Minnehaha Creek Watershed District *REQUEST FOR BOARD ACTION*

MEETING DATE: October 12, 2017

TITLE: Authorization of Submit Watershed Management Plan for BWSR Approval

RESOLUTION NUMBER: 17-063

PREPARED BY: Becky Christopher

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REVIEWED BY: ☐Administrator ☐ Counsel ☐ Program Mgr. (Name):_____
☐ Board Committee ☐ Engineer ☐ Other

WORKSHOP ACTION:

☐ Advance to Board mtg. Consent Agenda. ☐ Advance to Board meeting for discussion prior to action.

☐ Refer to a future workshop (date):_____ ☐ Refer to taskforce or committee (date):_____

☐ Return to staff for additional work. ☐ No further action requested.

☒ Other (specify): Requesting authorization at the October 12 Board meeting

PURPOSE or ACTION REQUESTED:
Authorization to submit the revised draft Watershed Management Plan to the Board of Water and Soil Resources (BWSR), Met Council, and state review agencies for final review and BWSR approval

PROJECT TIMELINE:

- June 22 - Board authorization to distribute draft Plan for 60-day review and comment
- September 5 – end of 60-day comment period
- September 28 – Board review and authorization of comment responses
- October 12 – public hearing and Board authorization to submit revised Plan for state agency review
- October 25 – submit Plan to state agencies for final review and approval
- December 20 – anticipated date of BWSR Board action on Plan approval

PAST BOARD ACTION:

- July 31, 2014 Board Meeting– Resolution 14-059: Adoption of a framework for the 2017 Comprehensive Plan update
- May 28, 2015 Board Meeting – Resolution 15-050: Appointment of Comprehensive Plan Advisory Committee Members
- October 8, 2015 Board Workshop – Resolution 15-085: Approval of process to evaluate and align District programs using strategic framework
- January 28, 2016 Board Meeting – Approval of revised Mission, Vision, Goals, and Guiding Principles
- September 8, 2016 Board Workshop – Resolution 16-076: Authorization for Plan extension
- February 9, 2017 Board Workshop – Resolution 17-007: Approval of MCWD's Strategic Direction and Adoption of 2017 Strategic Alignment Report

- June 22, 2017 Board Meeting – Resolution 17-043: Authorization to Distribute Draft Plan for Review and Comment
- September 28, 2017 – Resolution 17-061: Authorization of Comment Responses for the Watershed Management Plan

SUMMARY:

Background:
For the past two and a half years, the District has been working to develop its next generation Watershed Management Plan (Plan). This work has involved an extensive stakeholder process, including a series of meetings with technical, policy, and citizen advisory committees to discuss and vet the District's approach; subwatershed meetings to discuss local priorities and plans; and other targeted outreach efforts to local policymakers and technical staff.

The development of the Plan has also involved an extensive internal strategic planning process with staff and the Board to establish a clear and focused mission, vision, goals, and guiding principles; evaluate District programs; and establish clear and focused priorities for each program and the District as a whole.

The primary focus for the Plan update is on improving the District's implementation model following the direction established in the Board's *Balanced Urban Ecology* policy which aims to integrate the District's work with the built environment using the guiding principles of partnership, focus, and flexibility.

The draft Plan consists of three volumes. The first volume acts as an executive summary of the Plan, outlining the District's new mission and a high-level framework of how the District will achieve that mission. The second volume contains a synthesis of all pertinent data used in identifying specific resource issues and acts as the District library of all studies and data collected. The third volume expands on the District's implementation framework; defines issues, drivers, and management strategies for each of the District's 11 subwatersheds; and establishes priorities based on resource needs and opportunities created through integration with land use planning.

On July 7, 2017, the draft Plan was distributed for 60-day review and comment to the counties, cities, state review agencies, soil and water conservation districts, lake associations, and other stakeholders. The Plan was also made available on the District website. The District received a total of 34 comment letters. At the September 28, 2017 Board Meeting, the Board reviewed and authorized the distribution of responses to all comments received. The comments and responses have been distributed and posted on the District website. Staff is in the process of finalizing revisions to the Plan based on comments received.

October 12, 2017 Meeting:
All substantive Plan revisions have been made, and the revised sections are attached as red-lined text for Board review. These revisions address comments discussed at the September 28, 2017 Board Meeting and include:

- Section 2.1.2 – Clarification and additional information on the E-Grade Program
- Sections 2.2.4 and 3.5.7 – Clarification on public drainage systems and District obligations
- Section 3.4.1 – Clarification on the District's role in flood control/mitigation
- Sections 3.5.6 and 3.10 – Clarification regarding Land Conservation program activities
- Section 3.7 – Expanded explanation of the District's goal-setting and evaluation framework; reference to the District's TMDL Credit Distribution Policy; and table summarizing approved TMDLs
- Sections 3.9.8 and 3.9.11 – Addition of project-specific phosphorus load reduction estimates

A public hearing will be held at the October 12, 2017 Board Meeting to invite further input on the draft Plan. Pending any further comments received at the hearing, staff plans to request Board authorization to distribute the revised Plan to the BWSR, Met Council, and state review agencies for final review and BWSR approval. If substantive comments are received at the hearing, the resolution can be advanced to a later meeting.

Next Steps:
Following Board approval, staff will finalize the remaining non-substantive revisions and distribute the Plan by October 25, 2017.

Attachments:

- Revised Plan sections (red-lined text):
  - Section 2.1.2 – Volume 2 Introduction: Monitoring Program Data
  - Section 2.2.4 – Watershed Overview: Water Resources
  - Section 3.4.1 – Implementation Model: Understanding Resource Needs
  - Section 3.5.6 – MCWD Programs: Land Conservation
  - Section 3.5.7 – MCWD Programs: Project Maintenance and Land Management
  - Section 3.7 – Evaluation and Reporting
  - Section 3.9.8 – Subwatershed Plans: Minnehaha Creek CIP
  - Section 3.9.11 – Subwatershed Plans: Six Mile-Halsted Bay CIP
  - Section 3.10 – Clarification regarding Land Conservation program activities

RESOLUTION

RESOLUTION NUMBER: 17-063

TITLE: Authorization of Comment Responses for the Watershed Management Plan

WHEREAS, the District's next generation Watershed Management Plan (Plan) is due for adoption by December 31, 2017, per extension from the MN Board of Waters and Soil Resources; and

WHEREAS, on July 31, 2014, the Board approved a framework for updating the Plan that identified the primary focus of improving the District's implementation model following the direction established in the Board policy, *In Pursuit of a Balanced Urban Ecology in the Minnehaha Creek Watershed*; and

WHEREAS, development of the Plan has involved an extensive stakeholder process, including a series of meetings with technical, policy, and citizen advisory committees to discuss and vet the District's approach; subwatershed meetings to discuss local priorities and plans; and other targeted outreach efforts to local policymakers and technical staff; and

WHEREAS, development of the Plan has also involved an extensive internal strategic planning process with staff and the Board to establish a clear and focused mission, vision, goals, and guiding principles; evaluate District programs; and establish clear and focused priorities for each program and the District as a whole; and

WHEREAS, per MN Statutes 103B.231, on July 7, 2017, the District distributed the draft Plan for a 60-day review and comment period to all counties, the Metropolitan Council, the state review agencies, the Board of Water and Soil Resources (BWSR), soil and water conservation districts, towns, and cities; and

WHEREAS, at the September 28, 2017 Board Meeting, the Board reviewed and authorized the distribution of responses to all comments received; and

WHEREAS, the comments and responses were distributed to the cities, counties, state agencies, and other commenters and posted on the District website on October 2, 2017; and

WHEREAS, the District held a duly noticed public hearing on October 12, 2017 and the Board considered all public input received;

NOW, THEREFORE, BE IT RESOLVED that the Minnehaha Creek Watershed District Board of Managers authorizes staff to distribute the revised Plan, including any final non-substantive edits, to the BWSR, Met Council, and state review agencies for final review and BWSR approval.

Resolution Number 17-063 was moved by Manager _____, seconded by Manager _____. Motion to adopt the resolution ___ ayes, ___ nays, ___abstentions. Date: _____.

_____ Date:_____

Secretary

2.1.2 MONITORING PROGRAM DATA:

E-Grade Program:

In 2014, the District began developing a new tool to evaluate and broadly characterize the health and function of the watershed. The Ecosystem Evaluation Program, or E-Grade for short, will provide a holistic assessment of ecosystem health. The results from the E-Grade assessment will then allow the District to diagnose issues and stressors to guide management strategies.

Historically, water quality has been characterized by three measures: water clarity (i.e., Secchi depth measurements), chlorophyll-a, and total phosphorus concentrations. These measures are used to compute grades (ranging from A to F) on lakes. The public often uses the lake grades to assess which lakes to recreate upon, where to purchase lakefront property, and to request improvement of a waterbody from the District. However, the current grades are only a partial snapshot of a lake's health, because they exclude other indicators of a healthy ecosystem like flood control and habitat diversity. The current lake grading system also does not consider the interaction between lakes and other landscape types such as streams and uplands. The current system does not differentiate between deep and shallow lakes, which function very differently. Furthermore, there are more types of water bodies in the District than just lakes – such as wetlands and streams – yet the overall health and function of these waters has not been assessed to the same degree as lake systems, and the interaction amongst the many ecosystems has not been effectively studied and documented.

The E-Grade program will provide a better understanding of not only deep lakes ~~(1)~~, but also four other landscape types: ~~(2)~~ shallow lakes, ~~(3)~~ streams, ~~(4)~~ wetlands, ~~(5)~~ uplands. Each of the landscape types will be evaluated on six interdependent ecosystem services and the conditions that affect their performance. As it will more thoroughly assess waterbodies and uplands, E-Grade will lead to identification of more localized ecosystem issues and stressors, and better inform the management strategies of the District and its partners. As a result, project goals can be expanded beyond traditional metrics such as phosphorus reduction to include more complex metrics based on biological components. This science-based information will allow the District to better identify areas in highest need of improvement or protection, which in turn will inform priority-setting for District activities. Secondarily, E-Grade will broadly characterize watershed health to better educate the public.

Program Design:

Ecosystem services are functions that natural systems perform to the benefit of the environment. Ecosystem services are key to sustainability, and how well services function affects the quality of ecosystems. Given this understanding, the United Nations (UN) Environment Programme began an integrated approach to ecosystem management that "focuses on sustaining ecosystems to meet both ecological and human needs" (*United Nations Environment* - web.unep.org/ecosystems/who-we-are/about-ecosystems). The UN's integrated ecosystem management approach identified about three dozen ecosystem services to manage.

The E-Grade Program is based on this integrated approach and is being developed as an integrated watershed management tool. For the District, six ecosystem services were selected to best characterize ecosystem quality. The E-Grade integrated watershed management tool will allow the District to preserve and improve water quality, water quantity, and ecological integrity while promoting and enhancing the value of water resources that will lead to thriving communities.

Development of E-Grade was performed by District staff and Wenck Associates, and included the participation of a Technical Advisory Committee (TAC). Members of the TAC included representatives of state, local, and regional agencies, as well as academics from the University of Minnesota. The TAC provided guidance and feedback on which ecosystem services to select as well as the metrics to be used in assessing ecosystem performance. The TAC also provided biological data collected by other agencies and schedules for collection of this data. Their effort fulfilled two goals – to maximize the use of existing data and to provide professional rigor to a scientific foundation for E-Grade.

~~*Influence of Ecosystem Assessment*~~*Services, Functions and Measures:*~~:~~

~~MCWD will use the results of E-Grade in two avenues: (1) broadly characterize watershed health to better educate District staff as well as the public, and (2) diagnose issues and stressors at a project-specific scale to guide management strategies. As a result, project goals can be expanded beyond traditional metrics such as phosphorus reduction to include more complex metrics based on biological components. This science-based information will allow the District to better identify areas in highest need of improvement or protection, which in turn will inform priority-setting for District activities.~~

As previously noted, E-Grade will assess six ecosystem services for each of the five landscape types. The E-Grades ~~five landscape types are: deep lakes, shallow lakes, streams, wetlands and uplands, and the six ecosystem services assessment of the overall health and function~~ will be scaled from individual waterbodies and summarized up to the watershed level (Figure 2.1). The function and measures for each ecosystem service at each landscape type are listed in Table 2.1. The classification breakpoints for all the metrics is based on literature, widely accepted state agencies' standards, and/or recommendations by the TAC. The performance of the ecosystem services for each of the five landscape types will be graded using the terminology in Table 2.2.

Figure 2.1. Scale of E-Grade Assessment Tool.

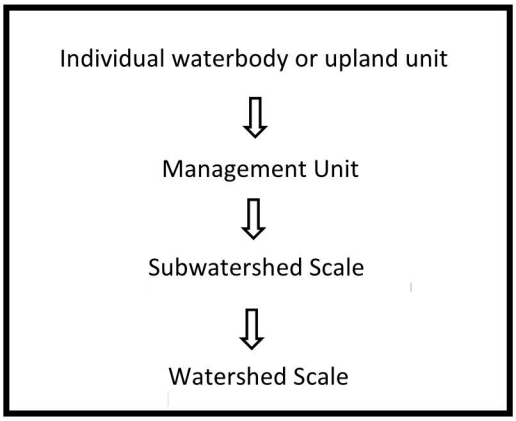

Table 2. 1. E-Grade Ecosystem Services, Functions and Measures.

Ecosystem Service	Functions	Measure	Landscape Types				
			Deep Lakes	Shallow Lakes	Streams	Wetlands	Uplands
Groundwater Supply	Groundwater Recharge	Groundwater Supply				X	X
Flood Control	Watershed Storage	Watershed Storage	X	X		X	
		Stormwater retention and detention					X
		Wetland Density				X	
	Floodplain Encroachment	Barriers in the Floodplain			X		
Biodiversity	Resilient Biological Community	Fish Community Quality	X		X		
		Aquatic Vegetation Quality	X	X		X	
		Macroinvertebrate Community Quality			X		
Habitat Diversity	Habitat for Fish, Macroinvertebrates, and Wildlife	Aquatic Vegetation Quality	X	X			
		Shoreline Quality	X	X			
		Stream Habitat Complexity			X		

		Connectivity			X	X	
		Stream Water Quality			X		
		Hydrology			X		
		Wetland Size				X	
Nutrient Cycling	Nutrient: Sink, Source, and/or Transformer	Eutrophication Indicators	X	X			
		Nutrient Concentrations in Stream			X		
		Wetland Soil Chemistry				X	
Recreation	Swimmability	Water Clarity	X	X	X		

~~A variety of relevant metrics have been identified for each of the ecosystem services. The classification breakpoints for all the metrics is based on literature, widely accepted state agencies' standards, and/or recommendations by the TAC. The performance of the ecosystem services for each of the five landscape types will be graded using the terminology in Table 2~~1.1.

