item 01

Pioneer-
Sarah Creek
Watershed Management Commission
ADMINISTRATIVE OFFICE: 3235 Fernbrook Lane N • Plymouth, MN 55447
763.553.1144 • Fax: 763.553.9326

May 14, 2020

Representatives
Pioneer-Sarah Creek Watershed
Management Commission
Hennepin County, Minnesota

The meeting packet for this meeting may be found on the Commission's website: http://www.pioneersarahcreek.org/minutes--meeting-packets.html

Dear Representatives:

A regular meeting of the Pioneer-Sarah Creek Watershed Management Commission will be held Thursday, May 21, 2020, at 6:00 p.m. This will be a virtual meeting. To join the meeting, click

https://zoom.us/j/845974640 or go to www.zoom.us and click **Join A Meeting.** Meeting ID is 845 974 640

If your computer is not equipped with audio capability, you need to dial into one of these numbers:

+1 929 205 6099 US (New York)
+1 669 900 6833 US (San Jose)
+1 253 215 8782 US
+1 312 626 6799 US (Chicago)
+1 346 248 7799 US (Houston)
+1 301 715 8592 US

In order to ensure a quorum for the regular meeting, please telephone 763.553.1144 or email me at amy@jass.biz to indicate if you or your Alternate will be attending. It is your responsibility to ascertain that your community will be represented at the regular meeting.

Regards,

Amy A. Juntunen
Administrator
AAJ:tim

cc: Alternates
Paul Stewart, Kirsten Barta, HCEE
Brian Vlach, TRPD
Joel Jamnik, Attorney
Diane Spector, Wenck Assocs.
Andrew Vistad, Kaci Fisher, Hakanson-Anderson
City Clerks
Met Council
official newspapers
MPCA
BWSR
DNR

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item 02

Pioneer-
Sarah Creek
Watershed Management Commission

ADMINISTRATIVE OFFICE: 3235 Fernbrook Lane N • Plymouth, MN 55447
763.553.1144 • Fax: 763.553.9326 • judie@jass.biz • www.pioneersarahcreek.org

REGULAR MEETING AGENDA
May 21, 2020 ● 6:00 p.m.
The meeting packet can be found on the Commission's website:
http://pioneersarahcreek.org/pages/Meetings/

1. Call to Order.
2. Approve Agenda.*
3. Consent Agenda.
   a. April meeting minutes.*
   b. Monthly Claims/Treasurer's Report.*
   c. Approve non-waiver of monetary limits on tort liability.*
4. Open forum.
5. Action Items.
   a. Consider 2021 Operating Budget.*
   b. Member Assessments.*
6. Old Business.
7. New Business.
8. Watershed Management Plan.* *(also see next page.)*
   a. Draft Plan – Update.*
   b. Appendices.*
9. Education.
10. Grant Updates.
11. Communications.
    a. Final Report Lake Independence Carp Study.*
    b. Letter from Met Council re Maple Plain Local Plan.*
12. Staff Report.*
    a. Subwatershed Assessments.*
    b. BWSR Watershed-based Funding.
13. Commissioner Reports.
14. Other Business.
15. Adjournment. (Next scheduled meeting: June 18, 2020.

Watershed Management Plan – timeline:

November 13, 2019	Commission 60-day notice of plan kickoff and request for information
November 21, 2019	Award contract
December-January 2020	Compile data, background work
January 16, 2020	Kickoff meeting
Feb-Mar-Apr	Commission, TAC, CAC meetings, Open House
April 16, 2020	Preliminary draft for informal review
May 21, 2020	**Review preliminary comments and revise plan**
June 18, 2020	**Review final draft plan and authorize start of 60 day review**
August 21, 2020	**Approximate end of 60-day review**
Sept 17, 2020	**Public Hearing**
Sept-Oct-Nov 2020	**Agency review and approval**
Dec -Jan 2021	**Commission adoption**

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REGULAR MEETING MINUTES
March 19, 2020

1. CALL TO ORDER. A regular meeting of the Pioneer-Sarah Creek Watershed Management Commission was called to order at 6:00 p.m., Thursday, April 16, 2020, by Chair Joe Baker via online Zoom.

Present: Mark Workcuff, Greenfield; Joe Baker, Independence; Brenda Daniels, Loretto; John Fay, Maple Plain; Pat Wulff, Medina; John Tschumperlin, Minnetrista; Andrew Vistad, Hakanson-Anderson, Brian Vlach, Three Rivers Park District (TRPD); and Amy Juntunen, JASS.

Also Present: Kyal Klawitter, Greenfield; Brad Spencer, Independence; Scott Johnson, Medina; Kris Guentzel and Paul Stewart, Hennepin County Environment and Energy (HCEE); and Diane Spector, Wenck Associates.

2. AGENDA. Items 5.b. Project Review 2020-003 and 7.a. Schedule Budget Meeting were added. Motion by Tschumperlin, second by Daniels to approve the agenda as revised. *Motion carried unanimously.*

3. CONSENT AGENDA. Motion by Wulff, second by Tschumperlin to approve the minutes as presented. *Motion carried unanimously.*

a. March Regular Meeting Minutes.*

b. April Monthly Claims/Treasurer's Report.* Claims total $4,642.23.

4. OPEN FORUM. The Cities of Medina and Independence have approved the new LICA no-wake trigger for Lake Independence. Information has been sent by Scott Johnson at Medina to the DNR for review and approval. Wulff will follow up with the DNR.

5. ACTION ITEMS.

a. Accept 2019 Annual Activity Report.* Baker acknowledged the JASS team for highlighting the productive year for the Commission. Motion by Wulff, second by Daniels to accept the 2019 Annual Activity Report as presented. *Motion carried unanimously.*

b. Project Review 2020-003 2020 Ardmore Avenue Culvert, Medina.* This project is to replace an existing culvert beneath Ardmore Avenue with polypropylene pipe. The Commission reviewed this project for compliance with rules D-stormwater management and E-erosion control. The project meets all standards. Motion by Wulff, second by Fay to approve project 2020-003 with no conditions. *Motion carried unanimously.*

6. OLD BUSINESS.

7. NEW BUSINESS (see Staff Report*). Baker, Fay and Tschumperlin volunteered to serve on the budget committee. The Committee will meet prior to the May meeting. A draft budget will be presented for review and comment at the May meeting and must be approved no later than the June meeting.

8. WATERSHED MANAGEMENT PLAN. Spector reviewed the draft plan. Commissioners and Staff provided comments and verbiage changes. Baker will work with Spector on wordsmithing, with a goal of directing the focus of the plan on results delivered, rather than "bean counting" and leveraging private partnerships. Baker suggested CIP cost-sharing should move to a flat 25%, or possibly even higher.

A TAC meeting will be scheduled for late April/early May for TAC members to familiarize themselves with

*Included in meeting packet.

the current CIP and work on prioritization. The budget committee will provide input on the amount of funding available for CIPs to assist in determining the annual CIP schedule.

Working Schedule.

1) May 21, 2020 - Review preliminary comments and revise plan
2) June 18, 2020 - Review final draft plan and authorize start of 60 day review
3) August 21, 2020 - Approximate end of 60-day review
4) Sept 17, 2020 - Public Hearing
5) Sept-Oct-Nov 2020 - Agency review and approval
6) Dec -Jan 2021 - Commission adoption

9. EDUCATION.

10. GRANT UPDATES.

Baker Park Ravine Update. Vlach and Wenck staff were interviewed on video by BWSR regarding the project for an upcoming article. The article/video will be posted to the website once available.

Minnesota Native Landscapes will complete the campground site restoration next week and complete seeding. Final inspection for project completion will occur in May. This work was included in the contract and will result in one more payment application before the final payment application for the retainage.

11. COMMUNICATIONS.

a. Final Report Lake Independence Carp Study.* Moved to the May meeting.

b. Letter from Met Council re Maple Plain Local Plan.* Moved to the May meeting.

12. STAFF REPORT.*

a. Subwatershed Assessments.* Moved to the May meeting.

13. COMMISSIONER REPORTS.

14. OTHER BUSINESS.

a. Juntunen will attend the **watershed-based implementation funding** meetings for the South Fork and North Fork major watershed areas over the next month to determine the amount of funding potentially available to the Commission in the 2020-2022 biennium.

b. The **next regular meeting** is scheduled for May 21, 2020 and will most likely be held online again via Zoom link https://zoom.us/j/845974640.

15. ADJOURNMENT. There being no further business, motion by Wulff, second by Fay to adjourn. *Motion carried unanimously.* The meeting was adjourned at 9:19 p.m.

Respectfully submitted,

Amy Juntunen, Recording Secretary
AAJ:tim

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**Included in meeting packet.*

Pioneer-Sarah Creek Watershed
Cash Disbursements Journal
For the Period From May 1, 2020 to May 31, 2020

Filter Criteria includes: Report order is by Date. Report is printed in Detail Format.

Date	Check #	Account ID	Line Description	Debit Amount	Credit Amount
5/15/20		50100	Project Review - March Inv 43701 Park Place/Nike Storage	138.00	
		50100	General Engineering - March Inv 43702	581.33	
		50100	Project Review - April Inv 43808 Park Place/Nike Storage	460.00	
		50100	Project Review - April Inv 43809 CSAH 15 Culvert Replacement	276.00	
		50100	General Engineering - April Inv 43810	1,201.75	
		10100	Hakanson Anderson Associates, Inc.		2,657.08
5/15/20		51100	Administration	1,218.17	
		51100	Meeting-related	1,089.33	
		51100	Bookkeeping / Audit Prep	522.70	
		51100	Annual Report / Work Plans	2,043.56	
		58210	Management Plan	313.89	
		51400	Website	100.85	
		57000	Education	14.95	
		51120	Project Reviews	51.01	
		51125	CIPs, BBR	1.30	
		10100	Judie Anderson's Secretarial Service		5,355.76
5/15/20		58200	4th Generation Management Plan - April invoice	4,866.30	
		58200	4th Generation Management Plan - May invoice	7,300.00	
		64003	Baker Ravine	787.60	
		10100	Wenck Associates, Inc.		12,953.90
	Total			**20,966.74**	**20,966.74**

Hakanson Anderson

3601 Thurston Avenue
Suite 101
Anoka, MN 55303

Pioneer Sarah Watershed Management Commission
3235 Fernbroke Lane
Plymouth, MN 55447

Invoice number 43701
Date 03/31/2020

Project **PSC201 NIKE STORAGE SITE**

Professional Services Provided Through 02/29/2020

MUNICIPAL REVIEW

Professional Fees

	Date	Hours	Rate	Billed Amount
Andrew Vistad	02/25/2020	1.50	92.00	138.00
PROJECT 2020-001 REVIEW AND COMMENTS NUMBER 1				
			PROFESSIONAL FEES SUBTOTAL	**138.00**
			MUNICIPAL REVIEW SUBTOTAL	**138.00**
			AMOUNT DUE THIS INVOICE	**138.00**

Invoice Summary		Current Billed	Prior Billed	Total Billed
	Total	138.00	0.00	138.00

Hakanson Anderson

3601 Thurston Avenue
Suite 101
Anoka, MN 55303

Pioneer Sarah Watershed Management Commission
3235 Fernbroke Lane
Plymouth, MN 55447

Invoice number 43702
Date 03/31/2020

Project **PSC901-2020 GENERAL ENGINEERING FOR PIONEER SARAH WMC 2020**

Professional Services Provided Through 02/29/2020

GENERAL ENGINEERING

Professional Fees

	Date	Hours	Rate	Billed Amount
Andrew Vistad *MONTHLY MEETING*	02/20/2020	4.50	92.00	414.00
Andrew Vistad *DOCUMENT SEARCH FOR GREENFIELD*	02/26/2020	1.50	92.00	138.00
			PROFESSIONAL FEES SUBTOTAL	**552.00**

Reimbursables

	Date	Units	Rate	Billed Amount
MILEAGE	02/20/2020	38.00	0.575	21.85
MILEAGE	02/26/2020	13.00	0.575	7.48
			MILEAGE SUBTOTAL	29.33
			REIMBURSABLES SUBTOTAL	**29.33**
			GENERAL ENGINEERING SUBTOTAL	**581.33**
			AMOUNT DUE THIS INVOICE	**581.33**

Invoice Summary

	Current Billed	Prior Billed	Total Billed
Total	581.33	572.13	1,153.46

Hakanson Anderson

3601 Thurston Avenue
Suite 101
Anoka, MN 55303

Pioneer Sarah Watershed Management Commission
3235 Fernbroke Lane
Plymouth, MN 55447

Invoice number 43808
Date 04/28/2020

Project **PSC201 NIKE STORAGE SITE**

Professional Services Provided Through 03/31/2020

MUNICIPAL REVIEW

Professional Fees

	Date	Hours	Rate	Billed Amount
Andrew Vistad *SITE PLAN REVIEW INCOMPLETE SUBMISSION*	03/09/2020	3.00	92.00	276.00
Andrew Vistad *SITE PLAN REVIEW INCOMPLETE SUBMISSION*	03/10/2020	2.00	92.00	184.00
			PROFESSIONAL FEES SUBTOTAL	**460.00**
			MUNICIPAL REVIEW SUBTOTAL	**460.00**
			AMOUNT DUE THIS INVOICE	**460.00**

Invoice Summary		Current Billed	Prior Billed	Total Billed
	Total	460.00	138.00	598.00

Hakanson Anderson

3601 Thurston Avenue
Suite 101
Anoka, MN 55303

Pioneer Sarah Watershed Management Commission
3235 Fernbroke Lane
Plymouth, MN 55447

Invoice number 43809
Date 04/28/2020

Project **PSC202 CSAH 15 CULVERT REPLACEMENTS**

Professional Services Provided Through 03/31/2020

MUNICIPAL REVIEW

Professional Fees

	Date	Hours	Rate	Billed Amount
Andrew Vistad	03/02/2020	3.00	92.00	276.00
CULVERT REPLACEMENT REVIEW NUMBER 1				

PROFESSIONAL FEES SUBTOTAL	**276.00**
MUNICIPAL REVIEW SUBTOTAL	**276.00**
AMOUNT DUE THIS INVOICE	**276.00**

Invoice Summary

	Current Billed	Prior Billed	Total Billed
Total	276.00	0.00	276.00

Hakanson Anderson

3601 Thurston Avenue
Suite 101
Anoka, MN 55303

Pioneer Sarah Watershed Management Commission
3235 Fernbroke Lane
Plymouth, MN 55447

Invoice number 43810
Date 04/28/2020

Project **PSC901-2020 GENERAL ENGINEERING FOR PIONEER SARAH WMC 2020**

Professional Services Provided Through 03/31/2020

GENERAL ENGINEERING

Professional Fees

	Date	Hours	Rate	Billed Amount
Andrew Vistad	03/09/2020	2.50	92.00	230.00
CARP BARRIER PLAN MEETING				
Andrew Vistad	03/16/2020	2.50	92.00	230.00
TAC MEETING FOR 4TH GENERATION PLAN *WETLAND BUFFER STRIP RULES EMAIL TO PROBE ENGINEERING*				
Andrew Vistad	03/19/2020	4.25	92.00	391.00
MONTHLY MEETING				
Andrew Vistad	03/27/2020	1.50	92.00	138.00
RESEARCH CONCEPT PROJECT FOR REVIEW CRITERIA				
Andrew Vistad	03/31/2020	2.00	92.00	184.00
FLOODPLAIN ENCROACHMENT DISCUSSION WITH KLJ FOR TH12 & CSAH92 STREAM CROSSING				
			PROFESSIONAL FEES SUBTOTAL	**1,173.00**

Reimbursables

	Date	Units	Rate	Billed Amount
MILEAGE	03/09/2020	50.00	0.575	28.75
DRIVE TO MEDIAN FOR CARP BARRIER PLAN MEETING				
			REIMBURSABLES SUBTOTAL	**28.75**
			GENERAL ENGINEERING SUBTOTAL	**1,201.75**
			AMOUNT DUE THIS INVOICE	**1,201.75**

Invoice Summary		Current Billed	Prior Billed	Total Billed
	Total	1,201.75	1,153.46	2,355.21

item 03b

Invoice

WENCK

Responsive partner.
Exceptional outcomes.

April 8, 2020
Invoice No: 12002178

Amy Juntunen
Pioneer-Sarah Watershed Management Comm.
3235 Fernbrook Lane
Plymouth, MN 55447

Project Manager Diane Spector

Project B1508-0008 4th Generation Watershed Management Plan

Professional Services Through March 31, 2020

Professional Personnel

		Hours	Rate	Amount	
Kemmitt, Katie		3.70	99.00	366.30	
Spector, Diane		22.50	200.00	4,500.00	
	Totals	26.20		4,866.30	
	Total Labor				**4,866.30**
			Total Invoice Amount		**$4,866.30**

	Current	Prior	Total
Billing Summary	**4,866.30**	**7,584.40**	**12,450.70**

item 03b

Invoice

WENCK

Responsive partner.
Exceptional outcomes.

