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4th Generation Watershed Management Plan – Final Draft



Prepared for: Pioneer-Sarah Creek Watershed Management Commission

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Rioneerarah Creek Watershed Management Commission



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Abbreviations and Acronyms

BMP	Best Management Practice
BWSR	Board of Water and Soil Resources
chl-a	Chlorophyll-a
Commission	Pioneer-Sarah Creek Watershed Management Commission
DNR	Department of Natural Resources
DO	Dissolved Oxygen
EPA	Environmental Protection Agency
F-IBI	Index of Biotic Integrity for Fish
HCEE	Hennepin County Environment and Energy
IBI	Index of Biotic Integrity
LA	Load Allocation
LGU	Local Government Unit
LWMP or LSMP	Local Water (or Stormwater) Management Plan
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
MDNR or MnDNR	Minnesota Department of Natural Resources
M-IBI	Index of Biotic Integrity for Macroinvertebrates
MPCA	Minnesota Pollution Control Agency
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
NWI	National Wetland Inventory
NWS	National Weather Service
ppb	parts per billion (μg/L)
Plan	Watershed Management Plan
PSC WMC	Pioneer-Sarah Creek Watershed Management Commission
SAV	Submersed Aquatic Vegetation
SWPPP	Storm Water Pollution Prevention Program
TMDL	Total Maximum Daily Load
ТР	Total Phosphorus
TRPD	Three Rivers Park District
TSS	Total Suspended Solids
μg/L	microgram per liter (ppb)
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WCA	Wetland Conservation Act
WLA	Wasteload Allocation
WMC	Watershed Management Commission
WMO	Watershed Management Organization

This Watershed Management Plan (Plan) describes how the Pioneer-Sarah Creek Watershed Management Commission (PSC WMC) will manage activities in the watershed in the ten-year period 2021-2030.

The Pioneer-Sarah Creek Watershed Management Commission is a Watershed Management Organization (WMO) formed in 1984 using a Joint Powers Agreement (JPA) developed under authority conferred to the member communities by Minnesota Statutes 471.59 and 103B.201 through 103B.251. The watershed is in the northwest portion of the Minneapolis-St. Paul seven county Metropolitan Area and is comprised of all or part of the following cities in Hennepin County:

Cities	Area (sq mi)
Greenfield	21.32
Independence	29.72
Loretto	0.26
Maple Plain	0.76
Medina	7.52
Minnetrista	10.70
Total	70.28

The WMO is governed by a Board of Commissioners that is comprised of one member appointed from each community by their respective City Councils. The Commission's purpose is set forth in Minnesota Statutes 103B.210, Metropolitan Surface Water Planning, which codified the Metropolitan Surface Water Management Act of 1982:

- (1) protect, preserve, and use natural surface and groundwater storage and retention systems;
- (2) minimize public capital expenditures needed to correct flooding and water quality problems;
- (3) identify and plan for means to effectively protect and improve surface and groundwater quality;

(4) establish more uniform local policies and official controls for surface and groundwater management;

- (5) prevent erosion of soil into surface water systems;
- (6) promote groundwater recharge;
- (7) protect and enhance fish and wildlife habitat and water recreational facilities; and
- (8) secure the other benefits associated with the proper management of surface and ground water.

Fourth Generation Watershed Management Plan

The Pioneer-Sarah Creek Watershed Management Commission initiated work on the Fourth Generation Plan in November 2019. The Plan includes a self-assessment and information required in Minnesota Administrative Rules Chapter 8410, Local Water Management: an updated land and water resources inventory, goals and policies; an assessment of problems and identification of corrective actions; an implementation program; and a process for amending the Plan.

Third Generation Plan Self-Assessment

The Third Generation Plan extended from 2015 to 2020. The Commission has completed or is in ongoing implementation of nearly all the work plan activities and strategies identified in the Third Generation Plan. The most successful achievements over the past six years have been:

- Continued identification and implementation of projects and practices to reduce pollutant loading to the lakes and streams in the watershed.
- Lake Rebecca, originally listed as impaired in 2008 for nutrients, now meets phosphorus, chlorophyll-a, and Secchi depth standards and has been removed from the Impaired Waters list.
- Built a sense of Commission and City alignment, highlighted by partnerships that identified implementation projects and grant and cost share funding to complete projects.
- Enhanced the working relationship with the Hennepin County Rural Conservationists to enhance visibility and build ties with the agricultural community.
- The Plan set a goal of improving water quality in the lakes by 10% over the previous ten-year period. Table ES.1 shows change in water quality as measured by Secchi depth (SD) (clarity) and Total Phosphorus (TP) in 5 of the 9 lakes with enough data to perform a trend analysis. The improvement in TP in West Lake Sarah and North Whaletail and clarity in North Whaletail and Lake Ardmore is statistically significant. Independence and Hafften are also trending better.

Lake	SD Change*	TP Change*		
Lake Ardmore	+28%	+9.5%		
Hafften Lake	+23%	-15%		
Lake Independence	+43%	-10%		
Peter Lake	-3%	+24%		
Lake Sarah-East	+36%	N/A		
Lake Sarah-West	+38%	-18%		
Spurzem Lake	+38%	N/C		
North Whaletail	+16%	-23%		
South Whaletail	+16%	-5%		

Table ES.1. Ten-year change in lake water quality.

*Note: a positive Secchi depth change is an improvement, while a negative TP change is an improvement. Values in **bold italic** are significant based on a Mann-Kendall trend analysis (ρ =0.05).

Areas where the Commission fell short include:

- No assessment of progress toward meeting Total Maximum Daily Load (TMDL) load reductions, Watershed Restoration and Protections Strategies (WRAPS) study, or water quality goals has been completed. TMDL modeling could be updated based on more recent and more complete data, including sediment core analysis and the Implementation Plans revisited.
- Because much of the implementation opportunity in the watershed is on privately-owned property, <u>the Commission's success is highly dependent upon its ability to provide sufficient</u> <u>technical and financial resources to enable private property owners to participate in projects</u>, and financial resources have been scarce and unpredictable.<u>there is heavy reliance on finding</u>

willing landowners. Additional implementation projects could have been completed had property owners been willing to participate.





• 33 Figure ES.1: Cities in the Pioneer-Sarah Creek watershed.

Fourth Generation Management Plan Issues and Priorities and Goals

The Commission and Citizen and Technical Advisory Committees identified the following issues and issue areas during the planning process:

- Impaired Waters Implementation
- Agricultural Community Outreach
- General Education and Outreach
- Effective Operations

The Pioneer-Sarah Creek watershed is primarily residential and agricultural in land use, with a very limited commercial and industrial tax base. Its financial capacity is limited, but the Commission has been successful at obtaining grants to supplement local funding sources, and at building partnerships to leverage resources. In implementing this Plan, the Commission will continue to work on identifying opportunities, securing grant and other funding, and working jointly with member cities, Hennepin County Environment and Energy (HCEE), the Three Rivers Park District (TRPD), public and private entities, and individual property owners to maximize the cost-effectiveness of implementation activities. The success of this Plan is dependent on continuing and expanding those partnerships and outside resources.

Through the identification of issues in the watershed, the PSC WMC developed the following priorities and goals to guide water resources planning and management functions.

FOURTH GENERATION MANAGEMENT PLAN PRIORITIES

- 1. Make systematic progress toward achieving lake water quality goals by 2030:
 - a. Delist South Whaletail Lake.
 - b. Protect Lake Rebecca so it continues to meet water quality standards.
 - c. Meet state water quality standards in the following lakes: Independence, Sarah, Spurzem, Half Moon, and Ardmore.
 - d. Achieve a 10% reduction in Total Phosphorus concentration in the other monitored lakes over the previous ten years.
- 2. Work in a coordinated way with urban and rural property owners, cities, lake associations, public and private entities, Hennepin County, and TRPD building partnerships to conserve our water and natural resources and deliver implementation projects
- 3. Raise the profile of the Commission across the watershed, within Hennepin County, and in the western Metro area, and the Crow River Watershed.
- 4. Serve as an informational and technical resource for the cities and the citizens and property owners in the watershed.

Guided by the identification and prioritization of issues in the watersheds, the Commission has established goals that will guide activities over the coming decade.

- Goal Area A. <u>Water Quantity</u>
 - Goal A. 1. Maintain the post-development 2-year, 10-year, and 100-year peak rate of runoff at pre-development level for the critical duration precipitation event.
 - Goal A. 2. Maintain the post-development annual runoff volume at pre-development volume.
 - Goal A. 3. Prevent the loss of floodplain storage below the established 100-year elevation.

Goal Area B. <u>Water Quality</u>

- Goal B. 1. Protect Lake Rebecca and achieve delisting of South Whaletail Lake.
- Goal B. 2. Meet state standards in Spurzem, Half Moon, Ardmore, Independence and Sarah Lakes, making progress towards their removal from the list of Impaired Waters.
- Goal B. 3. Improve water quality in the impaired lakes by 10% over the average of the previous ten years by 2030.
- Goal B. 4. Maintain or improve water quality in the lakes and streams with no identified impairments.
- Goal B. 5. Conduct a TMDL/WRAPS progress review every five years.
- Goal B. 6. Foster implementation of Best Management Practices in the watershed through technical and financial assistance.
- Goal Area C. <u>Groundwater</u>
 - Goal C. 1. Promote groundwater recharge by requiring abstraction/infiltration of runoff from new development and redevelopment.
 - Goal C. 2. Protect groundwater quality by incorporating wellhead protection study results into development and redevelopment Rules and Standards.
- Goal Area D. <u>Wetlands</u>
 - Goal D. 1. Preserve the existing functions and values of wetlands within the watershed.
 - Goal D. 2. Promote the enhancement or restoration of wetlands in the watershed.

Goal Area E. Drainage Systems

- Goal E. 1. Continue current Hennepin County jurisdiction over county ditches in the watershed.
- Goal Area F. <u>Commission Operations and Programming</u>
 - Goal F. 1. Identify and operate within a sustainable funding level that is affordable to member cities.
 - Goal F. 2. Foster implementation of TMDL and other implementation projects by sharing in their cost and proactively seeking grant funds.
 - Goal F. 3. Operate a public education and outreach program prioritizing elected and appointed officials' education and building better understanding between all stakeholders.

- Goal F. 4. Operate a monitoring program sufficient to characterize water quantity and quality and biotic integrity in the watershed and to evaluate progress toward TMDL goals.
- Goal F. 5. Maintain rules and standards for development and redevelopment that are consistent with local and regional TMDLs, federal guidelines, source water and wellhead protection requirements, nondegradation, and ecosystem management goals.
- Goal F. 6. Serve as a technical resource for member cities and residents.

Implementation

This Fourth Generation Watershed Management Plan continues and expands activities that have been successful in the past and introduces some new activities, including the development of Lake Management Plans for key resources. The Commission's partnerships with HCEE and TRPD have led to successes such as the delisting of Lake Rebecca from the state's list of Impaired Waters.

<u>Rules and Standards.</u> In the Third Generation Plan the Commission updated stormwater management and water resources protection policies and standards for new development and redevelopment. These were compiled and codified into a Rules and Standards document. In general, those Rules and Standards apply to all development and redevelopment one acre or more in size and require at a minimum: no increase in pollutant loading or stormwater volume; no increase in the peak rate of runoff from the property; and the abstraction/infiltration of 1.1 inches of runoff from impervious surfaces. The Commission reviews 4-8 development projects per year for conformance with those Rules.

<u>Monitoring Program.</u> The monitoring program continues routine monitoring for flow and water quality on Pioneer and Sarah Creeks, with periodic monitoring on other smaller streams and tributaries on a rotating or as-needed basis. Five lakes – Independence, Sarah, both basins of Whaletail, and Little Long – have been classified by the Commission as "Sentinel Lakes," and are monitored every year. Other lakes are monitored on a rotating basis.

<u>Education and Outreach.</u> The Commission has an Education and Outreach program that identifies stakeholder groups in the watershed and key education messages, and uses Web and social media, local newspapers and cable TV to share useful information. In recent years the Commission has partnered with Hennepin County rural conservationists and water resources specialists to expand outreach opportunities for rural and agricultural stakeholders. The Commission also participates in Metro-wide education and outreach initiatives such as Blue Thumb, Watershed Partners and Northland NEMO.

<u>TMDL Implementation</u>. The Commission was identified as being a partner in certain implementation activities in the lake and stream TMDLs and WRAPS in the watershed. Many of those activities are included in the monitoring, education and outreach, and Capital Improvement actions in this Plan.

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<u>Capital Improvement Program.</u> The primary focus of the Commission's Capital Improvement Program (CIP) is to systematically make progress toward meeting TMDLs by focusing resources on one or two lakes at a time, periodically reviewing progress and updating realistic five to ten year working plans.

- Lake Management Plans. The Commission will prepare lake management plans for Lake Independence, Lake Sarah, and Lake Ardmore that will summarize progress toward their TMDLs and update models and data as necessary. The plans will focus on holistic, whole-lake ecological management that include actions to manage aquatic vegetation and fish communities and internal load in addition to watershed load reductions.
- *Subwatershed Assessments and Studies.* The Commission will complete subwatershed assessments and special studies that will identify cost-effective practices and projects. A priority for assessment is the area tributary to Spurzem Lake, which is tributary to Lake Independence.
- *Capital Projects.* The Commission will focus on subwatershed assessments and other studies and will prioritize cost–share in TMDL/WRAPS implementation projects, starting with Lake Independence and Lake Sarah. The Commission will annually solicit capital projects and cost-share activities from the member cities. The Commission will also consider a policy to supplement Hennepin County incentives for cost-share practices in priority areas.

Local and Watershed Plan Amendments

After final approval of the Plan, cities will update their Local Stormwater Management Plans (LWMPs) as a part of their next Comprehensive Plans. These updates will be expected to include:

- Updated land use, hydrologic, and hydraulic data, and existing or potential water resource related problems that may have changed since the last LWMP.
- An explanation of how the member city will help to implement the actions set forth in the Commission's Plan.
- Show how the member city will take action to achieve the load reductions and other actions identified in and agreed to in TMDL Implementation Plans.
- Updated Implementation Plan identifying the specific structural, nonstructural, and programmatic solutions to the problems and issues identified in the LWMP.
- Set forth an implementation program including a description of adoption or amendment of
 official controls and local policies necessary to implement the Rules and Standards; programs;
 policies; a capital improvement plan; and estimates of cost and funding mechanisms.