Table 2. ~~1.~~2. E-Grade Technical Threshold Descriptions.

Technical Threshold Descriptions	
Exceptional	Community structure and species composition or ecosystem processes are near reference conditions. The most relatively pristine communities.
Good	Community structure and species composition or ecosystem processes are beginning to show signs of disturbance, but support the ecosystem service.
Poor	Community structure and species composition or ecosystem processes show obvious signs of disturbance.
Degraded	Community structure and species composition or ecosystem processes are showing high levels of disturbance.

Implementation Schedule:

The E-Grade program is a ten-year cycle that broadly characterizes ecosystem health throughout the District. With this cycle, the five landscape types within each subwatershed will be intensively monitored over a three-year period followed by a seven-year lag until they are monitored again. The eleven subwatersheds have been divided into three groups for the more focused three-year monitoring and assessment required for E-Grade. The E-Grade report schedule is: ~~These groups and their initial rotating schedules are:~~

- ~~Group 1:~~E-Grade Report Release in 2018
  - Minnehaha Creek
  - Schutz Lake
  - ~~,~~Six Mile Creek~~, Minnehaha Creek~~
  - ~~Monitoring: 2014-2016~~
  - ~~Program Completion: 2017~~
  - ~~Report release: 2018~~

- E-Grade Report Release in 2019
  - ~~Group 2:~~ Christmas Lake
  - Dutch Lake
  - Gleason Lake
  - Lake Minnetonka

- Lake Virginia
- ~~,~~ Langdon Lake
- ~~,~~ Long Lake Creek
- ~~,~~ Painter Creek
- ~~Monitoring: 2018-2020~~
- ~~Report release: 2021~~

Note: E-Grades will be based on data collected prior to 2018

- ~~Group 3: Christmas Lake, Gleason Lake, Lake Minnetonka, Lake Virginia~~
  - ~~Monitoring: 2021-2023~~
  - ~~Report release: 2024~~
  - ~~District-wide Report release: 2024~~

The E-Grade Program will characterize ecological health throughout the District ~~on a subwatershed-scale rotation~~ with the first subwatershed reports to be published in 2018. The data gathered, collected and analyzed will allow the District to better identify areas in highest need of improvement or protection. ~~-~~Volume 2 will be updated with the results of ~~as~~an E-Grade ~~rotates~~ assessment for each~~through~~ the subwatershe~~ds~~d. ~~collecting and analyzing new data sets.~~

2.2.4 WATER RESOURCES:

~~Ditches~~Public Drainage Systems:

Throughout many parts of Minnesota, including lands now within the Twin Cities metropolitan area, surface drainage systems ~~Historically, counties have been responsible for establishing and maintaining public drainage systems including ditches. Most ditches~~ were established in the early 1900's to promote agricultural activities on lands that were marginally productive because of wet conditions or to enable other uses. These ditch and tile systems were constructed pursuant to a set of laws referred to as the Minnesota drainage code that date to the late 1800's and continue in force today at Minnesota Statutes chapter 103E. Section 103E.005, subdivision 12, defines "drainage system" as:

> A system of ditch or tile, or both, to drain property, including laterals, improvements, and improvements of outlets, established and constructed by a drainage authority. "Drainage system" includes the improvement of a natural waterway used in the construction of a drainage system and any part of a flood control plan proposed by the United States or its agencies in the drainage system.

~~These areas were ditched and tiled through establishment of a public drainage system under Minnesota Statute Chapter 103E so more land would be available for agricultural production or other use.~~

The type of drainage system referenced by this definition and governed by Chapter 103E is a "public" system that typically provides a conveyance and outlet for surface drainage from multiple tracts of land. Public systems are differentiated from private drainage that a property owner may install to a natural outlet or connect to a public drainage system.

~~In areas that have since become urbanized, the need for agricultural productivity and drainage disappeared. Open ditches in urban areas of the District have been replaced with subsurface storm sewers. Often the storm sewers were constructed in different locations and alignment than that of the ditch they replaced and the old channels were filled in. However, in the more rural areas of the District the ditches remain, for the most part, open channels.~~

The eight public ditches for which the District is responsible are:

1. Judicial Ditch 2 – Six Mile Creek (mainly open channel)

2. County Ditch 10 – Painter Creek (mainly open channel)
3. County Ditch 14 – from St. Louis Park into Lake Calhoun (storm sewer)
4. County Ditch 15 – into Gleason Lake (open channel/sewer)
5. County Ditch 17 – from Edina to Lake Calhoun (storm sewer)
6. County Ditch 27 – part of Long Lake Creek (mainly open channel)
7. County Ditch 29 – from St. Louis Park into Lake Calhoun (storm sewer)
8. County Ditch 32 – out of Gleason Lake in Wayzata (open channel/sewer)

Figure 2.5 shows the general locations of County/Judicial Ditches within the District.

Under the drainage code, public drainage systems principally are managed by counties; however, by resolution of a county board, this responsibility may be transferred to a watershed district. In 1971, t~~T~~he District petitioned Hennepin County to transfer this responsibility for ~~the ditches to MCWD in 1971. The petition stated that MCWD intended to define the function of the ditches~~those county systems within the watershed. ~~The authority for Judicial Ditch 2 (Six-Mile Creek) was transferred to the District by court order on March 27, 1972 (a judicial ditch is located in more than one county).~~ The authority for the seven Hennepin County ~~Ditches~~ systems was transferred by Hennepin County Board resolution on March 28, 1972. The authority for Judicial Ditch 2 (Six-Mile Creek) was transferred to the District by court order on March 27, 1972 (a judicial ditch is located in more than one county and therefore, under the earlier drainage code, was managed through the district court).

~~The eight public ditches for which the District is responsible are:~~

~~Judicial Ditch 2 – Six Mile Creek (mainly open channel)~~
~~County Ditch 10 – Painter Creek (mainly open channel)~~
~~County Ditch 14 – from St. Louis Park into Lake Calhoun (storm sewer)~~
~~County Ditch 15 – into Gleason Lake (open channel/sewer)~~
~~County Ditch 17 – from Edina to Lake Calhoun (storm sewer)~~
~~County Ditch 27 – part of Long Lake Creek (mainly open channel)~~
~~County Ditch 29 – from St. Louis Park into Lake Calhoun (storm sewer)~~
~~County Ditch 32 – out of Gleason Lake in Wayzata (open channel/sewer)~~

~~Figure 2.5 shows the general locations of County/Judicial Ditches within the District.~~ ~~The term "ditch" as used here generally refers to a public drainage system established under Minnesota Statutes Chapter 103E.~~ In areas served by public drainage systems that have since become urbanized, drainage for agricultural productivity has greatly declined and many systems either convey urban stormwater or have been replaced with, or rendered superfluous by, municipal storm sewers. Often the storm sewers were constructed in different locations and alignment than that of the drainage system they replaced and the old channels were filled in. County Ditches 14, 17 and 29 lie entirely within the Cities of St. Louis Park, Edina and Minneapolis, and are of this nature.

County Ditches 15 and 32 lie entirely within the City of Plymouth. The first is a series of ponds connected by pipe, and the second lies within Gleason Creek. These two systems, a combination of open channel and subsurface pipe, no longer serve agricultural drainage purposes but provide drainage for residential development and associated roads.

Judicial Ditch 2, County Ditch 10 and County Ditch 27 are located in the less-developed western portion of the District and consist entirely or almost entirely of altered natural channels. These systems continue to provide drainage for agricultural purposes as well as the development that has occurred in those areas.

3.4.1 UNDERSTANDING RESOURCE NEEDS

The first element of the District's implementation model is to understand water resource needs on a subwatershed basis. The MCWD maintains multiple technical data sets, summarized in Volume 2, that provide the District and its partners with the information needed to guide implementation planning. Analysis of these data enables the District to identify areas of highest need, based on sound science. This represents the first step in the iterative process of establishing implementation priorities.

Each subwatershed plan within Section 3.9 follows an issues, drivers, and strategies sequence as described below.

Issues

For purposes of Plan organization, all natural resource issues within the District are nested within the three strategic goal areas of Water Quality, Water Quantity, and Ecological Integrity. Each of these three goal areas are described in more detail below.

No issues are outlined within the goal area of Thriving Communities. Thriving Communities serves as an overarching organizing element to guide the District in implementing its natural resource mission. The District strives to implement its clean water objectives in ways that meaningfully contribute to the development of thriving communities. As such, this goal area is informed by the goals of individual communities and no specific issues are identified within this plan under Thriving Communities.

Water Quality Issues

The Environmental Protection Agency (EPA) and the Minnesota Pollution Control Agency (MPCA) define acceptable water quality as that which supports the designated use of the waterbody (e.g. fishable, swimmable, drinkable).

Pollution discharged to waterbodies impacts water quality. Pollutant discharge within the Minnehaha Creek watershed is primarily from non-point sources, carried to lakes, streams and wetlands by snowmelt or rainfall that runs across the landscape. Land use within the landscape influences both the quality and quantity of the runoff. Runoff contains sediment, nutrients and other contaminants that exceed what lakes, streams and wetlands would receive in an undeveloped watershed.

Within freshwater systems, an excess of nutrients like phosphorus (eutrophication) is the most common problem impacting the use of lakes and streams. Phosphorus impacts algal and plant productivity, water clarity, fish habitat and aesthetics. While other pollutants do stress freshwater systems, phosphorus is used as standard indicator of the health of a system.

This Plan considers good water quality to be achieved when the physical, chemical, biological and aesthetic characteristics of a waterbody support designated use. Because the principal standard by which water quality is judged is total phosphorus concentration, the water quality emphasis of this Plan is on reducing phosphorus loads to lakes to achieve standards set by the state.

Water Quantity Issues

As watersheds are altered and developed by humans, the flow of water across the landscape changes. In undeveloped watersheds rainfall largely infiltrates into the ground. However, historically, as watersheds were built out, drainage systems were installed both to remove surface water and lower groundwater for agricultural production, and to channelize and accelerate removal of surface runoff for urban development and infrastructure.

As watersheds ~~begin~~ began to include built components, channels were straightened, wetlands were filled, drainage ways were placed into pipes, natural vegetation was removed, and hard surfaces (parking lots, roofs, roads, etc.) were built.

Combined, these modifications reduce the infiltration and storage of water. The result is larger volumes of water draining through the system faster. The volume of water and the rate at which it moves through the watershed are defined as water quantity issues.

Water quantity is most often recognized as flooding. Flooding occurs when a watershed is overwhelmed with rainfall that cannot infiltrate into the ground, or be appropriately stored on the landscape. Flooding can occur at a system level, across the watershed on major lakes and streams, or more locally in ponds and in street systems that cannot adequately store or convey the water being received during and after storm events.

However, water quantity is also an issue when there is not enough water. Water is essential for aquatic life and the health of aquatic systems. Streams with highly modified watersheds, like Minnehaha Creek, have a high ~~levels~~ proportion of hard surface~~s~~ that pipes water directly to the stream. In an undeveloped condition water would be stored in wetlands or infiltrated into the ground. This water then would ~~then~~ be slowly released into the stream channel, promoting long periods of stable water flow. In modified watersheds stream flow can be "flashy,~~"~~ with water moving through the system quickly after rainfall events. In streams like Minnehaha Creek, this can result in intermittent flow and periods where the channel is dry. This water quantity issue directly impacts the ecological health of the stream, stressing fish, macroinvertebrates, plants, and other aquatic life.

Within this Plan, the District is focused on water quantity issues that stress the regional system. In general, the District considers LGUs to have the primary role with respect to flood prevention and management by virtue of their roles in land use planning and development regulation, as owner and operator of stormwater conveyance infrastructure, and as the implementing authority for the National Flood Insurance Program and the state floodplain management program (Minn Rules 6120). The District's primary roles related to flood management are: (1) management of the Lake Minnetonka/Minnehaha Creek regional conveyance system through the operation of Grays Bay Dam; (2) providing cities and the public with flood prediction data using the District's Hydraulic and Hydrologic model; (3) preserving local flood storage volume by regulating floodplain fill during development permitting; and (4) implementing and promoting stormwater management practices to address pollutant loading, prevent local peak flow increase and provide for volume reduction. The District serves as a technical resource and ~~The District~~ will work with its partners to plan and implement solutions that create a more resilient system that is capable of handling both ends of the water quantity spectrum.

Ecological Integrity Issues

Ecological integrity encompasses issues of water quality and water quantity, but is broken out for simplicity in Plan organization. The three primary elements of an ecosystem are its structure, composition and function. Structure refers to all of the living and non-living physical components that make up an ecosystems. Composition refers to the variety of living things within an ecosystems. Function refers to all of the natural processes that occur within an ecosystem.

Ecological integrity exists when the composition and function of the ecosystem are unimpaired by stresses from human activity. ~~When~~ It exists when natural ecological processes are intact and self-sustaining, ~~with~~ where the system ~~evolving~~ evolves naturally~~,~~ and with a capacity for self-renewal.

Within this plan, ecological integrity focuses on achieving balance between the built and natural environments, with ecosystems providing the highest possible measures of structure, composition and function. ~~Emphasis is placed w~~Within the implementation plan, emphasis is placed not only on improving structure, composition and function at an individual resource level, but on connectivity between aquatic and terrestrial ecosystems, and connectivity at a regional landscape scale.

Drivers

Within each subwatershed plan, issue drivers are identified. A driver of a water quality, water quantity, or ecological integrity issue is a driving force or stressor that causes a biological community or physical structure to change. For example, in regards to water quality issues, stormwater runoff and altered wetlands can drive excess nutrient loading, increase the quantity of water flowing downstream, and degrade habitat and ecological integrity.

