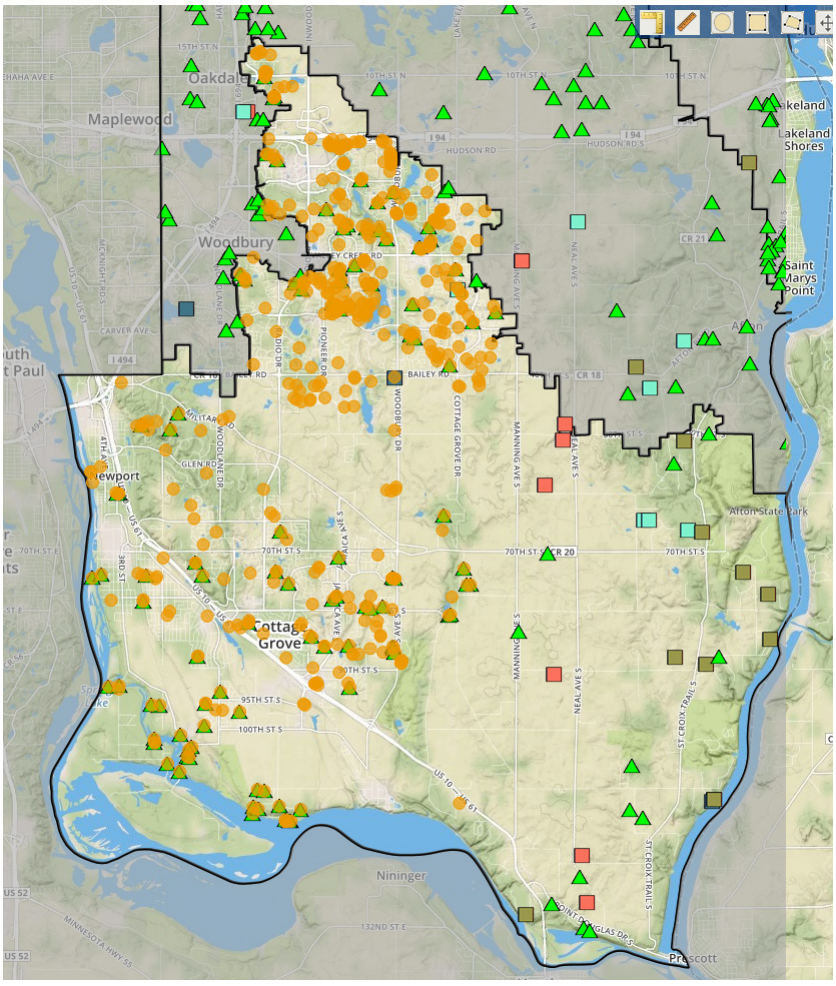


Figure 14: SWWD Best Management Practice (BMP) Database

PROGRAM: IMPLEMENTATION AND MAINTENANCE

CAPITAL IMPROVEMENT

Consistent with MN Rule 8410.0080 subp. 2, SWWD defines Capital Improvement Project (CIP) as a physical improvement with an extended useful life. For the purposes of its CIP Program, the District further defines a CIP as having a lifetime of greater than 25 years and a total project cost greater than $50,000. Generally, projects implemented under the District's CIP are developed and analyzed through completion of a feasibility study. Projects not meeting CIP program criteria are typically implemented through the District's Watershed Restoration, Reconstruction, and Resiliency program. The CIP plan is included as part of the District's long range workplan and includes all CIP projects the District intends to implement between 2017 and 2026. The plan is reviewed biennially and amendments, if necessary, are carried out under State guidelines for general watershed plan amendments.

PURPOSE: TO PROVIDE A MECHANISM TO PLAN FOR AND FUND NECESSARY PHYSICAL IMPROVEMENTS

Stormwater Reuse Intake Pipe Installation

Additional Information:

SWWD Central Draw Overflow Basis of Design Report

SWWD Projects

SWWD Grey Cloud Slough Restoration Feasibility Report

Wilmes Lake Retrofit Analysis

Performance Measures:

- Provide adequate funding to carryout identified capital projects
- Deliver Capital improvements as scheduled in the long-range workplan

Right of Way, Curb Cut Raingardens

PROGRAM: IMPLEMENTATION AND MAINTENANCE

INCENTIVES

Implementation need outpaces the District's implementation capacity. To address that need and gain efficiency by drawing on the capacity of public and private entities in the District, SWWD operates several incentive programs to facilitate implementation by District residents and partners. Those programs are briefly described here. Additional information is available on the SWWD website.

PURPOSE: TO LEVERAGE IMPLEMENTATION CAPACITY OF PUBLIC AND PRIVATE LANDOWNERS OF THE DISTRICT TO FACILITATE RESOURCE PROTECTION AND RESTORATION

GROUNDWATER POLLUTION PREVENTION

Washington County offers several grant or loan programs to incentivize residential protection of groundwater resources (i.e. Well sealing, septic system upgrades). The District does not currently offer similar programs. However, it may supplement existing County efforts through its Watershed Restoration, Reconstruction, and Resiliency Program. Should the District identify a need to implement its own groundwater focused incentive program, this Plan will be amended as necessary.


East Ridge Regional Pond

Additionally, the District provides direct grants to road authorities within the District to upgrade or improve de-icing operations.

COST SHARE

The SWWD Clean Water Cost Share Program offers financial assistance to encourage and enable citizens, municipalities, and businesses to use innovative practices to protect and improve lakes and streams within the district. This program promotes water quality improvement by focusing on the reduction of phosphorus in stormwater runoff. Design assistance is available through SWWD and its partners. Program details and eligibility criteria are established annually by the SWWD Board of Managers following its budgeting process. Current program information is available at http://www.swwdmn.org/programs/water-quality-cost-share-program/. A map based database of projects funded through the program is available at http://map.swwdmn.org/.

SWWD's existing program is effective at targeting suburban landowners. The cost share incentive program will expanded to include funds and criteria necessary to target source reduction in rural areas of the District.

STORMWATER UTILITY FEE CREDITS

The SWWD has set standards for controlling the amount of stormwater runoff volume for new development projects. In addition to this standard, the SWWD supports voluntary efforts to reduce the stormwater runoff volumes leaving a property. By providing a framework to reduce the stormwater utility fee (SUF) for a property based on volume control BMPs, the SWWD provides financial incentive for voluntary efforts to reduce stormwater runoff. SWWD offers SUF credits for BMP retrofitting that reduces annual runoff volume. Likewise, credits are available to new and re-development projects that go beyond current SWWD volume control standards. Current SUF credit program information is available at http://www.swwdmn.org/programs/non-residential-stormwater-utility-fee-program/.

PROGRAM: IMPLEMENTATION AND MAINTENANCE

COORDINATED CAPITAL IMPROVEMENTS

To facilitate actions to improve stormwater management in existing developed areas, the District administers a Coordinated Capital Improvement Program (CCIP) to provide financial assistance to local land use and public works authorities for water quality improvement projects. The goals of the program are to:

- Facilitate local government units within the District to explore water quality improvement opportunities and incorporate those opportunities into routine infrastructure operation and maintenance projects;
- Promote closer collaboration between local units of government and the District on water quality improvement efforts as an element of capital improvement plans;
- Foster stormwater management innovation and create demonstration/education examples;
- Defray local costs in the broader, watershed-wide interest of improving water quality; and
- Improve de-icing operations throughout the District.
- Promote actions to increase resiliency of District resourceds.


Stabilized Ravine at Wilmes Lake

Each year, the Board will set a budget for the following year's program pursuant to the Board's assessment of needs and funding limitations, not to exceed $1,000,000 per year. This is an open process that occurs in August and early September each year, and includes a public hearing at which all parties can review and address the Board of Managers on the District's proposed program budget. The current annual budgeted amount is $500,000. Should demand drive a need for increased funding, this plan and long range work plan will be amended.

Stormwater quality improvements made under the CCIP are more local in nature; however, cumulatively these projects will benefit the watershed as a whole. As improvements are more local, the CCIP program is funded through the collection of stormwater utility fees. Ad valorem levies will not be used to fund the CCIP. Other funding sources such as regional, state or federal grants may be applied to the program if the District is successfully awarded such grants for this purpose. Additional information about the CCIP program including current guidelines and most recent Request for Proposals is available at www.swwdmn.org.

Performance Measures:

- Maintain and refine existing incentive programs to adequately leverage community interest;
- Expand existing cost share program to effectively target rural areas for source reduction within 3 years;
- Annually review District's role in and need for supplementing County groundwater focused cost share and loan programs.

Additional Information:

SWWD Cost Share Program
SWWD CCIP Program
Washington County Groundwater Plan
SWWD Resiliency Plan


Native Planting at Newport Overlook

PROGRAM: INFORMATION AND EDUCATION

PURPOSE: TO EFFICIENTLY INFORM AND EDUCATE DISTRICT RESIDENTS AND STAKEHOLDERS

EDUCATION

SWWD is a member of the East Metro Water Resource Education Program. EMWREP is a partnership formed in 2006 that serves 20 local units of government in the east metro area. The purpose of the shared education program is to provide education to District communities and their residents about the impacts of non-point source pollution (e.g. Nutrients, de-icing chemicals) on local lakes, rivers, streams, wetlands and groundwater resources and to engage them in projects that will help to protect and improve water quality in the region. In 2012, the Minnesota Association of Watershed Districts recognized EMWREP as its Program of the Year.

Most District education efforts are implemented through EMWREP programming. Additional, smaller efforts are occasionally undertaken directly by SWWD staff. All education programming is funded through District levy funds.

INFORMATION

SWWD intends for this plan and its website to serve as a repository of water resource related information relevant to resources of the District. As such, we have incorporated known, relevant references into this plan with live links to the website or document and will modify the plan to include new references as they are developed or identified. Additionally, the District's website includes several tools which serve to deliver information to District residents and stakeholders including:

EMWREP Workshop

EMWREP Promotional Material

- Resource Library: This resource houses all District resources, including meeting agendas and minutes, guidance documents, lake management plans, monitoring reports, annual reports, etc.
- Water Quality Monitoring Database: This resource holds all of the District's surface water quality monitoring data and provides basic graphical and statistical functions. It also serves as a portal to download District water quality data.
- Web Viewer: This resource houses basic District geographical data and provides several basic mapping and ID functions.
- Story Maps: These resources provide additional information about District projects including photos and interactive maps.

PROGRAM: INFORMATION AND EDUCATION

Finally, in an effort to standardize the methods and procedures for evaluating hydrological impacts from development and land use changes, SWWD has established standard hydrological modeling specifications and is developing XPSWMM hydrological models covering the entire District. The models and specifications are available in the District's modeling library upon request.

Performance Measures:

- Continue support of and participation in EMWREP;
- Increase use of Website and Web Tools;
- Annually update story mapping as part of annual report to reflect current project status;
- Annually update water quality database to include previous year's data;
- Annually update web viewer to reflect most recent spatial data;
- Distribute semi-annual newsletter to District residents and stakeholders regarding District efforts and progress in addressing identified resource issues.
- Maintain up to date files on electronic library;
- Establish standard modelling specifications within 3 years;

Additional Information:

East Metro Water Resources Education Partnership

SWWD Resource Library

SWWD Web Viewer

SWWD Water Quality Database

SWWD Projects

PROGRAM: ADMINISTRATION

BOUNDARY

The current legal boundary of the SWWD is shown on Figure 1 and is available on the SWWD web viewer. Procedures for adjusting the legal boundary were established with the consolidation of the SWWD and the East Mississippi Watershed Management Organization. Legal descriptions of watershed boundaries are cumbersome to develop and adjust. Instead, the SWWD uses geospatial data established within Geographic Information System (GIS) to convey the legal boundary. Washington County upholds this established process for adjusting watershed legal boundaries. The SWWD annually reviews parcel data to verify existing properties and identify any necessary boundary change. Necessary changes are made through petition to BWSR.