This watershed management plan provides direction for PSC WMC activities through the year 2030. The Commissioners intend the Plan to provide a flexible framework for managing the watershed and, as such, may initiate amendments to this plan at any time. The Commission will annually review and refine the budget, monitoring program, education and outreach plan and Capital Improvement Program and may adopt plan amendments adding or revising proposed capital improvement projects or making other revisions to the Plan. The cities of Independence, Minnetrista, Medina and the Hennepin Conservation District created the Pioneer Creek Watershed Management Commission on January 13, 1978. When the 1982 Surface Water Management Act required that all watersheds within the Metro area be governed by watershed management organizations, Greenfield requested that the Sarah Creek watershed be merged with Pioneer Creek to form a joint watershed management organization (WMO). The Pioneer-Sarah Creek Watershed Management Commission was officially established in December 1984 through a Joint Powers Agreement (JPA) signed by Corcoran, Greenfield, Independence, Loretto, Maple Plain, Medina, and Minnetrista, Watertown Township, and Hennepin Conservation District, under the authority conferred through Minnesota Statutes Chapters 471.59 and 103B.211. Since that time, Watertown Township and Corcoran left the Watershed Management Commission. The JPA governing the WMO is included in Appendix A.

The watershed is in the northwest portion of the Minneapolis-St. Paul seven county metropolitan area (Figure 1.1) in the Crow River basin of the Upper Mississippi River watershed. The Commission's purpose is set forth in Minnesota Statutes 103B.210, Metropolitan Surface Water Planning, which codified the Metropolitan Surface Water Management Act of 1982.

- (1) protect, preserve, and use natural surface and groundwater storage and retention systems;
- (2) minimize public capital expenditures needed to correct flooding and water quality problems;
- (3) identify and plan for means to effectively protect and improve surface and groundwater quality;
- (4) establish more uniform local policies and official controls for surface and groundwater management;
- (5) prevent erosion of soil into surface water systems;
- (6) promote groundwater recharge;
- (7) protect and enhance fish and wildlife habitat and water recreational facilities; and
- (8) secure the other benefits associated with the proper management of surface and ground water.

1.1 Previous Generation Plans

The Commission adopted its First Generation Management Plan in July 1986, Second Generation Plan in June 2003, and Third Generation Plan in May 2015. The Third Generation Plan was amended three times between 2015 and 2020: once to conform the plan to Minnesota Rules Section 8410 revisions, and twice to revise the Capital Improvement Program (CIP). While not amending the plan, on August 22, 2019 the Commission relinquished its Wetlands Conservation Act (WCA) Local Government Unit (LGU) authority to the respective cities.

Number	Туре	Date of Adoption	Summary of Revisions
1	Minor	11/19/2015	Conform the plan to revisions in MR 8410
2	Minor	7/20/2017	Amend the CIP
3	Minor	6/21/2018	Amend the CIP

Table 1.1. Record of revisions to the Third Generation Watershed Management Plan.

¹⁻¹Pioneer-Sarah Creek Watershed Management Commission
Fourth Generation Watershed Management Plan
October 2020 Final Review Draft



Figure 1.1. The Pioneer-Sarah Creek watershed in Hennepin County, Minnesota.

1.2 PLAN REQUIREMENTS

Minnesota Statutes 103B.201 to 103B.253 and Minnesota Rules Chapter 8410 specify the basic content of the watershed management plan. The plan must:

- Describe the existing physical environment and land use in the area, as well as the proposed environment, land use, and development outlined in existing local and metropolitan comprehensive plans.
- Present information on the hydrologic system and its components and potential problems related thereto.
- State objectives and policies including management principles, alternatives and modifications, water quality, and protection of natural characteristics.
- Set forth a management plan including the desired hydrologic and water quality conditions and significant opportunities for improvement.
- Describe the effect of the plan on existing drainage systems.
- Identify high priority areas for wetland preservation, enhancement, restoration, and establishment and describe conflicts with wetlands and land use in those areas.
- Describe conflicts between the watershed plan and existing plans of Local Governmental Units (LGUs).
- Set forth an implementation program consistent with the management plan that includes a capital improvement program, standards, and schedules for amending the comprehensive plan and official controls of LGUs in the watershed to bring conformance with the plan.
- Set out procedures and timelines for amending the plan.

1.3 PLAN ORGANIZATION

This plan is divided into four sections:

1 – **Introduction and Purpose:** Describes the authority and composition of the PSC WMC, the purpose of the Surface Water Management Act and the components of this watershed management plan.

2 – **Inventory and Condition Assessment:** A thorough physical inventory of the watershed was completed for the Third Generation Plan and is summarized but not reproduced here. However, new information regarding current and planned land use and updated information on the lakes, streams, and wetlands in the watersheds is presented.

3 – Watershed Organization and Operations: This section provides information about the Commission, how it is organized, its history, and its responsibilities, and discusses ongoing operations. This section also provides an evaluation of the successes of the Third Generation Plan and the areas where the Commission may have fallen short of its goals for the 2015-2020 period.

4 – Implementation Plan: This section sets forth the goals the Commission will work to achieve in the ten-year period covered by this Plan, and descriptions of the Commission's proposed operating programs, the Capital Implementation Program, and a discussion of implementation costs and financing. It also discusses the methods by which the Commission will evaluate progress towards achieving the goals set forth in the Plan, the process that will be followed should this Plan need to be Amended, and the requirements for Local Stormwater Management Plans prepared by the member cities in the watershed.

2.0 Inventory and Condition Assessment

This section documents existing conditions and resource characteristics within the Pioneer-Sarah Creek watersheds. Where the Third Generation Watershed Management Plan included a detailed inventory of conditions, that data is not repeated here. A summary of that information is provided for context, with new or updated information presented in more detail.

The Physical Environment subsection describes the watershed's physical setting, geology and geomorphology, soils, and water resources. The Biological Environment subsection describes vegetation, biodiversity and native communities, unique features, and the biology of lakes and streams. The subsection Human Environment describes land use and growth patterns, recreational resources, and potential environmental hazards. The lakes, streams, and wetlands in the watershed are described in the Water Resources section.

2.1 WATERSHED PHYSICAL ENVIRONMENT

2.1.1 Location

The Pioneer-Sarah Creek watershed covers just over 70 square miles in west-central Hennepin County. There are six municipalities with land in the watershed (Figure 1.1, Table 2.1).

Cities	Area (sq mi)	% of City in Watershed
Greenfield	21.32	100%
Independence	29.72	86
Loretto	0.26	100
Maple Plain	0.76	71
Medina	7.52	28
Minnetrista	10.70	33
Total	70.28	

Table 2.1. Cities in the Pioneer-Sarah Creek watershed.

2.1.2 Topography and Drainage

The drainage pattern in the watershed is typical of a glaciated morainic area- gently rolling with low, round-top hills and numerous small wetlands in low areas. The southern watershed drains through Pioneer Creek to Ox Yoke and Rice Lakes to the South Fork Crow River, while the central watershed drains through Sarah Creek to the Crow River. The northern watershed drains through several small channels to the Crow River. Portions of the Pioneer Creek drainage area are in Wright and Carver Counties, outside the legal boundary of the watershed. Figure 2.1 shows the major watershed drainage features, including subwatershed boundaries, lakes, streams, and ditches.



Figure 2.1. Pioneer-Sarah Creek watershed drainage systems. Source: Minnesota DNR.

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2.1.3 Climate

The climate is predominately continental. Sitting close to the middle of North America, the weather in the watershed can vary widely and rapidly. Both temperature and precipitation can change abruptly. In an average year, around 30 inches of precipitation falls on the watershed. Winter snowfall averages about 46 inches. Snow generally stays on the ground from mid-December to April. Snow and rainfall data for the watershed is obtained at weather stations in Minneapolis and Rockford. The 30-year precipitation and temperature normals by month can be found in the Third Generation Plan. The State Climatology Office has <u>identified</u> a change in precipitation patterns in Minnesota over the past few decades, with increased rainfall in the spring and late summer, and shorter, more intense rain events. The MPCA <u>reports</u> that these changes could increase the risk of flooding, erosion, and sedimentation affecting lakes, streams, and rivers. Average temperatures have also been observed to be increasing, as are the number of days with high humidity. These could lead to more frequent or stronger algal blooms in lakes, affecting fish and other wildlife.

2.1.4 Soils

Most of the watershed's upland area is composed of well-drained soils. Texture is generally loamy or sandy with scattered organic or marsh soils areas. These soils have moderate to minimum infiltration rates ranging from 0.15 to 0.30 inches per hour when thoroughly wetted. Wind erodibility is also generally low to moderate. Highly to moderately permeable soils dominate the watershed, as indicated by the large areas covered by soil hydrologic group B (Figure 2.2). Soil hydrologic group characteristics can be found in the <u>Minnesota Stormwater Manual</u>.

The soils information in Figure 2.2 is provided for use in describing the general characteristics of the major soil associations for summary purposes. The Hennepin County Soil Survey or on-site soil borings should be consulted for site-specific information.

2.1.5 Geology and Geomorphology

The bedrock underlying the watershed is generally St. Lawrence and Franconia Formation sandstone and shale 150 to 250 feet below the surface. The surficial geology of the watershed is generally loamy glacial till, with the central watershed around Lakes Independence and Sarah tending more toward clayey till (Balaban 1989).

Two major geomorphic regions are found in the watershed: the Lonsdale-Lerdal Till Region in the eastern half and the Waconia-Waseca Moraine along the west. A small area in the northeastern watershed in the City of Greenfield lies within the Emmons-Faribault moraine. Lonsdale-Lerdal Till areas are characterized by circular, broad, level-topped hills with smooth sides. Soils are generally well-drained, but clayey deposits are common on top of the hills. Many small streams end in depressions or lakes. The lower elevations are interspersed with closed depressions containing lakes and wetlands. The Waconia-Waseca Moraine region is very similar to Lonsdale-Lerdal, without the characteristic clayey sediment deposits on hilltops (University of Minnesota 1975). More information can be found in the Third Generation Plan and in the Hennepin County Geologic Atlas.

2-3



Figure 2.2. Soils by Hydrologic Soil Group classification Source: USDA NRCS SSURGO.

2-4

2.2 WATERSHED BIOLOGICAL ENVIRONMENT

2.2.1 Vegetation

Prior to settlement by Europeans in the mid-19th century, vegetation in the watershed was maplebasswood forest (big woods) with areas of wet prairie. Since then the area has been used for urban uses and agriculture and only a few remnants of that vegetation remain, mostly within regional parks. The Department of Natural Resources (DNR) and the Minnesota Biological Survey (MBS) have identified those locations with intact native plant communities, and those with biodiversity significance (see Figure 2.3).

2.2.2 Fish and Wildlife

Fishing is possible on many of the lakes in the watershed. Whaletail, Little Long, Independence, Sarah, Spurzem, Rebecca, and Hafften all have public boat launches. Carry-in accesses are at Half Moon Lake and the Crow River. Little Long Lake and Lake Independence are regularly stocked with fish by the DNR. The Commission has not conducted any fish surveys on the lakes in the watershed. Consult the <u>DNR Lakefinder</u> to find the latest DNR fish survey information for each lake. There is one DNR Wildlife Management Area in the watershed: the Robina Lake WMA, nearly 200 acres of wetland west of Robina Lake and north of Highway 12. This WMA is open to the public for hunting.

2.2.3 Threatened and Endangered Species

The DNR Natural Heritage and Nongame Research Program maintains a database of observations of rare plant and animal species compiled from historical records from museum collections and published information supplemented with data from years of field work. More detail and plant community information can be found in the Third Generation Plan.

2.2.4 Aquatic Invasive Species

Five lakes in the watershed have been determined by the DNR to be infested with Eurasian watermilfoil, an invasive exotic plant species: Independence, Rebecca, Little Long, Sarah, and Whaletail. TRPD discovered zebra mussels at the public boat access on Lake Independence in 2014. The DNR and TRPD have conducted annual lake wide surveys throughout the lake to monitor the spread of zebra mussels in Lake Independence.

2.2.5 Unique Features and Scenic Areas

The Pioneer-Sarah Creek watershed has many natural areas, water resources, and regional and local parks. Some of these areas contain rare and endangered species and special habitats. Natural communities identified by the Minnesota Biological Survey within the watershed include federally or state-listed plants and animals, as well as previously state-listed plants and animals. The natural communities and rare species identified are mainly concentrated within the Lake Rebecca and Baker Park Reserves, and around Little Long Lake and Lake Independence.

2-5





Moderate





Figure 2.3. Sites of ecological diversity and significance. Source: Minnesota County Biologic Survey (MCBS), Minnesota DNR.

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2.3 WATERSHED HUMAN ENVIRONMENT

Native Americans were the first settlers in the Pioneer-Sarah Creek watershed. Notes from the 1856 Public Land Survey indicate that the area was heavily timbered with oak, sugar maple, basswood, ironwood, and hickory, with numerous boggy tamarack swamps. The lakes, it was noted, "abound with fine fish." The surveyors noted only a few streams aside from the Crow River, describing the streams as "...such as flow in and out of lakes." By the time the Public Land Survey was conducted, white settlers had arrived and land was already being claimed. By the turn of the 20th century, Lake Sarah had become well-known as a resort lake. Numerous orchards grew apples, strawberries, blackberries, currents, and gooseberries. The market began declining after World War I, but there are still several orchards in the watershed.

Within the watershed, Loretto and Maple Plain continue to be the population and commerce centers. Residential development is clustered around the lakes and in small, large-lot developments.

2.3.1 Land Use and Population

The predominant land use in the watersheds is Undeveloped, a category which includes undevelopable wetlands and grasslands in addition to lands that are currently vacant and developable (Figure 2.4 and Table 2.2). One third of the watershed is classified as agricultural. Developed land uses cover about ten percent of the watershed, with more intensive uses clustered along Highways 19 and 55 near Loretto and Rockford, and Highway 12 in Maple Plain and Independence. The only areas within the existing Metropolitan Urban Service Area (MUSA) are located along Highways 12, 19, and 55. Parcels outside the MUSA rely on Individual Sewage Treatment Systems for their sanitary sewer services. Population has grown from the approximately 9,520 persons counted in the 2000 Census to an estimated 9,795 persons counted in the 2010 Census.

Areas of projected urban growth are shown on Figure 2.5. This data was compiled by the Metropolitan Council from cities' most recent Comprehensive Plans and represents cities' planned 2040 land use. Most of the projected growth is expected to be in the existing developed corridors, with a mix of development at different densities, and to include residential, commercial, and industrial uses.

Land Use	Area (acres)	%
Undeveloped	15,723	35%
Agricultural	14,932	33%
Park, Recreational, or Preserve	4,422	10%
Single Family	4,238	9%
Open Water	3,533	8%
Farmstead	601	1%

Table 2.2. 2016 land use in the Pioneer-Sarah Creek watershed.

²⁻⁷ Pioneer-Sarah Creek Watershed Management Commission Fourth Generation Watershed Management Plan October 2020 Final Review Draft

Land Use	Area (acres)	%
Golf Course	598	1%
Industrial and Utility	352	1%
Commercial	160	0%
Institutional	154	0%
Multifamily	18	0%
Highway	258	1%
Total	44,990	100%

Source: Metropolitan Council from city Comprehensive Plans and aerial photo interpretation.