Management Strategies

To guide planning and implementation efforts, the District has established a simple framework of general strategies that will address the identified issues. Management Strategies correlate directly to the drivers of the subwatershed system. If, for example, stormwater runoff is driving an increase in water quantity and degrading water quality, the appropriate management strategy will be managing stormwater runoff through the use of best management practices tailored to the individual circumstance. If degraded water quality within a lake is driven by the presence of common carp and internal loading, management strategies may include rough fish management, and alum dosing. These strategies cover both the short and long-term, and serve to guide the identification and prioritization of individual implementation efforts.

3.5.6 LAND CONSERVATION

Program Purpose

The District operates a Land Conservation Program to conserve natural resource areas for the purpose of protecting and enhancing water resources and ecological integrity. Under the Land Conservation Program, the District may acquire land in fee title or may acquire an easement or lesser interest.

The District acquires land interests for several purposes. The land may be a desired site for a District capital project or other improvement identified in its implementation plan. In this circumstance, the acquisition typically would be considered an element of the project in question and would not be funded or carried out under the Land Conservation Program.

Differently, a tract of land may be a site suited for improvements not yet programmed, but may be available under favorable conditions. Preserving the land in its unimproved state, or actively restoring and managing its ecological condition, may serve water resource goals identified in the subwatershed plan. A primary purpose of the Land Conservation Program is to conserve, restore and enhance green infrastructure for regional stormwater management, regional management of sediment and phosphorus flows resulting from land alteration, corridor protection, habitat, and other water resources benefits.

Background

In the District's 2007 watershed management plan, targets for land rights acquisition were mapped by identifying strategic locations at a landscape scale. Qualifying lands were those with resources protecting surface water and groundwater quality and quantity; those demonstrating high-value habitat characteristics; those protecting aquatic habitat; or those offering habitat supporting aquatic-based species abundance. More specifically, the District sought to:

- Create corridors along streams and channels to provide buffers for water quality and stream stability and create wildlife corridors.
- Include wetlands previously identified with exceptional or high vegetative diversity or wildlife habitat, or moderate-to-high restoration potential.
- Include high-value upland areas, such as forested areas with connected habitat and high potential infiltration or evapotranspiration.
- Incorporate land cover types identified in the Minnesota Land Cover Classification System (MLCCS) survey conducted by Hennepin County as minimally disturbed with potential high-value habitat.

- Contain areas with multiple natural resource values, such as Minnesota County Biological Survey (MCBS) sites of biodiversity significance; Metro regionally significant ecological areas; or areas where the DNR had documented rare or threatened species.
- Incorporate green and natural resource corridors as designated by the DNR, Metropolitan Council, Hennepin County and local communities.

Section 2.3 includes a map for each subwatershed (titled Recreation and Other Features) showing lands where the District owns fee title or a conservation easement as a result of implementing the Land Conservation Program over the prior planning period. As the result of applying the above criteria, the District has acquired rights in ecologically connected tracts that together afford the District a land platform for regionally significant work in locations such as the Painter Creek and Six Mile Creek subwatersheds. However, acquisition strategy was not explicitly driven by aggregating holdings for such purposes or by the intent to serve specifically prioritized subwatershed goals.

Program Description

The Plan is oriented on achieving District strategic water quality, water quantity and ecological integrity goals. Each subwatershed plan will particularize these goals at a subwatershed level and identify implementation actions to achieve them. Land Conservation Program activity will be driven more specifically to achieve these subwatershed goals and to facilitate these implementation actions. The District will seek to implement the Program through the partnership framework of the Plan, so that District land and easement acquisitions and other Program activity defining land use and protection will align with land use priorities of local units of government, park agencies and other local partners.

In addition to its own acquisition of lands and land rights, under the Land Conservation Program the District may direct funds and staff resources toward the following, when they serve District strategic goals:

- Assisting landowners and local units of government to explore conservation options.
- Encouraging natural-resource oriented land management and ecological restoration.
- Facilitating conservation development by participating in local land use planning and ordinance development, assisting technical evaluation and serving as a conservation easement holder.
- Supporting cost-share, partnership, and tax incentive opportunities for landowners and other partners.

This Plan specifically supports District land rights acquisition through a watershed-wide implementation program. This program specifies a 10-year budget for the Land Conservation Program, further broken down into Program activities ranging from land rights acquisitions and management of District landholdings, to technical assistance. Acquisitions under the implementation program budget will link to land rights acquisition needs, as well as land management, technical assistance and similar support activities, identified through subwatershed planning. As Table 3.17 indicates, the District estimates expending $25 million over the 10-year planning period for land rights acquisitions, with a portion of that amount to support related program elements listed above. This~~The~~ budget amount ~~will indicate total expenditures~~is net of funds received into the program by grants, property reconveyance and any other external source. The acquisition expenditure of $25 million, or an average of $2.5 million/year, encompasses both direct spending and debt service for financed acquisitions. The District will rely principally on its ad valorem levy to meet this spending level, though also will consider other sources as may be available.

The implementation program description does not identify specific acquisitions. Instead, it references land-based implementation actions that will achieve subwatershed goals. Land rights availability is highly opportunity-based and, further, identifying specific properties in a plan format would put public funds at a disadvantage in negotiating with landowners. In addition, the timing of land rights purchases typically is driven by external (landowner) requirements that would not easily accommodate additional procedures to formally incorporate specific acquisitions into the Plan. The above implementation program description, with its linkage to identified

subwatershed goals, and in conjunction with the procedures stated here, is intended to meet Plan requirements for capital expenditures.

In addition, individual land acquisition opportunities not specifically rooted in subwatershed implementation programs may arise. The District may have an opportunity to acquire a fee or easement interest for a favorable price. It may be property owned by the state for nonpayment of taxes and available to local units of government, or private land placed on the market on favorable terms, or offered to the District at a below-market price for tax benefits or other reasons. It may be undevelopable land that has a low market value but value for water resource purposes.

The Land Conservation Program allows the District to acquire such lands or easements. Before committing funds to acquire a fee or easement interest under this circumstance, the Board of Managers will consider and make findings as to the following:

- The potential suitability of the property for a capital project or other project identified in the Plan.
- The potential for the land rights to facilitate the District's pursuit of its strategic water quality, water quantity and ecological integrity goals with respect to the specific subwatershed.
- The market value of the rights to be acquired, by means of appraisal or other valuation as the Board of Managers determines appropriate for the transaction.
- The extent to which the water resource purposes of the acquisition may be achieved without the District's spending public funds, due to physical, regulatory or similar constraints on use of the property.
- Ongoing property management costs.
- The District's ability to dispose of its property interests if the potential use on which the decision to acquire is based fails to materialize.

Acquisition Procedures

For any land rights acquisition under the Land Conservation Program, the District will follow these procedures:

1. The District will solicit review by a technical advisory team that includes staff from several natural resource agencies. The advisory team's recommendations will be a part of the record forwarded to the Board of Managers as it decides on a potential acquisition.
2. The District will consult with the local unit of government in which the land is located regarding alignment of the District's proposed acquisition with local land use, park and related plans. The precise means of consultation will vary depending on circumstances such as the extent of ongoing coordination, timing urgency, the sensitivity of negotiations, the scale of the acquisition, and what District staff determines to be warranted in order to understand the LGU's position with confidence. The result of the consultation also will be forwarded to the Board of Managers.
3. The acquisition will be valued by appraisal or other means pursuant to a written appraisal policy adopted by the Board of Managers.
4. The District's legal counsel will be retained to advise as to the structure and terms of, and prepare the necessary documents for, the transaction.
5. In accordance with Minnesota Statutes §103B.251 governing capital expenditures, the Board of Managers will notice and hold a public hearing to receive public comment on the proposed acquisition.
6. The Board of Managers will approve any acquisition in open meeting.

These steps may be updated from time to time by the Board of Managers without a formal amendment to this plan, provided that they continue to advance a detailed and thorough case-by-case review of each potential

transaction, have an appropriate level of legal review, and continue to require ~~final~~ approval of all transactions by the Board of Managers.

Land Management and Restoration

When an acquisition occurs, the District will prepare a management plan for the property that will present a recommended management status and, as relevant, evaluate restoration opportunities and costs in more detail. Site management and restoration activities on District land or pursuant to a District easement may be funded under the Land Conservation Program or under another identified land restoration program. The types of activities that the District may include in parcel restoration work include activities such as the following:

1. Regrading for natural system restoration.
2. Excavating to enlarge wetland or improve wetland functions and values.
3. Remeandering of a small section of creek, ditch or other watercourse.
4. Removing drainage tiles, placing ditch plugs and other steps to restore natural hydrology.
5. Installing erosion control and stabilizing banks with engineered and bioengineered features.
6. Installing local stormwater conveyance/control structures such as culverts and weirs.
7. Installing stormwater treatment best management practices.
8. Planting native vegetation.
9. Managing existing vegetation and invasive species via cutting, herbicides, prescribed burning and other techniques.

When the proposed work constitutes a capital improvement, it will be considered and authorized pursuant to the formal process specified at Minnesota Statutes §103B.251. If the proposed work is a capital improvement beyond the scope of restoring the natural features and function of the acquired property, it will not fall within the Land Conservation Program and must be established independently through applicable plan amendment and ordering procedures.

Partners

There are a number of other units of government with which the District may collaborate under this Program. Table 3.1 lists some of the agencies active in the District and roles in the Land Conservation Program these agencies may assume:

Table 3.1 MCWD Land Conservation Program potential partners

Organization/Agency	Role
MCWD	Acquisition of conservation easements and fee title; restoration of conserved lands; cost-share on private land restoration
Cities	Varies by city. Some have active land and easement acquisition programs ~~(ex. Minnetonka)~~. Others use park dedication through the development process to help secure greenway areas ~~(ex. Minnetrista)~~. Also see LGU requirements below.
Minneapolis Park and Recreation Board	Park and trail acquisition and management
Hennepin County Dept. of Environmental Services	Acquisition of donated conservation easements; cost-share and technical assistance for restoration and best management practices
Hennepin County Regional Rail Authority	Trail acquisition and maintenance
Carver County Parks	Park and trail acquisition and management
Three Rivers Park District	Park and trail acquisition and management

Organization/Agency	Role
Metropolitan Council	Partial funding for regional parks and trails
State of Minnesota	DNR owns and manages Wolsfeld Woods and Woodrill Scientific and Natural Areas. DNR provides grants to cities for acquisition. Funding for state and regional parks and trails.
US Department of Agriculture/Natural Resources Conservation Service and Farm Services Agency	Cost-share and technical assistance for restoration and best management practices
US Fish and Wildlife Service	Cost-share and technical assistance for restoration
The Trust for Public Land	Assists government agencies and non-profit organizations with acquisitions, financing for acquisitions, and prioritizing lands to conserve in urban and developing areas.
MN Land Trust	Acquires and monitors conservation easements, primarily through donation or as part of conservation development projects. Works with individual landowners and developers.
The Nature Conservancy	Owns and manages two nature reserves in the District – Hardscrabble Woods (Minnetrista), Ferndale Marsh (Wayzata)
Embrace Open Space	Education, technical assistance, and communications on open space issues for local communities.
Wildlife Organizations (e.g. MN Waterfowl Association)	Cost-share and technical assistance for restoration

3.5.7 PROJECT MAINTENANCE AND LAND MANAGEMENT (PMLM)

Program Purpose

Actions detailed in the subwatershed plans will require ongoing maintenance and management activities. The PMLM program's role is to maintain the District's capital investments, manage District lands, operate functional District infrastructure, and coordinate the District's response for flood events. The PMLM program has compiled an Operations and Maintenance (O&M) Manual which outlines the inspection, operation, and maintenance requirements and responsibilities for each of the District's past capital improvement projects. The O&M Manual will be updated regularly to include new capital improvement projects as they are implemented.

The PMLM program has also assembled an Infrastructure Maintenance Plan, which identifies annual repairs and their associated costs needed to repair and replace District infrastructure as it ages. Implementation of the District's Infrastructure Maintenance Plan will proactively address issues with aging infrastructure and limit liability associated with infrastructure failure. The Capital Improvement Program includes a cost estimate for the ongoing project maintenance and land management activities.

The District is the drainage authority for County Ditches 10, 14, 15, 17, 27, 29, and 32 and Judicial Ditch 2, as described in Section 2.2.4 and shown on Figure 2.5. The PMLM program includes inspectings and maintainings public ditchdrainage systems within the District as required under the drainage code, Minnesota Statute Chapter 103E. County Ditches 14, 17, and 29, withinIn urban areas of the District, a majority of the public ditches have been replaced by storm sewers or a combination of storm sewers and open channel, including County Ditch 14, 15, 17, and 29County Ditches 15 and 32 continue to serve drainage purposes, but principally as municipal stormwater conveyance. The drainage code allows for a drainage system to be abandoned, in whole or part, if it no longer provides a drainage benefit to assessed lands. It also provides for a system to be transferred to a municipality or other body when the system is better managed as stormwater conveyance infrastructure rather than under the drainage code. The District, in cooperation with the relevant local government units, may consider whether one or more of its urban systems is appropriately subject to a shift in management pursuant to these drainage code

provisions. ~~. In these instances, the District will consider abandonment, where appropriate, or turning jurisdiction over to local communities.~~ County Ditches 10~~,~~ and 27, ~~and 32~~ and Judicial Ditch 2, are altered natural watercourses that continue to provide valuable drainage conveyance for agricultural and other purposes. ~~In these cases, where appropriate, the District will consider redefining these ditches as streams where natural conditions dominate in the context of State Law.~~ The District intends to continue to manage these systems under the drainage code.

3.7 EVALUATION AND REPORTING

~~The District uses a variety of strategies to evaluate its performance and measure progress toward its strategic goals of Water Quality, Water Quantity, and Ecological Integrity. These evaluation and reporting processes are designed to meet the requirements of MN Rules 8410 and the District's Municipal Separate Stormsewer System (MS4) Permit.~~

3.7.1 GOAL-SETTING FRAMEWORK

Section 3.3 describes the District's four strategic goals of Water Quality, Water Quantity, Ecological Integrity, and Thriving Communities. As noted in previous sections, the strategic goal of Thriving Communities serves to guide the District in implementing its natural resource mission in ways that meaningfully contribute to the development of thriving communities. Progress toward this strategic goal is not subject to measurement through the water resource metrics of Minnesota Rules 8410, but will be tracked by means developed in conjunction with the District's individual communities. Progress toward the remaining three strategic goals will be assessed as discussed in this section.