May 7, 2020
Invoice No: 12002852

Amy Juntunen
Pioneer-Sarah Watershed Management Comm.
3235 Fernbrook Lane
Plymouth, MN 55447

Project Manager Diane Spector

Project B001508-19-008 4th Generation Watershed Management Plan

Professional Services Through April 30, 2020

Professional Personnel

		Hours	Rate	Amount	
Spector, Diane		36.50	200.00	7,300.00	
	Totals	36.50		7,300.00	
	Total Labor				**7,300.00**
			Total Invoice Amount		**$7,300.00**

Outstanding Invoices

Number	Date	Balance
12002178	4/8/2020	4,866.30
Total		**4,866.30**

	Current	Prior	Total
Billing Summary	**7,300.00**	**12,450.70**	**19,750.70**

item 03b

Invoice

May 8, 2020
Invoice No: 12002957

WENCK

Responsive partner.
Exceptional outcomes.

Ms. Judie Anderson
Pioneer-Sarah Watershed Management Comm.
3235 Fernbrook Lane
Plymouth, MN 55447

Project Manager Lucius Jonett

Project B001508-18-007 Baker Ravine Stabilization

Professional Services Through April 30, 2020

Phase 08 Construction Observation

Construction Observation

Professional Personnel

	Hours	Rate	Amount	
Bossert, Seth	4.90	114.00	558.60	
Jonett, Lucius	1.00	151.00	151.00	
Matthiesen, Edward	.40	195.00	78.00	
Totals	6.30		787.60	
Total Labor				**787.60**
			Phase Total	**$787.60**
			Total Invoice Amount	**$787.60**

	Current	Prior	Total
Billing Summary	**787.60**	**72,774.98**	**73,562.58**

JASS
Your Virtual Administrator

3235 Fernbrook Lane
Plymouth MN 55447

Pioneer-Sarah Creek Watershed Management Commission
3235 Fernbrook Lane Plymouth, MN 55447

May 15, 2020

General Administration					**Total Project Area**
Administrative	0.34	60.00	20.400		
Administrative	8.16	65.00	530.400		
Administrative - offiste	1.22	70.00	85.400		
Office Support	7.75	60.00	465.000		
Public storage	1.00	80.08	80.080		
Data Processing/File Mgmt		60.00	0.000		
Archiving		65.00	0.000		
Reimbursable Expense	36.89	1.00	36.890	1,218.170	Administration
Meeting packets, attendance, Minutes and Meeting follow-up					
Administrative	1.34	60.00	80.400		
Administrative	9.72	65.00	631.800		
Admin - Offsite	3.75	70.00	262.500		
Reimbursable Expense	114.63	1.00	114.630	1,089.330	Meeting-related activitie
Bookkeeping					
Bookkeeping, budget, audit requests	4.27	65.00	277.550		
Treasurer's Reports	1.75	65.00	113.750		
Audit Prep	1.00	65.00	65.000		Bookkeeping/TRs
Reimbursable Expense	66.40	1.00	66.400	522.700	Audit Prep
Annual Report/Work Plans					
Secretarial		55.00	0.000		
Administrative	26.21	65.00	1,703.650		
Reimbursable Expense	339.91	1.00	339.910	2,043.56	Annual Report Work plans
Management Plan and Amendments					
Administrative		55.00	-		
Administrative	2.91	65.00	189.15		
Offsite		70.00	0.00		
Reimbursable Expense	124.74	1.00	124.74	313.89	Management Plan
Website					
Weebly hosting - 1 year		1.00	0.000		
Pages, links, uploads	0.50	60.00	30.000		
Administrative	1.09	65.00	70.850	100.850	Website
Education, Strategic Planning					
Administrative		55.00	0.000		
Administrative	0.23	65.00	14.950		
Offsite		70.00	0.000		
Reimbursable Expense		1.00	0.000	14.950	Education
Project Reviews					
Administrative		55.00	0.000		
Administrative	0.33	65.00	21.450		
File Management/Archiving		50.00	0.000		
Reimbursable Expense	29.56	1.00	29.560	51.010	Project Reviews
CIPs, BBR - General Administration					
Administrative		55.00	0.000		
Administrative		60.00	0.00		
Administrative Offsite	0.02	65.00	1.30		
Reimbursable Expense		1.00	0.000	1.300	CIPs, BBR
			5,355.760	**5,355.760**	

LMC LEAGUE of MINNESOTA CITIES

LIABILITY COVERAGE – WAIVER FORM

Members who obtain liability coverage through the League of Minnesota Cities Insurance Trust (LMCIT) must complete and return this form to LMCIT before the member's effective date of coverage. Return completed form to your underwriter or email to pstech@lmc.org.

The decision to waive or not waive the statutory tort limits must be made annually by the member's governing body, in consultation with its attorney if necessary.

Members who obtain liability coverage from LMCIT must decide whether to waive the statutory tort liability limits to the extent of the coverage purchased. The decision has the following effects:

- *If the member does not waive the statutory tort limits*, an individual claimant could recover no more than $500,000 on any claim to which the statutory tort limits apply. The total all claimants could recover for a single occurrence to which the statutory tort limits apply would be limited to $1,500,000. These statutory tort limits would apply regardless of whether the member purchases the optional LMCIT excess liability coverage.

- *If the member waives the statutory tort limits and does not purchase excess liability coverage*, a single claimant could recover up to $2,000,000 for a single occurrence (under the waive option, the tort cap liability limits are only waived to the extent of the member's liability coverage limits, and the LMCIT per occurrence limit is $2,000,000). The total all claimants could recover for a single occurrence to which the statutory tort limits apply would also be limited to $2,000,000, regardless of the number of claimants.

- *If the member waives the statutory tort limits and purchases excess liability coverage*, a single claimant could potentially recover an amount up to the limit of the coverage purchased. The total all claimants could recover for a single occurrence to which the statutory tort limits apply would also be limited to the amount of coverage purchased, regardless of the number of claimants.

Claims to which the statutory municipal tort limits do not apply are not affected by this decision.

LMCIT Member Name:
Pioneer-Sarah Creek Watershed Management Commission

Check one:

☑ The member **DOES NOT WAIVE** the monetary limits on municipal tort liability established by Minn. Stat. § 466.04.

☐ The member **WAIVES** the monetary limits on municipal tort liability established by Minn. Stat. § 466.04, to the extent of the limits of the liability coverage obtained from LMCIT.

Date of member's governing body meeting: _____

Signature: _____ Position: _____

Pioneer-Sarah Creek Watershed Management Commission
2020 Approved Budget

	Actual 2018	2019 Budget	2019 Actual	2020 Budget	Proposed 2021 Budget	
Revenues						
Member Dues	$ 100,000.00	$ 100,000.00	$ 100,000.00	$ 103,800.00	$ 103,800.00	
Project Review Fees	6,050.00	4,000.00	14,074.00	6,000.00	6,000.00	
CIP Income	28,000.00	28,000.00	28,000.00	28,000.00	28,000.00	
Lake Sarah TMDL Imple	4,592.61	0.00	5,398.46	0.00	0.00	
Grant - Baker Park Ravine	208,000.00	0.00	0.00	0.00	0.00	
Watershed Based Funding Grant	0.00	0.00	29,159.00	0.00	0.00	
WCA Adm Fees	2,400.00	500.00	850.00	0.00	0.00	
Interest and Dividend Income	8,220.25	1,570.00	12,135.95	9,000.00	4,000.00	
Total Revenues	357,262.86	134,070.00	189,617.41	146,800.00	141,800.00	
Expenses						
Engineering/Consulting	14,356.29	24,190.00	24,953.06	47,000.00	35,200.00	
Administrative Expense	31,190.84	36,000.00	31,299.35	36,000.00	36,000.00	
Adm-Project Reviews	835.80	750.00	1,141.98	1,000.00	1,000.00	
Adm-CIP Mgmt	1,418.21	3,000.00	158.49	2,500.00	2,000.00	
WCA - Admin/Legal Expenses	1,186.03	300.00	254.95	0.00	0.00	
Adm - Tech Support	698.95	550.00	0.00	800.00	750.00	
Legal Expense	124.00	500.00	356.50	500.00	500.00	
Audit Expense	4,000.00	4,500.00	4,500.00	4,500.00	4,500.00	
Insurance	2,618.00	3,500.00	2,690.00	3,100.00	2,800.00	
Website	773.70	1,800.00	536.65	1,800.00	1,800.00	
Adm - General Programs		500.00	0.00	0.00	0.00	
TAC Meetings	1,962.60	3,000.00	0.00	3,000.00	2,500.00	
Lakes Monitoring - TRPD	5,180.00	8,100.00	8,100.00	8,100.00	8,100.00	(5 Lakes)
Lakes Monitoring - CAMP	550.00	760.00	760.00	1,520.00	760.00	
Stream Monitoring	7,600.00	7,120.00	7,120.00	9,500.00	9,500.00	(4 Sites)
Education	706.51	4,500.00	950.15	4,000.00	4,000.00	
Education-Events	0.00	500.00	0.00	500.00	500.00	
Invertebrate Monitoring	1,000.00	500.00	750.00	1,000.00	750.00	
Grant Writing	0.00	1,000.00	0.00	1,000.00	1,000.00	
Third Gen Plan	0.00	1,000.00	0.00	10,000.00	0.00	
Management Plan - Admin	974.20	0.00	970.09	1,000.00	1,000.00	
Special Projects	0.00	4,000.00		2,000.00	0.00	
Fourth Gen Plan	0.00	0.00	613.50	10,000.00	0.00	
Fifth Gen Plan						
Capital Improvement Project	6,958.49	28,000.00	8,000.00	28,000.00	29,140.00	*
Lake Sarah Implementation	4,611.53		5,398.46	0.00	0.00	
Baker Park Ravine	42,422.24		114,001.31	0.00	0.00	
Total Expenses	129,167.39	134,070.00	212,554.49	176,820.00	141,800.00	

June 21, 2018

Pioneer-Sarah Creek Watershed Management Commission
2020 Approved Budget

	Actual 2018	2019 Budget	2019 Actual	2020 Budget	Proposed 2021 Budget
Net Income	$ 228,095.47	$ 0.00	($ 22,937.08)	($ 30,020.00)	$ 0.00

*2021 Increased to zero net income

June 21, 2018

Pioneer-Sarah Creek Watershed
Balance Sheet
December 31, 2018

ASSETS		
Current Assets		
Cash-4M Fund	621,628.77	
Total Current Assets		621,628.77
Property and Equipment		
Total Property and Equipment		0.00
Other Assets		
Total Other Assets		0.00
Total Assets		$ 621,628.77
LIABILITIES AND CAPITAL		
Current Liabilities		
Accounts Payable	$ 122,352.88	
Total Current Liabilities		122,352.88
Long-Term Liabilities		
Total Long-Term Liabilities		0.00
Total Liabilities		122,352.88
Capital		

Funds Adjusted after 2019 Expenses

item 05a

Pioneer-Sarah Creek Watershed
Balance Sheet
December 31, 2018

Next Generation Plan Fund	25,000.00		25,000.00
Retained Surplus	209,356.29		209,356.29
CIP Fund	115,505.51		115,505.51
Grant Fund-Baker Ravine	143,192.17		29,190.86
Grant Fund-Watershed Based Funding	29,159.00		29,159.00
Net Income	(22,937.08)		91,064.23
Total Capital		499,275.89	499,275.89
Total Liabilities & Capital		$ 621,628.77	

item 05a

Pioneer-Sarah Creek Watershed Management Commission

DRAFT 2021 Member Assessments

2019	2018 Market Value PSC Basin	Increase in MV over Prev Year	2019 Op Budget		Increase over Prev Year	
			%age	Amount	%age	Amount
Greenfield	368,183,516	-12.09%	25.49%	32,625.08	-12.86%	(4,815.08)
Independence	558,624,135	3.96%	38.67%	49,500.20	3.04%	1,462.22
Loretto	61,598,085	10.60%	4.26%	5,458.26	9.62%	479.21
Maple Plain	118,116,948	8.15%	8.18%	10,466.45	7.20%	702.67
Medina	167,463,487	5.65%	11.59%	14,839.09	4.72%	669.10
Minnetrista	170,530,950	12.02%	11.81%	15,110.91	11.04%	1,501.88
TOTALS	**1,444,517,121**	0.89%	100.00%	**128,000.00**	0.00%	0.00

2020	2019 Market Value PSC Basin	Increase in MV over Prev Year	2020 Op Budget		Increase over Prev Year	
			%age	Amount	%age	Amount
Greenfield	387,408,426	5.22%	25.78%	33,972.21	4.13%	1,347.12
Independence	577,654,920	3.41%	38.43%	50,655.10	2.33%	1,154.90
Loretto	64,646,640	4.95%	4.30%	5,668.92	3.86%	210.66
Maple Plain	124,712,551	5.58%	8.30%	10,936.16	4.49%	469.71
Medina	173,159,976	3.40%	11.52%	15,184.56	2.33%	345.47
Minnetrista	175,423,480	15.23%	11.67%	15,383.05	1.80%	272.14
TOTALS	**1,503,005,993**	4.05%	100.00%	**131,800.00**	2.97%	3,800.00

2021	2020 Market Value PSC Basin	Increase in MV over Prev Year	2021 Op Budget		Increase over Prev Year	
			%age	Amount	%age	Amount
Greenfield	492,597,046	27.15%	29.66%	39,089.19	15.06%	5,116.98
Independence	598,303,894	3.57%	36.02%	47,477.37	-6.27%	(3,177.73)
Loretto	69,865,263	8.07%	4.21%	5,544.04	-2.20%	(124.89)
Maple Plain	132,270,685	6.06%	7.96%	10,496.11	-4.02%	(440.05)
Medina	180,132,527	4.03%	10.85%	14,294.11	-5.86%	(890.45)
Minnetrista	187,757,641	10.10%	11.30%	14,899.18	-3.15%	(483.87)
TOTALS	**1,660,927,056**	10.51%	100.00%	**131,800.00**	0.00%	0.00

Technical Memo

WENCK
Responsive partner.
Exceptional outcomes.

To: Pioneer-Sarah Creek WMO Commissioners

From: Diane Spector

Date: May 15, 2020

Subject: Fourth Generation Plan Work Session Five: Review Draft Plan

At the May 21, 2020 meeting we will review the draft Fourth Generation Management Plan that incorporates the review comments from the April meeting as well as the May 4, 2020 TAC input, including capital project submittals.

Our primary discussion at the May meeting will be the following topics:

1. Review and approve the Fourth Generation Plan Priorities statements (found in the Executive Summary)
2. Review the proposed CIP (found in Appendix F, at the end of the Appendices document)
3. Discuss the budget projections to be shown in Table 4.4 (found on page 4-16 near the end of the Plan document)

Another topic of discussion is the informal public input process. Because comments received during the 60-Day Review process become part of the formal record submitted to BWSR, it is useful to provide the member cities and public an opportunity for informal review. The Commission and cities can use their various information and outreach channels to alert the public of the opportunity to review and comment. Your plan schedule assumes that you will take comments through June 12, 2020. Depending on the nature of the comments received, the Commission would then begin the formal 60-Day review process at the June 18, 2020 meeting. The public hearing would be held at your September meeting, and the Plan would then be submitted to BWSR for its review and approval.

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Abbreviations and Acronyms

BMP	Best Management Practice
BWSR	Board of Water and Soil Resources
cfs	cubic feet per second
cfu	colony-forming unit
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
ft^3	Cubic feet
HCEE	Hennepin County Environment and Energy
IBI	Index of Biotic Integrity
LA	Load Allocation
LGU	Local Government Unit
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
SWPPP	Storm Water Pollution Prevention Program
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	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

Executive Summary

This Watershed Management Plan (Plan) describes how the Pioneer-Sarah Creek Watershed Management Commission (PSCWM 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 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.

Executive Summary (con't)

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 of and implementation of projects and practices to reduce pollutant loading to the lakes and streams in the watershed.
- Lake Rebecca, which was 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 TMDL 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 by 10% over the previous ten-year period. Table ES.1 shows an improvement in water quality as measured by Secchi depth (clarity) and TP in five of the 9 lakes with enough monitoring 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 trending in the right direction.

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

Lake	SD Change*	TP Change*
Lake Ardmore	N/C	+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%

*Note: a positive Secchi Depth change is an improvement, while a negative TP change is an improvement.

Areas where the Commission fell short include:

- 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, there is heavy reliance on finding willing landowners. Additional implementation projects could have been completed had property owners been willing to participate.