2.3.2 Water-Based Recreation

The Baker Park Reserve abuts the shoreline of Lake Independence; Spurzem and Half Moon Lakes are also located in the Park Reserve. Lake Rebecca is in the Lake Rebecca Park Reserve, which also includes the Lake Sarah Dog Off-leash Area. Both park reserves have boat launches, fishing piers, and swimming beaches that are heavily used. Public boat launches are available on several other lakes (see Figure 2.6). Other TRPD regional park facilities include Gale Woods Farm on Whaletail Lake and Kingswood Park on Little Long Lake. The latter park includes access to the lake's two-story warm and cold-water fishery as well as a tamarack bog and pristine, high quality aquatic and upland areas.

On the north end of Lake Independence, the YMCA operates Camp Ihduhapi, which provides traditional (camping, fishing, canoeing) and specialty summer camp experiences for youth ages 8-14 as well as adult retreats and meetings. Also on the north side of the lake is Vinland National Center, which treats individuals with cognitive disabilities and chemical and behavioral health needs. Aquatic recreation is offered as a complementary care service.

2.3.3 Potential Environmental Hazards

Groundwater connections, hazardous waste, leaking above- and below-ground storage tanks, and feedlots can be potential sources of surface and groundwater contamination. The Minnesota Pollution Control Agency (MPCA) maintains a current on-line mapping tool with information about air quality, hazardous waste, remediation, solid waste, tanks and leaks, and water quality. This tool is available at http://www.pca.state.mn.us/udgx680.



Figure 2.4. 2016 land use in the Pioneer-Sarah Creek watershed. Source: Metropolitan Council.

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Figure 2.5. Planned 2040 land use in the Pioneer-Sarah Creek watershed. Source: Metropolitan Council.



Figure 2.6. Water-based recreation in the Pioneer-Sarah Creek watershed. Source: Minnesota DNR.

2.4 WATERSHED WATER RESOURCES

2.4.1 Lakes

There are nineteen lakes in the watershed. Thomas and Robina Lakes are classified as wetlands. The DNR lake number and shoreland classification, lake morphometry, and water quality data are shown in Table 2.4. The lakes in the watershed are shown on Figure 2.7. Minnesota's standards for lake water quality vary depending on the depth classification of the lake (Table 2.3). Shallow lakes have a maximum depth of 15 feet or less or have 80% or more of the lake area shallow enough to support emergent and submerged rooted aquatic plants. More information about the lakes can be found online at the DNR's LakeFinder website: <u>dnr.state.mn.us/lakefind/index.html</u>.

Table 2.3. Water quality standards for lakes in the North Central Hardwood Forest Ecoregion.

Parameters	Shallow Lakes	Deep Lakes
Total Phosphorus (TP) (μg/L)	≤60	≤40
Chlorophyll-a (chl-a) (µg/L)	≤20	≤14
Secchi Depth transparency (SD) (meters)	≥1.0	≥1.4

		Surface	Max	Denth		Sur	nmer Aver	age	Vears of
Lake	ID#	Area (ac)	Depth (ft)	Class	Class	TP (µg/L)	Chl-a (µg/L)	SD (m)	Data
Lake Ardmore	27-0153-00	13	20	Shallow	RD	263	78	0.7	7
Hafften Lake	27-1999-00	37	44	Deep	NE	47	23	1.3	4
Halfmoon Lake	27-0152-00	30	26	Deep	NE	147	53	1	10
Haughey Lake	27-0187-00	54	23	Shallow	NE	326	46	1.3	10
Lake Independence	27-0176-00	832	58	Deep	RD	52	25	2.3	9
Irene Lake	27-0189-00	19.1	N/A	Shallow	RD	155	58	0.9	2
Little Long Lake	27-0179-00	69	76	Deep	RD	15	6	4.9	8
Ox Yoke Lake	27-0178-00	93	4	Shallow	NE	N/A	N/A	0.8	9
Peter Lake	27-0147-00	53	68	Deep	RD	46	22	3.1	5
Rattail Lake	27-0200-00	12	63	Deep	NE	53	24	2	6
Lake Rebecca	27-0192-00	263	30	Deep	NE	47	21	1.9	9
Lake Robina	27-0188-00	234	N/A	Wetland	RD	134	71	0.8	2
Lake Sarah-East	27-0191-01	541	59	Deep	RD	87	48	1.0	10
Lake Sarah-West	27-0191-02	40	N/A	N/A	NE	87	44	1.6	10
Schendel Lake	27-0196-00	40	29	Deep	NE	N/A	N/A	N/A	0
Schwappauff Lake	27-0194-00	40	N/A	N/A	NE	48	12	1.3	2
Spurzem Lake	27-0149-00	82	38	Deep	NE	151	54	1.6	9
Thomas Lake	27-0501W	9	N/A	Wetland	-	N/A	N/A	N/A	0
North Whaletail	27-0184-01	498	22	Shallow/	RD	65	27	0.83	10
South Whaletail	27-0184-02	4,70	~~~	Deep		55	26	1.3	9
Winterhalter Lake	27-0148-00	13	27	Deep	NE	N/A	N/A	N/A	0

Table 2.4. Characteristics of lakes in the Pioneer-Sarah Creek watershe	d (2009-2018).

Sources: Minnesota DNR, MPCA EQuIS.

NE = Natural Environment; RD = Recreational Development (Shoreland Management Classification)



Figure 2.7. Major lakes and streams in the Pioneer-Sarah Creek watershed. Source: Minnesota DNR, except ditches from Hennepin County.

Impaired Lakes. Eleven of the lakes in the watershed have been designated by the MPCA and Environmental Protection Agency (EPA) as Impaired Waters and are listed on the state's draft 2020 303(d) list for not meeting state nutrient concentration standards (Table 2.5 and Figure 2.8). In 2018 the MPCA removed, or delisted Lake Rebecca based on its improved water quality. Nutrient TMDLs and Implementation Plans have been completed for these lakes. The TMDLs and a 2017 Watershed Restoration and Protection Strategies (WRAPS) include strategies for protecting and improving all the lakes in the watershed. Nine of the listed nutrient impaired lakes as well as North and South Little Long have been listed as Impaired Waters for mercury in fish tissue. The MPCA has completed a statewide TMDL for those impairments. Lake Sarah was added to the Impaired Waters list in 2020 for exhibiting an impaired fish community.

Lake	DNR Lake #	Affected Use	Pollutant	TMDL Approved
Laka Sarah Fast	27 0101 01	Aquatic consumption	Mercury FT ¹	2007
Lake Sarah Most	27-0191-01	Aquatic recreation	Nutrients	2011
Lake Saran-west	27-0191-02	Aquatic life	FishBio ¹	Not started
Laka Bahassa	27 0102 00	Aquatic consumption	Mercury FT	2008
Lake Repetta	27-0192-00	Aquatic recreation	Nutrients	Delisted 2018
Laka Indonandanca	27 0175 00	Aquatic consumption	Mercury FT	2007
Lake independence	27-0175-00	Aquatic recreation	Nutrients	2007
North Whalatail	27 0194 01	Aquatic consumption	Mercury FT	2013
North Whaletall	27-0184-01	Aquatic recreation	Nutrients	2017
South Whalatail	27-0184-02	Aquatic consumption	Mercury FT	2013
South Whaletan		Aquatic recreation	Nutrients	2017
Courson Lake	27.0140.00	Aquatic consumption	Mercury FT	2007
Spurzem Lake	27-0149-00	Aquatic recreation	Nutrients	2017
Half Moon Lako	27.0152.00	Aquatic consumption	Mercury FT	2013
	27-0152-00	Aquatic recreation	Nutrients	2017
Haffton Lako	27.0100.00	Aquatic consumption	Mercury FT	Target 2025
Hanten Lake	27-0199-00	Aquatic recreation	Nutrients	2015
North Little Long	27-0179-01	Aquatic consumption	Mercury FT	2007
South Little Long	27-0179-02	Aquatic consumption	Mercury FT	2007
Peter Lake-North Bay	27-0147-02	Aquatic recreation	Nutrients	2017
Lake Irene	27-0189-00	Aquatic recreation	Nutrients	Target 2026
Lake Ardmore	27-0153-00	Aquatic recreation	Nutrients	2017

Table 2.5. Impaired lakes in the Pioneer-Sarah Creek watershed.

¹ "FT" means mercury in fish tissue. FishBio means fisheries bioassessment.

Source: Minnesota Pollution Control Agency.

2.4.2 Streams

The watershed is drained by two stream systems. Spurzem Creek flows through several small lakes to Lake Independence (Figure 2.7). Pioneer Creek flows out of Lake Independence southwest to Ox Yoke Lake. As it flows out of Ox Yoke Lake, it crosses the watershed legal boundary into Carver and Wright Counties, where it discharges into the South Fork of the Crow River. Two other small streams, Robina Creek and Deer Creek are tributary to Pioneer Creek. Sarah Creek is the outlet of the Lake Sarah drainage area, which flows to the Crow River. Dance Hall Creek is the primary tributary in this subwatershed. In the north, several small channels drain directly to the Crow River.

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Stream	Length (mi)	Stream	Length (mi)
Pioneer Creek	8.77	Sarah Creek	2.48
Robina Creek	2.66	Dancehall Creek	2.53
Deer Creek	3.97		

Source: Minnesota DNR.

Stream Conditions. A limited amount of data is available to evaluate stream condition. Two sites on Pioneer Creek have been monitored since 2009, one at the CR 90 crossing at the outlet of a large flow-through wetland, and one further downstream at the Copeland Road crossing. Both sites show elevated levels of total phosphorus across all flow regimes, and elevated total suspended solids during high-flow events. Monitoring data shows elevated *E. coli* levels and low dissolved oxygen readings. One site on Sarah Creek has been monitored since 2009, with similar results. More data is available in the Commission's Annual Reports.

Impaired Streams. Sarah Creek, the Crow River, and the South Fork of the Crow River have been designated by the MPCA and the EPA as Impaired Waters and are listed on the state's impaired Waters list for not meeting water quality standards as shown in Table 2.7 and Figure 2.8. The 2017 WRAPS included TMDLs and implementation actions for Pioneer, Sarah, Deer, and Unnamed Creeks while the Crow River and South Fork Crow were assessed in their respective WRAPS studies.

Stream	Stream AUID #	Affected Use	Pollutant	TMDL Approved
Sarah Creek	07010204-628	Aquatic recreation	E. coli	2017
Pioneer Cr	07010205-653	Aquatic life/ Aquatic recreation	E. coli DO	2017 Target 2026
Pioneer Cr	07010205-654	Aquatic Life	F-IBI ¹ , M-IBI ¹	Target 2026
Deer Creek	07010205-594	Aquatic life/ Aquatic recreation	E. coli DO	2017 Target 2026
Unnamed Creek*	07010205-593	Aquatic life/ Aquatic recreation	E. coli DO	2017 Target 2026
Crow River	07010204-502	Aquatic life/ Aquatic recreation	F-IBI ¹ , M-IBI ¹ , turbidity, fecal coliform	Fecal coliform & turbidity in 2013 N Fork WRAPS; others target 2026
South Fork Crow River	07010205-508	Aquatic consumption/ Aquatic life/recreation	F-IBI ¹ , M-IBI ¹ , Mercury FT ² , fecal coliform, turbidity, nutrients	Fecal coliform & turbidity in 2019 S Fork WRAPS; others target 2026

Table 2.7. Impaired streams in the Pioneer-Sarah Creek watershed.

*Unnamed Creek is within the Pioneer Creek hydrologic boundary but outside the legal boundary.

¹ Index of Biotic Integrity. A measure of the quantity and quality of aquatic life. M-IBI denotes macroinvertebrate impairment and F-IBI denotes fish impairment.

² "FT" means mercury in fish tissue.

Source: Minnesota Pollution Control Agency.



Figure 2.8. 2020 impaired lakes and streams.

Source: Minnesota Pollution Control Agency.

2.4.3 Ditches

There are several county ditches in the watershed (Figure 2.7). Pioneer Creek between Highway 12 and Watertown Road and several lateral ditches, including parts of Robina Creek, are under the ditch authority of Hennepin County as County Ditch #19. County Ditch #9 connects and outlets three small lakes in the northern watershed. Part of Deer Creek, several laterals and Pioneer Creek downstream of Ox Yoke Lake cross county lines and are designated Judicial Ditch #20.

2.4.4 Wetlands

The US Fish and Wildlife Service compiled wetland maps from aerial photo interpretation as part of the National Wetland Inventory (NWI). Wetland scientists use two common classification schemes to identify wetland type – the US Fish and Wildlife Service's "Circular 39" system, and a classification system developed by Cowardin et al. for the Fish and Wildlife Service, commonly referred to as the Cowardin system. The Circular 39 system was originally developed as a means for classifying wetlands for waterfowl habitat purposes. Nine of the Circular 39 freshwater wetland types are found in Minnesota. The Cowardin scheme is a hierarchical classification based on landscape position, substrate, flooding regime, and vegetation. While the Cowardin scheme has been officially adopted by the Fish and Wildlife Service and other agencies, the Circular 39 system is still commonly used because of its simplicity and ease of use. According to the NWI, wetlands, including lakes, cover approximately 27 percent of the watershed's surface (Table 2.8 and Figure 2.9Figure 2.9.) The NWI map is not considered definitive. A delineation of wetland boundaries is required to be completed any time development or other impacts may occur near or in a wetland.

Circular 39 Type	Acres	Percent
1 - Seasonally Flooded	4,218	9.4
2 - Wet Meadow	44	0.1
3 - Shallow Marsh	3,681	8.2
4 - Deep Marsh	331	0.7
5 - Shallow Open Water	3,266	7.3
6 - Shrub Swamp	476	1.1
7 - Wooded Swamp	122	0.3
8 - Bogs	21	<0.1
90- Riverine	566	0.2
Upland	32,126	72.8
Grand Total	44,980	100.0

Cowardin Type	Acres	Percent
Emergent (EM)	6,883	15.3
Forested (FO)	1,210	2.7
Scrub-shrub (SS)	480	1.1
Unconsolidated Bottom (UB)	3,132	7.0
Aquatic Bed (AB)	534	1.2
Upland	32,741	72.8
Grand Total	44,980	100.0

Source: Minnesota DNR, 2013 NWI Update East-Central Minnesota.



Figure 2.9. National Wetlands Inventory wetlands in the Pioneer-Sarah Creek watershed. Source: Minnesota DNR, 2013 NWI Update East-Central Minnesota.

2.4.5 Public Waters

State statutes classify certain waterbodies as Waters of the State and the DNR maintains maps and lists on the Public Waters Inventory (PWI). Public Waters wetlands include all type 3, type 4, and type 5 wetlands (as defined in U.S. Fish and Wildlife Service Circular No. 39, 1971) that are 10 acres or more in size in unincorporated areas or 2.5 acres or more in size in incorporated areas. Public watercourses are defined as natural and altered watercourses with a total drainage area greater than two square miles or natural. Work within PWI waterbodies is regulated by the DNR. Public waters wetlands and watercourses information can be found in the Third Generation Plan.