Each of the District's strategic goals encompasses a range of goals specific to concerns at a subwatershed or other more local level. In addition, to evaluate the performance of individual capital projects or other initiatives, in order to address project function, refine subwatershed implementation plans or provide for meaningful technology transfer, requires performance monitoring that is project and location specific. To assess progress toward the strategic goals, then, the District must develop and track more specific, quantifiable goals and metrics.

In addition, the District's implementation approach, based on collaborative planning with its stakeholders and largely opportunity-driven, means that it is not practical to prescribe specific local goals at the beginning of the ten-year planning cycle.

For these reasons, the District intends to set goals, establish performance monitoring plans and evaluate performance through a sequential process that begins with strategic goals and long-range targets and leads to subwatershed and then project-specific targets, performance measurement and evaluation.

Table 3.2 describes the District's strategic goals and ~~specific~~ the long-range targets associated with each. For the goal areas of water quality and ecological integrity, the measurable target is to achieve state standards for the impaired waters in the District. These impairments and the associated Total Maximum Daily Load (TMDL) studies are discussed further in Section 3.7.3. The measurable target for the water quantity is to, at a minimum, prevent an increase in peak stormwater flow or stormwater flow volume at critical locations. In addition, the District has identified a target of preserving existing wetland acreage as a means to serve all three of these strategic goals. Apart from the District's own wetland restoration work, it tracks gain and loss of wetland acreage through its implementation of WCA and its own wetland rule.

As discussed in Section 3.4, over the planning period the District will pursue a priority subwatershed approach, in which the District will implement coordinated projects and initiatives within a defined subwatershed identified through a planning process that integrates local interests. The result of this planning process will be an implementation program that addresses subwatershed-specific issues and priorities articulated in the Plan. The implementation program will include implementation goals and targets, and a plan of monitoring or other performance measurement that will allow performance toward these goals and targets to be assessed. When an individual project or initiative is pursued independent of the priority subwatershed process, a component of the

design will include a statement of project targets and a performance assessment plan specifically oriented toward the project goals and targets.

The Plan, at Section 3.9, also includes certain already-defined capital projects that are intended to reduce phosphorus loading. For these, each project description includes an estimated load reduction. These estimates will be refined through project feasibility and design.

Table 3.2. District goals and targets

Strategic Goal	Description	~~Specific~~ Long-Range Targets
Water Quality	Conserve, maintain, and improve the aesthetic, physical, chemical, and biological composition of surface and groundwater within the District.	Achieve state standards for nutrient, chloride, *E. coli*, and dissolved oxygen impairments in the District.
Water Quantity	Maintain or reduce existing flows from drainage within the watershed to decrease the negative effects of stormwater runoff and bounce from existing and proposed development as well as provide low flow augmentation to surface waters. Protect and maintain existing groundwater flow and promote groundwater recharge.	No net increase in volume or rate of stormwater runoff.
Ecological Integrity	Maintain and enhance floral and faunal quantity and ecological integrity of upland and aquatic resources throughout the watershed.	Achieve state standards for fish and macroinvertebrate bioassessment impairments in the District.
All of the above	Maintain or increase existing acreage of wetlands in the watershed and achieve no net loss in their size, quality, type, and biological diversity.	No net loss of wetland acreage.

3.7.~~1~~2 TYPES OF EVALUATION AND REPORTING

The District uses a variety of ~~strategies~~methods to evaluate ~~its~~ performance and measure progress toward ~~its~~District ~~strategic~~ goals, as described below ~~of Water Quality, Water Quantity, and Ecological Integrity~~. These evaluation and reporting processes are designed to meet the requirements of MN Rules 8410 and the District's Municipal Separate Storm~~s~~ Sewer System (MS4) Permit.

~~As described above, the District uses a combination of observed and projected outcomes to track progress toward its goals.~~ Table 3.3 provides a summary of key metrics that are tracked by the District, the programs responsible for tracking them, and the frequency with which they will be reported. These metrics will be tracked by subwatershed and summarized as part of the District's ~~annual~~ reports to the MN Pollution Control Agency and MN Board of Water and Soil Resources and in accordance with the biannual evaluation required by Minnesota Rules 8410. The reporting function will serve as a vehicle to engage with these agencies on matters of performance and accountability.

Observed Outcomes

The District has a robust monitoring program that measures progress toward the District's water quality, water quantity, and ecological integrity goals using a variety of metrics. This includes regular baseline monitoring to identify impairments and track trends over time; expanded monitoring through the District's E-grade program to broadly characterize ecosystem health on a 10-year rotating basis; and effectiveness monitoring to more directly measure the effectiveness of select District capital projects. The District's monitoring program is described in more detail in Section 2.1, including a summary of ~~the~~ monitoring locations, ~~frequency, and~~ parameters measured, and frequencies.

Projected Outcomes

Given the length of time it can take to observe changes in water quality, water quantity, and ecological integrity on the landscape, and the ~~difficulty of attributing~~complexity of linking those changes ~~directly~~ causally to the District's work, the District also relies on projections or estimates to measure progress toward its goals. ~~These~~ This includes the use of models to estimate metrics like phosphorus load reduction or volume reduction resulting from District capital projects, permit compliance, and grants. The District ~~also~~ tracks as well a number of discrete metrics that ~~have assumed~~serve as surrogates for water quality, water quantity, and ecological integrity benefit, such as acres of wetland restored and lineal feet of shoreline restored.

The District also tracks a number of metrics related to citizen engagement and awareness based on the assumption that increased awareness leads to action. Through various methods of data collection, the District is able to assess how many people are being reached, what they are learning, and the actions they are taking to protect and improve water quality. Approximately every five years the District conducts a public opinion survey of its residents to assess their level of awareness of the District and water quality issues, their perception of the condition of local lakes and streams, the personal actions they take to protect clean water and other metrics. The District also tracks and evaluates participation in its events, workshops, and programs such as Master Water Stewards and Watershed Association Initiative. Analytics from the District's online presence provide information on how many people are following the District's social media accounts (Facebook, Twitter, Instagram and YouTube), subscribe to the District's on-line newsletter, and visit the District's website.

While the District does not define specific issues or ~~objectives~~targets related to its strategic goal of Thriving Communities, the District is interested in quantifying and tracking outcomes related to broader community value. Examples include increased green space, access to water resources, and recreational opportunities.

District Effectiveness

As part of the development of this Plan, the District undertook an internal strategic planning process to establish clear and focused mission, vision, goals, and guiding principles; and to evaluate District programs to ensure alignment with the mission and improve effectiveness. The process resulted in a Strategic Alignment Plan that established clear and focused priorities for each program and the District as a whole. The District intends to use this Strategic Alignment Plan as a foundation to evaluate new initiatives and revisit existing work to ensure that the District maintains its focus and alignment moving forward.

~~3.7.2 METRICS~~

~~As described above, the District uses a combination of observed and projected outcomes to track progress toward its goals. Table 3.3 provides a summary of key metrics that are tracked by the District, the programs responsible for tracking them, and the frequency with which they will be reported. These metrics will be tracked by subwatershed and summarized as part of the District's annual report to the MN Board of Water and Soil Resources.~~

Table 3.3. Metrics tracked by MCWD

Strategic Goal	Metric	Programs	Reporting Frequency
Water Quality	Lake and stream concentrations for: • Total and dissolved phosphorus • Total suspended solids • Chlorophyll-a • Secchi disc depth • Dissolved oxygen • Chlorides • *E. coli* bacteria (streams only)	Research and Monitoring	Annually

	Lake and stream trends for: • Total phosphorus • Total suspended solids • Chlorophyll-a • Secchi disc depth	Research and Monitoring	Annually
	Phosphorus load reduction (modeled)	Projects, Grants, Permitting	At least every 2 years
Water Quantity	Stream discharge and trends	Research and Monitoring	At least every 2 years
	Volume of runoff (modeled)	Projects, Grants, Permitting	At least every 2 years
Ecological Integrity	Index of Biotic Integrity for fish and macroinvertebrates	Research and Monitoring	Every 10 years
	MPCA Stream Habitat Assessment	Research and Monitoring	Every 10 years
	Shoreline/streambank restored	Projects	At least every 2 years
All of the above	Wetland restoration/loss	Projects, Permitting	At least every 2 years
	Community engagement: • Participants in events, workshops, and programs • Analytics on District website, social media, and newsletter	Education and Communications	At least every 2 years
	• Public opinion survey responses		Every 10 years

3.7.3 TOTAL MAXIMUM DAILY LOAD (TMDL) REQUIREMENTS

As noted previously, there are a number of impaired waters in the District for which TMDL studies have been completed (see Table 3.4). Through these TMDLs, the MPCA allocates pollutant load reduction obligations among entities determined to be responsible for pollutant loads to the impaired water, which includes the municipalities, road authorities and other MS4s such as the District whose stormwater conveyance systems outlet to the impaired water. These obligations become conditions of MS4 National Pollutant Discharge Elimination System (NPDES) stormwater permits administered by the MPCA. MS4s are then required to report annually to the MPCA on their progress toward achieving the necessary reductions.

The District's capital projects and other initiatives often are accomplished in partnership with its local government units (LGUs) and with a contribution of funds or other elements of value from those partners. Although the District is a regulated MS4, its jurisdiction is limited to areas served by storm water conveyances that are owned or operated by the District, so there have been few load reduction obligations assigned directly to the District through these TMDLs. For both of these reasons, the District adopted and implements a policy (Resolution 13-062) that describes how load reduction credits for District water quality improvement projects are allocated among itself and other LGUs for the purpose of TMDL reporting.

Under this policy, load reduction first is allocated to MS4 project partners in proportion to those partners' share of project funding, typically as the allocation is defined in the project agreement. Then, reduction is allocated to meet any WLA assigned directly to the District. Remaining credit then is allocated among LGUs within the drainage area of the impaired water, in proportion to their TMDL-assigned WLAs. The District adopted this policy with support from MPCA staff, and it was incorporated into both the Minnehaha Creek-Lake Hiawatha TMDL and the MCWD Upper Watershed TMDL.

The main purpose behind the policy is to ensure that credit for pollutant reductions achieved through District projects is distributed equitably and in a way that limits obstacles to collaboration among its member communities. The policy recognizes that the portion of load reduction not resulting from the specific financial or other value contribution from a project partner MS4 ordinarily derives from the District's watershed-wide *ad valorem* tax levy. Importantly, this policy allows encourages LGUs to collaborate with the District to put projects where they will be most effective for improving the resource and where opportunities exist, without concern for political boundaries.

As explained in MPCA guidance documents, the method that the MPCA presently requires for MS4s to report on TMDL load reduction progress gives reporting primacy to the MS4 in whose boundaries a best management practice or activity is located. This MS4 reports the entirety of the estimated reduction. Other MS4s that have contributed to the BMP/activity may report it without a quantified reduction. Those MS4s that discharge to the impaired water but that have not contributed to the cost of the BMP/activity do not report it. This is different from the District policy; the District is concerned that it may serve to introduce local interests concerning project location, and otherwise may have the effect of discouraging collaboration among the District and its LGUs. The District will work with the MPCA and its LGUs to explore and address this policy concern.

In addition to its own evaluation and reporting efforts, the District intends to serve in a coordinating role to track collective progress toward TMDL goals among MS4s within its boundaries.

Table 3.4. Impaired Waters with Approved TMDLs

Waterbody	Pollutant	Target	Reduction Needed
Brownie Lake	Chloride	See TCMA Chloride TMDL	
Diamond Lake	Chloride	See TCMA Chloride TMDL	
Dutch Lake	Total Phosphorus	40 µg/L	262 lbs
East Auburn Lake	Total Phosphorus	40 µg/L	626 lbs
Forest Lake	Total Phosphorus	40 µg/L	147 lbs
Gleason Lake	Total Phosphorus	60 µg/L	447 lbs
Hadley Lake	Total Phosphorus	40 µg/L	72 lbs
Halsted Bay	Total Phosphorus	40 µg/L	4210 lbs
Holy Name Lake	Total Phosphorus	60 µg/L	350 lbs
Jennings Bay	Total Phosphorus	40 µg/L	2518 lbs
Lake Hiawatha	Total Phosphorus	50 µg/L	1907 lbs
Lake Nokomis	Total Phosphorus	50 µg/L	399 lbs
Lake Virginia	Total Phosphorus	40 µg/L	77 lbs
Langdon Lake	Total Phosphorus	60 µg/L	84 lbs
Long Lake	Total Phosphorus	40 µg/L	742 lbs
Minnehaha Creek	*E. coli*	See Minnehaha Creek TMDL	
Minnehaha Creek	Chloride	See TCMA Chloride TMDL	

Mooney Lake	Total Phosphorus	60 µg/L	81 lbs
Painter Creek	*E. coli*	See Upper Watershed TMDL	
Parley Lake	Total Phosphorus	60 µg/L	998 lbs
Peavey Lake	Chloride	See TCMA Chloride TMDL	
Powderhorn Lake	Chloride	See TCMA Chloride TMDL	
School Lake	Total Phosphorus	60 µg/L	176 lbs
Snyder Lake	Total Phosphorus	60 µg/L	22 lbs
Stone Lake	Total Phosphorus	40 µg/L	29 lbs
Stubbs Bay	Total Phosphorus	40 µg/L	199 lbs
Tamarack Lake	Total Phosphorus	40 µg/L	0 lbs
Tanager Bay	Total Phosphorus	40 µg/L	753 lbs
Turbid Lake	Total Phosphorus	40 µg/L	138 lbs
Unnamed Creek (07010206-718)	Chloride	See TCMA Chloride TMDL	
Wassermann Lake	Total Phosphorus	40 µg/L	470 lbs
West Arm	Total Phosphorus	40 µg/L	1602 lbs
Wolsfeld Lake	Total Phosphorus	40 µg/L	232 lbs

3.9.8 MINNEHAHA CREEK SUBWATERSHED PLAN

CAPITAL IMPROVEMENT PROGRAM

The CIP is a planning tool. It also is a means to inform partners, District residents, and other interested parties as to the District's scope and priorities for its capital work over the planning period. A project's inclusion in the CIP does not mean that the project will be constructed, only that the District has identified it as an action that may be a cost-effective way for the District to achieve identified water resource goals. A project identified in the CIP always will need further review as to technical feasibility, cost and financing, consistency with local needs, and other policy considerations before a formal decision to proceed to construction is made. Section 3.5.5 describes the development and evaluation steps that will occur before the District will commit resources to a project.