At times projects are proposed or issues occur within the legal boundary of the SWWD, but are outside of the hydrologic drainage area. These projects are approached on a case-by-case basis. Typically, the SWWD will assume the lead role on projects or issues which are within the legal boundary. Generally, the SWWD will coordinate with the appropriate adjacent watershed entity to ensure effective administration and project oversight.

FUNDING

SWWD collects revenue through two primary sources authorized under MN Statues—ad valorem levy and water management district fees or stormwater utility fees. SWWD also collects fees for permit reviews; however those fees are limited and used only to support the review. Rates are set annually by the Board.

Ad valorem levy revenues are used to support District-wide programs and administrative and operational expenses as authorized under MN Statutes 103B.241 and 103D.905. The District strives to maintain low administrative costs by developing partnerships with other agencies and participating in shared services opportunities.

Stormwater Utility Fees are used to support District projects as authorized under MN Statutes 103D.729 and 444.075.

A stormwater utility fee is a property charge based on stormwater characteristics for a type of land use. The SWWD calculates the fee based on computed runoff volumes for a typical single family residential property. The computed runoff volume defines a unitless Residential Equivalency Factor (REF). The REF values are assigned to individual parcels based on their computed runoff volumes compared to a typical single family residential property. Fees are established and collected by water management districts and expended only for projects within the management district the revenue originates. SWWD currently includes three water management districts (web viewer). The South Washington and East Mississippi management districts were established in 2002 and 2003, respectively, as described in the 2007 WMP. The Lower St. Croix management district was established in 2011. This plan maintains those management districts.

SWWD's past Watershed Management Plan established criteria for subwatershed financing of projects which further allocated project costs to individual subwatersheds within a defined management district. Subwatershed financing is being used for implementation of the District's Central Draw Overflow project (CDO). For that project, the District's Northern Watershed is responsible for 75% of the project cost while the remaining 25% is shared by the management District as a whole. Subwatershed financing is only used for costs related to the CDO.

When planned capital projects require funding beyond the capacity of annual District revenues, the District may issue bonds to fund the project in order to maintain consistent stormwater utility fee rates for its residents. Alternatively, the District prefers to accumulate funds in lieu of bonding as authorized under MN Statutes 103B.241 when possible. Included in the Long Range Workplan are funds necessary to pay down two previous bond issues. One related to land purchase as part of the Central Draw Storage Facility and Overflow project and the second for capital projects in the East Mississippi management area.

Anticipated funding needs through the life of this plan are identified in the Long Range Workplan. Annual budgeting and corresponding Levy and Utility Fees are established through a process beginning in June of each preceding year. The budgeting process occurs during regular public meetings of the District's Board of Managers.

PROGRAM: ADMINISTRATION

Municipality	~~Expected~~ LWMP Update	Local Controls Update
Afton	~~2018~~2019	2019
Cottage Grove	~~2018~~2019	2019
Denmark TWP	~~2018~~2019	2019
Grey Cloud Island Twp	2018	2019
Hastings	2018	2019
Lake Elmo	~~2018~~2019	2019
Newport	2018	2019
Oakdale	~~2018~~2019	2019
St. Paul Park	2018	2019
Woodbury	~~2018~~2019	2019

Figure 15: Municipal LWMP update schedule

LOCAL WATER PLANS

Upon completion and adoption of this Plan and amendments each municipality must amend an existing Local Water Management Plan (LWMP) to conform to the requirements of this Plan or prepare a new LWMP which is in conformance. Any or all of this plan may adopted by reference within a LWMP. The LWMP must include all requirements of this Plan, MN Rule 8410.0160 and MN Statutes 103B.235, and should also address elements recommend by the Metropolitan Council in Appendix C-2 of its 2040 Water Resources Policy Plan. The LWMP must be adopted within two years of the adoption of this plan, but not more than two years before the Municipality's Comprehensive Plan is due. Figure 15 will be updated to reflect status of municipal LWMPs and official controls following adoption of this Plan.

As required in MN Rule 8410.0160 subpart 3, local controls must be enacted within six months of LWMP approval. Those local controls must reflect SWWD Rules. Following adoption of this plan or amendment and prior to update of municipal local controls, SWWD will exercise its full permitting authority for development and redevelopment projects within that municipality. Following adoption of conforming local controls, SWWD will no longer issue separate permits unless specified by municipal LWMP (Lake Elmo). The District will, however, evaluate municipal permitting procedures through a routine audit process described in SWWD Rules.

Local Water Management Plans must include a mechanism for quantifying and evaluating progress of its implementation plan and amending that plan as necessary. Upon adoption of the LWMP, Municipalities must report the results of their progress evaluation annually and within 120 days of the end of the calendar year. The report must be readily available on the municipal website.

Additionally, SWWD's specific expectations for LWMP include the following:

- Participation in District planning efforts through the District's Technical Advisory Committee;
- Adopt and enforce controls consistent with this plan and District Rules in addition to State buffer and shoreland requirements;
- Develop and implement a construction site erosion and sediment control program, including identification of staff positions responsible for implementing the program;
- Develop and implement a Best Management Practice inspection and maintenance program;
- Coordinate planned Capital Improvements with the District to incorporate identified improvements; and
- Develop and utilize a mechanism for evaluating and reporting progress under the LWMP.

Should Municipalities be found to be non-implementing based on annual reports, SWWD will compel action

PROGRAM: ADMINISTRATION

through administrative or legal action.

REPORTING AND PROGRESS EVALUATION

Consistent with MN Rule 8410.0080 subpart 1, SWWD completes:

- An annual activity report for the previous year and updated workplan for the current year within 120 days of the end of the calendar year. The content of the annual activity report is specified in MN Rule 8410.0150.

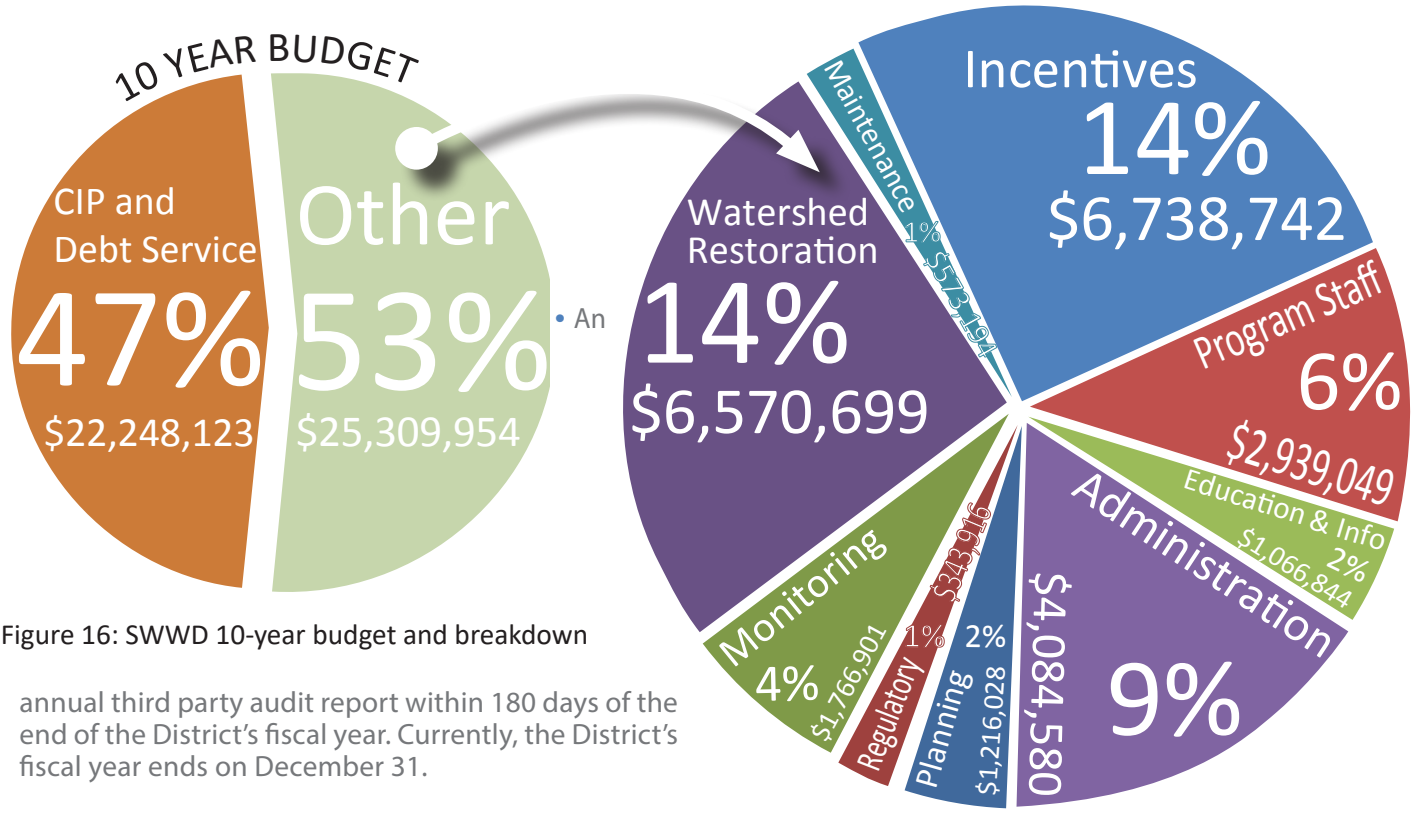


Figure 16: SWWD 10-year budget and breakdown

- An annual third party audit report within 180 days of the end of the District's fiscal year. Currently, the District's fiscal year ends on December 31.

- Presentation to the City or Council or Planning Commission of each Municipality within the District to discuss the annual activity report

As part of its annual reporting, the District evaluates performance of programs and progress toward meeting goals through implementation indicators established in this Plan and adopted guidance documents. Results of that evaluation, budget history, and current year workplan are all included in the annual report. That evaluation is then reviewed by the SWWD Board of Managers and Citizen Advisory Committee. Should lack of progress, or changing conditions require it, a plan amendment will be initiated upon consultation with the District's advisory committees. A sample of the evaluation form to be used is included in Appendix B of this Plan.

LONG RANGE WORKPLAN

The Long Range Workplan is reviewed annually by the SWWD Board of Managers in consultation with the SWWD Citizens Advisory Committee and with input from communities within the District. The workplan reflects priority issues of the District as identified in Part II of this plan and prioritizes implementation based on available resources. Priority 1 indicates implementation during years 1-3 of the plan, priority 2 indicates implementation during years 4-6 of the plan, and priority 3 indicates implementation during

PROGRAM: ADMINISTRATION

years 7-10 of the plan. Current priorities were established by the District Board based on available funding and status of current efforts. Priorities were presented to the District TAC and CAC for concurrence. Prioritization may change with additional information, coordination of local implementation efforts, or availability of outside funds.

The workplan is organized by District programs and administrative costs. The District's Capital Improvement Program currently makes up the largest portion of the District's planned expenditures over the next decade. That reflects the implementation of the District's Central Draw Storage Facility and Overflow project. Implementation of the that project will primarily use fund balance. Year to year budgeting is expected to grow at a 3% rate from today's budget of ~$3,000,000 which in turn is expected to maintain a flat or negative tax impact on District landowners.