Executive Summary (con't)

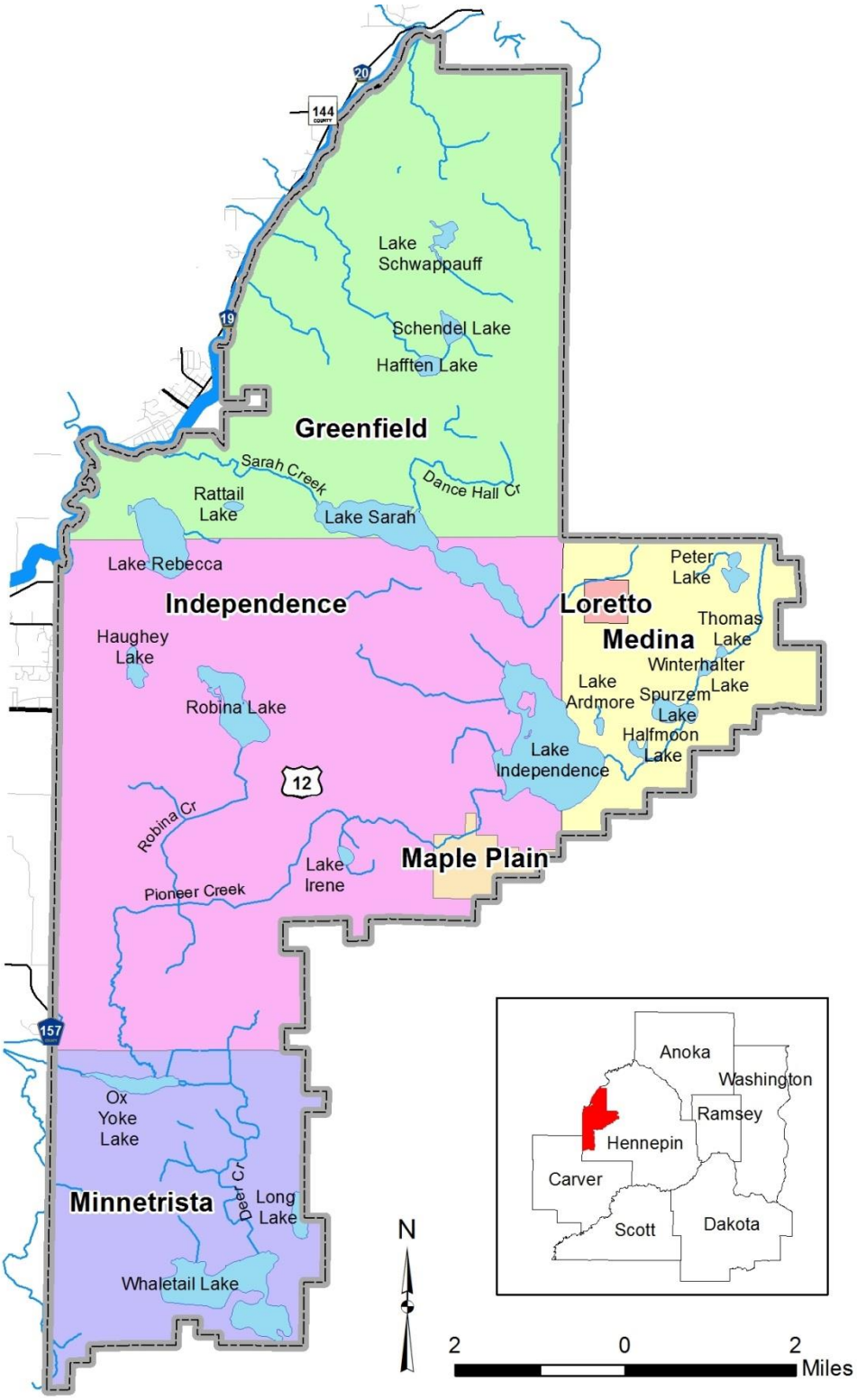

Figure ES.1: Cities in the Pioneer-Sarah Creek watershed.

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

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

Priorities:

FOURTH GENERATION MANAGEMENT PLAN PRIORITIES

1. Make systematic progress toward achieving lake water quality goals by 2030:
    a. Delist South Whaletail Lake.
    b. Meet state water quality standards in Spurzem, Half Moon, and Ardmore Lakes.
    c. Achieve a 10% reduction in TP concentration in Lake Independence over the previous ten years.
2. Work in a coordinated way with Hennepin County, Three Rivers Park District, cities, lake associations, urban and rural property owners, and public and private entities, 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.
4. Serve as an informational and technical resource for the cities and the citizens and property owners in the watershed.

Goals

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

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.

Executive Summary (con't)

Goal Area B. Water Quality

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

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.

Goal Area D. Wetlands

- 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 F. 1. Continue current Hennepin County jurisdiction over county ditches in the watershed.

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.

Executive Summary (con't)

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 Hennepin County and Three Rivers Park District have led to successes such as the delisting of Lake Rebecca from the state's list of Impaired Waters.

Rules and Standards. 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; 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.

Monitoring Program. 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 as "Sentinel Lakes," and are monitored every year. Other lakes are monitored on a rotating basis.

Education and Outreach. 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.

TMDL Implementation. 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 special studies actions in this Plan.

Capital Improvement Program. 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 updated implementation plans will focus on holistic, whole-lake ecological management that includes actions to manage

aquatic vegetation and fish communities and internal load in addition to watershed load reductions.

- *Subwatershed Assessments and Studies.* Annually, the Commission will consider completing subwatershed assessments and special studies monitoring that will identify cost-effective practices and projects. One subwatershed that is a priority for assessment is the area tributary to Spurzem Lake, which is tributary to Lake Independence.
- *Capital Projects.* 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. The Commission may 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 watersheds 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.

1.0 Introduction and Purpose

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 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 Joint Powers Agreement governing the WMO is included in Appendix A.

The watershed is located 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. While not amending the plan, on August 22, 2019 the Commission relinquished its WCA LGU authority to the respective cities.

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

Number	Type	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

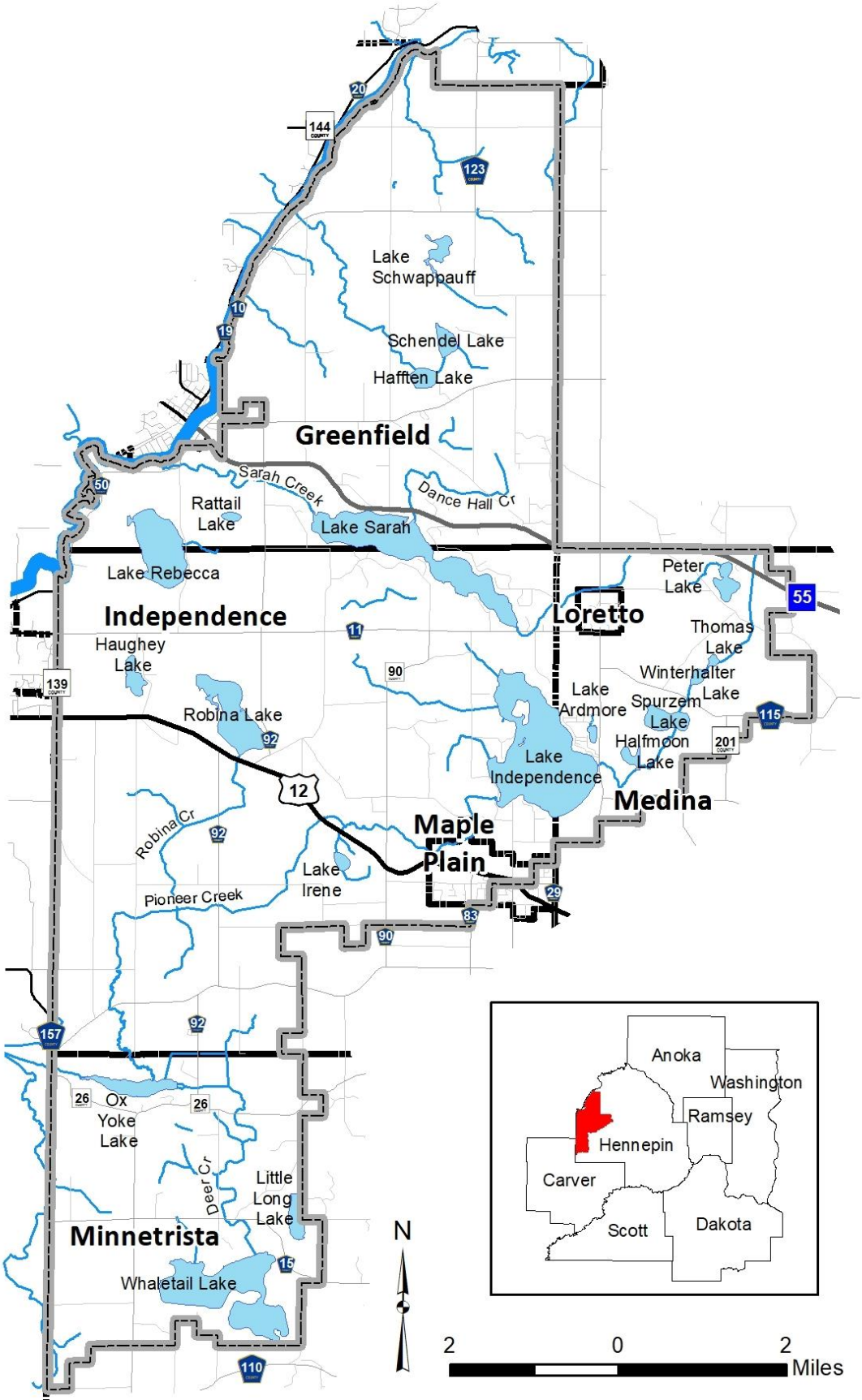

Figure 1.1. The Pioneer-Sarah Creek watershed in Hennepin County, Minnesota.

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 Surface Water 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).

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

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

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.

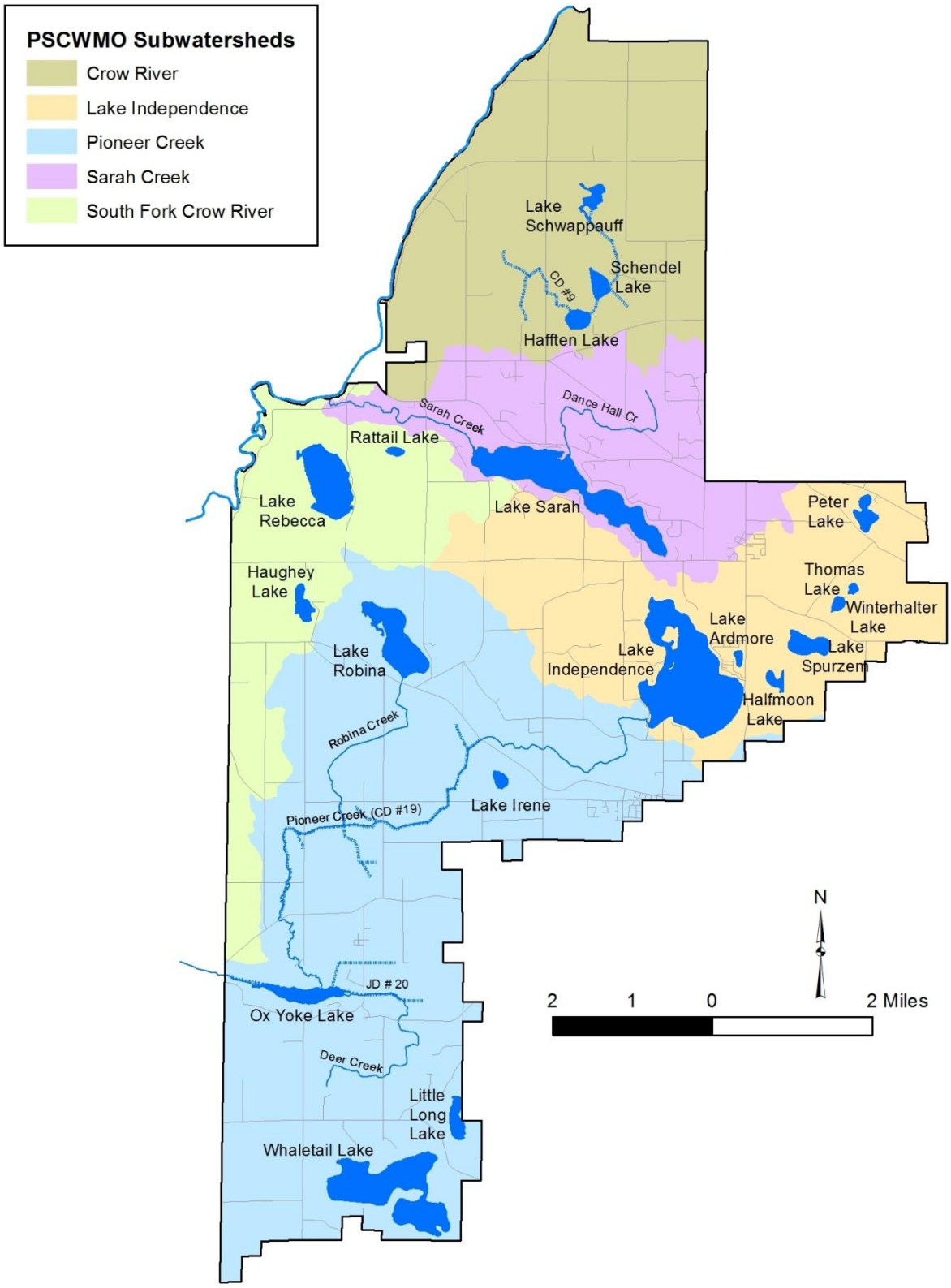

Figure 2.1. Pioneer-Sarah Creek watershed drainage systems.
Source: Minnesota DNR.

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 early March. 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.

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 Minnesota Stormwater Manual.

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.

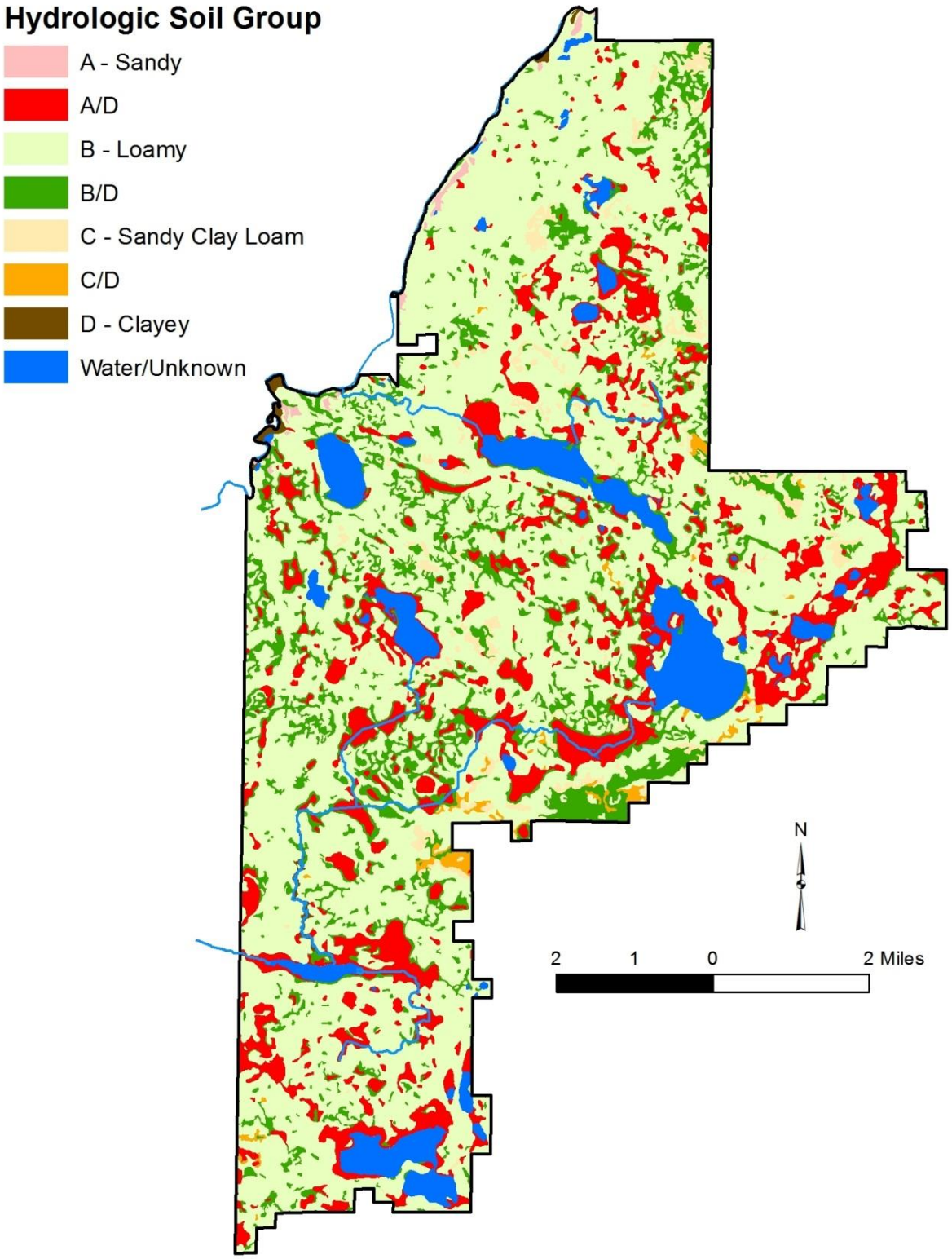

Figure 2.2. Soils by Hydrologic Soil Group classification
Source: USDA NRCS SSURGO.

2.2 WATERSHED BIOLOGICAL ENVIRONMENT

2.2.1 Vegetation

Prior to settlement by Europeans in the mid-19th century, vegetation in the watershed was maple-basswood forest (big woods) with areas of wet prairie. Since then the area has been used for urban uses and agriculture only a few remnants of that vegetation remain, mostly within regional parks. The 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 DNR Lakefinder website to find the latest 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 Department of Natural Resources (DNR) to be infested with Eurasian watermilfoil, an invasive exotic plant species: Independence, Rebecca, Little Long, Sarah, and Whaletail. Three Rivers Park District (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.