Section 3.5.5 also describes how the District will review the CIP on an ongoing basis throughout the planning period. This review will allow the District to reassess described projects from a technical perspective, but also will involve broader policy considerations such as shifts in District priorities, decisions as to annual budget and levy levels, and the prospect of state and federal grant funds or financing. For this reason, projects may be added to and deleted from the CIP from year to year, in accordance with those procedures.

A critical component of any project will be the development of a funding strategy that identifies the sources, uses, and timing of funds needed to successfully achieve identified goals. These plans will be developed in conjunction with the District's public and private partners as capital projects are advanced. Therefore, any costs identified

within this Plan are projections, are not intended to be used for budgeting purposes, and in most cases will not be wholly funded by MCWD's ad valorem tax levy.

Table 3.13. Minnehaha Creek Subwatershed CIP

Project	Minnehaha Creek FEMA Flood Damage Repairs
Description	Streambank restoration and repair of streambank erosion and other flood damage resulting from 2014 flooding.
Need	The 2014 flooding along Minnehaha Creek caused flood damage in the cities of Edina and Minneapolis. The District coordinated review of the flood damage with the Federal Emergency Management Agency (FEMA). FEMA approved 35 sites to receive federal funding to implement flooding repairs. The project would repair streambank erosion and other flood damages identified by the District and FEMA in 2014.
Outcome	Stabilized streambanks with both bioengineering and hard armoring to reduce erosion and protect the stream channel; Improve ecological integrity of the stream corridor through this reach; enhance riparian habitat and native vegetative communities.
Estimated Cost ~~and Potential Funding Sources~~	$920,000~~; District levy, Federal Emergency Management Agency (FEMA) grant~~
Potential Funding Sources	District levy and Federal Emergency Management Agency (FEMA) grant
Schedule	2017-2018

Project	325 Blake Road Regional Stormwater and Greenway
Description	Taking advantage of the opportunity to manage approximately 270 acres of area wide stormwater runoff at 325 Blake Road, the project requires construction of onsite stormwater management facilities to treat inflow from two diversion structures – Powell Road and Lake Street – which are already in place. The project also includes restoration of four to six acres of industrial land along Minnehaha Creek to restored greenway and riparian corridor.
Need	Minnehaha Creek is listed as an impaired water for multiple parameters, including fecal coliform bacteria, chloride, low dissolved oxygen, and fish and macroinvertebrate communities. Further, due to the sediment and nutrient loads transported by Minnehaha Creek, downstream receiving waterbody Lake Hiawatha is impaired for excess nutrients, and, along with Minnehaha Creek, has an approved ~~Total Maximum Daily Load (~~TMDL~~) study~~. ~~The Minnehaha Creek-Lake Hiawatha TMDL report identifies the need to reduce phosphorus and bacterial (E. coli) loading to meet water quality targets for Lake Hiawatha and Minnehaha Creek.~~ The TMDL ~~draft~~ report calls for a reduction of 1,907 lbs/year throughout the subwatershed in order for Lake Hiawatha to meet an in-lake nutrient concentration of 50 ug/L. ~~-~~The TMDL draft report also identifies a need to reduce bacterial (*E. coli*) loading in order to meet the state standard ~~of 126 organisms/100 ml~~. ~~-~~At this time with our current understanding, the best approaches for addressing excess bacteria loads appear to be source reduction or volume control practices. The District has been focusing on the most degraded section of Minnehaha Creek – between West 34th Street and Meadowbrook Lake in St. Louis Park and Hopkins – to implement a comprehensive corridor restoration that focuses on reducing pollutant loads, mitigating flashy hydrology, reconnecting the riparian corridor, and restoring the physical character of the stream channel. In 2011 the District made a strategic acquisition of land at 325 Blake Road as part of a regional scale effort to establish the Minnehaha Greenway. ~~-~~This effort identified

	opportunities for area wide stormwater improvement, ecological restoration of the Minnehaha Creek riparian zone and corridor linkage with upstream/downstream restoration projects. Portions of the site not utilized for watershed restoration will be sold for redevelopment to capture a return on the initial investment.
Outcome	The site and project represent a critical piece of the District's larger strategic initiative within the Minnehaha Creek Greenway focused on improving the quality and managing the quantity of stormwater runoff; enhancing the ecological integrity of the stream system; and facilitating broader community goals of economic development and livability by allowing the restored stream system to be integrated into the developed landscape. This project will implement over 270 acres of regional stormwater treatment to address water quality and quantity entering Minnehaha Creek, restore riparian and stream channel habitat, and expand the Minnehaha Creek Greenway while providing access to upstream and downstream project initiatives. The project is estimated to achieve a phosphorus reduction of 181 lbs/year and a volume reduction of 11.83 acre-feet/year. These estimates will be refined through project feasibility and design.
Estimated Cost ~~and Potential Funding Sources~~	$2,750,000~~; District levy and Minnesota Public Facilities Authority (50%)~~
Potential Funding Sources	District levy and Minnesota Public Facilities Authority (50%)
Schedule	2018-2019

Project	Meadowbrook Golf Course Ecological Restoration
Description	Partnership with the Minneapolis Park and Recreation Board (MPRB) to reconfigure and enhance Meadowbrook Golf Course to restore and improve the ecological integrity of the Minnehaha Creek stream corridor, and connect the Minnehaha Creek Greenway through MPRB land to the City of Edina parks and trails system.
Need	Minnehaha Creek is listed as an impaired water for multiple parameters, including fecal coliform bacteria, chloride, low dissolved oxygen, and fish and macroinvertebrate communities. Further, due to the sediment and nutrient loads transported by Minnehaha Creek, downstream receiving waterbody Lake Hiawatha is impaired for excess nutrients, and, along with Minnehaha Creek, has an approved ~~Total Maximum Daily Load (~~TMDL~~) study~~. ~~The Minnehaha Creek-Lake Hiawatha TMDL report identifies the need to reduce phosphorus and bacterial (E. coli) loading to meet water quality targets for Lake Hiawatha and Minnehaha Creek.~~ The TMDL ~~draft~~ report calls for a reduction of 1,907 lbs/year throughout the subwatershed in order for Lake Hiawatha to meet an in-lake nutrient concentration of 50 ug/L. The TMDL ~~draft~~ report also identifies a need to reduce bacterial (*E. coli*) loading in order to meet the state standard ~~of 126 organisms/100 ml~~. At this time with our current understanding, the best approaches for addressing excess bacteria loads appear to be source reduction or volume control practices. Situated within the most degraded section of Minnehaha Creek – between West 34th Street and Meadowbrook Lake in St. Louis Park and Hopkins – the project addresses historic issues such as ditching of the stream channel, loss of wetlands, corridor fragmentation, and fragmented and degraded habitat, all of which negatively impact the ecological integrity of the stream and its riparian systems and contribute to impairments of Minnehaha Creek.

Outcome	Improve ecological integrity of the stream corridor through this reach; improve ecological integrity of upland within the golf course and improve wetland function and value on site; improve water quality for Minnehaha Creek and downstream Lake Hiawatha; maintain or increase flood storage capacity to improve golf course resilience and reduce flood severity of adjacent neighborhoods; connect Minnehaha Creek Greenway trails through MPRB land to City of Edina parks and trails system in a manner that respects adjoining landowners' interests.
Estimated Cost ~~and Potential Funding Sources~~	$2,200,000~~; District levy, Minneapolis Park and Recreation Board, and Hennepin County grant funding~~
Potential Funding Sources	District levy, Minneapolis Park and Recreation Board, and Hennepin County grant funding
Schedule	2018-2019

Project	Arden Park Stream Restoration
Description	Partnership with the City of Edina to restore Arden Park and the Minnehaha Creek corridor through the park. . The project includes stream restoration, including the removal of one of the last two dams on the creek, regional stormwater management, habitat improvements, and enhanced parkland to provide stream accessibility and recreation opportunities.
Need	Minnehaha Creek is listed as an impaired water for multiple parameters, including fecal coliform bacteria, chloride, low dissolved oxygen, and fish and macroinvertebrate communities. Further, due to the sediment and nutrient loads transported by Minnehaha Creek, downstream receiving waterbody Lake Hiawatha is impaired for excess nutrients, and, along with Minnehaha Creek, has an approved ~~Total Maximum Daily Load (~~TMDL~~) study~~. ~~The Minnehaha Creek-Lake Hiawatha TMDL report identifies the need to reduce phosphorus and bacterial (E. coli) loading to meet water quality targets for Lake Hiawatha and Minnehaha Creek.~~ The TMDL ~~draft~~ report calls for a reduction of 1,907 lbs/year throughout the subwatershed in order for Lake Hiawatha to meet an in-lake nutrient concentration of 50 ug/L. The TMDL ~~draft~~ report also identifies a need to reduce bacterial (*E. coli*) loading in order to meet the state standard ~~of 126 organisms/100 ml~~. At this time with our current understanding, the best approaches for addressing excess bacteria loads appear to be source reduction or volume control practices. The grade control structure is a known contributor to existing impairments, acting as a barrier to fish passage and creating an impoundment that causes accumulation of sediment, thus degrading upstream aquatic habitat (Minnehaha Creek Stream Assessment 2003, 2012). The dam has altered the function and value of the creek system by removing connectivity to habitat for spawning and forage, while increasing residence time of water and surface area making the water warmer. ~~-~~These impediments increase algal growth and accumulation of decaying vegetation which uses oxygen and creates an environment that harmful for fish and macroinvertebrates.
Outcome	Improve ecological integrity of the stream corridor through this reach; improve ecological integrity of upland within the park; implement regional stormwater management for approximately 100 acres; expand and enhance recreation opportunities, safety, and community connections to Minnehaha Creek. The project is estimated to achieve a phosphorus reduction of 29.5 lbs/year and a volume reduction of 10 acre-feet/year. These estimates will be refined through project feasibility and design.

Estimated Cost ~~and Potential Funding Sources~~	$4,100,000~~; District levy, City of Edina, grant opportunities~~
Potential Funding Sources	District levy, City of Edina, and grant opportunities
Schedule	2018-2019

Project	Greenway to Cedar Trail Connection and Streambank Restoration
Description	Partnership with the City of St. Louis Park to enhance Minnehaha Creek Greenway connections to the Cedar Regional trail and restore a degraded section of Minnehaha Creek through streambank stabilization and vegetative enhancement.
Need	Minnehaha Creek is listed as an impaired water for multiple parameters, including fecal coliform bacteria, chloride, low dissolved oxygen, and fish and macroinvertebrate communities. Further, due to the sediment and nutrient loads transported by Minnehaha Creek, downstream receiving waterbody Lake Hiawatha is impaired for excess nutrients, and, along with Minnehaha Creek, has an approved ~~Total Maximum Daily Load (~~TMDL~~) study~~. The Minnehaha Creek Greenway is bisected by rail and regional trail, without access to upstream and downstream restoration initiatives. The rail line and train bridge crossing at Minnehaha Creek not only acts as an impediment to community connections by blocking access to the regional trail and Greenway, the stream channel at this location was historically manipulated, causing stream bank degradation and unnatural riparian structure.
Outcome	Improve ecological integrity of the stream corridor through this reach; improve stream channel stabilization; enhance riparian habitat and native vegetative communities; expand and enhance recreation opportunities, safety, and community connections to Minnehaha Creek and the Minnehaha Creek Greenway.
Estimated Cost ~~and Potential Funding Sources~~	$510,000~~; District levy, City of St. Louis Park, grant opportunities~~
Potential Funding Sources	District levy, City of St. Louis Park, and grant opportunities
Schedule	2019-2020

Project	Boone-Aquilla Floodplain
Description	Floodplain restoration and stormwater management project developed in coordination with public and private partners to address localized flooding and stormwater runoff in the Minnehaha Creek Greenway.
Need	Minnehaha Creek is listed as an impaired water for multiple parameters, including fecal coliform bacteria, chloride, low dissolved oxygen, and fish and macroinvertebrate communities. Further, due to the sediment and nutrient loads transported by Minnehaha Creek, downstream receiving waterbody Lake Hiawatha is impaired for excess nutrients, and, along with Minnehaha Creek, has an approved ~~Total Maximum Daily Load (~~TMDL~~) study~~. ~~The Minnehaha Creek-Lake Hiawatha TMDL report identifies the need to reduce phosphorus and bacterial (E. coli) loading to meet water quality targets for Lake Hiawatha and Minnehaha Creek.~~ The TMDL ~~draft~~ report calls for a reduction of 1,907 lbs/year throughout the subwatershed in order for Lake Hiawatha to meet an in-lake nutrient concentration of 50 ug/L. The TMDL ~~draft~~ report also identifies a need to reduce bacterial (*E. coli*) loading in order to meet the state standard ~~of 126~~

	~~organisms/100 ml~~.~~-~~ At this time with our current understanding, the best approaches for addressing excess bacteria loads appear to be source reduction or volume control practices. The District has been focusing on the most degraded section of Minnehaha Creek – between West 34th Street and Meadowbrook Lake in St. Louis Park and Hopkins – to implement a comprehensive corridor restoration that focuses on reducing pollutant loads, mitigating flashy hydrology, reconnecting the riparian corridor, and restoring the physical character of the stream channel. Historic development within this corridor resulted in large areas of floodplain fill, areas of localized flooding and impervious surfaces constructed within the floodplain and riparian zone of Minnehaha Creek.
Outcome	Improve ecological integrity of the stream corridor through this reach; expand floodplain storage in degraded section of Minnehaha Creek; enhance riparian habitat and native vegetative communities; expand and enhance recreation opportunities, safety, and community connections to Minnehaha Creek and the Minnehaha Creek Greenway.
Estimated Cost ~~and Potential Funding Sources~~	$500,000~~; District levy, public and private partner contributions, grant opportunities~~
Potential Funding Sources	District levy, public and private partner contributions, and grant opportunities
Schedule	2019-2020