Performance Measures:

- Annually, evaluate District progress in achieving identified issue goals and effectiveness of District programs;
- Maintain funding levels adequate to meet implementation demand of the District;
- In partnership with neighboring Districts, maintain legal boundary that reflects SWWD's hydrological boundary.

LONG RANGE WORKPLAN

Management Fund	Sub Fund	Activity	Funding Source	Priority	Grant Funds Necessary	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Estimated 10 year Total
			LEVY			$ 957,750	$ 1,096,068	$ 1,180,675	$ 1,656,895	$ 2,444,027	$ 1,475,147	$ 1,531,602	$ 1,571,100	$ 1,611,783	$ 1,653,686	$ 15,178,732
			SUF			$ 8,490,000	$ 7,832,250	$ 5,850,168	$ 2,008,173	$ 2,763,368	$ 1,318,719	$ 1,814,230	$ 1,794,907	$ 1,525,754	$ 1,531,777	$ 34,929,345
			TOTAL			$ 9,447,750	$ 8,928,318	$ 7,030,842	$ 3,665,067	$ 5,207,394	$ 2,793,866	$ 3,345,832	$ 3,366,007	$ 3,137,537	$ 3,185,463	$ 50,108,077
Programs																
Planning		*All actions identified as part of the Planning Program in Part III of the WMP. Includes costs for outside services and SWWD staff. Staff costs include staff support for all actions listed and completion of necessary WMP amendments. Click on each action to be directed to relevant section of the WMP.*														
	Surface Water															
		Modeling														
		• SWW	SUF	1	N	$ 15,000	$ 15,450	$ 15,914	$ 16,391	$ 16,883	$ 17,389	$ 17,911	$ 18,448	$ 19,002	$ 19,572	$ 171,958
		• EMW	SUF	1	N	$ 20,000	$ 35,000	$ 25,000	$ 10,000	$ 10,300	$ 10,609	$ 10,927	$ 11,255	$ 11,593	$ 11,941	$ 156,625
		• LSC	SUF	2	N	$ 20,000	$ 50,000	$ 75,000	$ 10,000	$ 10,300	$ 10,609	$ 10,927	$ 11,255	$ 11,593	$ 11,941	$ 221,625
		Resource Management Plans	SUF	1	N	$ 20,000	$ 30,300	$ 31,209	$ 32,145	$ 33,110	$ 34,103	$ 35,126	$ 36,180	$ 37,265	$ 38,383	$ 327,821
		Climate Adaptation Plan	SUF	2	N	$ -	$ -	$ -	$ 35,000	$ 35,000	$ 35,000	$ -	$ -	$ -	$ -	$ 105,000
		Flood Damage Response and Mitigation Plan	LEVY	2	N	$ -	$ -	$ -	$ 15,000	$ 15,000	$ 15,000	$ -	$ -	$ -	$ -	$ 45,000
	Groundwater															
		Modeling	LEVY	1	N	$ -	$ 22,500	$ 22,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 45,000
		Strategic Assessment Plan	LEVY	1	N	$ -	$ 7,500	$ 7,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 15,000
		Strategic Regulatory Coordination/Plan	LEVY	1	N	$ -	$ 4,000	$ 4,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 8,000
	Natural Resources															
		Greenway Plan	LEVY	1	N	$ 8,000	$ 11,000	$ 11,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 30,000
		Wetland Inventory	LEVY	1	N	$ -	$ 25,000	$ 25,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	
		Ravine Inventory	LEVY	1	N	$ 12,500	$ 17,500	$ 15,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 45,000
		Aquatic Habitat Restoration Plan	LEVY	2	N	$ -	$ -	$ -	$ 15,000	$ 15,000	$ 15,000	$ -	$ -	$ -		$ 45,000
	SWWD Planning Staff		LEVY		N	$ 33,725	$ 34,737	$ 35,779	$ 55,852	$ 57,528	$ 59,254	$ 61,031	$ 62,862	$ 64,748	$ 66,690	$ 532,206
Regulatory		*All actions identified as part of the Regulatory Program in Part III of this WMP. Includes costs for outside services (consultants, WCD technical services) in support of regulatory programs and SWWD staff costs. Click on each action to be directed to relevant section of the WMP.*														
	Outside Services		LEVY		N	$ 30,000	$ 30,900	$ 31,827	$ 32,782	$ 33,765	$ 34,778	$ 35,822	$ 36,896	$ 38,003	$ 39,143	$ 343,916
	SWWD Regulatory Staff		LEVY		N	$ 14,250	$ 14,678	$ 15,118	$ 15,571	$ 16,039	$ 16,520	$ 17,015	$ 17,526	$ 18,051	$ 18,593	$ 163,360
Implementation and Maintenance		*All actions identified as part of the Implementation and Maintenance Program in Part III of this WMP. Includes District funding for all on the ground projects implemented or supported by the District. Click on each action to be directed to relevant section of the WMP.*														
	Monitoring		LEVY		N	$ 155,000	$ 159,650	$ 164,440	$ 169,373	$ 174,454	$ 179,687	$ 185,078	$ 190,630	$ 196,349	$ 202,240	$ 1,776,901
	Watershed Restoration, Reconstruction, and Resiliency															
		Implement Resource Management Plans and Retrofit BMPs														
		• Colby	SUF	1	N	$ 50,000	$ 50,000	$ 50,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 150,000
		• Wilmes	SUF	1	Y	$ 300,000	$ 300,000	$ 300,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 900,000
		• Powers	SUF	1	N	$ 50,000	$ 50,000	$ 50,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 150,000
		• Markgrafs	SUF	2	N	$ -	$ -	$ -	$ 75,000	$ 75,000	$ 25,000	$ 25,000	$ -	$ -	$ -	$ 200,000
		• Armstrong	SUF	2	N	$ -	$ -	$ -	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ -	$ -	$ 125,000
		• Ravine	SUF	3	N	$ -	$ -	$ -	$ -	$ -	$ -	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 100,000
		• Miss River	SUF	2	Y	$ -	$ -	$ -	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ -	$ -	$ 1,250,000
		• St. Croix River	SUF	3	Y	$ -	$ -	$ -	$ -	$ -	$ -	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 1,000,000
		Agriculture BMP Pilots	LEVY	2	N	$ -	$ -	$ -	$ 50,000	$ 51,500	$ 53,045	$ 54,636	$ 56,275	$ 57,964	$ 59,703	$ 383,123

LONG RANGE WORKPLAN

Management Fund	Sub Fund	Activity	Funding Source	Priority	Grant Funds Necessary	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Estimated 10 year Total
		Climate Resiliency	SUF	3	Y	$ -	$ -	$ -	$ -	$ -	$ -	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 1,000,000
		Habitat														
		• Greenway	LEVY	2	Y	$ -	$ -	$ -	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 700,000
		• Buffers	LEVY	3	N							$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 100,000
		• Ravine Stabilization	LEVY	2	N	$ -	$ -	$ -	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,750	$ 26,523	$ 27,318	$ 179,591
		• AIS	LEVY	3								$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 40,000
		• In-Lake/in-stream	LEVY	2		$ -	$ -	$ -	$ 25,000	$ 25,750	$ 26,523	$ 27,318	$ 28,138	$ 28,982	$ 29,851	$ 191,562
		Flood Damage Reduction and Mitigation	LEVY	1	N	$ 5,000	$ 7,500	$ 10,000	$ 10,300	$ 10,609	$ 10,927	$ 11,255	$ 11,593	$ 11,941	$ 12,299	$ 101,423
	Inspection and Maintenance		SUF	1	N	$ 50,000	$ 51,500	$ 53,045	$ 54,636	$ 56,275	$ 57,964	$ 59,703	$ 61,494	$ 63,339	$ 65,239	$ 573,194
	CIP															
		Central Draw Overflow		1												$ -
		• Phase I	SUF	COMPLETE		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		• Phase II	SUF	COMPLETE		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
		• Phase III	SUF		N	$ 2,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,000,000
		• Phase IV	SUF		N	$ 1,500,000	$ 250,000	$ 250,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,000,000
		• Phase V	SUF		N	$ 150,000	$ 3,250,000	$ 3,250,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 6,650,000
		• Regional Pond Improvements	SUF		N	$ 2,000,000	$ 2,000,000	$ 1,000,000	$ 50,000	$ 51,500	$ 53,045	$ 54,636	$ 56,275	$ 57,964	$ 59,703	$ 5,383,123
		• Event Response	SUF		N	$ -	$ -	$ -	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 350,000
		Learning Center	LEVY	2	Y	$ -	$ -	$ -	$ 250,000	$ 1,000,000	$ -	$ -	$ -	$ -	$ -	$ 1,250,000
		Grey Cloud Restoration	SUF	1	Y	$ 150,000	$ 150,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 300,000
		Trout Brook Restoration		1												$ -
		• Phase I	SUF		Y	$ 350,000	$ 350,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 700,000
		• Phase II	SUF		Y	$ -	$ -	$ -	$ 400,000	$ 400,000	$ -	$ -	$ -	$ -	$ -	$ 800,000
		Wilmes Lake Commercial Retrofit	SUF	1	Y	$ 500,000	$ 500,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,000,000
	Incentives															
		Groundwater Pollution Prevention	LEVY	2	N	$ 5,000	$ 7,500	$ 10,000	$ 12,500	$ 15,000	$ 15,450	$ 15,914	$ 16,391	$ 16,883	$ 17,389	$ 132,026
		Cost Share	LEVY	1	N	$ 105,000	$ 127,250	$ 154,568	$ 159,205	$ 163,981	$ 168,900	$ 173,967	$ 179,186	$ 184,562	$ 190,099	$ 1,606,716
		CCIP	SUF	1	N	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 5,000,000
	SWWD Implementation and Maintenance Staff	SWWD Staffing Support for all Implementation and Maintenance Programs	LEVY	1	N	$ 158,175	$ 162,920	$ 167,808	$ 187,092	$ 192,705	$ 198,486	$ 218,691	$ 225,251	$ 232,009	$ 238,969	$ 1,982,106
Education & Information	*All actions identified as part of the Education and Information Program in Part III of this WMP. Includes funding for EMWREP, collaborative research efforts, development and maintenance of the District website and tools, and SWWD staff costs. Click on each action to be directed to relevant section of the WMP.*															
	Education															$ -
		EMWREP	LEVY	1	N	$ 32,000	$ 32,960	$ 33,949	$ 34,967	$ 36,016	$ 37,097	$ 38,210	$ 39,356	$ 40,537	$ 41,753	$ 366,844
		Experiential Programs	LEVY	2	N	$ -	$ -	$ -	$ 15,000	$ 15,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 80,000
	Information															$ -
		Research	LEVY	1	N	$ 10,000	$ 25,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 435,000
		Website/Databases	LEVY	1	N	$ 10,000	$ 15,000	$ 20,000	$ 20,000	$ 20,000	$ 20,000	$ 20,000	$ 20,000	$ 20,000	$ 20,000	$ 185,000
	SWWD Education and Information Staff	SWWD Staffing Support for all Education and Information Programs	LEVY	1	N	$ 22,800	$ 23,484	$ 24,189	$ 24,914	$ 25,662	$ 26,431	$ 27,224	$ 28,041	$ 28,882	$ 29,749	$ 261,376
Administration	*All operational expenses associated with running the organization, debt service from issued bonds, and SWWD administrative staff costs.*															
	Manager Expenses		LEVY	1	N	$ 28,500	$ 29,355	$ 30,236	$ 31,143	$ 32,077	$ 33,039	$ 34,030	$ 35,051	$ 36,103	$ 37,186	$ 326,721
	Staff Expenses		LEVY	1	N	$ 12,000	$ 12,360	$ 12,731	$ 13,113	$ 13,506	$ 13,911	$ 14,329	$ 14,758	$ 15,201	$ 15,657	$ 137,567
	Office		LEVY	1	N	$ 33,437	$ 34,440	$ 35,473	$ 36,538	$ 37,634	$ 38,763	$ 39,926	$ 41,123	$ 42,357	$ 43,628	$ 383,318
	Insurance		LEVY	1	N	$ 29,000	$ 29,870	$ 30,766	$ 31,689	$ 32,640	$ 33,619	$ 34,628	$ 35,666	$ 36,736	$ 37,838	$ 332,453
	Outside Services		LEVY	1	N	$ 39,850	$ 41,046	$ 42,277	$ 43,545	$ 44,852	$ 46,197	$ 47,583	$ 49,010	$ 50,481	$ 51,995	$ 456,836
	Training		LEVY	1	N	$ 8,000	$ 8,240	$ 8,487	$ 8,742	$ 9,004	$ 9,274	$ 9,552	$ 9,839	$ 10,134	$ 10,438	$ 91,711
	Equipment		LEVY	1	N	$ 11,330	$ 11,670	$ 12,020	$ 12,381	$ 12,752	$ 13,135	$ 13,529	$ 13,934	$ 14,353	$ 14,783	$ 129,886
	Debt Service		SUF	1	N	$ 815,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 3,065,000
	SWWD Administrative		LEVY	1	N	$ 194,183	$ 200,008	$ 206,009	$ 212,189	$ 218,555	$ 225,111	$ 231,865	$ 238,821	$ 245,985	$ 253,365	$ 2,226,090