2.4.6 Floodplain

Flooding effects may range from personal nuisance to property damage or loss to injury or death. Floodplain areas flood most often and severely. Land use regulations define the floodplain as the area covered by the flood that has a one percent chance of occurring each year, also known as the 100-year flood. The floodplain is divided into two zoning districts: the floodway and flood fringe. The floodway includes the river channel and nearby land areas which must remain open to discharge the 100-year flood. The flood fringe, while in the flood plain, lies outside the floodway. Regulations usually allow development in the flood fringe but require flood-proofing or raising to the legal flood protection elevation and providing compensating storage.

In 1968, Congress created the National Flood Insurance Program (NFIP) to make flood insurance available to property owners at federally subsidized rates. The NFIP required communities to adopt local laws to protect lives and future development from flooding. FEMA notifies communities by issuing a Flood Hazard Boundary Map (FHBM). This map shows the approximate boundaries of the community's 100-year flood plain. Each participating community has a Flood Insurance Study (FIS). Each of the communities in the Pioneer-Sarah Creek watershed has a Flood Insurance Study. Flood maps are available at each City Hall, at HCEE, and online at: gis.hennepin.us/naturalresources/map/default.aspx.

2.4.7 Groundwater

Much of the watershed is underlain by loamy and clayey glacial till, and groundwater is less vulnerable to contamination because the unsorted sediment with grains of different sizes is more closely packed together with less void space than sediments comprised of particles of more uniform size. However, the Crow River corridor is underlain with sand, loamy sand, and gravel outwash and is very highly sensitive to potential pollution. Wetlands and areas near wetlands and lakes are moderately susceptible to contamination due to the proximity to the water table.

Cities that provide municipal water from groundwater have completed Wellhead Protection Studies, which model groundwater flow and identify Wellhead Protection Areas that should be managed to reduce the risk of contamination of groundwater. Emergency Response Areas show where immediate action should be taken to clean up spills of contaminants to protect groundwater. More information is available from the respective cities and at

mda.state.mn.us/protecting/waterprotection/waterprotectionmapping.

3.0 Watershed Organization and Operations

This section describes how the Pioneer-Sarah Creek Watershed Management Commission is organized, its purpose and authorities, and its various operating programs under its current Watershed Management Plan. The section concludes with an assessment of progress towards meeting the goals in the current watershed management plan.

3.1 PIONEER-SARAH CREEK WATERSHED MANAGEMENT COMMISSION

3.1.1 Purpose and Authority

The Pioneer Creek Watershed Management Commission was formed in 1978 using a Joint Powers Agreement (JPA) developed under authority conferred to the member communities by Minnesota Statutes 471.59. In 1982 the City of Greenfield requested that the Sarah Creek watershed be merged with Pioneer Creek to form a joint watershed management organization. In December 1984, the Pioneer-Sarah Creek Watershed Management Commission (PSC WMC) was officially established under the authority of MS 103B.201 through 103B.251 by a JPA signed by Corcoran, Greenfield, Independence, Loretto, Maple Plain, Medina, and Minnetrista, Watertown Township, and Hennepin Conservation District. Since that time, Watertown Township and Corcoran left the Commission.

The Commission's purpose is set forth in Minnesota Statutes 103B.210, Metropolitan Surface Water Planning, which codified the Metropolitan Surface Water Management Act of 1982. Minnesota Statutes 103B.231 and Minnesota Rules 8410 establish requirements for watershed management plans within the Twin Cities Metro Area. The law requires the plan to focus on:

- (1) protect, preserve, and use natural surface and groundwater storage and retention systems;
- (2) minimize public capital expenditures needed to correct flooding and water quality problems;
- (3) identify and plan for means to effectively protect and improve surface and groundwater quality;
- (4) establish more uniform local policies and official controls for surface and groundwater management;
- (5) prevent erosion of soil into surface water systems;
- (6) promote groundwater recharge;
- (7) protect and enhance fish and wildlife habitat and water recreational facilities; and
- (8) secure the other benefits associated with the proper management of surface and ground water.

3.1.2 Governance

The Pioneer-Sarah Creek Watershed Management Commission is governed by a six-member board comprised of representatives who are appointed by each City Council for a term determined by the city. The Commission meets monthly, holding a meeting on the third Thursday of each month. Meetings are open to the public. The JPA setting forth the authorities granted to the Commission is included in Appendix A.

3.2 RESPONSIBILITIES

3.2.1 Commission

A Board of Commissioners has been established as the governing body of the Commission. A Technical Advisory Committee (TAC) comprised of member city staff designees meets as requested by the Commission.

Operating expenses are funded through an annual apportionment to each city based on their proportionate share of taxable market value or real property within the watershed. These expenses include the cost of contractual engineering, administrative, and legal services; programs such as water quality monitoring, public information and education, and special studies; and matching funds for grant-funded projects and studies. The mechanisms for funding capital improvements are identified in the current JPA and in policies adopted by the Commission.

The Commission cannot directly levy taxes or special assessments but has the ability to assess members who subsequently decide how they want to generate the funds. Options available to the members include *ad valorem* tax, creation of a watershed management tax district, special assessments, or Chapter 444 storm sewer utility financing. The Commission may also request bonding from Hennepin County. The has adopted a policy to participate in 25 percent of the cost of a qualifying project.

3.2.2 Relationship to Other Agencies

Cities. Member cities all have approved stormwater management plans that assist the Commission in implementing the Third Generation Watershed Management Plan. The cities have in place ordinances codifying the Commission's development rules and standards, including stormwater management, erosion control, and wetland and floodplain management. City stormwater management programs vary by community, depending on fiscal capacity, degree of development, and water resources.

All the member cities except Greenfield are National Pollutant Discharge Elimination System (NPDES) Municipal Separate Small Storm Sewer Systems (MS4s) and have approved NPDES permits and Stormwater Pollution Prevention Programs (SWPPPs) that include numerous activities to manage stormwater and prevent water resource degradation. Those SWPPPs also contain TMDL implementation actions to reduce pollutant loading and manage the rate and volume of stormwater runoff.

The JPA does not authorize the Commission to undertake capital improvement projects. The Commission may order capital projects for construction by member cities, often as regional projects which several cities may cooperatively agree to construct and fund. In addition to Commission projects member cities may undertake projects, such as including Best Management Practices (BMPs) in routine street reconstruction projects.

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Member cities also engage in various water management-related activities such as Adopt-A-Park programs, urban forestry and Arbor Day activities, promotion of recycling and composting, and environmental education published in the city newsletter and website. In many cities the Park and Recreation Commission or some other Commission is charged with providing advice to the City Council on environmental matters, including watershed related matters.

Hennepin County Environment and Energy (HCEE) operates several programs to conserve natural and water resources in the county. Educational and outreach services are focused on proper lawn and garden care, proper use of herbicides and pesticides, and composting; assistance to communities in identifying and conserving high-value natural resources; promotion of and assistance with agricultural BMPs; and managing public accesses to water resources. HCEE also participates in the education and outreach programming coordinated by the West Metro Water Alliance (WMWA) consortium of watershed management organizations in the county.

In addition, HCEE operates volunteer education and monitoring programs, including the RiverWatch stream macroinvertebrate monitoring program for elementary and secondary school students, and the Wetland Health Program (WHEP), a program for adult volunteers. HCEE is also responsible for administration and implementation of the Minnesota Wetlands Conservation Act and of cost-share conservation programs that financially assist landowners with the protection of their land, as well as administration of conservation easements.

Three Rivers Park District (TRPD). TRPD is a special park district created by the state legislature in 1957. The District owns over 27,000 acres of parks and trails in Hennepin, Carver, Dakota, Scott, and Ramsey Counties, and operates 20 parks and ten regional trails. TRPD stewards 43 lakes, more than 30 miles of rivers and streams and over 8,000 acres of wetlands, as well as prairie habitat, forest and woodlands, and conservation areas. In addition to natural resources conservation, TRPD provides a wealth of recreation and education opportunities. TRPD staff work closely with the PSCWMO to manage the lakes, streams, and wetlands in the two regional park reserves, Gale Woods Farm, and Kingswood Park.

Metropolitan Council. The Metropolitan Council's *Water Resources Management Policy Plan* spells out a wide range of programs and activities undertaken by a variety of governmental and private agencies for management of water resources in the Metro area. Among the many programs and activities are several of particular interest to the Commission: the development of targeted watershed pollutant loads; review of watershed and local water plans and comprehensive plans for consistency with Metro goals and objectives; grant programs; the Citizens' Assisted Lake Monitoring Program (CAMP); and the Environmental Information Management System. The Pioneer-Sarah Creek Commission has partnered with the Metropolitan Council's CAMP program since 2005 to support citizen volunteer lake water quality monitoring.

Minnesota Pollution Control Agency (MPCA). The MPCA operates several programs applicable to watershed planning. The MPCA monitors water quality, sets standards, and implements various controls. Of interest are the NPDES program and implementation of the Clean Water Act. The MPCA manages the NPDES Phase I construction and industrial stormwater discharge permitting.

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MPCA also manages the NPDES Phases I and II permitting for municipal separate storm sewer systems (MS4s). Hennepin County and MnDOT are also MS4s with conveyances in Pioneer-Sarah Creek watershed, although many of those conveyances in the watershed are outside the Census Urban Area Boundary and are thus not regulated under NPDES.

The MPCA implements the Clean Water Act's requirement that states adopt water quality standards to protect the nation's waters. The EPA and MPCA require managers of water resources that fail to meet these established standards to prepare TMDL studies identifying the source of the pollutant and a plan for bringing the water resource into compliance.

The Commission worked closely with the MPCA and received funding to complete TMDLs and Implementation Plans on Lake Independence and Lake Sarah, as well as the WRAPS study for several lake and stream impairments in the watershed.

Board of Water and Soil Resources (BWSR). The board is the state's administrative agency for 90 soil and water conservation districts, 46 watershed districts, 23 metropolitan watershed management organizations, and 80 county water managers. BWSR's core functions include implementing the state's soil and water conservation policy, comprehensive local water management, and the WCA. BWSR periodically assesses watershed organizations as part of its Performance Review and Assistance Program (PRAP).

BWSR wetland specialists participate in Technical Evaluation Panels in the watersheds to assess potential wetland impacts and mitigation strategies. BWSR also periodically audits the Commission to assure that WCA is being administered properly. Finally, BWSR is the implementation agency for the Clean Water Funds grant program funded by the Clean Water, Land, and Legacy Amendment.

Minnesota Department of Health (MDH). The Environmental Health Division of the MDH operates many programs of interest to the Commission. Programs include Drinking Water Protection, Wellhead Protection, Lake and Fish Monitoring (in partnership with DNR/MPCA), Environmental Health Services, Health Risk Assessment, Site Assessment, and Consultation and Well Management.

Minnesota Department of Natural Resources (DNR). The DNR manages and protects the state's natural resources and operates numerous programs. The department provides technical assistance and information regarding best management practices, natural resource management, incorporating natural resource conservation in land use planning, and lakescaping.

The Fisheries Division monitors and improves fisheries within the state including many of the lakes within the watershed. It also promotes fishing opportunities and provides grants to assist in the construction of fishing piers. The Ecological and Water Resources (EWR) Division focuses on an overarching vision of "Healthy Watersheds throughout Minnesota." "Healthy Watersheds" include: 1) sustainable quantities and qualities of water; 2) sustainable levels of biodiversity; 3) well-functioning ecosystem services; and 4) sustainable and vibrant natural resource economies and recreational opportunities. The EWR Division also provides the following services:

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- It maintains an inventory of public waters and operates permit programs for working in public waters or for appropriating public waters;
- Oversees the state's floodplain management program;
- Provides local stewardship by coordinating the Mississippi River Critical Area and MNRAA programs and the Shoreland Management program;
- Collects, analyzes, and provides ecological information, including:
 - Location and management of rare resources (endangered and threatened species, critical habitats, high quality natural communities);
 - Management of harmful exotic species, fish and wildlife diseases, and negative environmental impacts of human development;
 - Management and restoration of important ecological processes in river systems and key natural areas; and
 - Development of information about Minnesota's ecosystems and their significance to a sustainable quality of life.

The DNR's webpage at <u>dnr.state.mn.us/lakefind/index.html</u> is LakeFinder, a DNR supported tool that combines information from various DNR Divisions, as well as other state agencies, such as MPCA (water quality) and MDH (fish consumption). This tool contains data for more than 4,500 lakes and rivers throughout Minnesota.

Minnesota Department of Agriculture. The MDA is statutorily responsible for the management of pesticides and fertilizer other than manure to protect water resources. The MDA implements a wide range of protection and regulatory activities to ensure that pesticides and fertilizer are stored, handled, applied and disposed of in a manner that will protect human health, water resources and the environment. The MDA works with the University of Minnesota to develop pesticide and fertilizer BMPs to protect water resources, and with farmers, crop advisors, farm organizations, other agencies and many other groups to educate, promote, demonstrate and evaluate BMPs, to test and license applicators, and to enforce rules and statutes. The MDA has broad regulatory authority for pesticides and has authority to regulate the use of fertilizer to protect groundwater.

3.3 **OPERATIONS**

This section describes the current programs operated by the Commission.

3.3.1 Education and Outreach

The Commission initially established an Education Program as part of its Third Generation Plan. The Commission later joined the joint Education and Public Outreach Committee (EPOC) of the Bassett Creek, Elm Creek, Shingle Creek and West Mississippi Commissions and Blue Thumb. These organizations, along with TRPD, HCEE and the Freshwater Society, then formally formed the West Metro Water Alliance (WMWA) and developed the West Metro Education and Outreach Plan (EOP) to guide shared activities. The Commission has participated in WMWA in past years but is not a current member.

Details regarding the education and outreach activities may be found in the Commission's Annual Report. Some highlights over the past six years are:

- Maintained a website <u>pioneersarahcreek.org</u> to provide news to residents of the watershed and beyond. The Watershed Management Plan, monthly meeting materials, project reviews, Annual Reports, water monitoring results, and other watershed-related information are posted there. In addition, from time to time, news releases are provided to the member cities and their official newspapers for publication.
- Maintained a Facebook social media account to share timely information about the watershed and its resources and to share other water and natural resources information.
- The Commission participates in HCEE's Wetland Health Evaluation Program (WHEP), which is a citizen volunteer wetland monitoring program. This program educates volunteers about wetland ecology and quality and provides valuable planning information to the Commission and other interested parties.
- The Commission partnered with the Hennepin County Ag Specialist to conduct a Horse Stable Redesign for Water Quality and Animal Health Field Day to demonstrate best practices for water quality on agricultural sites.
- Over the course of the Third Generation Plan the Commission began to work more closely with Hennepin County Rural Conservationist and water resources staff to provide targeted education and outreach, both to the residents of the watershed and to the Commissioners.

3.3.2 Monitoring Program

Minnesota Administrative Rule 8410.0100 Subp. 5 requires watershed management organizations to conduct monitoring programs "capable of producing accurate data to the extent necessary to determine whether the water quality and quantity goals of the organization are being achieved."

The Commission publishes monitoring data in its Annual Report which presents data from the current year as well as water quality and quantity trends. That trend data is included in this Plan in Appendix B. The following are short descriptions of the current monitoring program.