Project	Cottageville Park Phase II Riparian Restoration
Description	Continued implementation of the Minnehaha Creek Greenway corridor restoration that will focus on reconnecting the riparian corridor, and restoring the physical character of the stream channel on an expanded portion of Cottageville Park.
Need	Minnehaha Creek is listed as an impaired water for multiple parameters, including fecal coliform bacteria, chloride, low dissolved oxygen, and fish and macroinvertebrate communities. Further, due to the sediment and nutrient loads transported by Minnehaha Creek, downstream receiving waterbody Lake Hiawatha is impaired for excess nutrients, and, along with Minnehaha Creek, has an approved ~~Total Maximum Daily Load (~~TMDL~~) study~~. Recent work within the most degraded section of Minnehaha Creek – between West 34th Street and Meadowbrook Lake in St. Louis Park and Hopkins – included implementation of Cottageville Park to address regional stormwater, stability of the Minnehaha Creek channel, and ecological restoration, all issues within the Minnehaha Creek subwatershed. ~~-~~Cottageville Park is an amenity on Minnehaha Creek that provides recreation, greenspace and trails, with an opportunity to expand these efforts to surrounding property, further protecting and enhancing the stream corridor.
Outcome	Improve ecological integrity of the stream corridor through this reach; improve stream channel stabilization; enhance riparian habitat and native vegetative communities; expand and enhance recreation opportunities, safety, and community connections to Minnehaha Creek and the Minnehaha Creek Greenway.
Estimated Cost ~~and Potential Funding Sources~~	$280,000~~; District levy, partner contributions, grant opportunities~~
Potential Funding Sources	District levy, partner contributions, and grant opportunities

Schedule	2019-2020

Project	West Blake Greenway Enhancement
Description	Opportunity to expand the Minnehaha Creek Greenway and restore a degraded section of Minnehaha Creek through streambank stabilization, wetland and upland restoration, and vegetative enhancement.
Need	Minnehaha Creek is listed as an impaired water for multiple parameters, including fecal coliform bacteria, chloride, low dissolved oxygen, and fish and macroinvertebrate communities. Further, due to the sediment and nutrient loads transported by Minnehaha Creek, downstream receiving waterbody Lake Hiawatha is impaired for excess nutrients, and, along with Minnehaha Creek, has an approved ~~Total Maximum Daily Load (~~TMDL~~) study~~. The Minnehaha Creek Greenway is bisected by multiple county roads and state highways, including Blake Road and Highway 7. These roadways create barriers for wildlife by diminishing continuity and access to upstream and downstream restoration initiatives. The crossings at Minnehaha Creek also as an impediment to community connections by blocking access to upstream and downstream Greenway trails. The stream channel at this location flows into a large wetland complex that was historically manipulated, causing stream bank degradation and unnatural riparian and wetland structure.
Outcome	Improve ecological integrity of the stream corridor through this reach; improve stream channel stabilization; enhance riparian habitat and native vegetative communities; expand and enhance recreation opportunities, safety, and community connections to Minnehaha Creek, local wetland environments and the Minnehaha Creek Greenway.
Estimated Cost ~~and Potential Funding Sources~~	$420,000~~; District levy, partner contributions, grant opportunities~~
Potential Funding Sources	District levy, partner contributions, and grant opportunities
Schedule	2020-2021

Project	Meadowbrook Greenway Expansion
Description	Opportunity to expand the Minnehaha Creek Greenway through the restored Meadowbrook Golf Course to downstream parks and open space areas within the City of Edina.
Need	Minnehaha Creek is listed as an impaired water for multiple parameters, including fecal coliform bacteria, chloride, low dissolved oxygen, and fish and macroinvertebrate communities. Further, due to the sediment and nutrient loads transported by Minnehaha Creek, downstream receiving waterbody Lake Hiawatha is impaired for excess nutrients, and, along with Minnehaha Creek, has an approved ~~Total Maximum Daily Load (~~TMDL~~) study~~. Access to the Minnehaha Creek Greenway presently ends at Excelsior Boulevard in St. Louis Park, north of adjacent Meadowbrook Golf Course. The roadway and golf course create barriers for wildlife by diminishing continuity and access to upstream restoration initiatives and downstream parkland, open space, and Meadowbrook Lake. The golf course on Minnehaha Creek also acts as an impediment to community connections by blocking access to upstream and downstream Greenway trails. As part of this plan the stream channel at this location is projected to be restored in 2018-2019, restoring ecological integrity, adding riparian structure, and providing a new greenway and conservation corridor.

Outcome	Enhance riparian habitat and native vegetative communities; expand and enhance recreation opportunities, safety, and community connections to Minnehaha Creek, Meadowbrook Lake and the Minnehaha Creek Greenway.
Estimated Cost ~~and Potential Funding Sources~~	$950,000~~; District levy, partner contributions, grant opportunities~~
Potential Funding Sources	District levy, partner contributions, and grant opportunities
Schedule	2020-2021

Project	Hiawatha Golf Course Restoration
Description	Partnership with the Minneapolis Park and Recreation Board (MPRB) and City of Minneapolis to reconfigure and enhance Hiawatha Golf Course to restore and improve the ecological integrity of the Minnehaha Creek stream corridor, address direct stormwater discharge to Lake Hiawatha, address localized flooding issues within the City, and further connect the community to new trail and recreation opportunities on MPRB land.
Need	Minnehaha Creek is listed as an impaired water for multiple parameters, including fecal coliform bacteria, chloride, low dissolved oxygen, and fish and macroinvertebrate communities. Further, due to the sediment and nutrient loads transported by Minnehaha Creek, downstream receiving waterbody Lake Hiawatha is impaired for excess nutrients, and, along with Minnehaha Creek, has an approved ~~Total Maximum Daily Load (~~TMDL~~) study~~. ~~The Minnehaha Creek-Lake Hiawatha TMDL report identifies the need to reduce phosphorus and bacterial (E. coli) loading to meet water quality targets for Lake Hiawatha and Minnehaha Creek.~~ The TMDL ~~draft~~ report calls for a reduction of 1,907 lbs/year throughout the subwatershed in order for Lake Hiawatha to meet an in-lake nutrient concentration of 50 ug/L. The TMDL ~~draft~~ report also identifies a need to reduce bacterial (*E. coli*) loading in order to meet the state standard ~~of 126 organisms/100 ml~~. At this time with our current understanding, the best approaches for addressing excess bacteria loads appear to be source reduction or volume control practices. Catalyzed by flooding in Spring 2014 and the need to work with the Federal Emergency Management Agency (FEMA) on restoration of land and property damaged by flooding, the MPRB has designated the Hiawatha Golf Course a priority location for long-term investments and improvement, and includes this site in its ecological systems plan that establishes a vision to make parks and public lands more environmentally friendly. In addition, the City has undertaken a flood reduction study for this area with goals that include reducing and managing localized flooding and achieving pollutant load reductions toward meeting the Lake Hiawatha/Minnehaha Creek TMDL. The City is also evaluating hydraulic, hydrologic and groundwater contributions to the ponds on the Hiawatha Golf Course.
Outcome	Improve ecological integrity of the stream corridor through this reach; improve stream channel stabilization; expand floodplain storage; address stormwater management issues; enhance riparian habitat and native vegetative communities; expand and enhance recreation opportunities, safety, and community connections to Minnehaha Creek and Lake Hiawatha.

Estimated Cost ~~and Potential Funding Sources~~	$1,940,000~~; District levy, partner contributions, grant opportunities~~
Potential Funding Sources	District levy, partner contributions, and grant opportunities
Schedule	2020-2021

Project	Minnehaha Parkway Stormwater Management
Description	Partnership with the Minneapolis Park and Recreation Board (MPRB) and City of Minneapolis to implement regional stormwater management by diverting direct storm sewer discharge along the Minnehaha Parkway into the buffer and riparian area for filtration/infiltration.
Need	Minnehaha Creek is listed as an impaired water for multiple parameters, including fecal coliform bacteria, chloride, low dissolved oxygen, and fish and macroinvertebrate communities. Further, due to the sediment and nutrient loads transported by Minnehaha Creek, downstream receiving waterbody Lake Hiawatha is impaired for excess nutrients, and, along with Minnehaha Creek, has an approved ~~Total Maximum Daily Load (~~TMDL~~) study~~. ~~The Minnehaha Creek-Lake Hiawatha TMDL report identifies the need to reduce phosphorus and bacterial (E. coli) loading to meet water quality targets for Lake Hiawatha and Minnehaha Creek.~~ The TMDL ~~draft~~ report calls for a reduction of 1,907 lbs/year throughout the subwatershed in order for Lake Hiawatha to meet an in-lake nutrient concentration of 50 ug/L. ~~-~~The TMDL ~~draft~~ report also identifies a need to reduce bacterial (*E. coli*) loading in order to meet the state standard ~~of 126 organisms/100 ml~~. At this time with our current understanding, the best approaches for addressing excess bacteria loads appear to be source reduction or volume control practices. In addition, the 2003 and 2012 Minnehaha Creek Stream Assessment(s) identified two major issues impacting water quality and biotic integrity in the Creek: flashy storm event flows that often result in streambank erosion; and low base flows, which reduce habitat and limit biotic integrity.~~-~~ The high percent of impervious surface in this urbanized subwatershed has reduced the amount of stormwater that naturally infiltrates to surficial groundwater and which helps sustain base flow. This stormwater is efficiently conveyed to the creek through stormsewers, which results in the flashy flows. The extensive storm sewer network that drains directly to Minnehaha Creek transports sediment, nutrient and pollutant loads, creating discharges that enter the stream system and flow to downstream Lake Hiawatha.
Outcome	Improve ecological integrity of the stream corridor through this reach; improve stream channel stabilization; intercept and remove storm sewer outfalls; address stormwater management issues; enhance riparian habitat and native vegetative communities; expand native vegetation communities and reduce maintenance of parkland; enhance base flow conditions in Minnehaha Creek; expand and enhance recreation opportunities on Minnehaha Creek and Lake Hiawatha. The project is estimated to achieve a phosphorus reduction of 229 lbs/year, total suspended solids reduction of 34.1 tons, and a volume reduction of 5.2 acre-feet/year. These estimates will be refined through project feasibility and design.

Estimated Cost ~~and Potential Funding Sources~~	$1,400,000~~; District levy, partner contributions, grant opportunities~~
Potential Funding Sources	District levy, partner contributions, and grant opportunities
Schedule	2021-2022

Project	Stormwater Volume and Pollutant Load Reduction
Description	Implementation of opportunities to reduce stormwater volumes and nutrient loading to Minnehaha Creek and Lake Hiawatha, including but not limited to construction of infiltration or filtration basins and devices, reforestation, revegetation, and stormwater detention or redirection.
Need	Minnehaha Creek is listed as an impaired water for multiple parameters, including fecal coliform bacteria, chloride, low dissolved oxygen, and fish and macroinvertebrate communities. Further, due to the sediment and nutrient loads transported by Minnehaha Creek, downstream receiving waterbody Lake Hiawatha is impaired for excess nutrients, and, along with Minnehaha Creek, has an approved ~~Total Maximum Daily Load (~~TMDL~~) study~~. ~~The Minnehaha Creek-Lake Hiawatha TMDL report identifies the need to reduce phosphorus and bacterial (E. coli) loading to meet water quality targets for Lake Hiawatha and Minnehaha Creek.~~ The TMDL ~~draft~~ report calls for a reduction of 1,907 lbs/year throughout the subwatershed in order for Lake Hiawatha to meet an in-lake nutrient concentration of 50 ug/L.~~-~~ The TMDL ~~draft~~ report also identifies a need to reduce bacterial (*E. coli*) loading in order to meet the state standard ~~of 126 organisms/100 ml~~. At this time with our current understanding, the best approaches for addressing excess bacteria loads appear to be source reduction or volume control practices. In addition, the 2003 and 2012 Minnehaha Creek Stream Assessment(s) identified two major issues impacting water quality and biotic integrity in the Creek: flashy storm event flows that often result in streambank erosion; and low base flows, which reduce habitat and limit biotic integrity. The high percent of impervious surface in this urbanized subwatershed has reduced the amount of stormwater that naturally infiltrates to surficial groundwater and which helps sustain base flow. This stormwater is efficiently conveyed to the creek through stormsewers, which results in the flashy flows. Specific project locations and methods will be identified and implemented to reduce nutrient and bacterial loading to Minnehaha Creek and thus to Lake Hiawatha; decrease peak discharge rates in Minnehaha Creek to reduce streambank erosion; and increase baseflow in the Creek to improve its biotic integrity.~~-~~ These projects are intended to reduce annual volume and peak flows discharged to the Creek; increase infiltration to surficial groundwater; and reduce nutrient and bacterial export to the Creek. Identifying specific implementation sites under this capital project element will be an ongoing process informed by refined technical knowledge of pollutant sources and geomorphological phenomena, available land and willing public or private partners. Priorities are set foremost by diagnosing the spatial distribution of pollutant loading to Minnehaha Creek.
Outcome	Improve ecological integrity of the stream corridor through this reach; improve stream channel stabilization; intercept and remove storm sewer outfalls; address existing

	stormwater management issues; minimize new pollutant loads conveyed by runoff and generated within Minnehaha Creek; minimize new volumes generated by new development; protect stream base flows and wetland and surficial groundwater hydrology; enhance riparian habitat and native vegetative communities.
Estimated Cost ~~and Potential Funding Sources~~	$2,450,000~~; District levy, partner contributions, grant opportunities~~
Potential Funding Sources	District levy, partner contributions, and grant opportunities
Schedule	2018-2027