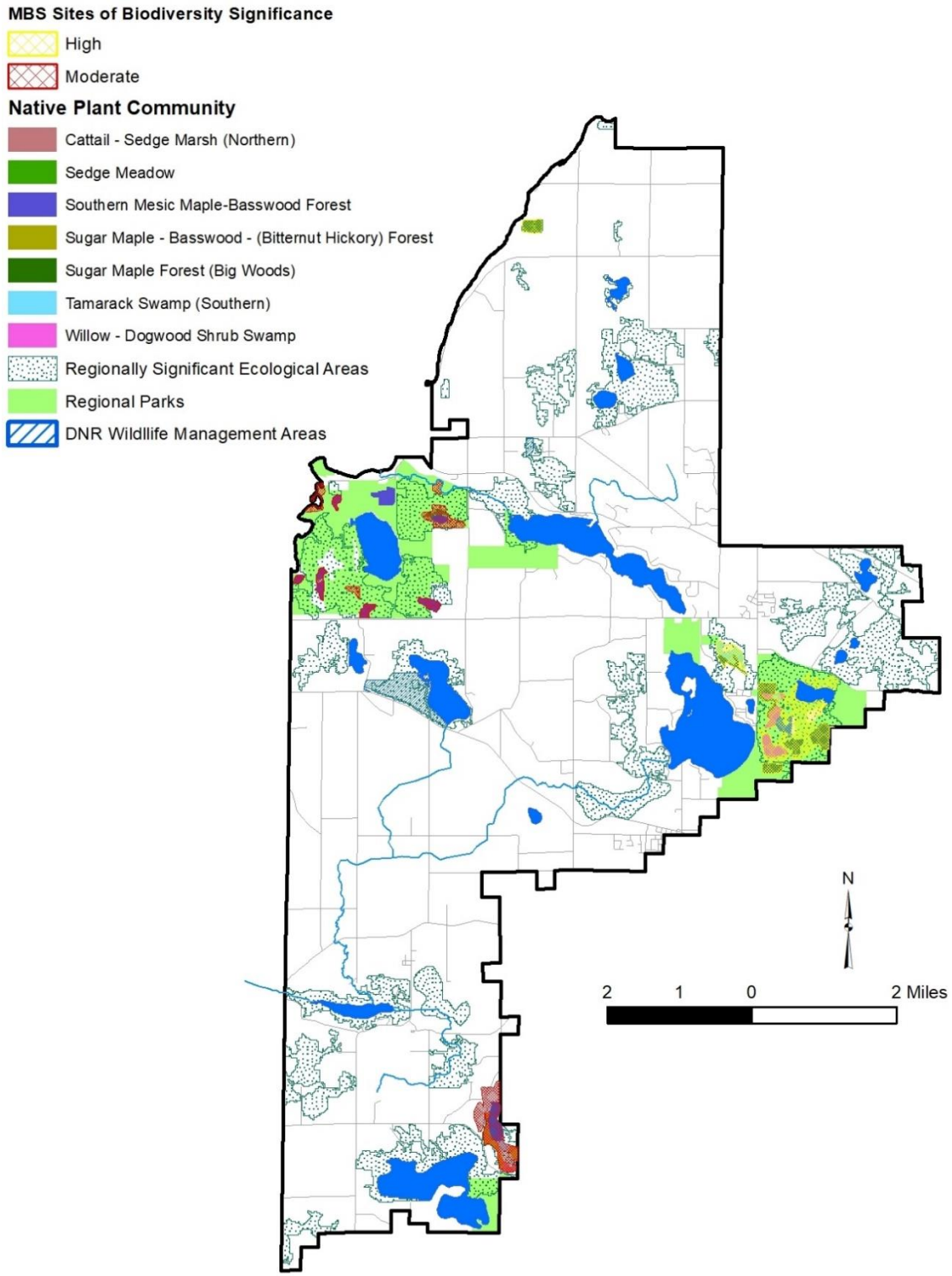

Figure 2.3. Sites of ecological diversity and significance.
Source: Minnesota County Biologic Survey (MCBS), Minnesota DNR.

2.3 WATERSHED HUMAN ENVIRONMENT

Native Americans of the Woodland Period 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.

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

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%

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 Three Rivers Park District 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 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.

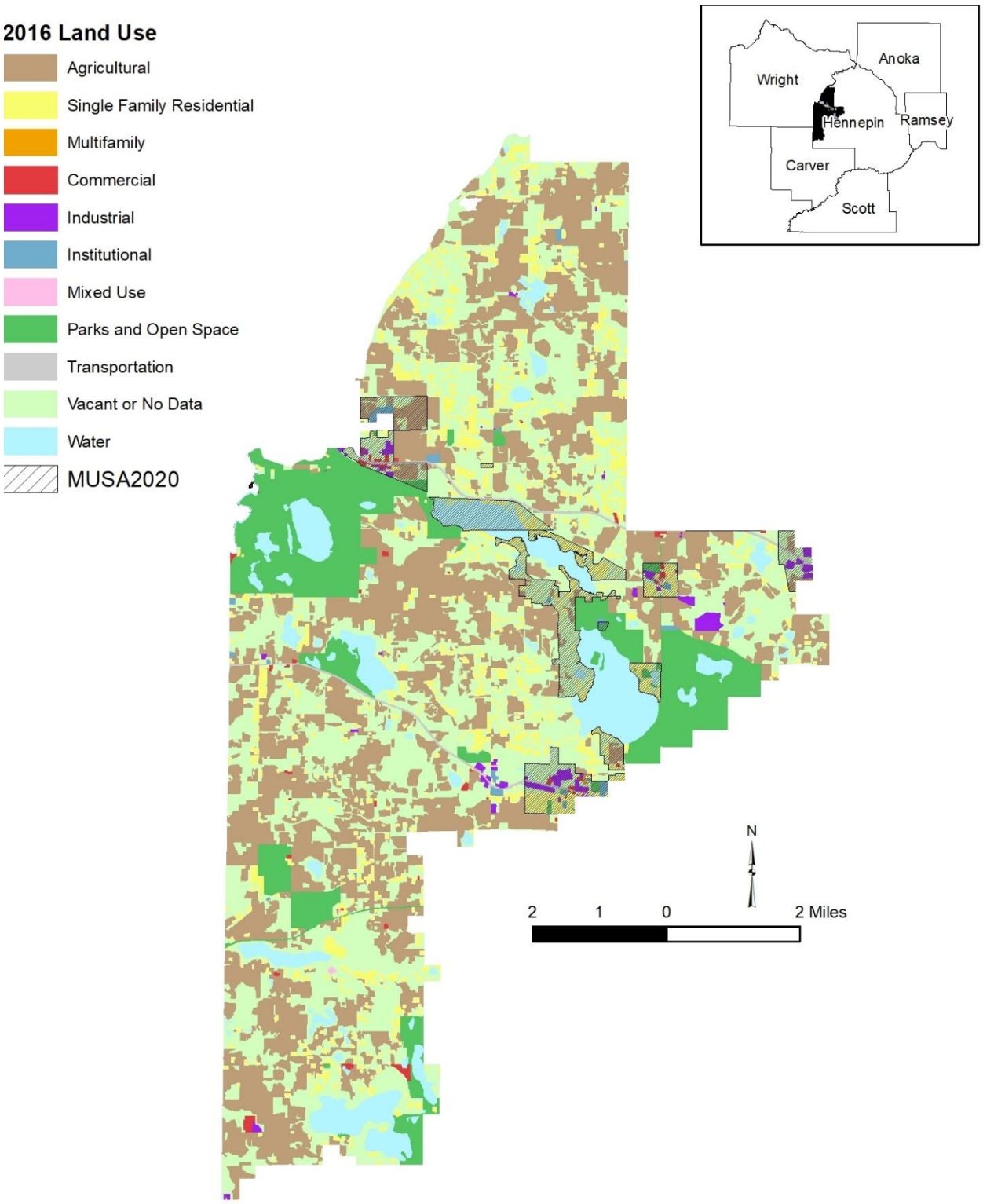

Figure 2.4. 2010 land use in the Pioneer-Sarah Creek watershed.
Source: Metropolitan Council.

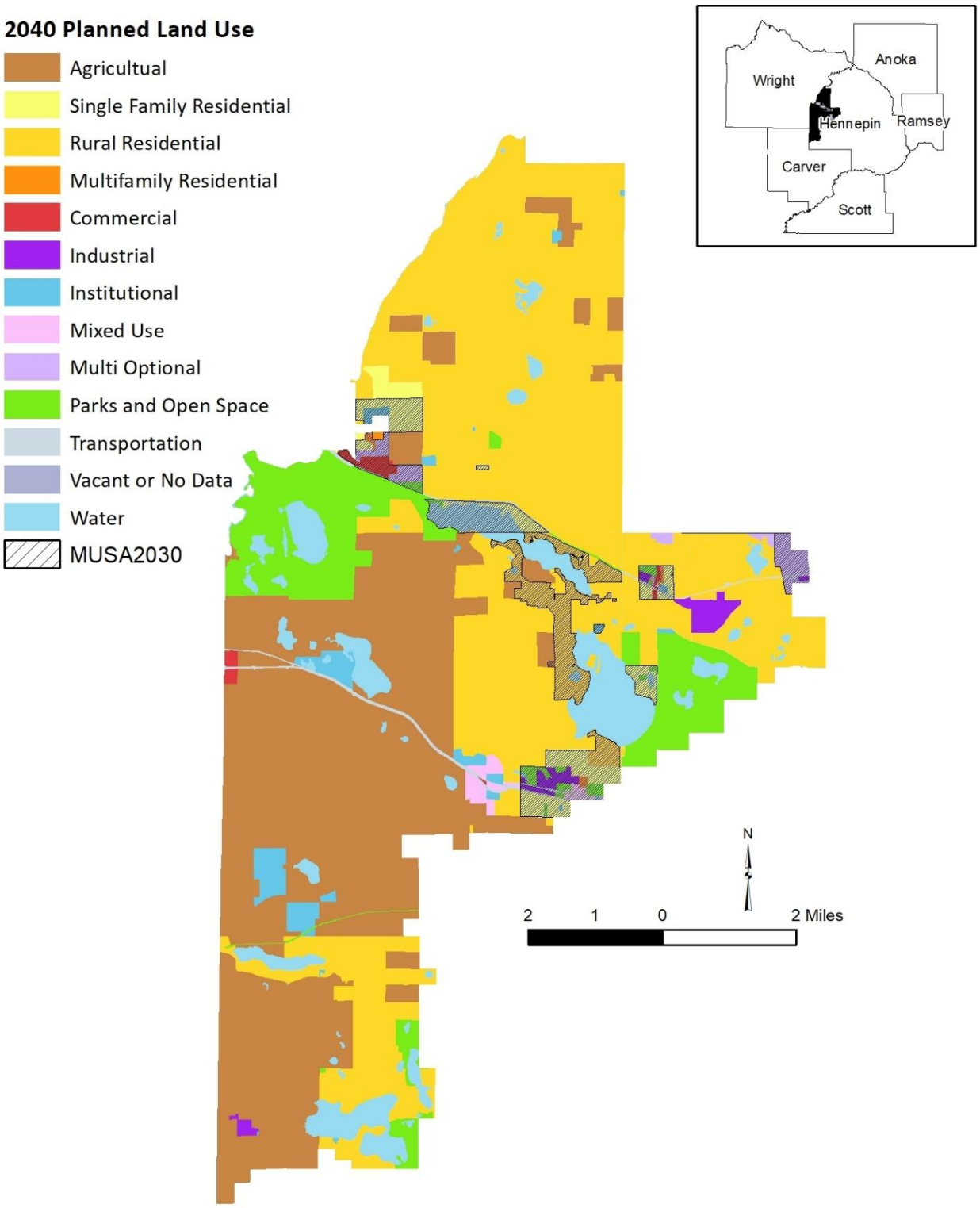

Figure 2.5. Planned 2020 land use in the Pioneer-Sarah Creek watershed.
Source: Metropolitan Council.

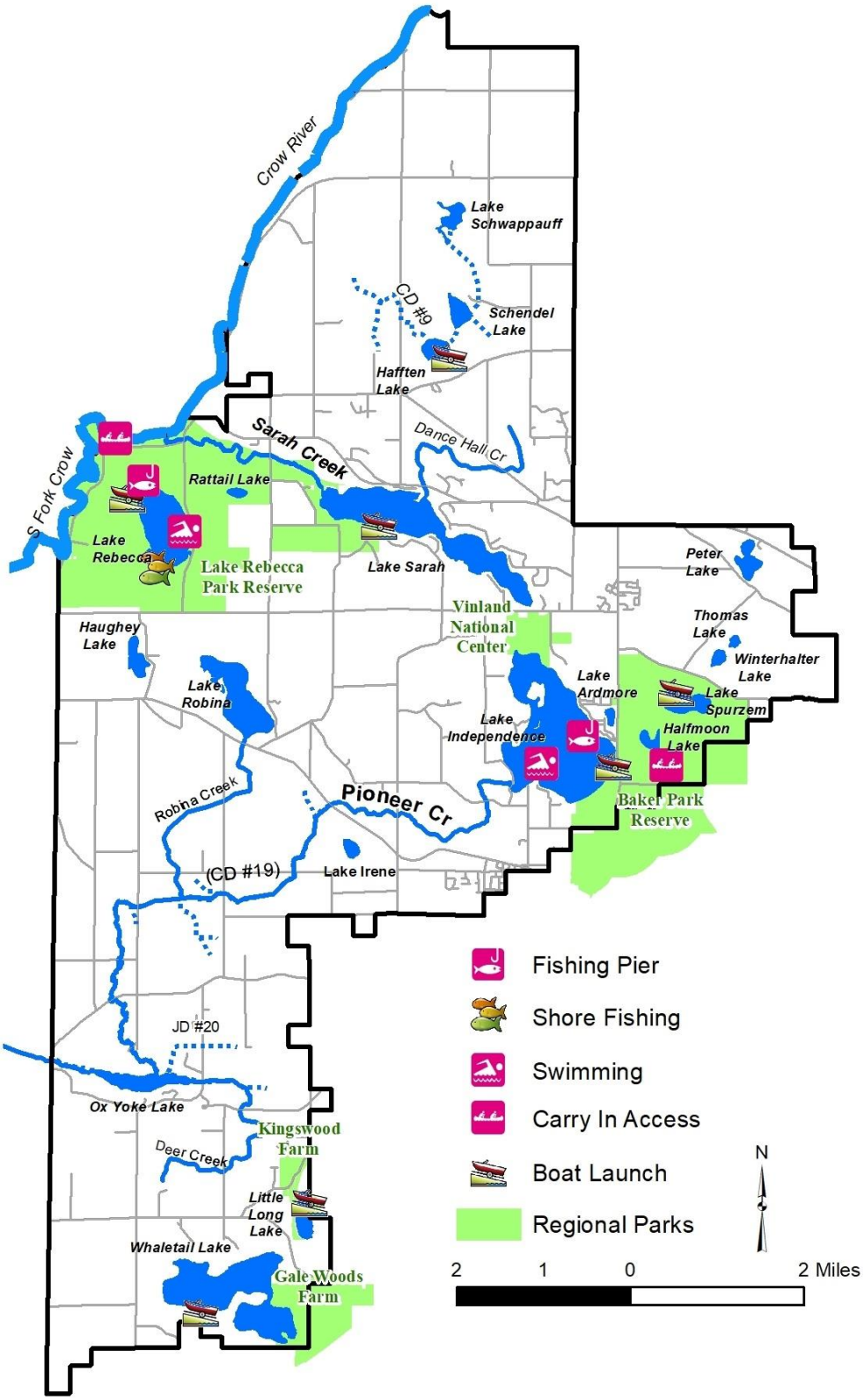

Figure 2.6. Water-based recreation in the Pioneer-Sarah Creek watershed.
Source: Minnesota DNR.

2.4 WATERSHED WATER RESOURCES

2.4.1 Lakes

There are nineteen lakes in the watershed. Thomas and Robina Lakes are classified as a wetland. 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: http://www.dnr.state.mn.us/lakefind/index.html.