Stream Monitoring. The Commission began monitoring water quality and streamflow in 1996 through the Metropolitan Council's Watershed Outlet Monitoring Program (WOMP); however, after a few years that monitoring was discontinued for budgetary reasons until the Commission started monitoring again in 2009. The Commission contracts with TRPD to monitor streams, and Typically one or two sites on Pioneer Creek- the crossings at Copeland Road and Pagenkopf Road in Independence, and on Sarah Creek site at the County Road 92 crossing just south of TH 55 are monitored for continuous flow. Other stream sites may be monitored for flow and water quality to obtain data for lake response modeling.

Lake Monitoring. The Commission contracts with TRPD to annually monitor Sentinel Lakes: Lake Independence, Lake Sarah, Whaletail Lake, and Little Long Lake. Parameters monitored typically include total phosphorus, soluble reactive phosphorus, total nitrogen, Secchi depth, and chlorophyll-a. In addition, two to three lakes are monitored each year by TRPD and by volunteers through the Citizen Assisted Monitoring program (CAMP.) *Biologic Monitoring.* High school volunteers coordinated by HCEE perform stream macroinvertebrate monitoring. Students from Rockford High School and West Lutheran High School have in the past monitored sites on Pioneer Creek and the Crow River, however, not in recent years. Two or three wetland sites are monitored each year by citizen volunteers through HCEE's RiverWatch program.

3.3.3 Rules and Standards and Project Reviews

The Commission does not issue permits but does require development and redevelopment projects to meet requirements for runoff rate control and water quality treatment. Those requirements as well as others relating to wetlands, floodplains, erosion control, buffers, and stream crossings are set forth in in the Third Generation Plan, and generally call for no net increase in pollutant loads from pre-development to post-development condition through the abstraction of 1.1" of runoff or BMPs and no increase in the rate of runoff for the 2-, 10-, and 100-year events. Through 2019 the Commission acted as the LGU for WCA administration for Greenfield, Loretto, and Maple Plain, but as of January 1, 2020 no longer serves as LGU for any member cities.

Development and redevelopment projects that meet certain size and other criteria are required to incorporate into their developments BMPs sufficient to meet the Commission's standards. Engineering plans, hydrologic calculations, wetland delineations, and other supporting material are submitted to the Commission's technical services consultant, who conducts a Project Review and discusses the proposal and any necessary revisions with the developer. Findings are summarized in a report to the Commission, which will either approve the plans as submitted or suggest minor modifications or will reject the plans. Table 3.1 summarizes the project reviews that have been completed during 2015-2019. These project reviews include private development and redevelopment as well as public projects such as street and highway projects.

Vear	Project	Wetland
Tear	Reviews	Only
2015	6	3
2016	4	5
2017	4	3
2018	6	11
2019	7	2
TOTAL	27	24

Table 3.1. Project reviews, 2015 - 2019.

3.3.4 Administration

Administration includes preparing for and attending routine and special meetings; taking minutes and record keeping; grant writing; correspondence; filing; and annual and financial reporting. Administrative and technical consulting staff also administers grants on behalf of the Commission: completing work plans, preparing interim and final reports, and preparing invoices.

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3.4 ASSESSMENT OF THIRD GENERATION MANAGEMENT PLAN PERFORMANCE

As part of the Fourth Generation Management Plan, the Commission conducted a self-assessment to identify achievements and areas that realized less success. Commissioners, contracted staff, stakeholder partners, and members of the public reflected on accomplishments during the Third Generation Plan period and how that might inform the next generation plan.

Each year the Commission establishes a Work Plan setting forth the strategies and actions it will pursue to make progress towards meeting the Management Plan goals. Each year's Annual Report then summarizes the actions taken and results achieved.

3.4.1 Successes

The Commission has completed or is in ongoing implementation of nearly all the work plan activities and strategies identified in the Third Generation Plan as detailed in Table 3.2 below. The most successful achievements over the past six years have been:

- Completed and began implementation of the watershed-wide TMDL and WRAPS studies. Three community conversations were held to gather input and comments.
- The Commission established a process to annually review projects submitted to the CIP, and each year sets aside funds to share in the cost of those projects.
- One of the priorities of the Commission was to complete subwatershed assessments (SWAs), or detailed studies of potential implementation projects. In 2014 the City of Independence completed a SWA to identify options for stormwater retrofit in the Lake Independence and Lake Sarah subwatershed portions of the city. The Commission completed SWAs in the Dance Hall Creek, Baker Park Reserve Campground Ravine Area, and Lake Ardmore Area subwatersheds. Some of the projects identified, such as the Baker Park Ravine Stabilization and Lake Ardmore projects, have since been or will be implemented, while others require additional exploration to find landowners willing to consider improvements.
- Built a sense of Commission and City alignment, highlighted by partnerships that identified TMDL implementation projects and grant and cost share funding to complete projects in the Lake Ardmore area and the Baker Park Ravine Stabilization.
- Enhanced the working relationship with the Hennepin County Rural Conservationists to enhance visibility, build ties with the agricultural community, and promote BMPs in priority areas.
- Continued fruitful partnerships with lake associations to complete curly-leaf pondweed treatment on Lake Sarah and to rebuild the Lake Independence outlet weir.
- The Commission adopted a Livestock Management Policy model ordinance which was subsequently adopted by three cities. An additional city considers these operations on a case by case basis via Conditional Use Permits, while the remaining two do not have any animal operations within their limits.
- The Commission established and continues a routine monitoring program for priority lakes in the watershed, and water quality and flow in Pioneer Creek.
- Partnered with the Hennepin County Ag Specialist to conduct a Horse Stable Redesign for Water Quality and Animal Health Field Day to demonstrate best practices for water quality.

- In 2018, BWSR completed a Performance Review and Assistance Program (PRAP) assessment of the Commission and its operations. Generally, the audit found that the Commission complied with nearly all the major performance standards for administrative, planning, and communication practices and was making progress implementing the Management Plan. BWSR made recommendations related to Commissioner training, improved data accessibility, and more detailed biennial progress reviews, which the Commission implemented.
- Lake Rebecca, which was originally listed as impaired in 2008 for nutrients, is now meeting phosphorus, chlorophyll-a, and Secchi depth standards and has been delisted from the 303(d) list.
- The Third Generation Plan established a goal of improving water quality by 10% over the previous ten-year period. Table 3.2 shows there appears to have been an improvement in water quality as measured by Secchi depth (clarity) and TP in five of the 9 lakes with monitoring data sufficient to perform a trend analysis. There has been a statistically significant improvement in TP in West Lake Sarah and North Whaletail and clarity in North Whaletail and Lake Ardmore. Independence and Haften are trending better.

Lake	SD Change*	TP Change*
Lake Ardmore	+28%	+9.5%
Hafften Lake	+23%	-15%
Lake Independence	+43%	-10%
Peter Lake	-3%	+24%
Lake Sarah-East	+36%	N/A
Lake Sarah-West	+38%	-18%
Spurzem Lake	+38%	N/C
North Whaletail	+16%	-23%
South Whaletail	+16%	-5%

Table 3.2. Ten-year change in lake water quality.

*Note: a positive Secchi Depth change is an improvement, while a negative TP change is an improvement. Values in **bold italic** are significant based on a Mann-Kendall trend analysis (ρ =0.05).

3.4.2 Areas for Improvement

Areas that fell short of Third Generation expectations or which could be improved include:

- While the BWSR PRAP found the Commission generally making progress, comments submitted by stakeholders surveyed during the assessment suggest that the Commission could be more proactive at undertaking projects and actions and at reaching out to the wider watershed community.
- The Technical Advisory Committee (TAC) does not meet regularly typically only once or twice a year to help review and revise the CIP. The stakeholders working in the watershed such as HCEE, TRPD, Extension, the DNR, and the cities tend to work independently, and could benefit from a clear framework and roles and common goals.
- No assessment of progress toward meeting TMDL load reduction or water quality goals has been completed. TMDL modeling could be updated based on more recent and more complete data, including sediment core analysis and the Implementation Plans revisited.
- Because much of the implementation opportunity in the watershed is on privately-owned property, the Commission's success is highly dependent upon its ability to provide sufficient technical and financial resources to enable private property owners to participate in projects, and financial

resources have been scarce and unpredictable. The Commission should examine how it can better support its landowners and consider options to ease these barriers to private landowner participation.there is heavy reliance on finding willing landowners. Additional implementation projects could have been completed had property owners been willing to participate.

- Outside of the lakeshore property owners there continues to be a lack of visibility and knowledge about the Commission and its role, water quality, and needs and opportunities. There is limited general education and outreach to the residents and property owners in the watershed aside from the website and social media.
- Identifying more robust CIP funding sources and grant opportunities.
- There is some concern about continuity in Commissioners and the level of history and technical knowledge that needs to be developed to be effective as a Commissioner. Some of the cities appoint City Council members on a rotating basis. Just when the Commissioner feels like they are up to speed, they are rotated off the Commission and a new Council member takes their place. The Commission has sponsored City Council participation in NEMO workshops when those are available.

3.4.3 TMDL Implementation

The Commission was identified as being a partner in certain implementation activities in the TMDLs and WRAPS. As noted below, several of these actions are incorporated into this Plan as part of the monitoring plan, education and outreach plan, operations, special studies, CIP cost sharing, and rules and standards. Many of these strategies will require further study and review prior to potential implementation. Actions taken to date are shown in *italics*.

Lake Independence TMDL Implementation Plan Actions:

- Identify and prioritize significant erosion potential areas within the lakeshed. The City of Independence partnered with HCEE and Metro Conservation Districts to complete a subwatershed assessment of its portion of the Lake Independence drainage area, including potential erosion areas. The CIP includes funding to complete high-priority projects.
- Design and implement cropland BMPs to reduce agricultural phosphorus inputs to the lake. *The Commission has worked with HCEE, U of M Extension, and other interested parties on outreach to agricultural landowners. This Plan's CIP includes funding to complete high-priority projects.*
- Cooperate with the cities of Medina and Independence to develop a manure hauling and disposal service to assist landowners with manure management. *HCEE continues to investigate the possibility of such a cooperative service but there are several hurdles to overcome that may make this infeasible.*
- Identify potential animal waste nutrient control project sites, and work with landowners to inform them of funding and projects that they can initiate to benefit the lake and their properties. The Commission will work with HCEE, U of M Extension, and other interested parties on outreach to agricultural landowners. This Plan's CIP includes funding to complete high-priority projects.
- Construct urban BMPs within the watershed and on the shoreline of Lake Independence to reduce phosphorus inflows. *The City of Independence partnered with HCEE and Metro Conservation Districts to complete a subwatershed assessment of its portion of the Lake*

Independence drainage area, the Lake Ardmore Area, and the Baker Park Ravine area, including potential urban BMPs. Projects were completed or will be completed from the Lake Ardmore SWA and the Baker Park Ravine Stabilization Project was completed in winter 2019-2020. This Plan's CIP includes funding to complete high-priority projects.

Lake Sarah TMDL Implementation Plan Actions:

- Lead a detailed assessment of specific opportunities for small scale land treatment practices to achieve phosphorus load reduction. *The City of Independence partnered with HCEE and Metro Conservation Districts to complete a subwatershed assessment of its portion of the Lake Sarah drainage area.*
- Lead a feasibility study to evaluate alternatives for constructing regional treatment facilities to reduce loadings from the Dance Hall Creek subwatershed. *The City of Greenfield partnered with TRPD to complete a similar assessment in the Dance Hall Creek subwatershed to Lake Sarah. This Plan's CIP includes funding to complete high-priority projects that may be identified in that assessment.*
- Lead and help finance the effort to implement curlyleaf pondweed management, with the Lake Sarah Improvement Association (LSIA) providing coordinating services with lakeshore owners as well as financial support. *The Commission has shared in the cost of this treatment.*
- Lead the effort to implement a potential alum treatment of the lake once watershed controls have been largely completed. *This action may be considered later in the scope of this Plan.*

Hafften Lake TMDL WRAPS Actions:

The North Fork Crow River Bacteria, Nutrients, and Turbidity TMDL and the accompanying WRAPS included source assessment, modeling, load reductions, and implementation actions for Hafften Lake. The primary sources of nutrients to Hafften are inflow from Schendel Lake and from internal sediment release. The TMDL requires a 34% TP load reduction, almost entirely from internal load. No specific actions were assigned to the PSCWMO in the WRAPS. Internal load control was assigned to either the SWCD or the lake association. General watershed load reductions were also assigned to the SCWD or the NRCS. To date, the Commission has not undertaken any implementation actions.

Pioneer-Sarah Creek Watershed TMDL and WRAPS Actions:

This 2017 TMDL addressed nutrient impairments in Peter, Spurzem, Ardmore, Halfmoon, North Whaletail and South Whaletail Lakes and *E. coli* impairments on Pioneer, Sarah, Deer, and Unnamed Creeks, including TP and *E. coli* load reductions. The study also evaluated dissolved oxygen (DO) impairments in Pioneer, Unnamed, and Deer Creeks. No load reductions were established for those impairments at that time.

Several generalized actions were assigned to the Commission in the WRAPS, typically in partnership with HCEE and the cities. These include:

- Improve fertilizer and manure application management
- Eliminate livestock traffic through waterways

- Improve urban/suburban stormwater management
- Improve upland urban and agricultural surface runoff controls and management
- Determine influence of wetlands on nutrient loading
- Reduce livestock bacteria in surface runoff
- Improve quality of upstream lake(s)
- Wetland restorations
- In-channel restoration
- Improve education and outreach
- Improve coordination/collaboration
- Implement/review policies and rules

The Commission was identified as having a supplemental role in internal load management on South and North Whaletail, Ardmore, Half Moon, Spurzem, Peter Lakes.

Two lakes, Lake Rebecca and Little Long, are Protection lakes, and the Commission is assigned the following actions in partnership with HCEE and TRPD:

- Continue to reduce watershed pollutant loadings
- Monitoring
- Internal load assessment and control

The 2017-2019 Lake Independence Carp Study Phases 1 and 2 tracked carp in Lake Independence and back into Lake Ardmore and the Spurzem Lake chain.