Project	Channel/Streambank Restoration
Description	The District will undertake channel/streambank restoration projects to improve ecological integrity, natural aesthetic and recreational value of Minnehaha Creek including but not limited to: removing or modifying grade controls to allow fish passage and a more natural hydrologic condition; preserving and expanding wooded/vegetated riparian buffers along the entire stream length; reconstructing or remeandering channel and floodplain where space allows to improve geomorphic/hydrologic form and function and in-stream habitat; stabilizing banks using bioengineering techniques; establishing areas to preserve and enhance view-sheds; and establishing recreational corridor connectivity through passive uses such as trails and vistas.
Need	Minnehaha Creek is listed as an impaired water for multiple parameters, including fecal coliform bacteria, chloride, low dissolved oxygen, and fish and macroinvertebrate communities. Further, due to the sediment and nutrient loads transported by Minnehaha Creek, downstream receiving waterbody Lake Hiawatha is impaired for excess nutrients, and, along with Minnehaha Creek, has an approved ~~Total Maximum Daily Load (~~TMDL~~) study~~. The 2003 and 2012 Minnehaha Creek Stream Assessment(s) identified numerous areas of erosion along the length of the creek, as well as a general lack of steam complexity and lack of habitat for macroinvertebrates and fish largely driven by stream aggradation in impounded areas often upstream of artificial grade controls. ~~Based on these stressors and its flow regime Minnehaha Creek has been designated by the State as an Impaired Water for fish communities. Minnehaha Creek is also listed as impaired for chlorides, dissolved oxygen, and bacteria (E. Coli).~~ The District will investigate improvement opportunities to high-priority reaches as identified in the ~~2003 Minnehaha Creek~~ Stream Assessment. Priority reaches are those where stream restoration could improve streambank stability to "Good" as measured by Pfankuch stability rating relative to Rosgen stream type, or those where the Stream Visual Assessment Protocol (SVAP) mean score could be improved to 5.0 or better, or by one full point. ~~Specific improvements are guided and refined by the results of the Minnehaha Creek Diagnostic Study, the Minnehaha Creek Biotic Integrity TMDL, the 2003 Minnehaha Creek Stream Assessment, the findings of the Minnehaha Creek Visioning Partnership, the 2012 Minnehaha Creek Stream Assessment, opportunities for partnership, future studies, and individual reach needs and opportunities.~~ The 2018 FEMA flood repair projects are an example of a project opportunity and could expand to include additional channel/streambank restoration elements that would be coordinated with the City of Minneapolis and the Minneapolis Park and Recreation Board.

Outcome	Stabilize streambanks with bioengineering to reduce erosion; improve riparian zone with native vegetation; improve fish and macroinvertebrate habitat; improve ecological integrity of the stream corridor.
Estimated Cost ~~and Potential Funding Sources~~	$3,120,000~~; District levy, partner contributions, grant opportunities~~
Potential Funding Sources	District levy, partner contributions, and grant opportunities
Schedule	2018-2027

3.9.11 SIX MILE-HALSTED BAY SUBATERSHED PLAN

CAPITAL IMPROVEMENT PROGRAM

The CIP is a planning tool. It also is a means to inform partners, District residents, and other interested parties as to the District's scope and priorities for its capital work over the planning period. A project's inclusion in the CIP does not mean that the project will be constructed, only that the District has identified it as an action that may be a cost-effective way for the District to achieve identified water resource goals. A project identified in the CIP always will need further review as to technical feasibility, cost and financing, consistency with local needs, and other policy considerations before a formal decision to proceed to construction is made. Section 3.5.5 describes the development and evaluation steps that will occur before the District will commit resources to a project.

Section 3.5.5 also describes how the District will review the CIP on an ongoing basis throughout the planning period. This review will allow the District to reassess described projects from a technical perspective, but also will involve broader policy considerations such as shifts in District priorities, decisions as to annual budget and levy levels, and the prospect of state and federal grant funds or financing. For this reason, projects may be added to and deleted from the CIP from year to year, in accordance with those procedures.

Table 3.16. Six Mile-Halsted Bay Subwatershed CIP

Project	East Auburn Stormwater Enhancement Project
Description	Design and construction of stormwater enhancements to two existing ponds in the City of Victoria. Enhancements will include the installation of an iron-enhanced sand filtration bench and a filtration bench.
Need	East Auburn exceeds state nutrient standards. A TMDL identified a need to reduce nutrient loading in East Auburn by 626 lbs/yr, with 200 lbs/year needing to come from upstream waterbodies.
Outcome	Reduction of nutrient export from downtown Victoria and upstream Church Lake to East Auburn Lake; native vegetative enhancements in the buffer and upland areas. The project is estimated to achieve a phosphorus reduction of 39 lbs/year. This estimate will be refined through project feasibility and design.
Estimated Cost	Capital Costs: $170,000 in 2017 dollars.
Potential Funding Sources	BWSR Clean Water Legacy grant, City of Victoria~~y~~
Schedule	2017-2018

Project	Wassermann West External Load Reduction and Landscape Restoration
Description	Design and implementation of strategies to reduce landscape phosphorus loading through the use of aluminum ~~sulphate~~ sulfate (alum), vegetative restoration, and/or hydrologic

	alternation; preservation and restoration of vegetative community in wetland and upland areas through land acquisition, development of restoration plan; programmed public access to Lake Wassermann for public use and enjoyment.
Need	Lake Wassermann exceeds state nutrient standards. An adopted TMDL requires a 470 lbs/yr reduction in phosphorus loading. This site is estimated to be responsible for 7% of the total phosphorus load at approximately 75 lbs. The site features a diversity of vegetative and wetland communities and has been recognized as a restoration priority by several agencies, including the MLCCS, MnDNR, City of Victoria, and MCWD.
Outcome	Reduction of nutrient export to Lake Wassermann; enhanced recreation access to Lake Wassermann; preservation and enhancement of shoreline, upland, and wetland buffers; vegetative wetland restoration. The project is estimated to achieve a phosphorus reduction of 64 lbs/year. This estimate will be refined through project feasibility and design.
Estimated Cost	Capital costs:$2,250,000, excluding land, in 2017 dollars
Potential Funding Sources	District levy, City of Victoria, and/or regional, state, and federal grants
Schedule	2018-2019

Project	Pierson Lake Headwaters Restoration
Description	Removal of drain tile system; Design and construction of outlet control structures; wetland establishment/restoration including site preparation, invasive species control, seeding, and maintenance; feasibility, design, and construction of stormwater management practices; stream restoration
Need	Pierson Lake is good quality, but 85% of its nutrient pollution is attributed to the drainage area north of the Lake. The area around Pierson Lake is anticipated to develop over the coming years as the City of Victoria expands into Laketown Township. This project will address the largest single source of phosphorus to a high value waterbody while protecting degraded wetlands from future development impacts.
Outcome	Reduced phosphorus loading to Pierson Lake; increased clarity in the north bay of Pierson Lake; enhanced wetland vegetative diversity creating waterfowl and non-game bird habitat; enhanced corridor connection. Phosphorus load reduction estimates will be developed during project feasibility and design.
Estimated Cost	Capital costs: $320,000, excluding land, in 2017 dollars
Potential Funding Sources	District levy, partner contributions, grants
Schedule	2019-2021

Project	Turbid-Lundsten Wetland Restoration
Description	Restoration of wetlands around Turbid and Lundsten Lakes through hydrologic modification, changes to storage capacity, and vegetation restoration; design and construction of soluble phosphorus filtration system; hydrologic modification to eliminate open water ditch downstream of Turbid; pond retrofit at South Lundsten inlet. Phase I will restores wetland upstream of Turbid Lake and Phase II will restores wetland and construct pond filtration downstream of Turbid Lake.
Need	Turbid Lake exceeds state nutrient standards. An adopted TMDL requires a 138 lbs/yr reduction in nutrient loading, or 55%. Though the TMDL identified internal loading as the principal driver of the impairment, a 2010 feasibility study found that reductions of 34 lb of phosphorus could be achieved through restoration upstream of Turbid Lake and 27 lb could be removed through downstream restoration to the benefit of South Lundsten. Water quality in South Lundsten is very poor and drives downstream water quality issues,

	including in Parley Lake which is impaired for water quality and clarity. South Lundsten is considered a wetland and therefore is not subject to specific regulatory standards but reducing its nutrient concentration is critical to downstream waterbodies that are impaired, including Parley Lake which exceeds state nutrient standards.
Outcome	Reduction of nutrient export to Turbid, South Lundsten, North Lundsten and Parley Lakes; Increase wetland biodiversity and habitat diversity, improve flood storage potential, and reduce phosphorus export; limit carp movement. These projects are estimated to achieve a phosphorus reduction of 93 lbs/year (Phase I 43 lbs, Phase II 50 lbs). These estimates will be refined through project feasibility and design.
Estimated Cost	Capital costs, phase I: $2,870,000, excluding land, in 2017 dollars. Capital costs, phase II: $230,000, excluding land, in 2017 dollars.
Potential Funding Sources	District levy, partner contributions, grants
Schedule	2019-2021

Project	Mud Lake Watershed Load Reductions
Description	Addressing watershed nutrient load to Mud Lake through wetland restorations, regional stormwater treatment, and enhancement of existing stormwater facilities. Phosphorus sources to Mud Lake are diffuse and implementation take place in a phased approach, targeting the most cost-effective and highest impact projects first.
Need	The 2013 Six Mile diagnostic identified Mud Lake as having very poor water quality, driven by a combination of internal loading, upstream lake water quality, and watershed loading. Reductions between 78% and 95% (1,864 lbs/yr – 2,258 lbs/yr) from the direct watershed are needed to shift the ecological condition of Mud Lake and address downstream impacts to Halsted Bay. Though Mud Lake is not required to meet state standards for nutrient concentrations, Halsted Bay requires the largest phosphorus load reduction in the District and about half of its load comes from upstream Mud Lake. The implementation approach was developed through a BWSR Clean Water Legacy grant which sought to identify nutrient sources and the most cost-effective means to address nutrient concentrations in Mud Lake.
Outcome	Reduced nutrient loading to Mud Lake and Halsted Bay; hydraulic and vegetative wetland restoration. Phosphorus load reduction estimates will be developed during project feasibility and design.
Estimated Cost	Capital costs, phase I: $1,120,000 excluding land, in 2017 dollars. Capital costs, phase II: $480,000 excluding land, in 2017 dollars. Capital costs, phase III: $1,490,000 excluding land, in 2017 dollars.
Potential Funding Sources	District levy, partner contributions, grants
Schedule	2019 - 2025

Project	Wassermann Lake Internal Load Management
Description	Application of alum to sediments to inactivate sediment release
Need	Lake Wassermann exceeds state nutrient standards. An adopted TMDL requires a 470 lbs/yr reduction in phosphorus loading, with 88% coming from internal sediment release. The 2013 Six Mile Diagnostic modeled an annual internal release rate of 374/lbs year. Alum can only be applied once the carp population has been significantly reduced and the recruitment is being managed through aeration or physical barriers.

Outcome	Reduction in phosphorus load from internal sources; improved water clarity; more abundant aquatic vegetation community. Phosphorus load reduction estimates will be developed during project feasibility and design.
Estimated Cost	Capital costs: $310,000 in 2017 dollars.
Potential Funding Sources	District levy, partner contributions, grants
Schedule	2020-2022

Project	East Auburn Wetland Restoration
Description	Restoration of up to five degraded wetland complexes draining to East Auburn from Steiger, Sunny, and Wassermann Lakes targeting nutrient reduction.
Need	East Auburn Lake exceeds state nutrient standards. An adopted TMDL requires a total reduction of 626 lb, 410 lb of which are from watershed sources. The Six Mile Diagnostic attributes 57% of the total watershed load to the drainage area, and further analysis indicates that a vast majority of the source of the drainage area loading is from these large, degraded wetland complexes. Further analysis will be required to determine the relative impact of each of the five complexes to determine the restoration priority and scope.
Outcome	Reduced nutrient loading to East Auburn; Hydrologic and vegetative wetland restoration; enhanced habitat; enhanced aesthetic value tying into a high value recreation area (Carver Park). Phosphorus load reduction estimates will be developed during project feasibility and design.
Estimated Cost	Capital costs: $990,000, excluding land, in 2017 dollars
Potential Funding Sources	District levy, partner contributions, grants
Schedule	2020-2021

Project	Halsted Bay Watershed Load Management
Description	Off-line alum treatment facility situated adjacent to Six Mile Marsh to treat upstream phosphorus load into Halsted Bay of Lake Minnetonka
Need	Halsted Bay of Lake Minnetonka greatly exceeds state nutrient standards. An adopted TMDL requires a 2,087 lb reduction from external sources (73%) to meet clean water standards. 50% of the total phosphorus load comes from upstream Mud Lake, driven by both watershed load and internal sediment release. Six Mile Marsh acts to transform phosphorus from particulate to dissolved, which requires chemical treatment to remove it from the water column. A 2013 feasibility study found that operating an off-line alum treatment facility would provide the most cost-effective means to reduce phosphorus loading into the Bay in the short term. Long term restoration of the upstream Parley-Mud system would allow the alum treatment facility to be brought off line at the end of its design horizon of 30 years.
Outcome	Reduced nutrient loading to Halsted Bay of Lake Minnetonka. The project is estimated to achieve a phosphorus reduction of 1,600 lbs/year. This estimate will be refined through project feasibility and design.
Estimated Cost	Capital Costs: $13,050,000
Potential Funding Sources	District levy, partner contributions, grants, state appropriations
Schedule	2022-2025

Strategy	Wetland Restoration

Description	May include bypassing flow around the wetland, the addition of nutrient filters, soil engineering or augmentation to permanently sequester phosphorus, or the development of wetland treatment cells. Selected restoration options will depend on site specific wetland conditions and hydrology, and overall needs of the subwatershed system. The selection process will be facilitated by a partnership with the US Army Corps to develop a restoration prioritization tool with input from agency partners including the Six Mile-Halsted Bay Subwatershed Partnership, the US Fish and Wildlife Service, and state agencies including BWSR and the DNR. The level of implementation (i.e. acres restored) will be dependent upon the District's ability to secure external grants or other funding.
Need	The Six Mile subwatershed has Six Lakes that exceed state nutrient standards (Wassermann, Turbid, East Auburn, Parley, Stone, and Halsted Bay), which others close to the limit of in-lake nutrient concentrations. The 2013 Six Mile diagnostic identified hydraulically altered and degraded wetlands as a principal source of external phosphorus to waterbodies subwatershed-wide, principally in Wassermann, Turbid, East Auburn, South Lundsten, Parley, Mud, and Halsted Bay. The Six Mile Subwatershed has thousands of acres of wetlands that not only play a critical role in nutrient cycling, but also provide habitat, forage, and breeding ground for the migratory and non-game bird species abundant within this subwatershed. Prioritization of wetland restoration opportunities will be based on water quality and natural resource impact, ownership (public vs. private), and available funding.
Outcome	Increased nutrient retention, enhanced vegetation diversity, supportive waterfowl and non-game bird habitat, enhanced corridor connection.
Estimated Cost	Capital costs: $3,000,000, excluding land, in 2017 dollars.
Potential Funding Sources	District levy, partner contributions, grants
Schedule	2018-2027