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

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

Lake	DNR ID#	Surface Area (ac)	Max Depth (ft)	Depth Class	DNR Class	Summer Average			Years of Data
						TP (µg/L)	Chl-a (µg/L)	SD (m)	
Lake Ardmore	27-0153-00	13	20	Shallow	RD	263	78	0.5	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 South Whaletail	27-0184-01 27-0184-02	498	22	Shallow/ Deep	RD	65 55	27 26	0.83 1.3	10 9
Winterhalter Lake	27-0148-00	13	27	Deep	NE	N/A	N/A	N/A	0

Sources: Minnesota DNR, MPCA EQuIS.
NE = Natural Environment; RD = Recreational Development (Shoreland Management Classification)

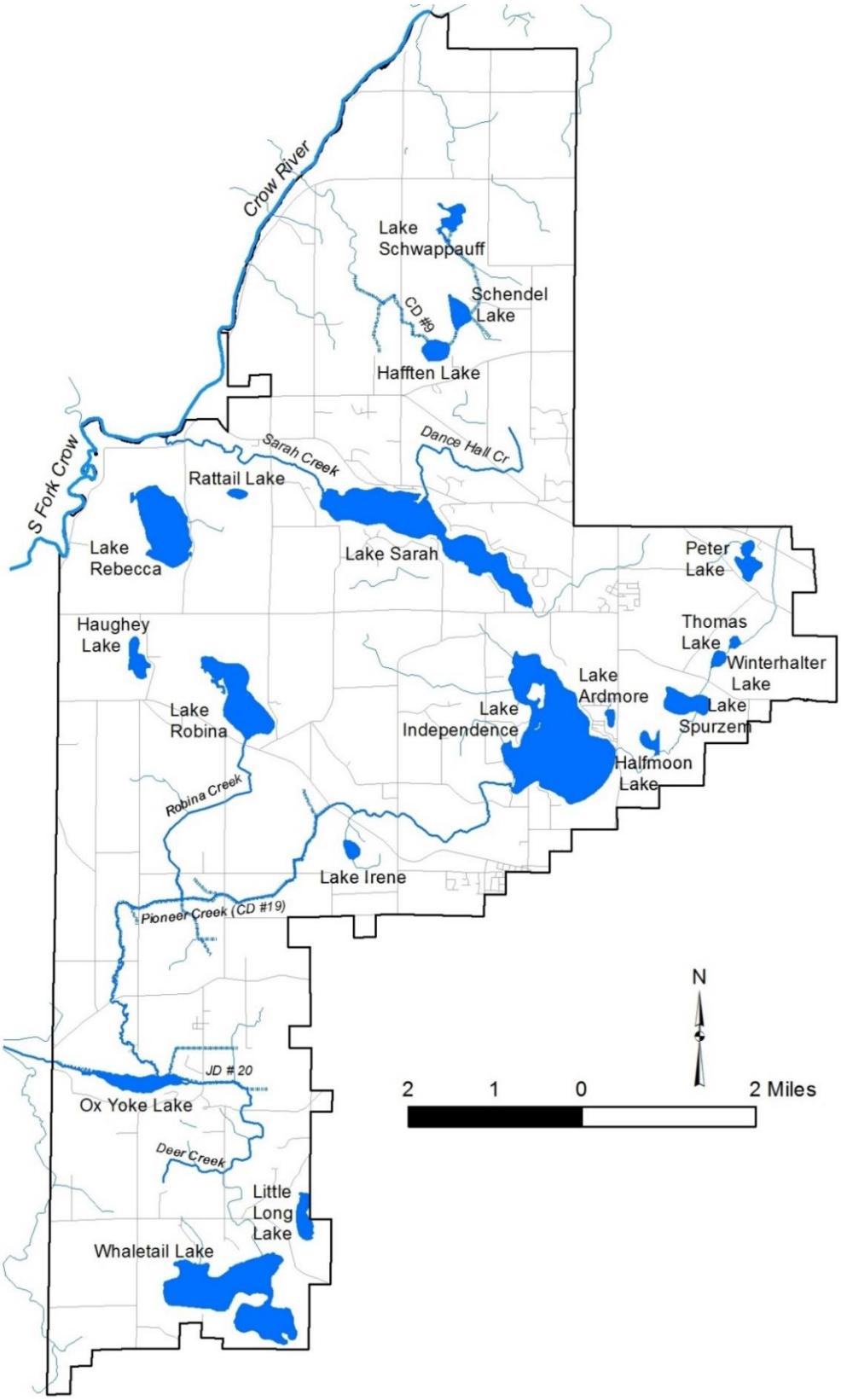

Figure 2.7. Major lakes and streams in the Pioneer-Sarah Creek watershed.
Source: Minnesota DNR, except ditches from Hennepin County.

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.

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

Lake	DNR Lake #	Affected Use	Pollutant	TMDL Approved
Lake Sarah-East Lake Sarah-West	27-0191-01 27-0191-02	Aquatic consumption Aquatic recreation Aquatic life	Mercury FT[1] Nutrients FishBio[1]	2007 2011 Not started
Lake Rebecca	27-0192-00	Aquatic consumption Aquatic recreation	Mercury FT Nutrients	2008 Delisted 2018
Lake Independence	27-0175-00	Aquatic consumption Aquatic recreation	Mercury FT Nutrients	2007 2007
North Whaletail	27-0184-01	Aquatic consumption Aquatic recreation	Mercury FT Nutrients	2013 2017
South Whaletail	27-0184-02	Aquatic consumption Aquatic recreation	Mercury FT Nutrients	2013 2017
Spurzem Lake	27-0149-00	Aquatic consumption Aquatic recreation	Mercury FT Nutrients	2007 2017
Half Moon Lake	27-0152-00	Aquatic consumption Aquatic recreation	Mercury FT Nutrients	2013 2017
Hafften Lake	27-0199-00	Aquatic consumption Aquatic recreation	Mercury FT Nutrients	Target 2025 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

[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 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.

Table 2.6. Stream characteristics in the Pioneer-Sarah Creek watershed.

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 Minnesota Pollution Control Agency (MPCA) and Environmental Protection Agency (EPA) as Impaired Waters, and are listed on the state's draft 2014 303(d) 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.

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

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

*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.

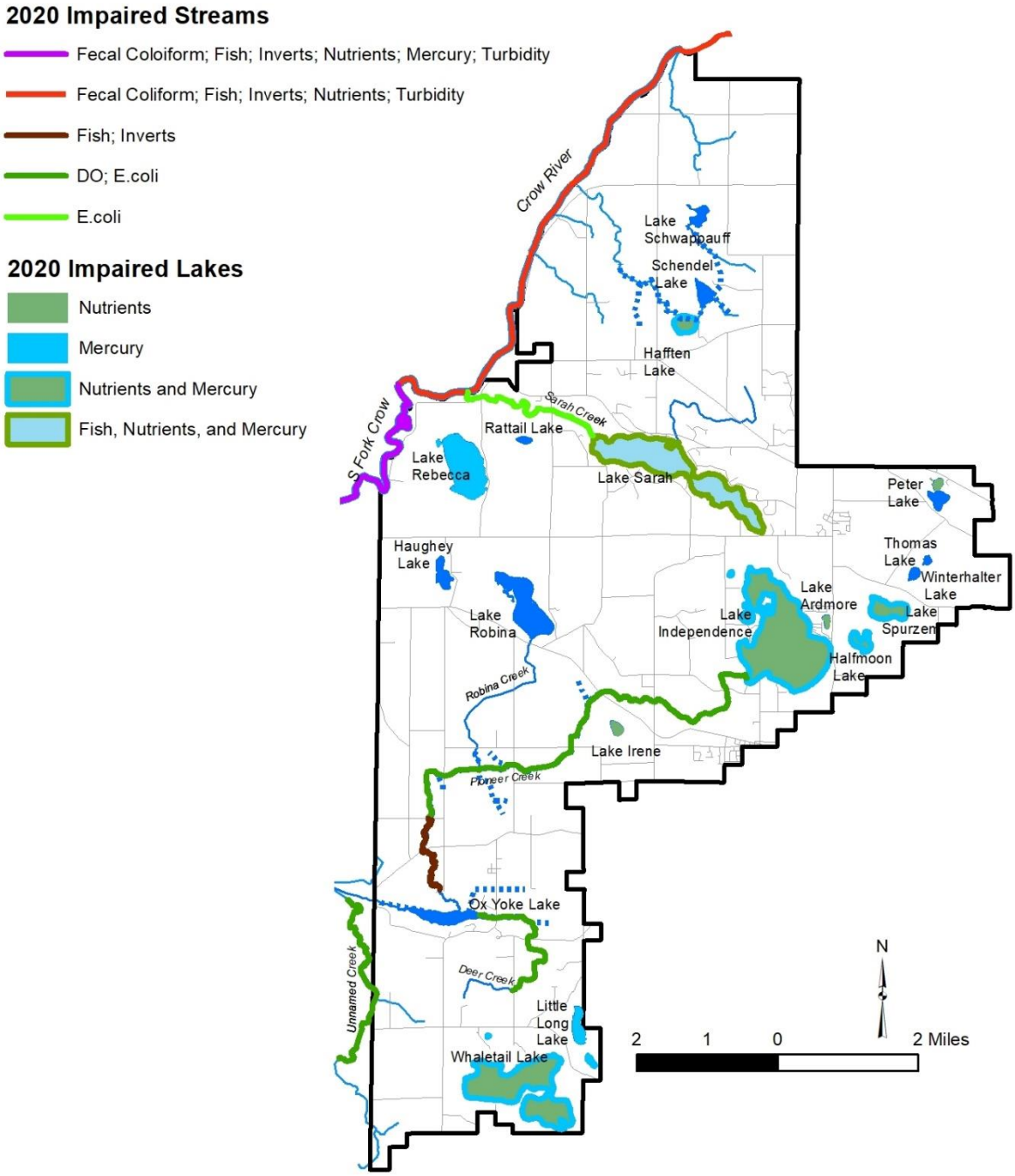

Figure 2.8. 2020 impaired lakes and streams.
Source: Minnesota Pollution Control Agency.

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 replacement 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.

Table 2.8. NWI wetland area by type in the Pioneer-Sarah Creek watershed.

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.

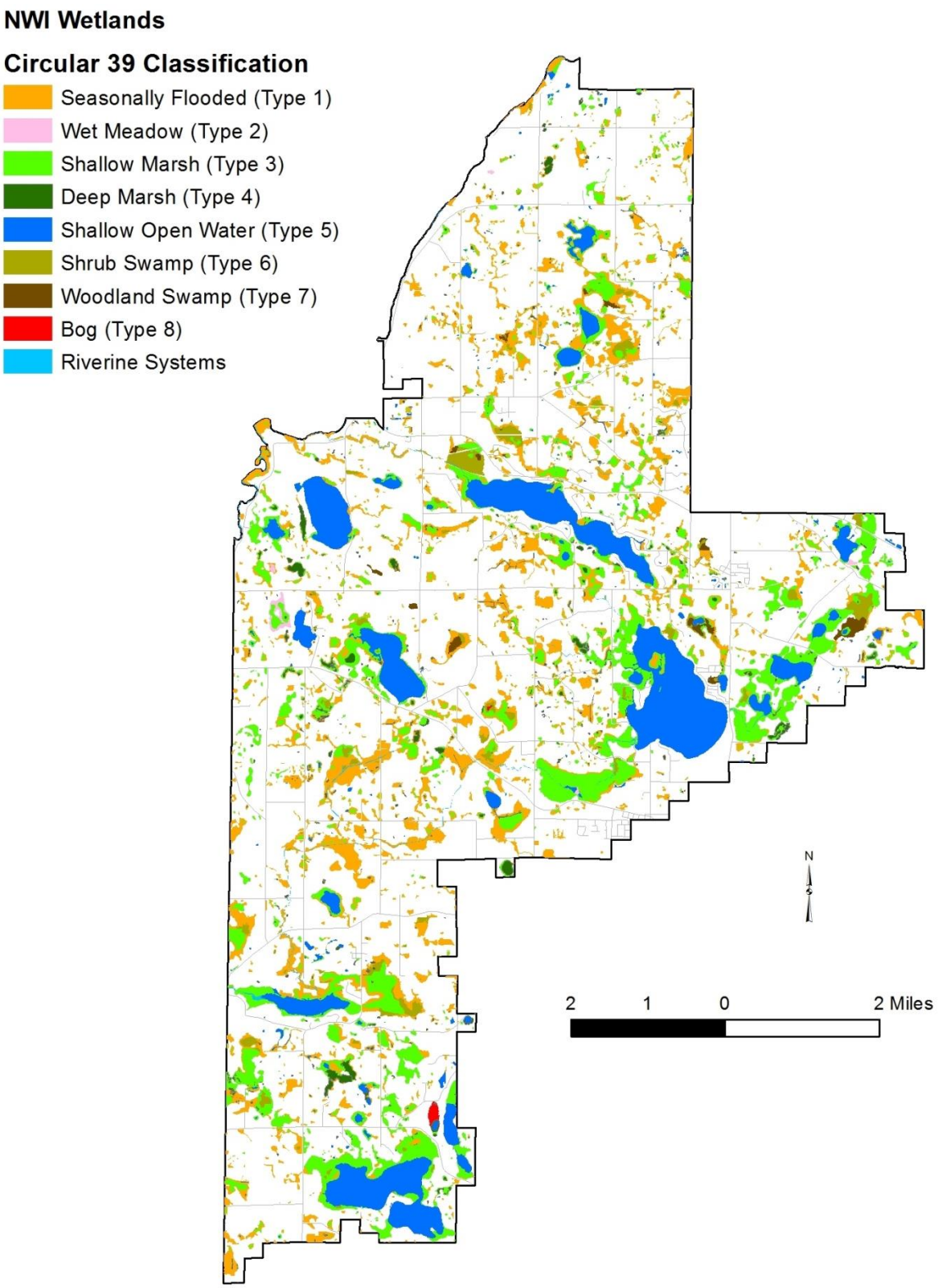

Figure 2.9. National Wetlands Inventory wetlands in the Pioneer-Sarah Creek watershed.
Source: Minnesota DNR, 2013 NWI Update East-Central Minnesota.

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 and altered watercourses designated by the DNR commissioner as trout streams. Work within waterbodies designated on the PWI 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, and at the Hennepin County Office of Environmental Services.

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 area near wetlands and lakes are moderately susceptible to contamination due to the proximity to the water table.

The 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 in the Third Generation Plan.

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 WMO) 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 Joint Powers Agreement 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 Joint Powers Agreement 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 Joint Powers Agreement 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 BMPs in routine street reconstruction projects.

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.

County. 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 best management practices; and managing public accesses to water resources. The County also participates in the education and outreach programming coordinated by the West Metro Water Alliance (WMWA) consortium of watershed management organizations in west Hennepin 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. Three Rivers Park District (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. The MPCA operates several programs applicable to watershed planning. The MPCA monitors water quality, sets standards, and implements various controls. Of interest are the National Pollutant Discharge Elimination System (NPDES) program and

implementation of the Clean Water Act. The MPCA manages the NPDES Phase I construction and industrial stormwater discharge permitting. MPCA also manages the NPDES Phases I and II permitting for municipal separate storm sewer systems (MS4s). Hennepin County and Mn/DOT 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 Environmental Protection Agency (EPA) and MPCA require managers of water resources that fail to meet these established standards to prepare a Total Maximum Daily Load (TMDL) study identifying the source of the pollutant and a plan for bringing the water resource into compliance.

The Pioneer-Sarah Creek Commission worked closely with the MPCA and received funding from that agency to complete TMDLs and Implementation Plans on Lake Independence and Lake Sarah, as well as the Watershed Restoration and Protection Strategy (WRAPS) study for several lake and stream impairments in the watershed.

Board of Water and Soil Resources. 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 Wetland Conservation Act (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. 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. 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 SC WMC. 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:

- 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 http://www.dnr.state.mn.us/lakefind/index.html is LakeFinder, a DNR supported tool that combines information from various DNR Divisions, as well as other state agencies, such as Minnesota Pollution Control Agency (water quality) and Minnesota Department of Health (fish consumption). This tool contains data for more than 4,500 lakes and rivers throughout Minnesota.

The DNR also provides a variety of specialized programs oriented to property owners or neighborhood groups, such as the Aquatic Plant Management, Urban Fisheries and Fishing in the Neighborhood, Neighborhood Wilds, and Metro Greenways programs.

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 Best Management Practices (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 Three Rivers Park District, Hennepin County Department of Environmental Services 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 - www. pioneersarahcreek.org - 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 the Hennepin County Environment and Energy's (HCEE) 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 Three Rivers Park District 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 Three Rivers Park District 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 Three Rivers and by volunteers through the Citizen Assisted Monitoring program (CAMP.)

Biologic Monitoring. High school volunteers coordinated by Hennepin County Environment and Energy (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 Local Government Unit (LGU) for Wetland Conservation Act (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 Best Management Practices (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.

Table 3.1. Project reviews, 2015 - 2019.

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

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.

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 Capital Improvement Program (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 ag and other Best Management Practices (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 cities 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 on agricultural sites.
- In 2018, the Board of Water and Soil Resources (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 in the right direction.

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

Lake	SD Change*	TP Change*
Lake Ardmore	N/C	+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%

*Note: a positive Secchi Depth change is an improvement, while a negative TP change is an improvement.

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 Hennepin County, Three Rivers Park District, 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, 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 as commissioner on a rotating basis. Just when the Commissioner feels like they are up to speed on the various complicated issues, 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 Pioneer-Sarah Creek 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 Hennepin County Environmental Services 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 Hennepin County, 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. *Hennepin County 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 Hennepin County, 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 Hennepin County 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 Hennepin County 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 Hennepin County 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 Hennepin County and Three Rivers Park District:

- 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.

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

#	Problem or Issue	Actions in 3rd Generation Plan	Completed 2014 - 2020
Funding 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.
Information, 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 Hennepin County rural conservationists on outreach.

#	Problem or Issue	Actions in 3rd 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 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 3rd Gen plan. However, the monitoring data and lake report cards available on the Commission's website are several 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 Hennepin County 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 3rd Generation Plan	Completed 2014 - 2020
4.4	Recent years have seen changes in frequency, intensity, and duration of storm events.	The Commission will continue to monitor information about climate change impacts and make adjustments to policies and actions as necessary.	The Rules and Standards for Development and Redevelopment adopted in the Third Generation Plan incorporated the most recent 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.