#	Problem or Issue	Actions in 3 rd Generation Plan	Completed 2014 - 2020
Fundiı	ng and Financial Stability		
1.1	TMDLs completed and underway have or will identify very significant load reductions to be made in order to achieve state water quality standards. This will increase pressure on the member cities to fund water quality improvements on an ongoing basis. Is there adequate funding for implementation?	The Commission's General Fund budget includes funds to complete BMP assessments and feasibility studies, and to cost share in small projects. The Plan states that for certain projects it may use the statutory authority for joint powers WMOs to request Hennepin County to levy an ad valorem tax to fund part or all of a capital project.	Two subwatershed assessments and an additional SWA/feasibility study have been completed. The Commission annually sets aside funds in the budget to share in 10% of the cost of projects. The Commission discussed but elected not to use the county levy authority for any capital projects.
1.2	Should the Commission continue to share in the cost of implementation projects with cities, and at what level?	See 1.1 above.	See above.
1.3	Identify a sustainable funding level and sources that minimize impacts to city levies.	See 1.1 above.	See above.
Inform	nation, Knowledge, and Commitment		
2.1	Many City staff and elected officials do not see the Commission as a policy leader or watershed issues as a priority.	The Plan includes a high priority action to sponsor workshops such as NEMO for all municipal officials in the watershed. The Implementation Plan includes Commission actions to become a more active technical resource: completing BMP assessments, leading feasibility studies, and providing education and outreach services.	The Commission has sponsored City Council participation in NEMO workshops when those are available and has gotten some participation. The Commission is becoming more technically active with SWAs and considering small BMP projects. However, there has been limited general education and outreach to residents.
2.2	Lack of information on water quality issues and actions individual property owners can take. Continue to enhance communication with City Councils, advisory commissions, lake associations, youth and scouting groups, schools, etc. Look for opportunities to use social media, technology, and other resources to garner input and feedback.	The Commission will convene Citizen Advisory Committees as needed to advise the Commission and to assist in program development and implementation. The Commission will also participate with collaborative groups to pool resources to undertake activities in a cost-effective manner.	The Commission has not convened a Citizens Advisory Committee. The Commission is a member of Watershed Partners but is no longer a member of the West Metro Water Alliance (WMWA). Recently the Commission began partnering with the HCEE rural conservationists on outreach.

Table 3.3. Actions completed during the Third Generation Plan period.

#	Problem or Issue	Actions in 3 rd Generation Plan	Completed 2014 - 2020
2.3	Various stakeholders, such as lakeshore owners and agriculture operators, have different, often conflicting opinions on water quality issues, leading to acrimony and finger-pointing.	The Plan will focus on providing opportunities for bridge-building between stakeholders with sometimes competing ideas and interests, such as lakeshore owners and agricultural operators.	As part of the watershed wide TMDL and WRAPS studies, the Commission sponsored three Community Conversations that brought together various stakeholders. Minimal additional outreach has occurred since then.
Data A	Availability		
3.1	Implementation of TMDLs will require more routine lake and stream monitoring data and other programmatic activities such as volunteer lake and stream monitoring.	This Plan includes an expanded monitoring program that includes routine stream and sentinel lake monitoring, and periodic monitoring of other resources on a rotating and as-need basis.	The Commission has implemented the routine lake and stream monitoring program set forth in the 3 rd Gen plan. However, the monitoring data and lake report cards available on the Commission's website are years out of date.
3. 2	Lack of information about the wetlands in the watershed.	The Plan requires that a functions and values assessment using the most recent version of the MnRAM protocol be submitted with a project review when wetland impacts are proposed.	The Commission requires a functions and values assessment when potential wetland impacts are proposed.
Other	Issues		
4.1	TMDLs have been completed and a WRAPS is in progress that identify load reduction and water quality protection activities. There is no timeline and no benchmarks established to evaluate progress.	The Commission will work together with the MPCA and stakeholders as part of the WRAPS process to develop an evaluation process and timeline.	The Commission has not yet completed an assessment of progress towards meeting the TMDL load reduction and water quality goals.
4.2	State and regional TMDLs and other state or regional policy changes such as revised or new water quality standards may impact management requirements.	The Commission will continue to monitor information about state and regional TMDLs and other water resources policies and adjust policies and actions as necessary.	The Commission is aware of new impairments in the watershed: Lake Irene nutrient impairment and Lake Sarah fish impairment.
4.3	The Commission, other agencies, and member cities need to work in partnership to meet common goals, pooling resources and technical capabilities.	The Implementation Plan includes Commission actions to become a more active technical resource: completing BMP assessments, leading feasibility studies, and providing education and outreach services. The Commission also intends to partner with groups such as the West Metro Water Alliance (WMWA) to gain access to shared resources.	The Commission has become more active at partnering with cities and HCEE to complete SWAs and feasibility studies as well as obtaining grants. The Commission was briefly a member of WMWA but withdrew from the consortium for budget reasons.

#	Problem or Issue	Actions in 3 rd Generation Plan	Completed 2014 - 2020
4.4	Recent years have seen changes in	The Commission will continue to monitor	The Rules and Standards for Development and
	frequency, intensity, and duration of storm	information about climate change impacts and	Redevelopment adopted in the Third
	events.	make adjustments to policies and actions as	Generation Plan incorporated the most recent
		necessary.	Atlas 14 updated rainfall frequency depths and
			intensity distribution curves.

4.0 Implementation Plan

This Plan section discusses the problems and issues that were identified during the Plan development process, and the goals and actions the Commission will pursue to address them. Each of the operating programs were reviewed during the planning process, and modifications to the monitoring plan, education program, and development rules and standards are described in this section and presented in more detail in appendices. This section includes a cost estimate for operations over the coming ten year period and the estimated member assessments, and a Capital Improvement Program of potential capital projects and special studies. Finally, this section concludes by summarizing the requirements for member city local water management plans and procedures for amending this Plan.

4.1 ASSESSMENT OF PROBLEMS AND ISSUES

4.1.1 Problem and Issue Identification

At the start of the planning process the Commission and TAC identified problems and issues confronting water resources management in the watershed. Table 4.1 shows the problems/issues in four general categories, in no order of priority.

#	Problem or Issue	Discussion
Impair	red Waters Implementation	
1.1	Have not yet completed a review of progress toward meeting the Lake Independence and Sarah TMDLs.	Follow-up monitoring, including sediment coring, on Lake Independence suggest the load partitioning between internal and external sources may need to be revised.
1.2	Some of the lakes require significant internal load management such as alum treatment, rough fish and submersed aquatic vegetation (SAV) management.	Alum treatments can be very cost-effective and provide long lasting improvements but are very expensive.
1.3	The stream TMDLs suggest that manure management practices and SSTS issues may be contributing to the bacteria impairments on the streams.	This is an opportunity to partner with HCEE on targeted outreach and management.
1.4	Have not identified a process for evaluating progress toward the other lake and stream TMDLs.	Need to periodically "check in" on progress and reevaluate strategies based on the most current data.

Table 4.1. Problems and issues identification.

#	Problem or Issue	Discussion
1.5	Lack of a directed framework to guide progress –	Cities don't participate in TAC meetings since most
	no commonality of goals, approach, or sense of	of their staff is contracted and they haven't seen
	team effort between the stakeholders.	the value. Without participation, projects aren't
		identified / implemented, and the cities don't
		understand the Commission's role and priorities.
		Commission needs a framework for improving
		engagement with cities identify municipal resources
		to improve coordination and implementation.
1.6	BMP implementation is highly reliant on	Opportunity to partner with HCEE to leverage
	partnering with willing landowners	federal (NRCS and EQIP) and state (Clean Water
		Fund) dollars to make implementation more
		feasible for the landowners.
1.7	Rather than focus solely on achieving numerical	Develop lake management plans that systematically
	pollutant load reductions, manage lakes and	address internal load and fish and aquatic
	streams holistically for a healthy aquatic	vegetation community management as well as
	ecosystem.	watershed load reductions.
Agricu	Itural Community Outreach	
2.1	There is a need for significant nutrient and	Focus efforts on "hot spots," or potential high-
	bacterial load reductions in the agricultural areas	loading areas and act fast when opportunities arise.
	of the watershed, but there are limited specific	There is a need to build trust and momentum with
	projects or strategies identified.	landowner's in the watershed.
2.2	There is an opportunity to work more in	Focus on implementing cost-effective structural
	partnership with HCEE to prioritize and	practices and increasing adoption of management
	incentivize conservation projects.	practices such as soil health and cover crops.
2.3	Investigate and grow public-private partnerships	Specifically, where there is common benefit, i.e. for
	to leverage resources and expertise.	private organizations to substantiate sustainability
		initiatives and for the Commission and its partners
		to implement conservation.
Gener	al Education and Outreach	
3.1	There is limited education and outreach. The	There is a desire to work more with students and
	Commission's 3rd Generation Plan set forth	the schools.
	education and outreach goals and strategies for	
	elected officials, cities, citizens, etc., but little has	
2.2	been accomplished.	
3. Z	member education so they can pass along that	continue to work with education and outreach
	member education so they can pass along that	partners and seek out additional opportunities.
2.2	Little private landowner outreach and	This is an apportunity to partner with HCEE on
5.5	engagement except for the lake associations	targeted outreach and management
Effecti	ve Operations	
4.1	Operating budget constraints affect the outreach	Reinforces the need to establish and build on
	and engagement staff can perform.	partnerships
4.2	There is a need for ongoing, continuous	There is a steep learning curve for new
	Commissioner education and development so	Commissioners.
	they can effectively serve as Commissioners.	

4.1.2 Identification of Priority Issues

Identification of priority issues was completed through ongoing discussions with the Commissioners and Technical Advisory Committee. Based on input from the Commissioners, TAC, and member city staff, the following issues have been identified as a high priority for this Management Plan.

FOURTH GENERATION MANAGEMENT PLAN PRIORITIES

- 1. Make systematic progress toward achieving lake water quality goals by 2030:
 - a. Delist South Whaletail Lake.
 - b. Protect Lake Rebecca so it continues to meet water quality standards.
 - c. Meet state water quality standards in the following lakes: Independence, Sarah, Spurzem, Half Moon, and Ardmore.
 - d. Achieve a 10% reduction in TP concentration in the other monitored lakes over the previous ten years.
- 2. Work in a coordinated way with urban and rural property owners, cities, lake associations, public and private entities, Hennepin County, and TRPD building partnerships to conserve our water and natural resources and deliver implementation projects.
- 3. Raise the profile of the Commission across the watershed, within Hennepin County, and in the western Metro area, and the Crow River Watershed.
- 4. Serve as an informational and technical resource for the cities and the citizens and property owners in the watershed.

4.2 FOURTH GENERATION MANAGEMENT GOALS AND ACTIONS

Guided by the identification and prioritization of issues in the watersheds, the Commission has developed goals that will guide activities over the coming decade. These goals were derived from the Gaps Analysis and a review of the accomplishments and unfinished business from the Third Generation Plan; discussions with Commissioners, Technical Advisory Committee members, state agency and city and county staff; and public input.

The framework to achieve these goals is set forth in the Implementation Plan and Capital Improvement Program detailed in the following sections and Appendix E. Member cities supplement and complement these actions with additional policies and programs tailored to their unique priorities and needs. The philosophy of the JPA and this Plan is that the management plan establishes certain common goals and standards for water resources management in the watershed, agreed to by the member cities, and implemented by those cities by activities at both the Commission and local levels. Successful achievement of the goals in this Plan is dependent on those member cities and their dedication to this effort.

4.2.1 Water Quantity

A statutory responsibility of watershed management organizations is to prevent and mitigate flooding. This Plan accomplishes this by ensuring that development and redevelopment does not

create excessive new volumes and rates of runoff that may cause downstream flooding and channel erosion. A second responsibility is promoting groundwater recharge, which impacts stream baseflow and lake levels, and maintaining adequate hydrology to wetlands. As noted in section 2.1.3 above state agencies have reported increasingly frequent, heavy precipitation events as well as increasingly frequent freeze/thaw cycles during the wintertime. Both patterns may exacerbate flooding and other related water quantity concerns, straining member communities into the future. The Fourth Generation management goals for water quantity are focused on maintaining the current flood profiles of the creeks and tributaries and considering impacts of changing precipitation patterns on the Commission's future mission and activities.

Goal Area A. Water Quantity

- Goal A.1. Maintain the post-development 2-year, 10-year, and 100-year peak rate of runoff at pre-development level for the critical duration precipitation event.
- Goal A.2. Maintain the post-development annual runoff volume at pre-development volume.
- Goal A.3. Prevent the loss of floodplain storage below the established 100-year elevation.

Water Quantity Actions:

- a. The Commission shall maintain Rules and Standards requiring development and redevelopment meeting certain criteria to meet runoff rate control and runoff volume and infiltration requirements.
- b The Commission will work with state, regional, county, member city and other partners to better understand the impacts of changing precipitation and temperature patterns and to identify and implement appropriate regulatory and design standards revisions to better protect water and natural resources, infrastructure, and properties in the watershed.
- bc. Landlocked depressions that presently do not have a defined outlet and do not typically overflow may only be allowed a positive outlet provided the downstream impacts are addressed and the plan is approved by the Commission.
- ed. The Commission encourages the use of Low Impact Design techniques to reduce runoff rates and volumes, erosion and sedimentation, and pollutant loading.
- de. Member cities shall adopt local controls and local stormwater management plans that are at least as stringent as the Commission Water Quantity goals and policies and the Commission Rules and Standards.
- ef. Develop technical and educational resources for assisting landowners with implementing sustainable farming practices to manage water on their farms.

Floodplain Actions:

dg. The Commission requires a plan review by the local permitting authority for development or redevelopment if any part of the development is within or affects a 100-year floodplain.

Goal Area A. <u>Water Quantity</u>

- eh. The Commission shall maintain Rules and Standards requiring development and redevelopment affecting the 100-year floodplain to meet Commission compensatory storage, low flow elevation, and timing requirements.
- fi. Member cities shall adopt a floodplain ordinance and any other required local controls, and local stormwater management plans that are at least as stringent as the Commission Floodplain goals and policies and the Commission Rules and Standards.

4.2.2 Water Quality

The TMDLs and WRAPS completed for several lakes and streams in the watershed established nutrient and *E. coli* load reductions necessary to improve water quality. The Fourth Generation goals for water quality are focused on making progress to improve the lakes and streams in the watershed as well as protect those that are not impaired waters. The goals are aggressive; some of them will require much dedication and effort and public and private resources to achieve. However, public input received for this Plan, the TMDLs, and other sources show that achieving a high standard of water quality is a priority for the public as well as required by state statute, and the Implementation Plan includes actions to help meet these goals.

Goal Area B. Water Quality

- Goal B.1. <u>Protect Lake Rebecca and Aa</u>chieve delisting of South Whaletail Lake.
- Goal B.2 Meet state standards in Spurzem, Half Moon, Ardmore, Independence, and Sarah Lakes, making progress towards their removal from the list of Impaired Waters.
- Goal B.3 Improve water quality in the impaired lakes by 10% over the average of the previous ten years by 2030.
- Goal B.4. Maintain or improve water quality in the lakes and streams with no identified impairments.
- Goal B.5. Conduct a TMDL/WRAPS progress review every five years.
- Goal B.6. Foster implementation of Best Management Practices in the watershed through technical and financial assistance through partnership development.

Water Quality Actions:

- a. The Commission adopts as water quality goals the standards for Class 2b waters in the North Central Hardwood Forest ecoregion as set forth in Minn. Rules 7050.0222.
- b. The Commission will undertake a routine lake and stream monitoring program to assess progress toward meeting these goals.
- c. The Commission shall maintain Rules and Standards requiring development and redevelopment meeting certain criteria to meet water quality requirements.
- d. The Commission shall maintain Rules and Standards requiring development and redevelopment meeting certain criteria to meet erosion control requirements.