Strategy	Stormwater Volume and Pollutant Load Reduction
Description	Identify opportunities to implement regional treatment or other best management practices that augment treatment capacity and add ecosystem service value concurrent with regional growth and development, including but not limited to construction of infiltration or filtration basins and devices, reforestation, revegetation, and stormwater detention or redirection.
Need	Six lakes exceed state nutrient standards. A TMDL identified the need to reduce external loading by 30 lbs to Wassermann (though the Six Mile Diagnostic identifies a much higher external load), 27 lbs to Parley, 33 lbs to Turbid, 420 lbs to East Auburn, and 2,087 lbs to Halsted Bay. Other waterbodies may be targeted for stormwater as a protection measure against development impacts. The District will typical play a technical and grant assistance role in developing stormwater management projects but may be more heavily involved where the associated water quality and natural resource benefit is highest.
Outcome	Reduction in sediment and nutrient export; stormwater treatment above regulatory compliance levels.
Estimated Cost	Capital costs: $2,000,000, excluding land, in 2017 dollars
Potential Funding Sources	District levy, partner contributions, grants
Schedule	2018-2027

Strategy	Stream Channel Restoration

Description	Stream restoration may include bank stabilization, grade control, culvert modification, and floodplain/riparian management.
Need	Six Mile Creek has been heavily ditched and modified over time. The 2012 Minnehaha Creek Stream Assessment identified a number of opportunities for stream restoration to manage sediment and nutrient loading and provide in-stream and riparian ecological benefit. Stream restoration projects may be carried out in concert with wetland restoration projects, as much of the stream acreage is associated with marsh areas.
Outcome	Reduced sediment and nutrient loading to downstream waterbodies, reconnection of stream bank to riparian marshes.
Estimated Cost	Capital costs: $870,000, excluding land, in 2017 dollars.
Potential Funding Sources	District levy, partner contributions, grants
Schedule	2018-2027

Strategy	Internal Load Management
Description	Application of aluminum ~~sulphate~~ sulfate or similar chemicals in order to inactivate sediment phosphorus release from the lakebed
Need	The Six Mile Diagnostic identified Lakes in which internal sediment phosphorus release is a significant driver of water quality issues. A TMDL identified the need to reduce internal loading by 442 lbs (88%) to Wassermann, 971 lbs (61%) to Parley, and 104 lbs (77%) to Turbid. South Lundsten also needs internal load management to address its contribution to the impairment of Parley Lake. All of these lakes currently exceed the carp population concentration where ecological damage occurs. Carp also reduce the effectiveness of alum by resuspending bottom sediments that have been sealed by alum, so no internal load treatments can be complete until the carp population has been brought below that threshold.
Outcome	Reduced internal nutrient release; increased water clarity; reemergence of submersed aquatic vegetation.
Estimated Cost	Capital costs: $980,000 in 2017 dollars.
Potential Funding Sources	District levy, partner contributions, grants
Schedule	2018-2027

Strategy	Whole Lake Drawdown
Description	Hydrologically manipulate lake levels to temporarily expose lake bed sediments to promote the growth of healthy submersed aquatic vegetation communities.
Need	South Lundsten, Parley and Mud Lakes have very high carp populations and nutrient concentrations which jointly have created turbid lake conditions wherein the lake lacks submerged aquatic vegetation, is dominated by rough fish, and is characterized by turbid water from sediment resuspension and algal production. Whole lake drawdown is needed to reestablish a biotic community supportive of a clear shallow lake state and address internal loading in all three lakes. Whole Lake drawdown is the final step in a long term shallow lake management strategy and will be implemented only after other compounding issues have been addressed including carp management, reduced watershed nutrient loading, reduced loading from upstream waterbodies. Internal load management can be done concurrently or in advance, dependent upon timing of other factors.
Outcome	Reduce internal sediment and nutrient loading; reemergence of submerged aquatic vegetation; establishment of healthy fishery
Estimated Cost	Capital cost: $770,000 in 2017 dollars.

Potential Funding Sources	District levy, partner contributions, grants
Schedule	2018-2027

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3.10 IMPLEMENTATION TABLES

Table 3.17 summarizes the District's programs, their general activities, approximate annual budgets, funding sources, and schedule. More detailed descriptions for each of these programs can be found in Section 3.5. The subwatershed plans in Section 3.9 describes specific implementation actions to be undertaken by the District and its partners.

Table 3.17. District program activities, budgets, funding sources, and schedule

Program Activities	Approximate Annual Budget	Funding Sources*	Schedule
Education and Communications	**$1,000,000**	MCWD Levy	Ongoing
Build support for District policy, programs, and projects Engage and educate communities on water resource issues Provide knowledge and skills needed to adopt clean water practices			
Incentive Programs	**$500,000**	MCWD Levy	Ongoing
Administer grants to facilitate green infrastructure projects			
Land Conservation	**$2,500,000**	MCWD Levy	Ongoing
Continue proactive efforts to conserve high-value natural resources ~~Service debt for past land purchases and capital expenses~~	-	-	-
Permitting	**$650,000**	MCWD Levy	Ongoing
Permit administration Field inspection and compliance enforcement Opportunity identification and partnership-building			
Planning	**$1,000,000**	MCWD Levy	Ongoing
Capital project planning and implementation Policy development and coordination with District partners Maintain internal program coordination and alignment			
Project Maintenance and Land Management (PMLM)	**$750,000**	MCWD Levy	Ongoing
Maintain District capital projects, lands, and infrastructure Provide technical assistance to partners and landowners Inspect and maintain ditches under MCWD jurisdiction			
Research and Monitoring	**$1,000,000**	MCWD Levy	Ongoing
Data collection and analysis to inform management efforts Carp management AIS early detection, rapid response, and support of partner efforts			
Capital Improvement Program	**$3,500,000**	See Table 3.~~5~~18	
See Table 3.~~5~~18			

*See Section 3.4.4 for more information on funding sources

Table 3.18 summarizes the District's Capital Improvement Plan (CIP), including the subwatershed where the project is located, project name, estimated cost, potential funding sources, and schedule. More detailed descriptions for each project can be found in the Subwatershed Plans in section 3.9. The CIP is a planning tool. It also is a means to inform partners, District residents, and other interested parties as to the District's scope and priorities for its capital work over the planning period. A project's inclusion in the CIP does not mean that the project will be constructed, only that the District has identified it as an action that may be a cost-effective way for the District to achieve identified water resource goals. A project identified in the CIP always will need further review as to technical feasibility, cost and financing, consistency with local needs, and other policy considerations before a formal decision to proceed to construction is made. Section 3.5.5 describes the development and evaluation steps that will occur before the District will commit resources to a project.

Section 3.5.5 also describes how the District will review the CIP on an ongoing basis throughout the planning period. This review will allow the District to reassess described projects from a technical perspective, but also will involve broader policy considerations such as shifts in District priorities, decisions as to annual budget and levy levels, and the prospect of state and federal grant funds or financing. For this reason, projects may be added to and deleted from the CIP from year to year, in accordance with those procedures. A critical component of any project will be the development of a funding strategy that identifies the sources, uses, and timing of funds needed to successfully achieve identified goals. These plans will be developed in conjunction with the District's public and private partners as capital projects are advanced. Therefore, any costs identified within this Plan are projections, are not intended to be used for budgeting purposes, and in most cases will not be wholly funded by MCWD's ad valorem tax levy.

Table 3.18. 2018-2027 Capital Improvement Program

Subwatershed	Capital Projects	Estimated Cost	Potential Funding Sources*	Proposed Implementation Year
District-wide	Land Conservation	See Table 3.17	MCWD Levy, partner contributions, grants	2018-2027
Christmas Lake	Stormwater Volume and Pollutant Load Reduction	$200,000	MCWD levy, partner contributions, grants	2018-2027
Dutch Lake	Stormwater Volume and Pollutant Load Reduction	$780,000	MCWD levy, partner contributions, grants	2018-2027
Gleason Lake	Stormwater Volume and Pollutant Load Reduction	$600,000	MCWD levy, partner contributions, grants	2018-2027
Lake Minnetonka	Halsted Bay Internal Phosphorus Load Reduction	$1,400,000	MCWD levy, partner contributions, grants	2018-2027
Lake Minnetonka	Stormwater Volume and Pollutant Load Reduction	$1,000,000	MCWD levy, partner contributions, grants	2018-2027
Lake Virginia	Stormwater Volume and Pollutant Load Reduction	$650,000	MCWD levy, partner contributions, grants	2018-2027
Langdon Lake	Stormwater Volume and Pollutant Load Reduction	$230,000	MCWD levy, partner contributions, grants	2018-2027
Long Lake Creek	Stormwater Volume and Pollutant Load Reduction	$1,320,000	MCWD levy, partner contributions, grants	2018-2027
Minnehaha Creek	Minnehaha Creek FEMA Flood Damage Repairs	$920,000	MCWD levy, partner contributions, grants	2018
Minnehaha Creek	325 Blake Road Regional Stormwater and Greenway	$2,750,000	MCWD levy, partner contributions, grants	2018-2019
Minnehaha Creek	Meadowbrook Golf Course Ecological Restoration	$2,200,000	MCWD levy, partner contributions, grants	2018-2019
Minnehaha Creek	Arden Park Stream Restoration	$4,100,000	MCWD levy, partner contributions, grants	2018-2019
Minnehaha Creek	Greenway to Cedar Trail Connection and Streambank Restoration	$510,000	MCWD levy, partner contributions, grants	2019-2020
Minnehaha Creek	Boone-Aquilla Floodplain	$500,000	MCWD levy, partner contributions, grants	2019-2020
Minnehaha Creek	Cottageville Park Phase II Riparian Restoration	$280,000	MCWD levy, partner contributions, grants	2019-2020
Minnehaha Creek	West Blake Greenway Enhancement	$420,000	MCWD levy, partner contributions, grants	2020-2021
Minnehaha Creek	Meadowbrook Greenway Expansion	$950,000	MCWD levy, partner contributions, grants	2020-2021
Minnehaha Creek	Hiawatha Golf Course Restoration	$1,940,000	MCWD levy, partner contributions, grants	2020-2021
Minnehaha Creek	Minnehaha Parkway Stormwater Management	$1,400,000	MCWD levy, partner contributions, grants	2021-2022
Minnehaha Creek	Stormwater Volume and Pollutant Load Reduction	$2,450,000	MCWD levy, partner contributions, grants	2018-2027
Minnehaha Creek	Channel/Streambank Restoration	$3,120,000	MCWD levy, partner contributions, grants	2018-2027
Painter Creek	Potato Marsh Restoration	$ 870,000	MCWD levy, USACE Section 206, partner contributions, grants	2019
Painter Creek	SOBI Marsh Restoration	$240,000	MCWD levy, USACE Section 206, partner contributions, grants	2020
Painter Creek	Upper and Lower Painter Marsh Restoration	$2,800,000	MCWD levy, USACE Section 206, partner contributions, grants	2021
Painter Creek	South Katrina Marsh Restoration	$1,270,000	MCWD levy, USACE Section 206, partner contributions, grants	2022
Painter Creek	Stormwater Volume and Pollutant Load Reduction	$980,000	MCWD levy, partner contributions, grants	2018-2027
Painter Creek	Stream Restoration	$2,990,000	MCWD levy, partner contributions, grants	2018-2027
Painter Creek	Wetland Restoration	$330,000	MCWD levy, partner contributions, grants	2018-2027
Schutz Lake	Stormwater Volume and Pollutant Load Reduction	$250,000	MCWD levy, partner contributions, grants	2018-2027
Six Mile-Halsted Bay	East Auburn Stormwater Enhancement Project	$170,000	MCWD levy, partner contributions, grants	2018
Six Mile-Halsted Bay	Wassermann West External Load Reduction and Landscape Restoration	$2,250,000	MCWD levy, partner contributions, grants	2018-2019
Six Mile-Halsted Bay	Pierson Lake Headwaters Restoration	$320,000	MCWD levy, partner contributions, grants	2019-2021
Six Mile-Halsted Bay	Turbid-Lundsten Wetland Restoration	$3,100,000	MCWD levy, partner contributions, grants	2019-2021
Six Mile-Halsted Bay	Mud Lake Watershed Load Reductions	$3,090,000	MCWD levy, partner contributions, grants	2019-2025
Six Mile-Halsted Bay	Wassermann Internal Load Management	$310,000	MCWD levy, partner contributions, grants	2020-2022
Six Mile-Halsted Bay	East Auburn Wetland Restoration	$990,000	MCWD levy, partner contributions, grants	2020-2021
Six Mile-Halsted Bay	Halsted Bay Watershed Load Management	$13,050,000	MCWD levy, partner contributions, grants	2022-2025

Six Mile-Halsted Bay	Wetland Restoration	$3,000,000	MCWD levy, partner contributions, grants	2018-2027
Six Mile-Halsted Bay	Stormwater Volume and Pollutant Load Reduction	$2,000,000	MCWD levy, partner contributions, grants	2018-2027
Six Mile-Halsted Bay	Whole Lake Drawdown	$770,000	MCWD levy, partner contributions, grants	2018-2027
Six Mile-Halsted Bay	Internal Load Management	$980,000	MCWD levy, partner contributions, grants	2018-2027
Six Mile-Halsted Bay	Stream Restoration	$870,000	MCWD levy, partner contributions, grants	2018-2027

*See Section 3.4.4 for more information on funding sources