Table 4.1. Problems and issues identification.

#	Problem or Issue	Discussion
Impaired 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 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 Hennepin County 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.
1.5	Lack of a directed framework to guide progress – no commonality of goals, approach, or sense of team effort between the stakeholders.	Cities don’t participate in TAC meetings since most of their staff is contracted and they haven’t seen the value. Without participation, projects aren’t identified / implemented, and the cities don’t understand the Commission’s role and priorities.

#	Problem or Issue	Discussion
1.6	BMP implementation is highly reliant on partnering with willing landowners	Opportunity to partner with Hennepin County to leverage 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 pollutant load reductions, manage lakes and streams holistically for a healthy aquatic ecosystem.	Develop lake management plans that systematically address internal load and fish and aquatic vegetation community management as well as watershed load reductions.
Agricultural 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.	Focus efforts on "hot spots," or potential high-loading areas and act fast when opportunities arise. There is a need to build trust and momentum with landowner's in the watershed.
2.2	There is an opportunity to work more in partnership with Hennepin County to prioritize and incentivize conservation projects.	Focus on implementing cost-effective structural practices and increasing adoption of management practices such as soil health and cover crops.
2.3	Investigate and grow public-private partnerships to leverage resources and expertise.	Specifically, where there is common benefit, i.e. for private organizations to substantiate sustainability initiatives and for the Commission and its partners to implement conservation.
General 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.	There is a desire to work more with students and the schools.
3. 2	Need for ongoing commissioners and council member education so they can pass along that knowledge to the public.	Continue to work with education and outreach partners and seek out additional opportunities.
3.3	Little private landowner outreach and engagement except for the lake associations.	This is an opportunity to partner with Hennepin County on targeted outreach and management.
Effective Operations		
4.1	Operating budget constraints affect the outreach and engagement staff can perform.	Reinforces the need to establish and build on partnerships
4.2	There is a need for ongoing, continuous Commissioner education and development so they can effectively serve as Commissioners.	There is a steep learning curve for new 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, member city staff, and CAC, the following issues have been identified as of 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. Meet state water quality standards in Spurzem, Half Moon, and Ardmore Lakes.
    c. Achieve a 10% reduction in TP concentration in Lake Independence over the previous ten years.
2. Work in a coordinated way with Hennepin County, Three Rivers Park District, cities, lake associations, urban and rural property owners, and public and private entities, 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.
4. Serve as an informational and technical resource for the cities and the citizens and property owners in the watershed.

4.2 THIRD 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. Member cities supplement and complement these actions with additional policies and programs tailored to their unique priorities and needs. The philosophy of the Joint Powers Agreement 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. A second responsibility is promoting groundwater recharge, which impacts stream baseflow and lake levels, and maintaining adequate hydrology to wetlands.

The Fourth Generation management goals for water quantity are focused on maintaining the current flood profiles of the creeks and tributaries.

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. 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.
c. The Commission encourages the use of Low Impact Design techniques to reduce runoff rates and volumes, erosion and sedimentation, and pollutant loading.
d. 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.

Floodplain Actions:

d. 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.
e. 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.
f. 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. Achieve delisting of South Whaletail Lake and meet state standards in Spurzem, Half Moon, and Ardmore Lakes, making progress towards their removal from the list of Impaired Waters.

Goal B.2 Improve water clarity in the impaired lakes by 10% over the average of the previous ten years by 2030.

Goal B.3. Maintain or improve water quality in the lakes and streams with no identified impairments.

Goal B.4. Conduct a TMDL/WRAPS progress review every five years.

Goal B.5. 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.
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 shall 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.

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 administer WCA themselves. The Commission requires submittal of a functions and values assessment using the latest version of MnRAM whenever 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 development 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.
e. 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 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 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 Third 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.

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.

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.

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, Hennepin County, the Three Rivers Park District, public and private entities, and individual property owners to maximize the cost-effectiveness of implementation activities.

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.

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 Three Rivers Park District under contract to the Commission. This Plan assumes that Three Rivers will continue its annual monitoring on Lake Rebecca and other lakes as they require.
- Continuation of the partnership with Hennepin County Environment and Energy 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 Three Rivers Park District 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 Hennepin County.
- 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 Hennepin County 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 Hennepin County and Three Rivers Park District 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 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 Capital Improvement Program (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 $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 Joint Powers Agreement 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 Capital Improvement Program (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 Hennepin 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 self-assessment will become part of the Commission's Annual Report.

Table 4.2. Conceptual self-assessment matrix.

Goal	Actions Taken this Past Year	Actions Taken to Date	Additional Actions to Achieve Goal	Schedule, Responsible Party(ies), Cost and Funding
Goal 1	*To be completed annually*	*To be completed annually*	*To be completed annually*	*To be completed annually*
Goal 2	*To be completed annually*	*To be completed annually*	*To be completed annually*	*To be completed annually*
…	…	…	…	…

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 this Plan addressing the identified problems and issues.

#	Problem or Issue	Actions in the 4th Generation Plan
Impaired 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.
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 as carp barriers completed or included in this plan.
1.3	The stream TMDLs suggest that manure management practices and SSTS issues may be contributing to the bacteria impairments on the streams.	The CIP includes funding for opportunistic manure management and other cost-share practices throughout the watershed.
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.	Hennepin County 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.
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. Hennepin County is actively reaching out to property owners to determine interest.

#	Problem or Issue	Actions in the 4th Generation Plan
2.2	There is an opportunity to work more in partnership with Hennepin County 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.
General 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 Hennepin County to reach out to various stakeholders.
3. 2	Need for ongoing commissioners and council member education so they can pass along that knowledge to the public.	Hennepin County 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.	Hennepin County 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 Hennepin County 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.	Hennepin County staff have developed a program of ongoing Commissioner education. The Commission will continue to participate in Project NEMO training as available.

Table 4.4. Pioneer-Sarah Creek Fourth Generation Plan Implementation Plan.

Action	Priority	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Expenses:												
OPERATING EXPENSES												
Engineering/consulting												
Administrative expense												
Administrative -project reviews												
WCA- administrative /legal expenses												
Administrative -tech support												
Legal expense												
Audit expense												
Insurance												
PROGRAM DELIVERABLES AND EDUCATION												
Administrative-general programs												
Technical Advisory Committee												
Lake monitoring - contracted												
Lake monitoring - CAMP												
Stream monitoring – routine												
Stream monitoring -other												
Management Plan Amendment												
Education program												
Education-events												
Grant writing												
Invertebrate monitoring												
Website												
MISCELLANEOUS												
Contingency - Other												
Contribution to Next Gen Plan												
Subw Assessments/CIP Cost Share												
TOTAL OPERATING EXPENSE												
Revenues:												
Member Dues (max 2% increase)												
Project Review Fees												
WCA Administrative Fees												
Interest & Dividends												
(To) from Reserve												
TOTAL OPERATING REVENUE												
Dues Per Capita (Based on 2010 est. pop.)												
Dues per $100,000 2013 Market Value												

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

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 water management plans adopted by member cities pursuant to Minnesota Statutes, Section 103B.235 shall be consistent with the Third 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 water management 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 water 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 water 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 Capital Improvements Program (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 the Board of Water and Soil Resources (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.
2. When a capital project is included in the approved Capital Improvement Program 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.

5.0 References

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Pioneer-Sara Creek WMO. Annual. Annual Activity Reports. http://www.pioneersarahcreek.org/annual-reports.html

USDA NRCS. 2014. Soil Survey Geographic (SSURGO) Data Base. http://www.lib.ncsu.edu/gis/nrcs.html

Appendix A
Joint Powers Agreement

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Appendix B
Water Quality Trends

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Lakes

Attach TRPD lake report cards

Streams

Attach TRPD stream report cards

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Appendix C
Rules and Standards

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Pioneer-Sarah Creek
Watershed Management Commission

Rules and Standards

Adopted: March 4, 2015

Effective: June 1, 2015

PIONEER-SARAH CREEK
WATERSHED MANAGEMENT COMMISSION
RULES AND STANDARDS

POLICY STATEMENT

The Pioneer-Sarah Creek Watershed Management Commission is a Joint Powers Association of the State under the Minnesota Watershed Act, and a watershed management organization as defined in the Metropolitan Surface Water Management Act. These acts provide the Commission with power to accomplish its statutory purpose: the conservation, protection, and management of water resources in the boundaries of the watershed through sound scientific principles. The Commission has adopted a water resources management plan pursuant to the Acts. These Rules implement the plan's principles and objectives.

Land alteration and utilization can affect the rate and volume and degrade the quality of surface water runoff. Sedimentation from ongoing erosion and construction activities can reduce hydraulic capacity of waterbodies and degrade water quality. Water quality problems already exist in many waterbodies in the watershed. Most of these waterbodies have been designated by the State of Minnesota as Impaired Waters, and do not meet state water quality standards.

Activities that increase the rate or volume of stormwater runoff will aggravate existing flooding problems and contribute to new ones. Activities that degrade runoff quality will cause quality problems in receiving water. Activities that fill floodplain or wetland areas will reduce flood storage and hydraulic capacity of waterbodies, and will degrade water quality by eliminating the filtering capacity of such areas.

These Rules and Standards protect the public health, welfare, and natural resources of the watershed by regulating the alteration of land and waters in the watershed to 1) reduce the severity and frequency of high water, 2) preserve floodplain and wetland storage capacity, 3) improve the chemical and physical quality of surface waters, 4) reduce sedimentation, 5) preserve the hydraulic and navigational capacities of waterbodies, 6) promote and preserve natural infiltration areas, and 7) preserve natural shoreline features. In addition to protecting natural resources, these Rules and Standards are intended to minimize future public expenditures on problems caused by land and water alterations.

RELATIONSHIP WITH MUNICIPALITIES AND COUNTY

The Commission recognizes that the control and determination of appropriate land use is the responsibility of the municipalities. The Commission will review projects involving land-disturbing activities in accordance with these Rules and Standards. The Commission intends to be active in the regulatory process to ensure that water resources are managed in accordance with its goals and policies.

The Commission desires to provide technical advice to the municipalities in the preparation of local stormwater management plans and the review of projects that may affect water resources prior to investment of significant public or private funds.

RULE A. DEFINITIONS

For the purposes of these Rules, unless the context otherwise requires, the following words and terms shall have the meanings set forth below. References in these Rules to specific sections of the Minnesota Statutes or Rules include amendments, revisions or recodifications of such sections. The words "shall" and "must" are mandatory; the word "may" is permissive.

100 Year Event. The rainfall depth with a 1 percent chance of occurring in a given year.

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

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

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

Applicant. Any person or political subdivision that submits an application to the Commission for a project review under these Rules.

Best Management Practices (BMPs). Techniques proven to be effective in controlling runoff, erosion and sedimentation including those documented in the Minnesota Construction Site Erosion and Sediment Control Planning Handbook (BWSR 1988), Protecting Water Quality in Urban Areas (MPCA 2000), and the Minnesota Stormwater Manual (MPCA 2005) as revised.

Biofiltration. Using living material to capture and/or biologically degrade or process pollutants prior to discharging stormwater, such as directing runoff through a vegetated buffer or to a rain garden or vegetated basin with an underdrain.

Bioretention. A terrestrial-based (upland, as opposed to wetland) water quality and water quantity control process. Bioretention employs a simplistic, site-integrated design that provides opportunity for runoff infiltration, filtration, storage and water uptake by vegetation.

Buffer Strip. An area of natural, unmaintained, vegetated ground cover abutting or surrounding a watercourse or wetland.

BWSR. The Minnesota Board of Water and Soil Resources.

Commission. The Pioneer-Sarah Creek Watershed Management Commission.

Commissioners. The Board of Commissioners of the Pioneer-Sarah Creek Watershed Management Commission.

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

County. Hennepin County, Minnesota.

Dead Storage. The permanent pool volume of a water basin or the volume below the runout elevation of a water basin.

Detention Basin. Any natural or manmade depression for the temporary storage of runoff.

Development. Any proposal to subdivide land, any land-disturbing activity or creation of impervious surface.

Directly Connected Impervious Surface. Any hard surface (rooftop, driveway, sidewalk, roadway, etc.) from which runoff is not subject to loss beyond initial abstraction before being routed to the downstream collection and conveyance system.

Disturbance. See Land Disturbing Activity.

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

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

Erosion and Sediment Control Plan. A plan of BMPs or equivalent measures designed to control runoff and erosion and to retain or control sediment on land during the period of land disturbing activities in accordance with the standards set forth in these Rules.

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

Fill. The deposit of soil or other material by artificial means.

Filtration. A process by which stormwater runoff is captured, temporarily stored, and routed through a filter bed to improve water quality and slow down stormwater runoff.

Floodplain. The area adjacent to a waterbody that is inundated during a 1% chance (100-year) flood, as defined by the FEMA Flood Insurance Study for the member City.

Impaired Water. A waterbody that does not meet state water quality standards and that has been included on the MPCA Section 303(d) list of Impaired Waters of the state.

Impervious Surface. A surface compacted or covered with material so as to be highly resistant to infiltration by runoff. Impervious surface shall include roads, driveways and parking areas, whether or not paved, sidewalks greater than 3 feet wide, patios, tennis and basketball courts, swimming pools, covered decks and other structures. Open decks with joints at least ¼ inch wide, areas beneath overhangs less than 2 feet wide, and sidewalks 3 feet or less wide shall not constitute impervious surfaces under these Rules.

Infiltration. The passage of water into the ground through the soil.

Infiltration Area. Natural or constructed depression located in permeable soils that capture, store and infiltrate the volume of stormwater runoff associated with a particular design event.

Interested Party. A person or political subdivision with an interest in the pending subject matter.

Land Disturbing Activity. Any change of the land surface to include removing vegetative cover, excavation, fill, grading, and the construction of any structure that may cause or contribute to erosion or the movement of sediment into waterbodies. The use of land for agricultural activities, or improvements such as mill an overlay or concrete rehabilitation projects that do not disturb the underlying soil, shall not constitute a land disturbing activity under these Rules.

Landlocked Basin. A basin that is 1 acre or more in size and does not have a natural outlet at or below the 1% chance (100-year) flood elevation as determined by the 1% chance (100-year), 10-day runoff event.

Low Floor. The finished surface of the lowest floor of a structure.

Member City. Any city wholly or partly within the Commission's boundary that has executed the Joint Powers Agreement.

MnDOT. The Minnesota Department of Transportation.

MPCA. The Minnesota Pollution Control Agency.

Municipality. Any city wholly or partly within the Commission's boundary.

NPDES. National Pollutant Discharge Elimination System.

NURP. The Nationwide Urban Runoff Program developed by the Environmental Protection Agency to study stormwater runoff from urban development.

Ordinary High Water Level (OHW). The elevation delineating the highest water level which has been maintained for a sufficient period of time to leave evidence upon the landscape,

commonly that point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial. For watercourses, the OHW level is the elevation of the top of the bank of the channel. If an OHW has been established for a waterbody by the Minnesota Department of Natural Resources, that will constitute the OHW under this definition.

Owner. The owner of a parcel of land or the purchaser under a contract for deed.
Parcel. A parcel of land designated by plat, metes, and bounds, registered land survey, auditor's subdivision, or other accepted means and separated from other parcels or portions by its designation.

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

Political Subdivision. A municipality, county or other political division, agency or subdivision of the state.

Project. A space, parcel, or parcels of real property owned by one or more than one person which is being or is capable of being developed or redeveloped as a single project.

Public Health and General Welfare. Defined in Minnesota Statutes, Section 103D.011, Subdivisions 23 and 24.

Public Waters. Any waters as defined in Minnesota Statutes, Section 103G.005, Subdivision 15.

Public Waters Wetland. Any wetland as defined in Minnesota Statutes, Section 103G.005, Subdivision 15a.

Redevelopment. Any proposal to re-subdivide land, or any land-disturbing activity or addition of impervious surface to a developed site.

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

Sediment. Soil or other surficial material transported by surface water as a product of erosion.

Sedimentation. The process or action of depositing sediment.

Shoreland Protection Zone. Land located within a floodplain or within 1,000 feet of the OHW of a public water or public waters wetland or 300 feet of a public waters watercourse.

Site. A space, parcel, or parcels of real property owned by one or more than one person which is being or is capable of being developed or redeveloped as a single project.

Standard. A required level of quantity, quality, or value.

Stormwater Management Plan. A plan for the permanent management and control of runoff prepared and implemented in accordance with the standards set forth in these Rules.

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

Subdivision or Subdivide. The separation of a parcel of land into two or more parcels.

TMDL. A Total Maximum Daily Load is the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. "TMDL" can also refer to a study that calculates that load, or to the allocation of that allowable load to its various sources. An Implementation Plan may be part of the TMDL study or it may be a separate document that sets forth the steps that will be taken to achieve the TMDL.

Volume Management. The retention and abstraction of a certain volume of stormwater runoff onsite through techniques such as infiltration, evapotranspiration, and capture and reuse.

Water Basin. An enclosed natural depression with definable banks capable of containing water that may be partly filled with public waters.

Waterbody. All water basins, watercourses and wetlands as defined in these Rules.