APPENDICES:

1. ISSUE AND GOAL IDENTIFICATION + PLAN DEVELOPMENT PROCESS
2. PROGRESS EVALUATION FORM
3. BIBLIOGRAPHY
4. GLOSSARY

ISSUE AND GOAL IDENTIFICATION AND PLAN DEVELOPMENT PROCESS

SWWD identified issues and goals included in its Watershed Management Plan (Plan) in accordance with MN Rule 8410.0045 (Issue Identification and Assessment) and 8410.0080 (Establishment of Goals). SWWD's update process began with a Board Workshop in 2013 to discuss the status of its 2007 Plan as well as several changing and emerging issues. Building on that workshop and with revision to MN Rule 8410 complete and completion of a performance evaluation by the State, SWWD decided to undertake a plan update.

As required by MN Rule 8410.0045, subparts 3 and 4, SWWD notified State review agencies, Washington County, Washington Conservation District, and Municipalities within the District of its intent to undertake a plan update and requesting input on issues and goals on January 12, 2015. Concurrently, as required by MN Rule 8410.0045, subpart 2, the District was re-forming its Citizen's Advisory Committee (CAC) and Technical Advisory Committee (TAC). The CAC, consisting of District residents from throughout the District met on April 7, 2015 to discuss the update process, role of the CAC, and provide a forum for members to raise issues. A second CAC was held May 28, 2015 to discuss issues and preliminary goals based on review of the 2007 Plan and input received from agencies and municipalities. The TAC, consisting of Agency and City staff, met for the first time on May 28, 2015 to discuss the role of the TAC and input received following agency notification of the plan update process.

Subsequently, the District held an initial planning meeting on June 23, 2015 as required by MN Rule 8410.0045, subpart 5 to discuss input received following agency notification and from the initial CAC and TAC meetings. Draft goals based on identified issues were prepared prior to the meeting for Board discussion. Based on Board direction, staff completed Part II, issues and goals of this plan and drafted Part III, Programs. The plan was reviewed at a second Board planning meeting on October 13, 2015 to review Draft plan sections, including long range workplan. With Board direction, Staff completed a full Draft plan.

A second TAC meeting was held November 5, 2015 to discuss the finalized Part II and draft Part III. TAC members provided extensive direction to better coordinate District efforts with those at Cities and agencies. A third CAC meeting was held November 16, 2015 to discuss the full Draft plan. Consensus of the CAC was that the District had prepared a valuable plan update that would be useful to the District, its Cities, and residents going forward.

Following the November CAC and TAC meetings, District staff completed work on a revised Draft plan. That revised Draft plan was sent to all State and local review agencies for a 60 day informal stakeholder review period from January 5, 2016 to March 4, 2016. Based on comments received during the informal stakeholder review, the District determined that additional advisory committee meetings were unnecessary. The District then revised the plan, launched an updated website to coordinate and complement the draft plan and submitted the plan for 60 day review under MN Statute 103b.231, subpart 7.

The 60 day review extended from April 14, 2016 to June 17, 2016. Following the 60 day review period, the District prepared and distributed a response to comments on June 28, 2016. The SWWD Board held a public hearing at its July meeting to receive additional public comment on the plan. That hearing was held open through the August 8 Board meeting. No additional comment was received during the public hearing.

Following the close of the public hearing, District Staff finalized edits to the plan as indicated on the response to comments and submitted the plan for 90 day review as directed by the Board under SWWD resolution 2016-009 and as required by MN Statute 103B.231, subpart 9.

Issue Category	Issue	ID Source	Goals	Implementation Indicators	Implementation Programs	Status
Flooding						
Flood Damage Reduction and Mitigation			Minimize existing and future potential damage to property, public safety, and water resources due to flood events.			
	Wilmes Flooding	Woodbury, Past WMPs, Met Council		No increase in Wilmes HWL from development	Implementation & Maintenance, Regulatory	Flood-proofing program complete, regulatory ongoing
	ID and protect key flood storage	2007 WMP		Complete/Update inventory within 3 years; no net loss	Planning, Information, Regulatory	ID complete in SWW, still needed in EM and LSC regulatory ongoing
	Flooding Emergency Response Plan	2007 WMP		Complete within 6 years	Planning	Not Started
	ID critical inter-community flow crossings, set max rates, assess existing flow rates + enforcement	2007 WMP		Review/update within 3 years; implement necessary reductions with development	Planning, Information, Regulatory	ID complete; regulatory ongoing
	Mississippi River Flood Damage Reduction/Mitigation	Washington County, Municipalities		Maintain programmatic flexibility to respond if necessary	Planning, Implementation & Maintenance	Ongoing
	Clear Channel Pond Construction	2007 WMP, St Paul Park, Cottage Grove, MnDOT		Implement remaining portions of project as site develops	Implementation & Maintenance	Stalled
	O'Conners Lake Levels/Flooding	LSCWMO		Maintain current HWL	Planning, Regulatory	Ongoing
Overflow		Municipalities, past WMPs, Guidance Docs, Washington County, Met Council	Operational by 2020	Phase III complete by 2017; Phase IV complete by 2018; Phase V complete by 1/1/2020	Planning, Implementation & Maintenance	Phase II of V in construction
Watershed Alterations						
Surface water degradation and impairment			Protection and restoration of District resources to meet local resource goals and State standards			
	Impairment Source ID	2007 WMP		Complete management plan for all lakes/streams within 6 years; re-assess plans completed plans every 3 years to adjust strategy	Planning	Complete for waters fully within District; pending TMDLs for Big Rivers
	Protection of Resources	2007 WMP		Complete management plan for all lakes/streams	Planning, Regulatory, Implementation &	Ongoing

			within 6 years; re-assess plans completed plans every 3 years to adjust strategy; prevent new impairment listings	Maintenance	
	Restoration of Resources	2007 WMP; Met Council; MnDNR	Achieve identified watershed load reductions from completed management plans; Continue various implementation programs; ultimately de-list; Coordinate CIP with Cities through TAC	Planning, Regulatory, Implementation & Maintenance	Ongoing
	Protect high quality wetlands	2007 WMP; BWSR/WCA	No net loss in acreage or functions	Regulatory	ID complete, no efforts yet specific to protection
	Maintain WQ in landlocked basins	2007 WMP; LSCWMO	No new impairments (incl Powers, La, and OConners)	Regulatory, Implementation & Maintenance	Ongoing
	Regional TMDLs (Big Rivers)	2007 WMP, MPCA	Consider adoption of completed TMDLs for Statewide and Regional resources for which actions are identified for SWWD	Planning, Regulatory, Implementation & Maintenance	Participation in development ongoing, none finalized
	Trout Brook Remeander	LSCWMO, 2007 WMO, TB Mgmt Plan; MnDNR	Move to work plan		30% design complete, fundraising
	Trout Brook Riparian Restoration	LSCWMO, 2007 WMO, TB Mgmt Plan	Move to work plan		Ongoing
	Trout Brook Watershed Restoration	LSCWMO, 2007 WMO, TB Mgmt Plan	Move to work plan		Ongoing
	Grey Cloud Flow Restoration	2007 WMP, DNR, NPS, USFWS, USACE, GCIT	Move to work plan		Ready for final design
	Lions Park Retrofit, St Paul Park	St. Paul Park	Move to work plan		Not started
	Agriculture—little regulation, impacts from water use, fertilizer migration to ground and surface water, soil loss, etc	CAC	Develop incentive program for BMP implementation on ag lands within 3 years; Identify willing landowners and begin pilot ag BMP research program within 6 years	Planning, Implementation & Maintenance	Not Started

	Chlorides	TAC		Implement actions from Metro Chloride TMDL; Continue incentives to improve de-icing operations; Implement educational efforts to reduce salt use on private property	Planning, Implementation & Maintenance	Ongoing
	Emerging Contaminants	TAC		Evaluate impact of emerging contaminants and identify District programs or actions to control or mitigate risk	Planning, Implementation & Maintenance	Not Started
Bluff, Streambank, and Shoreland Erosion						
	State Buffer Initiative—WDs to Enforce	MnDNR		Develop reg measures to comply with State Reqs	Regulatory	New
	Bluff and Ravine erosion	LSCWMO, 2007 WMP; MnDNR; CAC		Establish and maintain 50' buffer on all bluffs, ravines, lakes, and streams; ID excessively eroding features within 3 years; Stabilize within 10 years	Planning, Regulatory, Implementation & Maintenance	Bluff rule in place needs to be expanded, no proactive efforts to date
	Ravine Park East Tributary Stabilization	Met Council		None. Should be addressed by Washington Co Park master plan	Washington County actions likely eligible for SWWD assistance through incentive programs	New
GW Sustainability						
Supply (mining and conservation)			Implement conservation efforts to ensure long term viability of groundwater resources in South Washington County.			
	ID and preserve optimal infiltration areas	2007 WMP; WashCo; MnDNR				Complete
	Assess temporal significance of recharge	2007 WMP, WashCo; MnDNR				Complete
	Implement actions identified in regional planning efforts	MnDNR, WashCo		Implement local action items	Planning, Implementation & Maintenance	Not Started
	Promote sustainable withdrawals to prevent groundwater mining	2007 WMP, WashCo, Met Counicl, MnDNR		Needs to MnDNR or WashCo lead. Will assist if needed		Not Started
	Permitting small users (Potential role of WDs)	MnDNR, WashCo		WD role?		Authority not currently

						used by SWWD
	Promote conservation	WashCo, MnDNR		Incentivize practices that reduce water demand on aquifers	Planning, Implementation & Maintenance	Ongoing
Protection			Prevent impacts to groundwater from District projects and public opperations.			
	ID/Inventory Karst Features	2007 WMP, LSCWMO		Continue enforcement of existing Karst rules	Regulatory	Ongoing
	Prevent Pollution	WashCo; MDH; Municipalities		Consider of pollution potential in siting and design of BMPs; Continue to work with agencies to improve de-icing operations	Planning, Implementation & Maintenance	Ongoing
	Lake Elmo/Oakdale Special Well Construction Area	MDH, DNR, 2007 WMP		Use alternative compliance for infiltration	Planning, Regulatory	Ongoing
	SW/GW Interactions	WashCo; Met Council		Work with partners to assess risk to groundwater resources from known interactions (and vice versa); Implement increased protections where appropriate	Planning	ID Complete—WashCo; What to do with it?
	Research: Regional Infiltration, Impacts to streams from withdrawals	WashCo; MDH; MPCA		Continue work with partners to assess potential impacts (positive and negative) of regional infiltration at CDSF on groundwater; Work with DNR and WashCo to identify resource risks from additional groundwater appropriation	Planning	Ongoing
Natural Resources						
Habitat			Protect, restore, and reconstruct native terrestrial and aquatic habitat for the benefit of resource management.			
	Aquatic Invasive Species	MnDNR; WashCo		Participate in development of regional programs prevention and control	Planning	Not Started