Goal Area B. Water Quality

- e. The Commission will work in partnership with other organizations and agencies to pursue grant and other funding to implement improvement projects and feasibility studies.
- f. The Commission will update implementation plans and this Plan as necessary following TMDL/WRAPS completion and progress reviews.
- g. Member cities shall adopt local controls and local stormwater management plans that are at least as stringent as Commission Water Quality goals and policies and the Commission Rules and Standards.
- h. Periodically review manure management model ordinance to ensure it conforms with the most current MDA and MPCA laws and standards.

4.2.3 Groundwater

The Commission has undertaken limited groundwater management activities in the past, primarily by encouraging projects requiring project review to infiltrate a portion of runoff. Over the past decade cities that rely on groundwater for drinking water have worked with the Minnesota Department of Health to adopt wellhead protection plans and to implement policies and official controls to protect drinking water sources. In the Third Generation Plan, the Commission adopted a new requirement for development and redevelopment to infiltrate 1.1" of runoff to promote groundwater recharge and reduce runoff. This Fourth Generation Plan maintains that requirement.

Goal Area C. Groundwater

- Goal C.1. Promote groundwater recharge by requiring abstraction/infiltration of runoff from new development and redevelopment.
- Goal C.2. Protect groundwater quality by incorporating wellhead protection study results into development and redevelopment Rules and Standards.

Groundwater Actions:

- a. The Commission shall maintain Rules and Standards requiring development and redevelopment meeting certain criteria to meet infiltration requirements.
- b. Member cities shall adopt local controls and local stormwater management plans that are at least as stringent as Commission Groundwater goals and policies and the Commission Rules and Standards
- c. The Commission will partner with the DNR, USGS, MDH, and other agencies to educate the member cities and watershed community officials about groundwater issues and their relation to stormwater management and surface water quality.
- d. The Commission shall consult maps showing the wellhead protection zones within its boundaries upon completion of a local wellhead protection plan for use in determining vulnerable areas that should be exempted from infiltration.

4.2.4 Wetlands

The Commission's primary tool for managing wetlands is the Wetland Conservation Act (WCA). The six member cities self-administer WCA. The Commission requires submittal of a functions and values assessment using the latest version of MnRAM when an applicant proposes wetland impacts.

Goal Area D. Wetlands

- Goal D.1. Preserve the existing functions and values of wetlands within the watershed.
- Goal D.2. Promote wetland enhancement or restoration of wetlands in the watershed.

Wetland Actions:

- a. The Commission shall maintain Rules and Standards requiring development and redevelopment meeting certain criteria to provide buffers adjacent to wetlands, lakes, and streams.
- b. Member cities shall adopt local controls and local stormwater management plans that are at least as stringent as Commission Wetland goals and policies and the Commission Rules and Standards.
- c. Developers must complete a wetland delineation by a wetland professional to identify the location and extent of any wetlands present within the site.
- d. For any development or redevelopment proposing impacts to any wetlands in the watershed, a functions and values assessment using the most recent version of the MnRAM protocol must be completed and submitted to the respective LGU.
- Before consideration or approval of a wetland replacement plan or use of wetland banking credits, the member cities shall ensure that the applicant has exhausted all possibilities to avoid and minimize adverse wetland impacts according to the sequencing requirements of the Wetland Conservation Act. The order of descending priority-preference for the location of replacement wetland, including the use of wetland banking credits, is as follows:
 - 1. On-site;
 - 2. Within the same subwatershed;
 - 3. Within the Pioneer-Sarah Creek watershed;
 - 4. Within Hennepin County; and
 - 5. Outside the Pioneer-Sarah Creek watershed within Major Watershed Number 18 or Major Watershed Number 19.
- f. Work with Hennepin County to incentivize and implement cost-effective wetland enhancement and/or restoration projects which improve water quality and wetland functions and values and attenuate peak flows.

4.2.5 Drainage Systems

Pioneer Creek between Highway 12 and Watertown Road and several lateral ditches, including parts of Robina Creek, are under the ditch authority of Hennepin County as County Ditch #19. The

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County also is ditch authority for County Ditch #9 connecting and outletting Lake Schwappauff, Schendel Lake, and Hafften Lake in the northern watershed; and Judicial Ditch #20, which includes part of Deer Creek and several laterals, and Pioneer Creek downstream of Ox Yoke Lake. The primary Fourth Generation activity related to drainage systems is to periodically review the advantages and disadvantages of ditch authority and to reconsider jurisdiction.

Goal Area E. Drainage Systems

Goal E.1. Continue current Hennepin County jurisdiction over county ditches in the watershed.

Drainage System Actions:

- a. Periodically reconsider the appropriate jurisdiction over the county ditches in the watershed.
- b. Work with the county to implement multi-purpose drainage management projects which improve water quality while maintaining drainage rights for benefitted landowners on county ditches as well as other private drainage systems.
- c. Work with HCEE and BWSR to develop a policy regarding drain tiling and the discharge of private drainage into public waterways.

4.2.6 Operations and Programming

These goals guide the routine programs and operations of the Commission, and include the education and outreach program; maintenance of rules and standards; the annual monitoring program; and programs and activities to stay abreast of changing standards and requirements, search for grant and other funds to supplement the regular budget, and operate a capital improvement program and share in the cost of projects.

Goal Area F. Commission Operations and Programming

- Goal F.1. Identify and operate within a sustainable funding level that is affordable to member cities.
- Goal F.2. Foster implementation of TMDL and other implementation projects by sharing in their cost and proactively seeking grant funds.
- Goal F.3. Operate a public education and outreach program prioritizing elected and appointed officials' education and building better understanding between all stakeholders.
- Goal F.4. Operate a monitoring program sufficient to characterize water quantity and quality and biotic integrity in the watershed and to evaluate progress toward TMDL goals.
- Goal F.5. Maintain rules and standards for development and redevelopment that are consistent with local and regional TMDLs, federal guidelines, source water and wellhead protection requirements, nondegradation, and ecosystem management goals.
- Goal F.6. Serve as a technical resource for member cities <u>and residents</u>.

Goal Area F. <u>Commission Operations and Programming</u>

Operations and Programming Actions:

- a. Annually review the budget and Capital Improvement Program and convene a professional Technical Advisory Committee to identify and prioritize projects.
- b. Convene Citizen Advisory Committees as necessary to advise the Commission and to assist in program development and implementation.
- c. Prepare and implement an annual monitoring plan and provide annual reporting.
- d. Every five years evaluate progress toward meeting TMDL and WRAPS water quality goals, and adjust the Implementation Plans as necessary to achieve progress.
- e. Periodically review the development rules and standards for adequacy and make revisions as necessary.
- f. Coordinate water resources management between the Commission, Three Rivers Park District, Hennepin County, and the member cities.
- g. Continue to educate the public about water resources issues.
- h. Develop relationships with private land owners to implement new projects.
- i. Review and amend as necessary the Commission's Cost Share Policy for projects both on and separate from the CIP.

4.3 FOURTH GENERATION IMPLEMENTATION PLAN AND CAPITAL IMPROVEMENT PROGRAM

To achieve the goals set forth above the Commission will operate a regulatory program, implement monitoring and education and outreach programs, and undertake capital improvement projects. The following sections summarize these programs, which are described in more detail in attached appendices. Following the descriptions, Table 4.3 describes how the programs and projects in this Implementation Program address the Problems and Issues identified in the Gaps Analysis and subsequent public review and input and Table 4.4 details the Implementation Program and its estimated cost. The Capital Improvement Program (CIP) is set forth in Appendix F.

The Pioneer-Sarah Creek watershed is primarily residential and agricultural in land use, with a very limited commercial and industrial tax base. Its financial capacity is limited, but the Commission has been successful at obtaining grants to supplement local funding sources, and at building partnerships to leverage resources. In implementing this Plan, the Commission will continue to work on identifying opportunities, securing grant and other funding, and working jointly with member cities, HCEE, the TRPD, public and private entities, and individual property owners to maximize the cost-effectiveness of implementation activities. The success of this Plan is dependent on continuing and expanding those partnerships and outside resources.

4.3.1 Rules and Standards and Project Reviews

This Third Generation Watershed Management Plan adopted modifications to the standards for new development and redevelopment, codifying them in a Rules and Standards document. The modifications brought those standards closer to consistency with those of other jurisdictions and with state and other requirements TMDLs. The Rules and Standards are set forth in Appendix C.

Project Review Size Thresholds. All single-family residential projects that disturb more than one acre and all other non-single-family residential land-disturbing projects regardless of size are required to submit erosion control plans for review. The threshold of project size for application of Commission water quality and quantity rules and standards is one acre, regardless of density or land use.

Infiltration. The infiltration-from-net-new-impervious-surface requirement is 1.1 inches of runoff infiltrated within 48 hours. This is consistent with the MPCA's Minimal Impact Design Standards (MIDS) and the NPDES General and Construction Permits requirements. Where infiltration is not feasible, the rules require that runoff be filtered before discharging off the site. The rules include several credits toward meeting that infiltration volume requirement, including disconnection of impervious surface; conservation of existing native vegetation; and the use of decompacted and amended soil as a BMP.

Water Quality. The water quality requirement is "the load reduction achieved by abstracting 1.1 inches runoff from net new impervious or no net increase in TP or TSS, whichever is lower." From a practical standpoint, developers will need to calculate first, the loading from the pre-development condition, and second, the loading assuming the abstraction of 1.1 inches of impervious runoff from the post-development condition. The development must incorporate water quality BMPs to limit post-construction loading to the lesser of those two figures. Load reduction achieved by meeting the infiltration requirement can be applied toward meeting the water quality requirement.

Buffers. An average 25 foot, minimum 10 foot wide buffer adjacent to lakes, wetlands, PWI streams, and county ditches is required for any new development or redevelopment. This buffer requirement provides more flexibility in establishing the buffer while retaining the basic buffer functions. Where waters are subject to the state buffer law, the state requirements will take precedence.

4.3.2 2021-2030 Monitoring Program

The monitoring program refined in the Third Generation Plan had two organizing principles: continuation of routine flow and water quality monitoring in Pioneer and Sarah Creeks and Sentinel Lakes, and volunteer monitoring of water quality in other lakes. In this Fourth Generation Plan, each year the Commission will evaluate the proposed program and make modifications as necessary based on the most current data needs. The monitoring objectives guiding the Pioneer-Sarah Creek monitoring program and the assessment of data are shown below. The program is set forth in more detail in Appendix D.

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MONITORING PROGRAM GOALS

- 1. To quantify the current status of streams and lakes throughout the watershed in comparison to state water quality standards.
- 2. To quantify changes over time, or trends, in stream and lake water quality in the watersheds.
- 3. To enhance the value of previous monitoring data by extending the period of record.
- 4. To track and quantify the effectiveness of implemented BMPs throughout the watersheds for the protection of water quality.
- 5. To evaluate progress toward meeting TMDL load reduction and other goals.

In general, the components of the monitoring program are:

- Continuation of routine flow and water quality monitoring on Pioneer Creek at Copeland Road and/or Pagenkopf Road and Sarah Creek at Highway 92.
- Periodic flow and water quality monitoring on Dance Hall Creek (DHC); Loretto Creek (LC); and Spurzem Creek (SC) on a rotating basis, or other streams or outfalls as desired.
- Annual monitoring of five "Sentinel Lakes": Lake Independence, Lake Sarah, both basins of Whaletail Lake, and Little Long Lake. This monitoring has been completed by the TRPD under contract to the Commission. This Plan assumes that TRPD will continue its annual monitoring on Lake Rebecca and other lakes as they require.
- Continuation of the partnership with HCEE to obtain macroinvertebrate collections by student volunteers each year through the RiverWatch program and by cities to evaluate wetlands through the Wetland Health Evaluation Program. (WHEP).
- Continuation of the partnership with the Metropolitan Council to conduct lake surface water quality monitoring by volunteers every two to three years through the Citizen Assisted Monitoring Program (CAMP).
- Each year TRPD prepares a report on current water quality and trends, and reports water quality monitoring data to the state's EQuIS database. The Commission will annually post updated data and report cards on the Commission's website.

4.3.3 2021-2030 Education and Outreach Program

Education and Public Outreach is a core function of the Pioneer-Sarah Creek Watershed Management Organization. The Commission has conducted some education and outreach activities and has also collaborated with other organizations in Hennepin County as part of the West Metro Water Alliance (WMWA) and participated in Metro-wide education and outreach initiatives such as Blue Thumb, Watershed Partners and Northland NEMO.

This Fourth Generation Education and Public Outreach Program builds on the Commission's education and outreach activities. The program is set forth in more detail in Appendix E. The following sections set forth the program goals and strategies.

WATERSHED EDUCATION AND PUBLIC OUTREACH PROGRAM GOALS

The goal of the Pioneer-Sarah Creek Watershed Management Commission's Education & Outreach Program is to engage people in the community in the protection and improvement of lakes, rivers, streams and wetlands through education, increased water awareness and community participation. This Program establishes individual stakeholder goals to better target implementation strategies.

Implementation Strategies. Each year the Commission will evaluate the proposed Education and Outreach program and establish education and outreach activities for the coming year. The Commission will rely on the following and other strategies to implement the program and achieve the Plan's education and outreach goals:

- Expand education and outreach opportunities by coordinating with other entities such as HCEE.
- Use the Commission's, member cities', and educational partners' websites and newsletters, social media, co-ops, local newspapers and cable TV to share useful information to stakeholders on ways to improve water quality and keep content current.
- Convene Citizen Advisory Committees as needed to advise the Commission and to assist in program development and implementation.
- Participate with collaborative groups to pool resources to undertake activities in a cost-effective manner, promote interagency cooperation and collaboration, and promote consistency of messages.
- Prominently display the Commission's logo on information and outreach items, project and interpretive signs, and other locations to increase visibility.
- Provide opportunities for the public to learn about and participate in water quality activities.
- Provide education opportunities for elected and appointed officials and other decision makers.
- Enhance education opportunities for youth.
- Provide opportunities for bridge-building between stakeholders with sometimes competing ideas and interests, such as lakeshore owners and agricultural operators.
- Collaborate with HCEE to undertake targeted education and outreach to agricultural and other landowners in the watershed.

4.3.4 TMDL Implementation

Commission Actions. In general, the Commission in the TMDL Implementation Plans and WRAPS has taken on responsibility for undertaking subwatershed assessments to identify potential BMP locations, for continuing ongoing water quality monitoring to assess progress, and for working cooperatively with HCEE and TRPD to implement urban, rural, and agricultural load reduction practices. Additional potential activities include targeted education and outreach to property owners, and exploration of strategies for in-lake nutrient management such as alum treatments, curly-leaf pondweed and carp management.

City Actions. The member cities have taken on responsibility in the TMDL Implementation Plans for undertaking capital projects and activities to reduce pollutant loading. Many of those actions are

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not reflected in this Plan. Projects and programs for which the member cities seek Commission cost-share funding are included in the Implementation Plan shown on Table 4.4. The Local Plan Content requirements set forth in Section 4.4 of this Plan require the member cities to "Show how the city will take action to achieve the load reductions and other actions identified in and agreed to in the TMDL Implementation Plan."