Watercourse. Any natural or improved stream, river, creek, ditch, channel, culvert, drain, gully, swale, or wash in which waters flow continuously or intermittently in a definite direction.

Water Resources Management Plan. The watershed management plan for the Commission adopted and implemented in accordance with Minnesota Statutes, Section 103B.231.

Watershed. Region draining to a specific watercourse or water basin.

Wetland. Land transitional between terrestrial and aquatic systems as defined in Minnesota Statutes, Section 103G.005, Subdivision 19.

Wetland Conservation Act (WCA). Minnesota Wetland Conservation Act of 1991 as amended.

RULE B. PROCEDURAL REQUIREMENTS

1. **APPLICATION REQUIRED**. Any person or political subdivision undertaking an activity for which a project review is required by these Rules shall first submit to the Commission a project review application, design data, plans, specifications, fees, and such other information and exhibits as may be required by these Rules. Applications shall be signed by the owner, or the owner's authorized agent, except for activities of a political subdivision which may be signed by either the owner or the general contractor. All project review applications must be authorized by the municipality where the proposed project is located.

2. **FORMS**. Project review applications shall be submitted on forms provided by the Commission. Forms are available at the Commission office or Web site.

3. **ACTION BY COMMISSION**. The Commission shall act within 60 days after receipt of a complete application, including all required information, exhibits and fees. If a state or federal law or court order requires a process to occur before the Commission acts on an application, or if an application requires prior approval of a state or federal agency, the deadline for the Commission to act is extended to 60 days after completion of the required process or the required prior approval is granted. The Commission may extend the initial 60-day period by providing written notice of the extension to the applicant. The extension may not exceed 60 days unless approved by the applicant.

4. **SUBMITTAL**. A complete project review application with all required information and exhibits shall be filed with the Commission at least 14 calendar days prior to the scheduled meeting date of the Commission. Late or incomplete submittals will be scheduled to a subsequent meeting date.

5. **CONDITIONS**. A project review may be approved subject to reasonable conditions to assure compliance with these Rules. The conditions may include a requirement that the applicant and owner enter into an agreement with the member city in a form acceptable to the Commission to a) specify responsibility for the construction and future maintenance of approved structures or facilities, b) document other continuing obligations of the applicant or owner, c) grant reasonable access to the proper authorities for inspection, monitoring and enforcement purposes, d) affirm that the Commission or other political subdivisions can require or perform necessary repairs or reconstruction of such structures or facilities, e) require indemnification of the Commission for claims arising from issuance of the approved project review or construction and use of the approved structures or facilities, and f) reimburse the reasonable costs incurred to enforce the agreement. Project reviews and agreements may be filed for record to provide notice of the conditions and continuing obligations.

6. **ISSUANCE OF PROJECT REVIEWS**. The Commission will issue a project review approval only after the applicant has satisfied all requirements of these Rules and paid all required fees.

7. **VALIDITY**. Issuance of a project review approval based on plans, specifications, or other data shall not prevent the Commission from thereafter requiring the correction of errors in the approved plans, specifications and data, or from preventing any activity being carried on thereunder in violation of these Rules.

8. **MODIFICATIONS**. The applicant shall not modify the approved activity or plans and specifications on file with the Commission without the prior approval of the Commission.

9. **INSPECTION AND MONITORING**. With permission of the property owner and under the authority of the member city, the Commission may perform such field inspections and monitoring of the approved activity as the Commission deems necessary to determine compliance with the conditions of the project review and these Rules. Any portion of the activity not in compliance shall be promptly corrected. In applying for a project review, the applicant consents to entry upon the land for field inspections and monitoring, or for performing any work necessary to bring the activity into compliance.

10. **SUSPENSION OR REVOCATION**. The Commission may suspend or revoke a project review approved under these Rules whenever the project review approval is issued in error or on the basis of incorrect information supplied, or in violation of any provision of these Rules, or if the preliminary and final project approvals received from the municipality or county are not consistent with the conditions of the approved project review.

11. **EXPIRATION OF COMMISSION APPROVALS.** An approved project review shall expire and become null and void if the approved activity is not commenced within one year from date of approval, or if the approved activity is suspended or abandoned for a period of one year from the date the activity originally commenced. With the approval of the affected member city, applicants may apply for an extension of that period if the city review process is extended beyond the usual review period. Before an activity delayed for one year or more can recommence, the project approval must be renewed. Any applicant may apply for an extension of time to commence the approved activity under an unexpired project review approval.

    An application for renewal or extension must be in writing, and state the reasons for the renewal or extension. Any plan changes and required fees must be included with the application. There must be no unpaid fees or other outstanding violations of the approval being renewed or extended. An application for extension must be received by the Commission at least 30 days prior to the approval's expiration. The Commission shall consider the application for renewal or extension on the basis of the Rules in effect on the date the application is being considered. The Commission may extend the time for commencing the approved activity for a period not exceeding one year upon finding that

circumstances beyond the control of the applicant have prevented action from being taken.

12. SEVERABILITY. If any provision of these Rules is adjudged unconstitutional or invalid by a court of competent jurisdiction, the remainder of these Rules shall not be affected thereby.

RULE C. GENERAL STANDARDS

1. POLICY. It is the policy of the Commission to protect the water resources of the watershed by requiring that all activities within the watershed comply with minimum standards for the protection of water quality and the environment.

2. REGULATION.

a) All land disturbing activities, whether requiring a project review under these Rules or otherwise, shall be undertaken in conformance with BMPs.

b) Project reviews are required of any land disturbing activity meeting the review thresholds set forth in Rule D Section 2.

c) In areas that drain to Impaired Waters, TMDL Implementation Plans may include site-specific requirements for any land-disturbing activities that are in addition to these rules and standards.

d) No person shall conduct land-disturbing activities without protecting adjacent property and waterbodies from erosion, sedimentation, flooding, or other damage.

e) Development shall be planned and conducted to minimize the extent of disturbed area, runoff velocities, and erosion potential, and to reduce and delay runoff volumes. Disturbed areas shall be stabilized and protected as soon as possible and facilities or methods used to retain sediment on-site.

f) Existing natural watercourses and vegetated soil surfaces shall be used to convey, store, filter, and retain runoff before discharge into public waters or a stormwater conveyance system.

g) Runoff from roof gutter systems shall discharge onto lawns or other pervious surfaces to promote infiltration where possible.

h) Use of fertilizers and pesticides in the shoreland protection zone shall be so done as to minimize runoff into public waters by the use of earth material, vegetation, or both. No phosphorus fertilizer shall be used unless a soil nutrient analysis shows a need for phosphorus or in the establishment of new turf.

i) When development density, topographic features, and soil and vegetation conditions are not sufficient to adequately handle runoff using natural features and vegetation, various types of constructed facilities such as diversions, settling basins, skimming

devices, dikes, waterways, and ponds may be used. The Commission encourages designs using surface drainage, vegetation and infiltration rather than buried pipes and man-made materials and facilities.

j) Whenever the Commission determines that any land disturbing activity has become a hazard to any person or endangers the property of another, adversely affects water quality or any waterbody, increases flooding, or otherwise violates these Rules, the Commission shall notify the member city where the problem occurs and the member city shall require the owner of the land upon which the land disturbing activity is located, or other person or agent in control of such land, to repair or eliminate such condition within the time period specified therein. The owner of the land upon which a land disturbing activity is located shall be responsible for the cleanup and any damages from sediment that has eroded from such land. The Commission may require the owner to submit a project review application under these Rules before undertaking any repairs or restoration.

RULE D. STORMWATER MANAGEMENT

1. **POLICY**. It is the policy of the Commission to control excessive rates and volumes of runoff by:

a) Requiring that peak runoff rates not exceed existing conditions or the capacity of downstream conveyance facilities or contribute to flooding or streambank erosion.

b) Managing subwatershed discharge rates and flood storage volumes to be consistent with the goals of the Commission's water resources management plan and the local water resources management plans.

c) Controlling runoff rates by the use of on-site or if feasible regional detention or infiltration facilities.

d) Reviewing stormwater management structures based on the 1% (100-year) critical storm event for the drainage area.

e) Routing runoff to water treatment ponds or other acceptable facilities before discharging into waterbodies.

f) Promoting the use of natural resources for storing runoff and improving water quality and other amenities where appropriate.

g) Promoting natural infiltration of runoff.

2. **REGULATION**. No person or political subdivision shall commence a land disturbing activity or the development or redevelopment of land for the following types of projects without first submitting to and obtaining approval of a project review from the Commission or the city in which the project is located that incorporates a stormwater management plan for the activity, development or redevelopment:

a) Plans of any land development or site development that disturbs more than 1 acre of land.

b) Linear projects that create one acre or more of new impervious surface must meet all Commission requirements for the net new impervious surface.

c) Plans of any land development or individual site development adjacent to or containing a lake, wetland, or a natural or altered watercourse as listed in the Hennepin County wetland inventory or the final inventory of Protected Waters and Wetlands for Hennepin County, as prepared by the DNR.

d) Any culvert installation or replacement, bridge construction, stream cross-section alteration, or activity requiring a DNR Waters Permit.

e) Plans for any land development or site development within the 1% chance (100-year) floodplain as defined by the Flood Insurance Study for the member city or the Commission's flood study.

f) Plans of any land development or site development regardless of size, if such review is requested by a member city.

g) Land disturbing activity that drains to more than one watershed, for that portion of the site draining into the Pioneer-Sarah Creek Watershed.

3. CRITERIA. Stormwater management plans shall comply with the following criteria regarding runoff rate restrictions, volume control requirements, and water quality requirements.

a) A hydrograph method based on sound hydrologic theory will be used to analyze runoff for the design or analysis of flows, volumes, water quality, and water levels.

b) *Runoff rates* for the proposed activity shall not exceed existing runoff rates for the 2-year, 10-year, and 100-year critical storm events and rainfall distribution for the project location as set forth in NOAA Atlas 14 Volume 8, published June 2013, or its successor, using the online NOAA Precipitation Frequency Data Server or a similar data source. Applicant must document the location and event depths used. If an approved local water management plan requires more restrictive rate control, then the more restrictive rate shall govern. Runoff rates may be restricted to less than the existing rates when necessary for the public health and general welfare of the watershed.

i) If detention basins are used to control rate of runoff they shall be designed to provide:

(1) An outlet structure to control the 2-year, 10-year, and 100-year critical storm events to predevelopment runoff rates. Said outlet structure will be required to control critical storm events to less than predevelopment runoff rates if downstream facilities have insufficient capacity to handle the increased flow.

(2) Alternative to (1), runoff may be directed to a downstream facility within the same hydrologic subwatershed that has sufficient capacity to provide the required rate control. This means that no rate control may be required for an individual development provided there is a regional facility designed and constructed to accommodate the flow from this property.

(3) An identified overflow spillway sufficiently stabilized to convey a 1% (100-year) critical storm event.

(4) A normal water elevation above the OHW of adjacent waterbodies.

(5) Access for future maintenance.

(6) An outlet skimmer to prevent migration of floatables and oils for at least the two year storm event.

(7) The low floor elevation shall be at minimum two feet above the critical event 100-year elevation and at minimum one foot above the emergency overflow elevation of nearby waterbodies and stormwater ponds.

ii) Regional detention basins may be used to manage peak flow rates and meet water quality objectives when feasible.

iii) Analysis of flood levels, storage volumes and flow rates for waterbodies and detention basins shall be based on the range of rainfall and snow melt duration producing the critical flood levels and discharges, whichever is most critical.

iv) Landlocked water basins may be provided with outlets that:

(1) Retain a hydrologic regime complying with floodplain and wetland alterations.

(2) Provide sufficient storage below the outlet run-out elevation to retain back-to-back 100-year, 24-hour rainfalls and runoff above the highest anticipated groundwater elevation and prevent damage to property adjacent to the basin.

(3) Do not create adverse downstream flooding or water quality conditions.

c) Stormwater runoff volume must be *infiltrated/abstracted* onsite in the amount equivalent to one point one inch (1.1”) of runoff generated from new impervious surface.

i) Applicant must minimize the creation of new impervious surface, reduce existing impervious surfaces where possible, and minimize the amount of directly connected impervious surface.

ii) When using infiltration for volume reduction, runoff must be infiltrated within 48 hours. Infiltration volumes and facility sizes shall be calculated based on the measured infiltration rate determined by a double-ring infiltrometer test(s) conducted to the requirements of ASTM Standard D3385 at the proposed bottom elevation of the infiltration area. Other testing methods may be used with the approval of the Commission’s Engineer. The measured infiltration rate shall be divided by the appropriate correction factor selected from the Minnesota

Stormwater Manual. This site investigation must be conducted by a licensed soil scientist or engineer.

iii) A post-construction percolation test must be performed on each infiltration practice and must demonstrate that the constructed infiltration rate meets or exceeds the design infiltration rate prior to project acceptance by the city.

iv) Infiltration areas will be limited to the horizontal areas subject to prolonged wetting.

v) Areas of permanent pools tend to lose infiltration capacity over time and will not be accepted as an infiltration practice.

vi) Stormwater runoff must be pretreated to remove solids before discharging to infiltration areas to maintain the long term viability of the infiltration areas.

vii) Design and placement of infiltration BMPs shall be done in accordance with the Minnesota Department of Health guidance "Evaluating Proposed Stormwater Infiltration Projects in Vulnerable Wellhead Protection Areas," as amended.

viii) Constructed bioretention and infiltration practices such as rain gardens, infiltration trenches, and infiltration benches shall not be used in:

(1) Fueling and vehicle maintenance areas;

(2) Areas with less than 3 feet separation from the bottom of the infiltration system to the elevation of seasonal high groundwater;

(3) Areas with runoff from industrial, commercial and institutional parking lots and roads and residential arterial roads with less than 5 feet separation distance from the bottom of the infiltration system to the elevation of seasonal high groundwater;

(4) Areas within 400 feet of a community water well, within 100 feet of a private well, or within a delineated 1-year time of travel zone in a wellhead protection area;

(5) Sites documented to contain contaminated soils or groundwater.

ix) Credit towards compliance with the abstraction requirement in (c) may be achieved by:

(1) Meeting post construction soil quality and amendment depth requirements. Areas that will be subjected to clearing, grading, or compaction that will not be covered by impervious surface, incorporated into a drainage facility, or engineered as structural fill or slope may be included in the credit calculation if they meet post construction soil quality and amendment depth requirements. Soil amendment areas become part of the site's storm drainage system, and must be protected by a utility and drainage easement and be included in the site's utility maintenance agreement. The applicant may compute a credit of 0.5 inches over the soil amendment area and apply that toward the abstraction volume requirement.

(a) A minimum 8-inch depth of compost amended soil or imported topsoil shall be placed in all areas of the project site being considered for the abstraction credit. Before the soil is placed, the subsoil must be scarified (loosened) at least 4 inches deep, with some incorporation of the amended soil into the existing subsoil to avoid stratified layers.

(b) Soil amendment may be achieved by either mixing 2 inches of approved compost into the 8 inches of soil depth, or by mixing a custom-calculated amount of compost to achieve 8 inches of uncompacted soil depth with a minimum organic content of five percent.

(c) The amended areas must pass a 12-inch probe test during the site final inspection, in accordance with the Commission's testing procedure. Once amended, soil areas must be protected from recompaction.

(2) Preserving undisturbed forest or grassland conservation areas. Conservation areas must remain undisturbed during construction and must be protected by a permanent conservation easement prescribing allowable uses and activities on the parcel and preventing future development. A long-term vegetation management plan describing methods of maintaining the conservation area in a natural vegetative condition must be submitted with the stormwater management plan. The applicant may compute a credit of 0.5 inches over the conservation area and apply that toward the abstraction volume requirement.

(3) Providing wetland buffers in excess of minimum requirements. Areas eligible for credit must meet all wetland buffer requirements, must be monumented and shown on the construction plans. The applicant may compute a credit of 0.5 inches over the excess buffer area and apply that toward the abstraction volume requirement.

(4) Disconnecting impervious surface by redirecting runoff across a pervious surface or into an engineered bioinfiltration facility. Impervious disconnection must be designed to prevent any reconnection of runoff with the storm drain system. The applicant may subtract the disconnected impervious surface area from the total impervious surface area used to compute the required abstraction volume.

x) Alternative to (c), runoff may be directed to a downstream facility within the same hydrologic subwatershed that has sufficient capacity to provide the required volume management. This means that no volume management may be required for an individual development provided there is a regional facility designed and constructed to accommodate the volume from this property.

d) Where infiltration is not advisable or infeasible due to site conditions, *biofiltration* must be provided for that part of the abstraction volume that is not abstracted by other BMPs. Where biofiltration is infeasible, at a minimum filtration through a medium that incorporates organic material, iron fillings, or other material to reduce soluble phosphorus must be provided.

e) There shall be *no net increase in total phosphorus (TP) or total suspended solids (TSS)* from pre-development land cover to post-development land cove. Pre-development land cover is defined as the predominant land cover over the previous 10 years. The TP and TSS export coefficients to be used to calculate predevelopment and post-development land use loadings are set forth in Commission project review guidance.

i) Full infiltration of one point one (1.1) inches of runoff from all impervious surface will satisfy (e).

ii) If it is not feasible to achieve the full 1.1 inch infiltration requirement, a combination of BMPs may be used to achieve the no-net-increase requirement.

iii) If permanent sedimentation and water quality ponds are used they shall be designed to the Wet Pond Design Standards set forth on Appendix A to these Rules and provide:

(1) Water quality features consistent with NURP criteria and best management practices.