Terrestrial Invasives (i.e. buckthorn)	MnDNR		Participate in development of regional programs prevention and control	Planning	Not Started
	Protect rare species	MnDNR		Avoid impacts from District funded projects	Implementation & Maintenance	Not started
Implement in-Lake Management	SWWD Lake Mgmt Plans; MnDNR		Survey aquatic veg every 3 years; implement actions in adopted management plans	Planning, Implementation & Maintenance	Ongoing
	Protect and Restore high quality habitats	2007 WMP		Avoid impacts from District funded projects	Regulatory (buffers), Implementation & Maintenance	Ongoing
ID areas with potential for protection, restoration, or that could be incorporated into state wildlife areas	2007 WMP		ID within 6 years, incorporate into greenway plan where feasible	Planning	Not Started
	Avoid encroachment of development on high quality habitats	2007 WMP, WashCo		Avoid impacts from District funded projects	Regulatory (buffers), Implementation & Maintenance	Not started
Promote use of site appropriate plants	MnDNR		Promote use of site appropriate plants on District funded projects	Implementation & Maintenance	Ongoing (district projects)
	Pollinators	CAC		Promote compliance with guidance for pollinator friendly design practices as part of District funded projects; Consider preservation and restoration of native habitat and benefits to pollinators in allocating incentive funding.	Implementation & Maintenance	Not Started
Promote establishment of grassland over turf	MnDNR		Develop credit mechanism to incentivize native cover over turf within 6 years.	Regulatory	Ongoing
	Help minimize conversion of native forestland	MnDNR		Develop credit mechanism to incentivize preservation of mature trees during development within 6 years.	Regulatory	Not started
Tree Inventory	MnDNR		N/A	N/A	Municipal Role

	Greenway ID and Implementation—preserve and connect open spaces necessary for conveyance of water and protection of water quality	2003 & 2007 WMP; MnDNR		Implement incentives program and buffer regs to established planned greenway	Planning, Regulatory, Implementation & Maintenance	CDO portions complete, rest not started
Climate Change						
Adaptive Management			Facilitate increasing resilience of District resources and public infrastructure through development of information and strategies and implementation of accepted climate adaptation practices			
	Assess and manage risks of changing climate			Assess adaptive capacity of District resources and systems in developing projects; require use of up to date hydrologic data for meeting District standards	Planning, Regulatory	Ongoing (regs)
	Work with Cities to plan for changing climate and implement improvements to increase resilience	CAC		Utilize District models and predicted scenarios to identify infrastructure vulnerabilities within 6 years; Utilize CCIP to assist Cities in increasing system resiliency	Planning, Implementation & Maintenance	Ongoing
	Assess changing risks to groundwater—quantity and quality—from changing climate (increased demand, changing interactions with surface water)	CAC		Utilize District and County models to evaluate potential changes in Surface water/groundwater interactions dynamics; Promote use of alternative landscapes which require less water; promote water re-use where feasible to reduce aquifer demand	Planning, Implementation & Maintenance	Not started
Information and Education						
Information	Resource Assesment		Operate a monitoring program adequate to establish baseline conditions and identify long term trends; Operate a program adequate to detect changes in loading rates as a result of District implementation			
	• Operate Groundwater Monitoring	MnDNR; WashCo		Continue current GW	Implementation &	Ongoing

	Program			monitoring efforts, work with partners to expand as appropriate	Maintenance		
	• Operate Surface Water Monitoring Program	WMPs, Rule 8410		Implement SWWD Monitoring Plan	Implementation & Maintenance		Ongoing
	Modeling		Maintain updated, District-wide hydrological modeling to inform District and Municipal management of resources and infrastructure				
	• District-wide hydrologic model	WMP		Complete within 6 years, annually update to reflect development; calibrate to monitoring data every 3 years	Planning		Ongoing
	• Standard modeling specifications	WMP		Complete within 3 years	Planning		Ongoing
	Research		Manage the Watershed and its resources using the best known practices and strategies				
	• Pursue/support efforts to inform and improve management efforts of the District and its partners	Staff		ID and refine research and information needs as ongoing role of TAC; Pursue opportunities to provide for identified needs; annually publish summary of completed and ongoing efforts as part of annual report	Planning, Education & Information		Not Started
	Education						
	• Develop and implement outreach mechanisms to reach targeted audiences						
	• ID experiential programs that utilize watershed assets through public/private partnerships	2007 WMP		Within 5 years, develop programming for SWWD prairie in partnership with EMWREP and local non-profits.			
	• Assist MS4s in meeting Education requirements of the permit	2007 WMP					
	• Establish reasonable water quality expectations with residents	2007 WMP					
Efficiency and							

Accountability						
Results Based Accountability			Utilize a Results Based Accountability approach in evaluating and refining implementation strategies for achieving resource goals and to evaluate program performance			
	RBA	Washington County		Ongoing development and use of documented strategies and actions to achieve established resource goals; Incorporate strategy documentation, progress evaluation, and annual workplan into annual report; amend watershed plan as necessary to provide the District with programs and tools necessary to implement identified strategies	Planning	New
	Progress Evaluation	2007 WMP; MN Rule 8410; PRAP	?	Biennially evaluate District progress in achieving identified issue goals.	Planning	Ongoing
Uniform Standards			Establish and maintain District controls necessary to achieve established District resource goals, comply with mandated permits and programs, and maximize regulatory consistency with neighboring jurisdictions			
	Uniform standards across Municipalities	2007 WMP		Municipal adoption/compliance with District Rules within 2 years of adoption	Planning, Regulatory	Ongoing, recent rule update
	Compliance with State permits	State agencies; 2007 WMP		Regularly update District Rules to keep pace with changing resource issues and mandated regulatory programs (MS4, NPDES)	Planning	Ongoing, recent rule update
	Uniform standards across WD boundaries	WDs; Municipalities; MN Rule 8410		Work with Washington County Consortium and neighboring WDs to ID and implement consistency where possible.	Planning	Should be revisited, ongoing/sporadic effort at consortium level

	Support Low Impact Development	MnDNR		Prevent degradation and promote enhancement of Water Quality of District resources—statistical evaluation of WQ trends.	Regulatory	Ongoing
	Erosion & Sediment Control Enforcement	MPCA		Ensure compliance across full District jurisdiction using cooperative/coordinated approach that limits duplication of efforts.	Planning, Regulatory	Ongoing
Collaboration/ Cooperation			Limit duplication of planning and implementation efforts by the District and its State and Local partners; Create efficiencies in implementation through increased partnership and coordination of CIP			
	Develop and engage an ongoing CAC					
	Improve Collaboration and Information Sharing	WashCo; MnDNR; BWSR; MPCA; Met Council		Collaborate and coordinate agency efforts through TAC; Incorporate local input through CAC; Participate in State and Regional advisory committees; combine local implementation efforts to gain economy of scale	Planning	Ongoing

PROGRESS EVALUATION

PROGRAM COMPLETION

STATUS: 5%

PROGRAM: IMPLEMENTATION AND MAINTENANCE

WATERSHED RESTORATION, RECONSTRUCTION, AND RESILIENCY

PROGRAM PURPOSE:

TO PROVIDE THE MECHANISM AND RESOURCES TO REVERSE OR ADAPT TO THE IMPACTS OF LAND ALTERATION AND CLIMATE CHANGE

PERFORMANCE INDICATOR	IMPLEMENTATION SCHEDULE	LONG RANGE WORKPLAN BUDGET	AMOUNT SPENT TO DATE	STATUS
Establishment and protection of identified greenway corridors				
Establishment and protection of vegetated buffers along streams, ravines, bluffs and around lakes and wetlands				
Stabilization of identified ravines to prevent downstream transport of sediment and nutrients				
Implementation of identified practices to increase resiliency of natural and man-made systems against land use and climate change				
Implementation of identified strategies to address aquatic and terrestrial invasive species.				
Identify willing landowners and begin operation of pilot agriculture BMP research program	2020 - 2026	$385,000	$96,250	25%

ISSUE PROGRESS / PROGRAM PERFORMANCE

Progress/performance to date. Expand on scorecard data...

RECOMMENDED ACTION / CHANGE

Document any necessary change in strategy...

CURRENT YEAR WORKPLAN

Description of planned work for current year...

DOCUMENTS

Janke, B.D. Nutrient Load Estimation and Analysis of Water Quality Monitoring Data from the South Washington Watershed District, 2000-2014. 2015. Available at http://www.swwdmn.org/pdf/UMNfinalmonitoringreport.pdf. Accessed 7/5/2016.

> Abstract: This report contains the results of an analysis of water quality monitoring data collected by the Washington Conservation District (WCD) at the primary monitoring and regional assessment sites in the South Washington Watershed District (SWWD) during 2000 – 2014. The MS-1, MS-2, Central Ravine, Newport, St. Paul Park, Trout Brook, and Wilmes Lake Outlet sites were included in the analysis. Water quality parameters analyzed in this study included water volume and major nutrients, including total phosphorus (TP), total suspended solids (TSS), and chloride (Cl). The primary purpose of the analysis was to provide annual (monitoring season) estimates of water and nutrient loading at these monitoring sites over the entirety of their monitoring records. Additional outcomes included an investigation of the effects of seasonality and precipitation on nutrient loads and concentrations, and an initial assessment of the effectiveness of the monitoring program for determining nutrient loading.

Loomis, J., M. Moore, and A. Schilling. Locally Driven Watershed Restoration. 2014. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/Locally-Driven-Watershed-Restoration.pdf. Accessed 7/5/2016.

> Abstract: In an increasingly complex regulatory environment, it is easy to lose organizational focus on local goals and missions and get caught up in checking boxes for permit requirements. That makes it increasingly important to coordinate and galvanize cross-jurisdiction efforts to achieve common goals. The South Washington Watershed District fills that role. By identifying and filling planning gaps, maintaining a focus on implementation, and routinely assessing progress, the District is able to move everyone toward their shared goals in a cost-effective manner while other local and state agencies take the lead on fulfilling permit programmatic requirements. The success of this approach has repeatedly proven successful for the District and is discussed here in the context of District led restoration efforts for Colby Lake.

Lower St. Croix Watershed Management Organization. O'Conner's Stream and Lake Management Plan. 2007. By Emmons and Olivier Resources, Incorporated. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/OConnersStreamandLakeManagementPlan.pdf. Accessed on 7/5/2016.

> Abstract: Management plan for O'Conners stream and lake developed by the former Lower St. Croix WMO. O'Conners lies within SWWD's Lower St. Croix Management unit and is a landlocked basin with primarily agricultural landuse. The plan identifies strategies for protecting and restoring the stream and lake.

Lower St. Croix Watershed Management Organization. Trout Brook Management Plan. 2009. By Emmons and Olivier Resources, Incorporated. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/Trout-Brook-Mgmt-Plan.pdf. Accessed 7/5/2016.