4.3.5 Capital Improvement Program

The primary focus of the Commission's CIP is to systematically make progress toward meeting TMDLs focusing resources on one or two lakes at a time, periodically reviewing progress and updating realistic five to ten year working plans. The Commission will periodically convene a TAC/Working group to coordinate work and jointly assess progress and set priorities. The Commission contributes to a capital projects fund and shares in the cost of implementation projects. In addition, the Commission will continue to seek out grant and other funding to undertake larger cost-effective projects as opportunities arise.

Lake Management Plans. The Lake Independence TMDL was completed in 2007 and the Lake Sarah TMDL in 2011. Stakeholders have completed several implementation actions since that time. Additional monitoring data such as sediment core release rate analysis and lake inflow have since been collected. Priority implementation actions in this Plan are progress reviews for each of these TMDLs including lakeshed and lake response model and TMDL load reduction target updates. These progress reviews will also update the TMDL implementation plans. The focus of these plans will be on holistic, whole-lake ecological management that includes actions to manage aquatic vegetation, fish communities and internal load in addition to watershed load reductions.

Subwatershed Assessments and Studies. The Commission budgets at least \$20,000 annually for special studies and for cost sharing capital projects. Annually, the Commission will consider completing subwatershed assessments and special studies such as feasibility studies and special monitoring that will identify the most cost-effective practices and projects. It is currently the Commission's priority to focus on identifying and implementing load reducing projects that make progress toward achieving TMDL goals. One subwatershed that is a priority for assessment is the area tributary to Spurzem Lake, which itself is tributary to Lake Independence.

Capital Projects. The Commission's JPA authorizes the Commission to undertake capital improvement projects as set forth in Minn. Stat. 103B.251. That statute allows watershed organizations to fund projects on their CIP by certifying for payment by the county all or any part of the cost of a capital improvement. In 2011 the Commission adopted a major plan amendment to its Second Generation Plan that added a cost-share policy and revised the CIP to show a ten percent cost share from the Commission, funded by a dedicated portion of the annual member dues. That policy was continued in the Third Generation Plan and is incorporated into this Plan as well. In recent years the Commission has increased its cost share to 25 percent of the project cost net of any grants received.

For 2021-2030 the Commission will focus on completing or participating in subwatershed assessments and other studies and will prioritize cost—share in TMDL/WRAPS implementation projects, starting with Lake Independence and Lake Sarah. The Commission will annually solicit capital projects and cost-share activities from the member cities and will budget for and convene a Technical Advisory Committee (TAC) of staff and professional engineers to identify potential capital projects and to evaluate and prioritize city submittals for Commission funding. That TAC will continue in future years to provide advice and assistance to the Commission. The Commission may also consider a policy to supplement County incentives for cost-share practices in priority areas.

4.3.6 Commission Self-Assessment

A periodic robust and frank self-assessment is necessary to ensure that organizations stay on track to achieve goals. During this Fourth Generation Plan, the Commission will annually review progress towards goals. This self-assessment will use a matrix such as Table 4.2 below to systematically review and evaluate progress towards goals. This matrix will also be used to set each year's work plan as well as provide a "heads up" to member cities about future years' needs. This selfassessment will become part of the Commission's Annual Report.

Table HL	able fiel conceptual sen assessment matrix.				
Goal	<u>Metric</u>	Actions Taken this Past Year	Actions Taken to Date	Additional Actions to Achieve Goal	Schedule, Responsible Party(ies), Cost and Funding
Goal 1	<u>To be updated</u>	To be	To be	To be completed	To be completed annually
	<u>as necessary</u>	completed	completed	annually	
		annually	annually		
Goal 2	<u>To be updated</u>	To be	To be	To be completed	To be completed annually
	<u>as necessary</u>	completed	completed	annually	
		annually	annually		

Table 4.2. Conceptual self-assessment matrix.

4.3.7 Addressing Identified Problems and Issues

As noted above, this planning process revealed several problems and issues to be considered in this Fourth Generation Watershed Management Plan. Table 4.3 below repeats the problems and issues set forth in Table 4.1 at the beginning of this report section, and describes how each were addressed in this Implementation Plan.

Table 4.3. Actions in	n this Plan a	addressing the	identified pr	oblems and issues.
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#	Problem or Issue	Actions in the 4 th Generation Plan
Impair	red Waters Implementation	•
1.1	Have not yet completed a review of progress toward meeting the Lake Independence and Sarah TMDLs.	Both TMDLs are programmed for review and update in the Implementation Plan.

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#	Problem or Issue	Actions in the 4 th Generation Plan
1.2	Some of the lakes require significant internal load management such as alum treatment, rough fish and SAV management.	The CIP includes an alum treatment on South Whaletail Lake and a potential additional alum treatment on Lake Rebecca if necessary. Alum treatments may be considered for other lakes based on the results of the TMDL progress reviews. Rough fish assessment has been underway on the Lake Independence chain, with additional activities such
1.3	The stream TMDLs suggest that manure management practices and SSTS issues may be contributing to the bacteria impairments on the streams.	as carp barriers completed or included in this plan. The CIP includes funding for opportunistic manure management and other cost-share practices throughout the watershed. The Commission will also work with
1.4	Have not identified a process for evaluating progress toward the other lake and stream TMDLs.	This process will be developed based on the Commission's experience reviewing the Independence and Sarah TMDLs as part of those Lake Management Plans.
1.5	Lack of a directed framework to guide progress – no commonality of goals, approach, or sense of team effort between the stakeholders.	The Commission will convene a periodic TAC meeting to share information and develop shared goals and strategies.
1.6	BMP implementation is highly reliant on partnering with willing landowners.	HCEE intends to actively reach out to property owners and can bring cost-share funding to reduce costs. The Commission will consider a policy to supplement those cost-share funds.
1.7	Rather than focus solely on achieving numerical pollutant load reductions, manage lakes and streams holistically for a healthy aquatic ecosystem.	The Implementation Plan includes projects to develop Lake Management Plans for Lake Independence, Ardmore Lake, and Lake Sarah.
Agricu	ltural Community Outreach	
2.1	There is a need for significant nutrient and bacterial load reductions in the agricultural areas of the watershed, but there are limited specific projects or strategies identified.	Subwatershed assessments include nutrient loading modeling to identify potential high loading areas for prioritization and potential BMPs. HCEE is actively reaching out to property owners to determine interest.
2.2	There is an opportunity to work more in partnership with HCEE to prioritize and incentivize conservation projects.	See 1.6 above.
2.3	Investigate and grow public-private partnerships to leverage resources and expertise.	The Commission will actively seek out such partnerships.
Gener	al Education and Outreach	•
3.1	There is limited education and outreach. The Commission's 3rd Generation Plan set forth education and outreach goals and strategies for elected officials, cities, citizens, etc., but little has been accomplished.	The Commission will continue to work in partnership with Watershed Partners, Project NEMO, and HCEE to reach out to various stakeholders.

#	Problem or Issue	Actions in the 4 th Generation Plan						
3. 2	Need for ongoing commissioners and council member education so they can pass along that knowledge to the public.	HCEE staff have developed a program of ongoing Commissioner education. The Commission will continue to participate in Project NEMO training as available.						
3.3	Little private landowner outreach and engagement except for the lake associations.	HCEE is actively reaching out to property owners to determine education and outreach needs.						
Effective Operations								
4.1	Operating budget constraints affect the outreach and engagement staff can perform.	The Commission will continue to work in partnership with Watershed Partners, Project NEMO, and HCEE to reach out to various stakeholders in a cost-effective way.						
4.2	There is a need for ongoing, continuous Commissioner education and development so they can effectively serve as Commissioners.	HCEE staff have developed a program of ongoing Commissioner education. The Commission will continue to participate in Project NEMO training as available.						

Action	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Expenses:											
OPERATING EXPENSES											
Engineering/consulting	47,000	35,200	35,900	36,600	37,300	38,000	38,800	39,600	40,400	41,200	42,000
Administrative expense	36,000	36,000	36,700	37,400	38,100	38,900	39,700	40,500	41,300	42,100	42,900
Administrative -project reviews	1,000	1,000	1,000	1,000	1,200	1,200	1,200	1,300	1,300	1,400	1,400
Administrative -CIP Management	2,500	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Administrative -tech support	800	750	750	750	750	750	750	750	750	750	750
Legal expense	500	500	500	500	500	500	500	500	500	500	500
Audit expense	4,500	4,500	4,500	4,500	4,500	4,500	4,600	4,700	4,800	4,900	5,000
Insurance	3,100	2,800	2,800	2,800	2,800	2,800	2,900	3,000	3,100	3,200	3,300
Website	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Technical Advisory Committee mtgs	3,000	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
Lake monitoring - TRPD	8,100	8,100	8,300	8,500	8,700	8,900	9,100	9,300	9,500	9,700	9,900
Lake monitoring - CAMP	1,520	760	800	800	800	800	800	800	800	800	800
Stream monitoring – routine	9,500	9,500	9,700	9,900	10,100	10,300	10,500	10,700	10,900	11,100	11,300
Education program	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Education-events	500	500	500	500	500	500	500	500	500	500	500
Invertebrate monitoring	1,000	750	750	750	750	750	750	750	750	750	750
Grant writing	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Third Gen Plan	10,000	-									
Management Plan-admin	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Special Projects	2,000										
Fourth Gen Plan	10,000										
Capital Improvement Project/SWA	28,000	29,140	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000
TOTAL OPERATING EXPENSE	176,820	141,800	142,500	144,300	146,300	148,200	150,400	152,700	154,900	157,200	159,400
Revenues:											
Member Dues (max 2% increase)	103,800	103,800	104,500	106,300	108,300	110,200	112,400	114,700	116,900	119,200	121,400
Project Review Fees	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
CIP Income	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000
Interest & Dividends	9,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
TOTAL OPERATING REVENUE	146,800	141,800	142,500	144,300	146,300	148,200	150,400	152,700	154,900	157,200	159,400
% Dues Increase	3.8%	0.0%	0.7%	1.7%	1.9%	1.8%	2.0%	2.0%	1.9%	2.0%	1.8%

Note: See Appendix F for Capital Improvement Projects and Programs.

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4.4 IMPACT ON LOCAL GOVERNMENTS

Following approval and adoption of the Pioneer-Sarah Creek Fourth Generation Watershed Management Plan pursuant to Minnesota Statutes 103B, governmental units having land use planning and regulatory responsibility are required by statute to prepare or amend their local water management plans. Local plan content is driven primarily by Minnesota Rules 8410 and must include a capital improvement program and implementation plan to bring the local water management plan into conformance with the Commission's Plan. This update must be completed no sooner than two years prior

4.4.1 Local Plan Content

Local Stormwater Management Plans adopted by member cities pursuant to Minnesota Statutes, Section 103B.235 shall be consistent with the Fourth Generation Watershed Management Plan. Local plans must comply with Minnesota Statutes, Section 103B.235 and Minnesota Rules 8410 regarding local plan content. The Commission strongly encourages communities to develop the scope of their local plan with assistance from the Commission. At a minimum, local plans are required to do the following:

- Update the existing and proposed physical environment and land use. Information from previous plans that has not changed may be referenced and summarized but does not have to be repeated. Local plans may adopt sections of this Plan's Inventory and Condition Assessment by reference unless the city has more recent information, such as revised figures and data.
- Explain how the goals and policies, and rules and standards in this Plan will be implemented at the local level, including any necessary modifications of local ordinances, policies, and practices, and a schedule for their adoption. Explain specifically how the manure management ordinance will be implemented and enforced.
- Show how the member city will take action to achieve the load reductions and other actions identified in and agreed to in TMDL Implementation Plans and the WRAPS study, including identifying known upcoming projects including street or highway reconstruction projects that will provide opportunities to include load and volume reduction BMPs. Member cities must report their load-reducing actions to the Commission, for inclusion in the Annual Report.
- Update existing or potential water resource related problems and identify nonstructural, programmatic, and structural solutions, including those program elements detailed in Minnesota Rules 8410.0100, Subp. 1 through 6.
- Summarize the estimated cost of implementation and potential sources of funding.
- Set forth an implementation program including a description of adoption or amendment of official controls and local policies necessary to implement the Rules and Standards; programs; policies; and a ten year capital improvement plan.

4.4.2 Local Plan Review

Each member city shall submit its proposed Local Stormwater Management Plan to the Commission and the Metropolitan Council for review before adoption by its governing body. The Metropolitan Council review period is 45 days and the Commission review period is 60 days after plan receipt.

4.4.3 Financial Impact

This Plan assumes the annual increase in member city assessments will be approximately an annual inflation increase, assumed to be 2%. The JPA allows member cities to request Commission review of proposed budget increases prior to accepting an annual budget. The largest municipal cost is likely to be the result of local planning efforts mandated by the State of Minnesota through the NPDES MS4 permit and updating local plans. Costs to revise the in-place local plan will range from minimal to \$20,000 depending on the level of activity anticipated by the community.

4.5 PLAN REVIEW, UPDATE AND REVISION

This Watershed Management Plan provides direction for the Pioneer-Sarah Creek Watershed Management Commission activities through the year 2030. The Commission may initiate amendments to the Plan at any time. The Commission intends that the Plan provide a flexible framework for managing the watershed.

The Commission will annually review the Implementation Plan and CIP, and revisions to the IP and CIP may require future minor or major plan amendments. The Plan estimates programs and general costs in the Implementation Plan for 2021-2030 activities, and future plan amendments may be necessary to amend the Implementation Plan based on new requirements, policies, or standard practices.

4.5.1 Amendment Procedures

All amendments to the Plan except minor amendments shall adhere to the full review and process set forth in Minnesota Statutes 103B.231, and this section. The Commission shall adopt proposed major plan amendments upon their approval by BWSR in accordance with Minnesota Statutes 103B.231. The amendment procedure for minor plan amendments shall be in accordance with Minnesota Rules 8410.0140 as such rules now exist or as subsequently amended.

Neither a minor nor a general plan amendment will be required for the following situations:

- 1. If projects included in the approved CIP are implemented in a different year than shown.
- When a capital project is included in the approved CIP and the Commission's share of an updated cost estimate does not exceed 125 percent of the Commission's share shown on the CIP, as adjusted by the Construction Cost Index (CCI) as published by the Engineering News Record (ENR).
- 3. When a capital project is included in the approved Capital Improvement Program and the Commission's share of an updated cost estimate is less than the Commission's share shown on the CIP, as adjusted by the CCI. However, the Commission will review such projects to evaluate the extent to which the original project objectives are being met.

4.5.2 Form of the Amendment

Unless the entire document is reprinted, all adopted amendments adopted must be printed in the form of replacement pages for the Plan, each page of which must conform to the following:

- 1. On draft amendments being considered, show deleted text as stricken and new text underlined.
- 2. Be renumbered as appropriate.
- 3. Include the effective date of the amendment.

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