> Abstract: Management plan for Trout Brook developed by the former Lower St. Croix WMO. Trout Brook lies within SWWD's Lower St. Croix management unit. Trout Brook has high groundwater inputs and provides habitat and water temperatures suitable for trout. The plan identifies several management strategies to protect and restore habitat within the stream.

Minnesota Board of Water and Soil Resources. Level II Performance Review, South Washington Watershed District. 2014. Available at http://www.swwdmn.org/pdf/FinalPRAP2014.pdf. Accessed 7/5/2016.

Abstract: Summary of the South Washington Watershed District's PRAP performance review by the State Board of Water and Soil Resources. The PRAP review is a systematic review of the performance of local units of government to ensure effective operation. Review of SWWD found that the District is an effective agent for positive water resource management in a complex metropolitan environment.

Minnesota Department of Agriculture. Minnesota Nitrogen Fertilizer Management Plan. By Jeff Berg et al. March 2015. Available at http://www.mda.state.mn.us/nfmp. Accessed on 6/30/2016.

Abstract: The nitrogen fertilizer management plan is the state's blueprint for preventing or minimizing impacts of nitrogen fertilizer on groundwater. As required by state statute, the NFMP provides voluntary components and provisions for the development of requirements if implementation of voluntary components in proven to be ineffective.

Minnesota Department of Natural Resources, Ecological and Water Resources Division. North & East Metro Groundwater Management Area Plan. 2015. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/gwma_ne-plan.pdf. Accessed 7/5/2016.

Abstract: Minnesota's groundwater resources are vital to its ecological health, economic prosperity and quality of life. But in some parts of the state, our underground supplies of water are under increasing demands for irrigation, industry and domestic needs, putting them at risk of overuse and degradation. A statewide analysis of groundwater resources identified the north and east metro region of the Twin Cities as an area where such concerns exist. The North and East Metro Groundwater Management Area Plan guides the DNR's efforts to manage groundwater appropriations sustainably in this area from 2015-2020. The Plan establishes sustainability goals to help appropriation permit holders plan for their future water use.

Minnesota Geological Survey. Educational Series 7-Geologic History of Minnesota Rivers. By H.E. Wright, Jr. 1990. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/Geologic-History-of-MN-Rivers.pdf. Accessed 6/30/2016.

Abstract: Includes extensive discussion of the geologic history of Minnesota's rivers as they were shaped by repeated glaciations. Provides extensive background to help understand the bedrock, soil, and water resources that now characterize the South Washington Watershed District.

National Park Service. River of History-A Historic Resources Study of the Mississippi National River and Recreation Area. By John O. Anfinson. Published by St. Paul District, Corps of Engineers. 2003. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/History-of-MNRRA.pdf. Accessed 6/30/2016.

Abstract: Provides an extensive discussion of the forces and changes that have shaped the Mississippi National River and Recreation Area, including geology, Native Americans, settlement, commerce and navigation, milling, timber, and hydroelectric power, land use and cover changes, and residential development.

State of Minnesota Rule 8410. Board of Water and Soil Resources, Metropolitan Water Management. Available at http://www.bwsr.state.mn.us/planning/metro/MR_8410_July_13_2015.pdf. Accessed 7/5/2016.

Abstract: State rules governing the general administration of metropolitan watershed management activities, including the South Washington Watershed District, and ten year plans.

South Washington Watershed District. Armstrong Lake Subwatershed Retrofit Analysis. 2018. Available at http://www.swwdmn.org/wp-content/uploads/2018/09/Armstrong-Lake-Subwatershed-Retrofit-Analysis-Report.pdf. Accessed on 1/8/2019.

Abstract: Subwatershed analysis of stormwater retrofit opportunities within the Armstrong Lake watershed (Oakdale/Lake Elmo). Result is a ranked list of opportunities based on cost-effectiveness. Serves to guide ongoing implementation of BMPs to benefit Armstrong Lake.

South Washington Watershed District. Central Draw Storage Facility (CDSF) Basis of Design Report. By HDR Engineering, Incorporated. 2013. Available at http://www.swwdmn.org/wp-content/uploads/2016/04/2013_BoDR_100913.pdf. Accessed 7/5/2016.

Abstract: This is a Basis of Design Report (BoDR) for construction of the South Washington Watershed District's (SWWD's) Central Draw Storage Facility (CDSF) and associated outlet pipe system which are located in the City of Cottage Grove. This is a living document that will be progressively updated as the design and permitting phase continues and will only be finalized when construction of the Project is complete. This BoDR serves as a summary of the design documentation and of the design and construction process.

South Washington Watershed District. Glacial Valley Interpretive Area. By LHB Architects. 2018. Available at http://www.swwdmn.org/wp-content/uploads/2018/09/170469-20180223-SWWD-Summary-Report_FINAL.pdf. Accessed on 1/8/2019.

Abstract: Conceptual design for future learning center at SWWD's Central Draw Overflow property. First identified in Metro Greenways Easement over the property, held by Washington County. Serves to assist SWWD in budgeting and pursuing grant opportunities.

South Washington Watershed District. Greenway Corridor Plan. 2000. Available at http://www.swwdmn.org/wp-content/uploads/2016/04/SWWD-Greenway-Corridor-Plan-2000.pdf. Accessed 7/5/2016.

Abstract: Final report for the SWWD Greenway Corridor Plan. The report defines the geographic location of the corridor, describes the biological and physical features and sets forth a framework for implementation.

South Washington Watershed District. DRAFT Comprehensive Wetland Management Plan. 2002. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/DRAFT_Wetland_Mgmt_Plan_2002_SWWDVERSION.pdf. Accessed 7/5/2016.

Abstract: The District's draft Comprehensive Wetland Management Plan. Identified as a need in the 1997 Watershed Management Plan, this plan provides an inventory, functional assessment, and management classification for all known wetlands in the South Washington management unit. It also presents management standards for protecting the wetlands which were incorporated into District rules. The plan predates enlargement of SWWD to include East Mississippi and Lower St. Croix and

does not include inventory or classification of wetlands in those management units. However, it does establish criteria that can be used to assess and classify those wetlands as needed. The need to update and finalize the plan is identified in the 2016 Watershed Management Plan.

South Washington Watershed District. East Mississippi - Newport Subwatershed Retrofit Analysis. 2018. Available at http://www.swwdmn.org/wp-content/uploads/2018/08/East-Mississippi-Subwatershed-Retrofit-Analysis-Report_Final_red.pdf. Accessed on 1/8/2019.

Abstract: Subwatershed analysis of stormwater retrofit opportunities within the City of Newport. Result is a ranked list of opportunities based on cost-effectiveness. Serves to guide ongoing implementation of BMPs to benefit the Mississippi River.

South Washington Watershed District. Environmental Assessment Worksheet. "Central Draw Storage Facility (CDSF) Overflow Project: Phase II – Phase V". 2014. Available at http://www.swwdmn.org/wp-content/uploads/2016/04/Central-Draw-Storage-Facility-Overflow-Project-EAW_Phases-2-5.pdf. Accessed 7/5/2016.

Abstract: EAW for SWWD's overflow project phases II-V which includes stream stabilization through 3M's Cottage Grove facility between TH61 and the Mississippi River, modification of the Ravine Lake outlet, stabilization of a ravine through Cottage Grove Ravine Regional Park, and construction of 72" underground pipe from near 75th Street to the northern Ravine Park boundary.

South Washington Watershed District. Central Draw Storage Facility Overflow Record of Decision. "Findings of Fact, Conclusions of Law, and Resolution". 2014. Available at http://www.swwdmn.org/wp-content/uploads/2016/04/Central-Draw-Storage-Facility-Overflow-EAW_2014Findingsoffact.pdf. Accessed 7/5/2016.

Abstract: Response to comments, findings of facts, and record of decision for the Central Draw Storage Facility (CDSF) Overflow Project : Phase II – Phase V" EAW. Also includes a recap of project need, project development, and summary of EAW for Phase I of the project.

South Washington Watershed District. South Washington Watershed District Climate Resiliency Plan. 2018. By Barr Engineering, Co. Available at http://www.swwdmn.org/wp-content/uploads/2018/03/FINAL_SWWD-Climate-Resiliency-Plan-3_26_2018.pdf. Accessed 1/8/2019.

Abstract: High level strategies to guide District implementation in adapting to ongoing climate changes. Built on pair of workshops engaging over 60 District stakeholders including City and County staff and residents. Priorities and strategies are grouped under three primary areas of concern—groundwater, natural resources, and storm sewer infrastructure. Implementation to occur in cooperation with Cities and County through modified CCIP program.

South Washington Watershed District. Colby Lake Water Quality Modeling Project. 2011. By Houston Engineering, Incorporated. Available at http://www.swwdmn.org/wp-content/uploads/2016/04/Colby-Lake-Modeling-Report.pdf. Accessed 7/5/2016.

Abstract: Modeling report for Colby Lake and its watershed. Identifies water and load balance and establishes load reduction targets necessary to restore the lake to meet state eutrophication standards.

South Washington Watershed District. South Washington Watershed District Lake Management Plan. By Wenck Associates. 2018. Available at https://www.swwdmn.org/wp-content/uploads/2018/09/WoodburyandSWWDLakeManagementPlans_Final.pdf. Accessed on 1/8/2019.

Abstract: Updated plans for Armstrong, Markgrafs, Powers, Wilmes, Colby, and Ravine Lakes. New plan for La Lake. All include updated analysis with all current lake data and lake sediment cores. Identifies updated

load reduction needs and implementation priorities (in lake, watershed, ponds, etc.).

South Washington Watershed District. Water Quality Modeling Report, Armstrong Lake, Markgrafs Lake, and Wilmes Lake. 2012. By Houston Engineering, Incorporated. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/Final-Armstrong-Markgrafs-Wilmes-Report.pdf. Accessed on 7/5/2016.

Abstract: Modeling report for Armstrong, Markgrafs, and Wilmes Lakes and their associated watersheds. Identifies water and load balance and establishes load reduction targets necessary to protect or restore the lakes to meet state eutrophication standards.

South Washington Watershed District. Grey Cloud Slough Restoration Feasibility Study. 2012. By Houston Engineering, Incorporated. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/Grey-Cloud-Slough-Feasibility-Report-Final.pdf. Accessed 7/5/2016.

Abstract: A study into the feasibility of restoring flow to the Grey Cloud Slough. The study examined several project criteria in evaluating different options for restoring flow. Ultimately, the study determines that restoring flow is feasible and recommends a preferred project alternative given the defined project criteria.

South Washington Watershed District. Trends and Influences (Summary of Board Workshop). 2013. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/PlanWorkshopJan2013.pdf. Accessed 7/5/2016.

Abstract: Meeting materials for the January 17, 2013 SWWD Board planning workshop where the Board reviewed the current state of SWWD's Watershed Management Plan. The materials provide a summary of issues identified in the 2007 WMP and progress toward addressing them as well as several emerging issues.

South Washington Watershed District. Powers Lake Water Quality Modeling Report. 2011. By Houston Engineering, Incorporated. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/PowersLakeMgmtPlanMay2010_JHL.pdf. Accessed on 7/5/2016.

Abstract: Modeling report for Powers Lake and its associated watershed. Identifies water and load balance and establishes load reduction targets necessary to protect the lake to continue to meet state eutrophication standards and more stringent SWWD goals.

South Washington Watershed District. Ravine Lake Water Quality Modeling and Management Report. 2013. By Houston Engineering, Incorporated. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/Ravine-Lake-Mngmnt-Report-Final.pdf. Accessed 7/5/2016.

Abstract: Modeling report for Ravine Lake and its watershed. Identifies water and load balance and establishes load reduction targets necessary to restore the lake to meet state eutrophication standards. Also recommends a revised total phosphorus loading standard for development in the Ravine Lake watershed.

South Washington Watershed District. Monitoring Plan. 2009. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/Monitoring-Plan-2009.pdf. Accessed 7/5/2016.

Abstract: SWWD's monitoring plan which establishes the parameters for the varying types of monitoring SWWD does.

South Washington Watershed District. DRAFT Surface Water Model User Guide. 2016. By Houston Engineering, Incorporated. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/Model-Data-Structure-Draft-022616.pdf. Accessed 7/5/2016.

Abstract: This document is intended to serve as a user guide for the South Washington Watershed District (SWWD) surface water models. It describes the general structure of the SWWD modeling data and how it is intended to interact with the XP-SWMM (SWMM) modeling software it was created for. An ArcGIS personal geodatabase template was developed along with this documentation. This template serves as the basis for SWWD modeling data structure and was created to house all of the data required for each of the SWWD models. The sections of this report reference this template and the feature classes, tables, and other data within it.

South Washington Watershed District. Stormwater Pollution Prevention Plan. 2014. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/SWPPP_2014.pdf. Accessed 7/5/2016.

Abstract: SWWD's stormwater pollution prevention plan (SWPPP) as required by its MS4 general permit. The SWPPP documents SWWD practices and programs through which the District complies with requirements of the MS4 permit.

South Washington Watershed District. District Rules. 2015. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/2015SWWDRules-1.pdf. Accessed 7/5/2016.

Abstract: SWWD rules developed and adopted as required through MN Statute 103D.341 to accomplish the purposes of that statute, implement the powers of the District's Board of Managers, and the policies of the District as contained in the District Watershed Management Plan. Rules apply to development, redevelopment, and any other activity which may affect water resources of the District.

South Washington Watershed District. Concept Design Report. "Trout Brook Watershed Improvements, Afton Alps, Afton, Minnesota." 2012. By HR Green and Inter-Fluve. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/Trout-Brook-Watershed-Improvements-Concept-Design-Report.pdf. Accessed 7/5/2016.

Abstract: This report provides a summary of the analysis and recommendations for the improvement of Trout Brook and the surrounding watershed at the Afton Alps Ski Resort in Washington County, Minnesota. HR Green partnered with Inter-Fluve Inc. to provide comprehensive assessment and design services for this effort. Multiple site visits were conducted to observe specific hydrology and land&use patterns, perform a fluvial geomorphic analysis of the stream, investigate soil conditions, and determine the feasibility of proposed solutions. GIS data from multiple sources was analyzed to add 3D spatial information to field observations. A variety of solutions are proposed to improve in-stream and riparian habitat, improve stream and watershed aesthetics, and reduce the maintenance burden on the property owners. All solutions are designed to avoid interruption of normal business activities for the ski resort.

South Washington Watershed District. Infiltration Management Study Phase II Report. Emmons and Olivier Resources. November, 2001. Available at http://www.swwdmn.org/wp-content/uploads/2016/08/Infiltration-Management-Study-Phase-II-Report.pdf. Accessed 7/20/2016

Abstract: The South Washington Watershed District (SWWD) initiated the Infiltration Management Study (IMS) in 1997 to characterize infiltration and explore the use of infiltration as a component of

overall stormwater management in the watershed. Phase I of the IMS was completed in October of 1998. Phase I emphasized literature review, obtaining background information on soils and geology, data collection through establishing a monitoring network and program, organizing Technical and Local Advisory Committees, and implementation of pilot projects in the watershed to enhance infiltration. The Phase I progress report is available at the District office. Phase II includes continued data collection, monitoring of infiltration in the field, analysis of infiltration rates, and modeling to evaluate the importance of infiltration as a stormwater management tool. Phase II examines the behavior of the watershed through modeling of the surface and groundwaters and discussion of the effects of stormwater infiltration on groundwater quality and environmental resources. Phase II has included continued input from the Local and Technical Advisory Committees and the development of recommendations on the use of infiltration as an important component of stormwater management in the SWWD. The Report includes the following chapters that discuss how the data was collected, how it was analyzed and interpreted, how it was utilized with predictive computer modeling to evaluate benefits and impacts, and finally, what options the District has available and how to proceed.

South Washington Watershed District. Watershed Management Plan. 1997. Revised November 2002. Available at http://www.swwdmn.org/watershed-guidance-documents/1997-watershed-management-plan/. Accessed 6/30/2016.

Abstract: The District's first Watershed Management Plan, adopted in 1997. Focus of the plan was on assessment of resources and issues in the District.

South Washington Watershed District. Watershed Management Plan. 2007. Revised May 2011. Available at http://www.swwdmn.org/watershed-guidance-documents/2007-watershed-management-plan/. Accessed 6/30/2016.

Abstract: The District's second Watershed Management Plan, adopted in 2007 and amended in 2009 and 2011. The focus of the plan was on implementation of projects to address known issues in the District.

Washington Conservation District. Colby Lake Stormwater Retrofit Assessment. 2011. Available at

Abstract: Stormwater retrofit assessment for the Colby Lake watershed. Using the Metro Conservation District's retrofit protocol, the report identifies priority retrofit opportunities within the watershed based on expected cost-effectiveness. Rankings established in the report are used to target available SWWD funds and staff efforts.

Washington Conservation District. Highway 61 Corridor Subwatershed: Stormwater Retrofit Assessment. 2010. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/SWWD-Hwy-61-Corridor-2010-FINAL.pdf

Abstract: Stormwater retrofit assessment for the highway 61 corridor. Using the Metro Conservation District's (MCD) retrofit protocol, the report identifies priority commercial retrofit opportunities within the corridor based on expected cost-effectiveness. This report is the first retrofit assessment completed under the MCD's retrofit protocol. Rankings established in the report are used to target SWWD funds and staff efforts.

Washington Conservation District. Powers Lake Stormwater Retrofit Assessment. 2011. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/POWERS-Assessment-Report-DRAFT.pdf

Abstract: Stormwater retrofit assessment for the Powers Lake watershed. Using the Metro

Conservation District's retrofit protocol, the report identifies priority retrofit opportunities within the watershed based on expected cost-effectiveness. Rankings established in the report are used to target available SWWD funds and staff efforts.

Washington Conservation District. Trout Brook Ravines Stormwater Retrofit Analysis. 2017. Available at http://www.swwdmn.org/wp-content/uploads/2017/08/Trout-Brook-Ravine-SWA.pdf. Accessed 1/8/2019.

Abstract: Inventory and assessment of ravines in the Trout Brook subwatershed. Result is a ranked priority list of ravines in need of stabilization. Prioritization is based on severity of ongoing erosion and potential for impact to Trout Brook. Serves to guide ongoing SWWD implementation in Trout Brook.

Washington Conservation District. Wilmes Lake Subwatershed Retrofit Analysis. 2014. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/Wilmes-Lake-SWA_10.20.14_R.pdf

Abstract: Stormwater retrofit assessment for the Wilmes Lake watershed. Using the Metro Conservation District's retrofit protocol, the report identifies priority retrofit opportunities within the watershed based on expected cost-effectiveness. Rankings established in the report are used to target available SWWD funds and staff efforts.

Washington County. Cottage Grove Area Nitrate Study Report. By Barr Engineering. October, 2005. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/CGA-Nitrate-Study-Report-2003.pdf. Accessed 6/30/2016.

Abstract: This report presents the results of the Cottage Grove Area Nitrate Study (CGANS) that was conducted for Washington County (County) for the purposes of: (1) determining the general location and types of sources responsible for the nitrate detected in groundwater and (2) Identifying zones of denitrification to determine if there are areas in the Jordan Sandstone in the Cottage Grove vicinity that are more suitable for water supply than others. This study is a more detailed follow-up to a 1999 study performed by the Minnesota Pollution Control Agency in southern Washington County which found elevated levels of nitrate in several wells. Nitrate concentrations were strongly correlated with herbicide concentrations, indicating that much of the nitrate is agriculturally derived.

Washington County. Integrating Groundwater & Surface Water Management – Southern Washington County. By Barr Engineering. August, 2005. Available at https://www.co.washington.mn.us/DocumentCenter/View/730. Accessed 8/2/2016.

Abstract: Final report for project commissioned by Washington County and several local and State partners to assist managers in making decisions that will balance land use needs and the protection of groundwater resources. The primary focus of the study is protection of groundwater contribution to surface waters.

Washington County. Intercommunity Groundwater Protection: Sustaining Growth and Natural Resources in the Woodbury/Afton Area, Report on Development of a Groundwater Flow Model of Southern Washington County, Minnesota. By Barr Engineering. June, 2005. Available at https://www.leg.state.mn.us/docs/2006/mandated/060018/LCMR_Model_Report.pdf. Accessed 8/2/2016.

Abstract: This report summarizes the construction and use of hydrologic models of southern Washington County, Minnesota, developed through a collective effort of local watershed districts, cities, state agencies, and Washington County. The primary purpose of the project was to develop a predictive tool that can be used to evaluate the "sustainability" of groundwater withdrawals in the Woodbury-Afton area of Washington County. The project was funded over two calendar years, with a start date of January 1, 2004 and a completion data of June 30, 2005. Funding for this project was

recommended by the Legislative Commission on Minnesota Resources (LCMR) from the Minnesota Environmental and Natural Resources Trust Fund. The official LCMR title is "Intercommunity Groundwater Protection 'Sustaining Growth and Natural Resources' in the Woodbury/Afton Area".

Washington County. Report for Water Governance Study. May, 1999. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/ENV-GWGovernance_20120928124633 3876.pdf. Accessed 6/30/2016.

Abstract: Study to identify and evaluate the best governance structure for water management from a countywide perspective. The recommendations in the study were developed by a 25 member water governance work group appointed by the County Board, representing all of the interests involved in water management in the County.

Washington County. Groundwater Plan, 2014-2024. 2014. Available at http://www.swwdmn.org/wp-content/uploads/2016/03/Groundwater-Plan-2014-2024-Final-High-Res_20141205103259 2720.pdf. Accessed 7/5/2016.

Abstract: The purpose of preparing, adopting, and implementing a Plan is to provide a countywide structure for the protection and conservation of groundwater resources. The Plan is a comprehensive document that lays out the technical framework, issues, policies, and strategies to address existing and future groundwater related problems. By Minnesota Statute 103B.255, county government is responsible for writing, coordinating, and administering the Plan; however, no one entity has the overall authority to implement all the necessary actions. Through this planning effort, the county seeks support from the community in order to protect and conserve this valuable resource now and for future generations.

Weiss, Peter, Greg LeFevre, and John Gulliver. 2008. Contamination of Soil and Groundwater Due to Stormwater Infiltration Practices. Prepared for Minnesota Pollution Control Agency. Available at https://www.pca.state.mn.us/sites/default/files/stormwater-r-weiss0608.pdf. Accessed on 6/30/2016.

Abstract: Literature review of known research into impacts of infiltration BMPs on soil contamination and groundwater pollution.

WEBSITES/OTHERS

Board of Regents of the University of Wisconsin System. Wisconsin Initiative on Climate Change Impacts. Available at http://www.wicci.wisc.edu/. Accessed 6/30/2016.

Summary: Homepage for the Wisconsin Initiative on Climate Change Impacts. Provides extensive information about climate change, its impacts, and adaptation strategies. Though the focus is Wisconsin, much of the information is relevant to SWWD and Minnesota.

Metropolitan Council. Lake Monitoring & Assessment (includes Citizen Assisted Monitoring Program). Available at http://www.metrocouncil.org/Wastewater-Water/Services/Water-Quality-Management/Lake-Monitoring-Analysis.aspx. Accessed 6/30/2016.

Summary: Information about the Metropolitan Council's Lake Monitoring and Citizen Assisted Monitoring Programs (CAMP). SWWD utilizes these programs for annual baseline monitoring of District lakes.

Metropolitan Council. Potential Water Supply Issues in the Twin Cities Metropolitan Area. Available at http://www.metrocouncil.org/Wastewater-Water/Planning/Water-Supply-Planning/Guidance-Planning-Tools/Water-Supply-

Planning-Metro-Area.aspx. Accessed on 6/30/2016.

Summary: Website provides an interactive map to identify known water supply issues by municipality. User can zoom into southern Washington County and click on cities to learn about issues specific to SWWD.

Minnesota Board of Water and Soil Resources. Buffer Program. Available at http://www.bwsr.state.mn.us/buffers/. Accessed 6/30/2016.

Summary: Information about Minnesota's recent buffer protection legislation including policy information for local units of government responsible for implementing the program.

Minnesota Board of Water and Soil Resources. Wetland Conservation Act Forms and Guidance. Available at http://www.bwsr.state.mn.us/wetlands/wca/. Accessed 7/5/2016.

Summary: Information about the State's Wetland Conservation Act (WCA), including necessary forms and guidance for implementation. Targeted to local government units responsible for WCA implementation.

Minnesota Department of Agriculture. The Agricultural BMP Handbook for Minnesota. Available at http://www.mda.state.mn.us/protecting/cleanwaterfund/research/agbmphandbook.aspx. Accessed 7/5/2016.

Summary: Project information about the purpose and scope of the Agricultural BMP handbook as well as access to the completed document.

Minnesota Department of Agriculture. Conservation Practices, Minnesota Conservation Funding Guide-Irrigation Management. Available at http://www.mda.state.mn.us/protecting/conservation/practices/irrigation.aspx. Accessed 6/30/2016.

Summary: Primary website for MDA's irrigation management efforts. Includes information about best practices and financial and technical assistance for landowners.

Minnesota Department of Agriculture. Pollinators and Their Habitat. Available at http://www.mda.state.mn.us/protecting/bmps/pollinators.aspx. Accessed 7/5/2016.

Summary: MDA's primary website for information about pollinators and their habitat including resources for residents interested in protecting and restoring habitat for pollinators.

Minnesota Department of Agriculture. Township Testing Program. Available at http://www.mda.state.mn.us/townshiptesting. Accessed 7/5/2016.

Summary: Primary website for the MDA's township groundwater nitrate testing program.

Minnesota Department of Natural Resources. Buffer Mapping Project. Available at http://dnr.state.mn.us/buffers/index.html. Accessed 6/30/2016.

Summary: Information about Minnesota's recent buffer protection legislation including maps of

waters that require buffers.

Minnesota Department of Natural Resources, State Climatology Office. Climate of Minnesota. Available at http://www.dnr.state.mn.us/climate/index.html. Accessed 7/5/2016.

Summary: Primary website for the DNR State Climatology Office which exists to manage, analyze, and disseminate climate information in service to the Citizens of Minnesota.

Minnesota Department of Natural Resources. Wild & Scenic Rivers Laws, Statutes, and Rules. Available at http://www.dnr.state.mn.us/waters/watermgmt_section/wild_scenic/wsrivers/legislation.html. Accessed 6/30/2016.

Summary: Information about wild and scenic rivers laws and designated resources in Minnesota.

Minnesota Geospatial Information Office. Digital Soil Mapping in Minnesota (includes Soil Survey). Available at http://www.mngeo.state.mn.us/chouse/soil.html#printed. Accessed 6/30/2016.

Summary: Catalogue of digital soil mapping for Minnesota. Includes access to County soil surveys.

Minnesota Office of the Revisor of Statutes. 2015 Minnesota Statutes-Chapter 103D. Watershed Districts. Available at https://www.revisor.mn.gov/statutes/?id=103d. Accessed 6/30/2016.

Summary: MN Statute 103D, the statute governing Watershed Districts throughout the State.

Minnesota Pollution Control Agency. Climate Change. Available at https://www.pca.state.mn.us/air/climate-change. Accessed 6/30/2016.

Summary: MPCA's primary website about climate change. Includes information about how Minnesota's climate is changing, regulatory initiatives, programs, and policies, and climate adaptation.

Minnesota Pollution Control Agency. Lake St. Croix – Excess Nutrients: TMDL Project. Available at https://www.pca.state.mn.us/water/tmdl/lake-st-croix-excess-nutrients-tmdl-project. Accessed 7/5/2016.

Summary: Project website for the Lake St. Croix TMDL project. Includes relevant background for the project and the completed study.

Minnesota Pollution Control Agency. Municipal Stormwater (MS4). Available at https://www.pca.state.mn.us/water/municipal-stormwater-ms4. Accessed 6/30/2016.

Summary: Primary webpage for information about MPCA's municipal separate storm sewer system (MS4) permit program.

Minnesota Pollution Control Agency. Road Sale and Water Quality. Available at https://www.pca.state.mn.us/water/road-salt-and-water-quality. Accessed on 6/30/2016.

Summary: Primary website for the MPCA's road salt and water quality information. Includes tips to reduce pollution, educational and training resources, and statistics.

Minnesota Pollution Control Agency. Sediment Reduction Strategy| Minnesota River Basin & South Metro Mississippi

River. Available at https://www.pca.state.mn.us/water/sediment-reduction-strategy-minnesota-river-basin-south-metro-mississippi-river. Accessed 6/30/2016.

Summary: MPCA's project website for efforts to reduce sediment in the Minnesota and Mississippi Rivers. Includes links to completed sediment related TMDLs for the two basins.

Minnesota Pollution Control Agency. TCMA Chloride Project. Available at https://www.pca.state.mn.us/water/tcma-chloride-project. Accessed 7/5/2016.

Summary: Primary website for the Twin Cities Metropolitan Area Chloride Project and chloride management plan for the 7 county metropolitan area. The plan serves as a TMDL for waters impaired for chloride.

National Wild and Scenic Rivers System. About the WSR Act. Available at https://www.rivers.gov/wsr-act.php. Accessed 6/30/2016.

Summary: Information about wild and scenic rivers laws, the national system, management, and resources.

Washington Conservation District. East Metro Water Resource Education Program. Available at http://www.mnwcd.org/emwrep/. Accessed 6/30/2016.

Summary: Homepage for the East Metro Waters Resources Education Program, a joint effort of dozens of Watershed Districts and communities in Washington County. EMWREP provides education and outreach for priority water resource issues throughout the County.

Washington County Historical Society. Community Histories. Available at http://www.wchsmn.org/research/community-histories/. Accessed 7/5/2016.

Summary: Compilations of community histories for all municipalities in Washington County. User can click on links for individual municipalities.

GLOSSARY

Adaptive capacity – Ability of a system to adjust to climate change to mitigate potential damages, take advantage of opportunities, or cope with consequences.

Adaptive management: an iterative, systematic process for continually improving management strategies and practices by learning from the outcomes of previously employed actions.

BMPs – Best Management Practices, practices to address water quality and quantity issues.

BWSR – Board of Water and Soil Resources, the Minnesota state soil and water conservation agency. Administers programs that prevent sediment and nutrients from entering lakes streams and wetlands; enhance fish and wildlife habitat; and protect wetlands.

CAMP – Citizen Assisted Monitoring Program a long-term, baseline monitoring program operated by the Metropolitan Council with support of local government units and citizens.

CCIP – Coordinated Capital Improvement Program

Citizen Advisory Committee – Committee of residents of the District appointed by the Board of Managers to provide input on District planning and implementation activities.

CDO – Central Draw Overflow, when complete will provide a controlled overflow from the District's Central Draw Storage Facility (CDSF) to the Mississippi River through a series of underground and above ground converyances.

CDSF – Central Draw Storage Facility, the District's series of regional infiltration basins meant to retain runoff from the District's northern watershed which includes most of the City of Woodbury and smaller portions of Lake Elmo, Oakdale, Afton, and Cottage Grove.

Climate adaptation – Adjustments made by societies or ecosystems to reduce negative impacts of climate change.

Federal Clean Water Act – Primary federal law in the U.S. governing water pollution.

Greenway – Denotes SWWD's identified multipurpose open space corridors encompassing major drainage routes through the District.

Growing season – Generally refers to May through September in Minnesota for the purpose of water quality standards.

Guidance Document – Report, plan, study, or other document adopted by the District to further define an issue or guide implementation.

Hydrograph – A plot of variation of runoff or discharge over time. Reflects runoff characteristics of the watershed including topography, impervious cover, natural depressions, antecedent moisture, etc.

Impaired Water – State designation under the Federal Clean Water Act for water resources which do not meet applicable water quality standards.

Invasive species – Non-native plants, animals, or pathogens that aggressively compete with native species for habitat space.

Levy – A property charge based on property value.

Long Range Workplan – Projected workload and budget over 10 year period extending from date of plan adoption.

LWMP – Local Water Management Plan, adopted by a municipality which guides water resource related municipal

activities.

Management Unit – Administrative units within the District through which stormwater utility fees are collected.

MDA – Minnesota Department of Agriculture

MDH – Minnesota Department of Health

MnDNR – Minnesota Department of Natural Resources

MnDOT – Minnesota Department of Transportation

MPCA – Minnesota Pollution Control Agency

MS4 – Municipal Separate Storm Sewer System, a conveyance or system of conveyances that is owned by a state, city, town, village, or other public entity that discharges to a water of the United States. Regulated by the MS4 general or individual permit.

NGO – Nongovernmental organization. Usually refers to non-profit organizations and citizen groups such as lake associations.

ORVW – Outstanding Resource Value Water, a surface water designation in Minnesota which denotes waters with exceptional qualities. Confers additional protections to preserve those resources.

Pollinators – Insects essential for pollination of plants. Includes bees, some wasps, ants, and a variety of flies, butterflies, moths, and beetles.

PRAP – Performance Review and Assistance Program, a program operated by the Minnesota Board of Water and Soil Resources to assess the performance of units of government that constitute Minnesota's local delivery system for conservation of water and related land resources.

RBA – Results Based Accountability, is a disciplined way of thinking and taking action that communities can use to improve the lives of residents and the community as a whole. Also used by organizations to improve the performance of their programs.

Regional Assessment Locations – Key resources and intercommunity flow paths which the District uses to asses impact of past and proposed development and restoration efforts.

Responsible LGU – Responsible Local Unit of Government denotes local unit of government with responsibility for implementing or administering a given permit, usually on behalf of the State.

Riparian – relating to or located on the bank of a watercourse or basin.

Stormwater Utility – a property charge based on stormwater characteristics for a type of land use and management unit. Calculated from amount of runoff expected from a specific property based on property size and amount of impervious cover. Rates are set by management unit.

SWWD - South Washington Watershed District, a special purpose local unit of government.

Technical Advisory Committee – Ad hoc committee formed by the District to provide technical input on District planning and implementation activities. Members generally represent Municipalities within the District and State or Regional agencies.

TMDL – Total Maximum Daily Load, a regulatory term in the Clean Water Act defining the maximum amount of a specific pollutant that a body of water can receive and still meet applicable water quality standards.

Watershed – all of the land in which all water flows to once specific point.

Watershed District – Special purpose local units of government that work to solve and prevent water-related problems. The boundaries of each district follow those of a natural watershed.

WCA – Wetland Conservation Act, Minnesota legislation governing conservation and protection of wetlands in Minnesota.

WCD – Washington Conservation District

WMP – Watershed Management Plan, plan that identifies Watershed District issues and guides Watershed District activities over 10 year period extending from date of plan adoption.