(2) A permanent wet pool with dead storage of at least the runoff from a 2.5-inch storm event.

iv) Alternative to (e), runoff may be directed to a downstream facility within the same hydrologic subwatershed that has sufficient capacity to provide the required treatment. This means that no treatment may be required for an individual development provided there is a regional facility designed and constructed to accommodate the flow from this property.

4. WAIVERS.

a) The Commission may waive the on-site runoff rate, volume and water quality control design criteria as noted above, if a municipality has an off-site stormwater facility that provides equivalent control and treatment of runoff that conforms to Commission standards.

b) The design criteria for infiltration may be waived for sites with total impervious surface of less than one acre if infiltration BMPs have been incorporated to the maximum extent possible.

5. EXHIBITS. The following exhibits shall accompany the project review application (one set full size, one set reduced to a maximum size of 11" x 17", and one electronic set in pdf format). All plans must be signed by a licensed professional engineer registered in Minnesota.

a) Property lines and delineation of lands under ownership of the applicant.

b) Delineation of the subwatershed contributing runoff from off-site, proposed and existing subwatersheds on-site, emergency overflows and watercourses.

c) Proposed and existing stormwater facilities location, alignment and elevation.

d) Delineation of existing on-site wetland, marsh, shoreland and floodplain areas.

e) Where infiltration or filtration is used as a stormwater management practice, identification, description, results of double-ring infiltrometer tests, and permeability and approximate delineation of site soils and seasonal high groundwater elevation in both existing and proposed as-developed condition.

f) Existing and proposed ordinary high and 1% chance (100-year) water elevations on-site.

g) Existing and proposed site contour elevations at 2-foot intervals, referenced to NAVD (1988 datum). If NAVD 1988 is not used, applicant must specify the datum used and the appropriate conversion factor.

h) Construction plans and specifications of all proposed stormwater management facilities, including design details for outlet controls.

i) Runoff volume and rate analysis for the 2-year, 10-year, and 100-year critical storm events, existing and proposed.

j) Pre-construction and post-construction annual runoff volume (ac-ft), annual total phosphorus (lbs/yr), and annual total suspended solids (lb/yr).

k) All hydrologic, water quality and hydraulic computations made in designing the proposed stormwater management facilities.

l) A narrative describing the pre-and post-construction drainage conditions and the post-construction BMPs incorporated in the plans.

m) Applications requesting a soil management credit must include a Soil Management Plan (SMP) that shall include an 11” x 17” or larger site map indicating areas where soils will be amended, and calculations for soil volumes to be stockpiled and amounts and specifications of amendment or topsoil to be imported to achieve specified minimum organic matter content.

n) Delineation of any ponding, flowage or drainage easements, or other property interests, to be dedicated for stormwater management purposes.

6. **MAINTENANCE**. All stormwater management structures and facilities shall be maintained in perpetuity to assure that the structures and facilities function as originally designed. The owner of any water quality treatment device if not a governmental unit shall provide to the member city, in a form acceptable to the Commission, a recordable agreement detailing an operations and maintenance plan that assures that the structure(s) will be operated and maintained as designed.

7. **EASEMENTS**. The member city shall obtain from the applicant, in form acceptable to the Commission, recordable temporary and perpetual easements for ponding, flowage and drainage purposes over hydrologic features such as waterbodies, wetlands, buffers, floodplain and stormwater basins and other permanent BMPs. The easements shall include the right of reasonable access for inspection, monitoring, maintenance and enforcement purposes.

8. **COVENANTS**. The Commission may require as a condition of project review approval that the member city shall require that the land be subjected to restrictive covenants or a conservation easement, in form acceptable to the Commission, to prevent the future expansion of impervious surface and the loss of infiltration capacity.

RULE E. EROSION AND SEDIMENT CONTROL

1. **POLICY**. It is the policy of the Commission to control runoff and erosion and to retain or control sediment on land during land disturbing activities by requiring the preparation and implementation of erosion and sediment control plans.

2. **REGULATION**. No person or political subdivision shall commence a land disturbing activity or the development or redevelopment of land for which a project review is required under Rule D without first submitting to and obtaining approval of a project review from the Commission that incorporates an erosion and sediment control plan for the activity, development or redevelopment.

3. **CRITERIA**. Erosion and sediment control plans shall comply with the following criteria:

a) Erosion and sediment control measures shall be consistent with best management practices as demonstrated in the most current version of the MPCA manual "Protecting Water Quality in Urban Areas," and shall be sufficient to retain sediment on-site.

b) Erosion and sediment controls shall meet the standards for the General Permit Authorization to Discharge Storm Water Associated with Construction Activity Under the National Pollutant Discharge Elimination System/State Disposal System Permit Program Permit MN R100001 (NPDES General Construction Permit) issued by the Minnesota Pollution Control Agency, except where more specific requirements are required.

c) All erosion and sediment controls shall be installed before commencing the land disturbing activity, and shall not be removed until completion.

d) The activity shall be phased when possible to minimize disturbed areas subject to erosion at any one time.

4. **EXHIBITS**. The following exhibits shall accompany the project review application (one set full size, one set reduced to a maximum size of 11" x 17", and one electronic set in pdf format). Erosion and sediment control plans must be prepared by a qualified professional.

a) An existing and proposed topographic map showing contours on and adjacent to the land, property lines, all hydrologic features, the proposed land disturbing activities, and the locations of all runoff, erosion and sediment controls and soil stabilization measures.

b) Plans and specifications for all proposed runoff, erosion and sediment controls, and temporary and permanent soil stabilization measures.

c) Detailed schedules for implementation of the land disturbing activity, the erosion and sediment controls, and soil stabilization measures.

d) Detailed description of the methods to be employed for monitoring, maintaining and removing the erosion and sediment controls, and soil stabilization measures.

e) Soil borings if requested by the Commission.

5. **MAINTENANCE**. The project review applicant shall be responsible for proper operation and maintenance of all erosion and sediment controls and soil stabilization measures, in conformance with best management practices and the NPDES permit. The project review applicant shall, at a minimum, inspect and maintain all erosion and sediment controls and soil stabilization measures daily during construction, weekly thereafter, and after every rainfall event exceeding 0.5 inches, until vegetative cover is established.

RULE F. FLOODPLAIN ALTERATION

1. **POLICY**. It is the policy of the Commission to prevent and control flooding damage by:

a) Preserving existing water storage capacity below the 100-year critical flood elevation on all waterbodies in the watershed to minimize the frequency and severity of high water.

b) Minimizing development in the floodplain that will unduly restrict flood flows or aggravate known high water problems.

c) Requiring compensatory storage for floodplain fill.

2. **REGULATION**. No person or political subdivision shall alter or fill land below the 100-year critical flood elevation of any public waters watercourse, public waters wetland, or other wetland without first obtaining an approved project review from the Commission.

3. **CRITERIA**.

a) Floodplain alteration or filling shall not cause a net decrease in flood storage capacity below the projected 1% (100-year) critical flood elevation or alter the timing of flooding unless it is shown that the proposed alteration or filling, together with the alteration or filling of all other land on the affected reach of the waterbody to the same degree of encroachment as proposed by the applicant, will not cause high water or aggravate flooding on other land and will not unduly restrict flood flows.

b) All new structures shall be constructed with the low floor at the elevation required in the municipality's ordinance, however, in no case shall the low floor be less than two feet above the regulatory elevation.

4. **EXHIBITS**. The following exhibits shall accompany the project review` application (one set full size, one set reduced to a maximum size of 11" x 17", and one electronic set in pdf format):

a) Site plan showing boundary lines, delineation and existing elevation contours of the work area, ordinary high water level, and 1% (100-year) critical flood elevation. All elevations shall be referenced to the NAVD 1988 datum. If NAVD 1988 is not used, applicant must specify the datum used and the appropriate conversion factor.

b) Grading plan showing any proposed elevation changes.

c) Preliminary plat of any proposed subdivision.

d) Determination by a registered professional engineer of the 100-year critical flood elevation before and after the proposed activity.

e) Computation of the change in flood storage capacity as a result of the proposed alteration or fill.

f) Erosion and sediment control plan which complies with these Rules.

g) Soil boring logs and report if available.

5. **EXCEPTIONS**. If a municipality has adopted a floodplain ordinance that prescribes an allowable degree of floodplain encroachment, the applicable ordinance shall govern the allowable degree of encroachment and no project review will be required under this Floodplain Alteration Rule.

RULE G. WETLAND ALTERATION

1. **POLICY**. It is the policy of the Commission to preserve and protect wetlands for their water quality, stormwater storage, habitat, aesthetic, and other attributes by:

a) Achieving no net loss in the quantity, quality and biological diversity of wetlands in the watershed.

b) Increasing the quantity, quality and biological diversity of wetlands in the watershed by restoring or enhancing diminished or drained wetlands.

c) Enforcing mitigation of direct or indirect impacts from activities that destroy or diminish the quantity, quality and biological diversity of watershed wetlands.

d) Replacing affected wetlands where sequencing demonstrates that avoidance is not feasible.

2. **REGULATION**. No person or political subdivision shall drain, fill, excavate or otherwise alter a wetland without first obtaining the approval of a wetland replacement plan from the local government unit with jurisdiction over the activity. Mitigation of wetland impacts will be considered in the following sequence: 1) mitigated by enhancing the

impacted wetland; 2) mitigated within the subcatchment of the impacted wetland; 3) mitigated in the drainage area of the impacted wetland; 4) mitigated in the watershed of the impacted wetland; 5) mitigated through purchase of wetland bank credits.

3. CRITERIA.

a) Any drainage, filling, excavation or other alteration of a wetland shall be conducted in compliance with Minnesota Statutes, section 103G.245, the Wetland Conservation Act, and regulations adopted thereunder.

b) A wetland may be used for stormwater storage and treatment only if pre-treatment is provided and the use will not adversely affect the function and public value of the wetland as determined by the local government unit.

c) Other activities which would change the character of a wetland shall not diminish the quantity, quality or biological diversity of the wetland.

4. LOCAL GOVERNMENT UNIT. The Commission will serve as the local government unit (LGU) for administration of the Wetland Conservation Act (WCA) for those cities that have designated the Commission to serve in that capacity. If a member city has not designated the Commission as the LGU for the administration of the WCA, they shall be responsible for administering the WCA. MnDOT serves as the LGU on its right of way.

RULE H. BRIDGE AND CULVERT CROSSINGS

1. POLICY. It is the policy of the Commission to maintain channel profile stability and conveyance capacity by regulating crossings of watercourses for driveways, roads and utilities.

2. REGULATION. No person or political subdivision shall construct or improve a road, driveway or utility crossing across any public waters watercourse or county ditch without first submitting to the Commission and receiving approval of a project review.

3. CRITERIA. Crossings shall:

a) Retain adequate hydraulic capacity to pass the 100-year flow and maintain the 100-year flow profile, if available.

b) Mimic the existing base flow (1-year, 2-year) conditions.

c) Not adversely affect water quality.

d) Represent the "minimal impact" solution to a specific need with respect to all reasonable alternatives.

e) Allow for future erosion, scour, and sedimentation maintenance considerations.

f) If the project proposes changing the FEMA FIS profile,, a FEMA map revision must be obtained.

g) If the project requires a DNR Work in Public Waters permit, the conditions of that permit must be satisfied.

4. EXHIBITS. The following exhibits shall accompany the project review application (one set full size, one set reduced to a maximum size of 11" x 17", and one electronic set in pdf format):

a) Construction plans and specifications.

b) Analysis prepared by a registered professional engineer showing the effect of the project on hydraulic capacity and water quality.

c) An erosion and sediment control plan that complies with these Rules.

5. MAINTENANCE.

a) The maintenance, reconstruction and stabilization of any public crossing shall be the responsibility of the political subdivision with jurisdiction over the crossing.

b) The maintenance, reconstruction and stabilization of any private crossing shall be the responsibility of the owner of the crossing.

c) If a crossing over any public waters watercourse is determined by the Commission to be causing significant erosion, the Commission may notify the member city where said crossing is located and the member city may order the owner of the crossing to make necessary repairs or modifications to the crossing and outlet channel.

RULE I. BUFFER STRIPS

1. POLICY. It is the policy of the Commission to maintain the water quality and ecological functions provided by watercourses and wetlands by requiring the development of vegetated buffers around watercourses, lakes and wetlands where development and redevelopment occurs, and to encourage the installation of vegetated buffers around all watercourses and wetlands. Vegetative buffers reduce the impact of surrounding development and land use on watercourse, lake and wetland functions by stabilizing soil to prevent erosion, filtering sediment from runoff, and moderating water level fluctuations during storms. Buffers provide essential habitat for wildlife. Requiring buffers recognizes that watercourse, lake and wetland quality and function are related to the surrounding upland.

2. REGULATION. No person or political subdivision shall commence a land disturbing activity or the development or redevelopment of land for which a project review is required under Rule D on land that contains or is adjacent to a watercourse, lake or wetland

without first submitting to and obtaining approval of a project review from the Commission that incorporates a vegetated buffer strip between the development or redevelopment and the watercourse or wetland.

3. GENERAL PROVISIONS.

a) This Rule shall apply to all lands containing or abutting watercourses, lakes or wetlands that are subject to a project review under these Rules. Watercourses, lakes and wetlands shall be subject to the requirements established herein, and other applicable federal, state and local ordinances and regulations. If a municipality has a buffer strip requirement that has been reviewed and approved by the Commission, the municipal regulation shall have precedence over the Commission's Rules.

b) An applicant shall determine whether any watercourse, lake or wetland exists, and shall delineate the boundary for any wetland on the land. An applicant shall not be required to delineate wetlands on adjacent property, but must review available information to estimate the wetland boundary.

c) Documentation identifying the presence of any watercourse, lake or wetland on the applicant's land, including wetland delineation and buffer strip vegetation evaluation, must be provided to the Commission with a project review application.

d) Wetland and buffer strip identifications and delineations shall be prepared in accordance with state and federal regulations.

4. CRITERIA. The following standards apply to all lands that contain or abut a watercourse, lake or wetland:

a) BMPs shall be followed to avoid erosion and sedimentation during land disturbing activities.

b) When a buffer strip is required the applicant shall, as a condition to issuance of an approved project review:

i) Submit to the member city, in a form acceptable to the Commission, a recordable conservation easement for protection of approved buffer strips. The easement shall describe the boundaries of the watercourse or wetland and buffer strips, identify the monuments and monument locations, and prohibit any of the alterations set forth in Paragraph 5(e) below and the removal of the buffer strip monuments within the buffer strip or the watercourse or wetland.

ii) Submit to the member city, in a form acceptable to the Commission, an executed buffer maintenance plan and agreement for the first two growing seasons following establishment, and providing an escrow or an alternate surety to assure successful vegetation establishment.

iii) Install the wetland monumentation required by Paragraph 7 below.

c) All open areas within the buffer strip shall be seeded or planted in accordance with Paragraph 8 below. All seeding or planting shall be completed prior to removal of any erosion and sediment control measures. If construction is completed after the end of the growing season, erosion and sediment control measures shall be left in place and all disturbed areas shall be mulched for protection over the winter season.

5. BUFFER STRIPS.

a) A buffer strip shall be maintained around the perimeter of all watercourses, lakes or wetlands. The buffer strip provisions of this Rule shall not apply to any parcel of record as of the date of this Rule until such parcel is developed or redeveloped or unless required by a previous project review. The Commission does, however, strongly encourage the installation of buffer strips on all parcels in the watershed.

b) Buffer strips on watercourses, lakes, and wetlands shall be an average 25 feet wide and a minimum of 10 feet wide. It is recommended that all structures have a minimum 15 foot setback from the buffer strip.

c) Buffer strips shall apply whether or not the watercourse or wetland is on the same parcel as a proposed development.

d) Buffer areas disturbed by grading operations must be finish graded to a slope of 6:1 or less or an increase in width of five (5) feet for each one (1) foot decrease in horizontal width (i.e., a 25 required foot buffer width at a 5:1 slope must be 30 feet wide, 4:1 must be 35 feet wide, and 3:1 must be 40 feet wide.)

e) Buffer strip vegetation shall be established and maintained in accordance with Paragraph 8 below. Buffer strips shall be identified within each parcel by permanent monumentation in accordance with Paragraph 7 below.

f) Subject to Paragraph 5(g) below, alterations including building, storage, paving, mowing, plowing, introduction of noxious vegetation, cutting, dredging, filling, mining, dumping, grazing livestock, agricultural production, yard waste disposal or fertilizer application, are prohibited within any buffer strip. Noxious vegetation shall be removed to meet state standards. Alterations would not include plantings that enhance the natural vegetation or selective clearing or pruning of trees or vegetation that are dead, diseased or pose similar hazards.

g) The following activities shall be permitted within any buffer strip, and shall not constitute prohibited alterations under Paragraph 5(f) above:

    i) Use and maintenance of an unimproved access strip through the buffer, not more than 20 feet in width, for recreational access to the watercourse, lake or wetland and the exercise of riparian rights.

    ii) Placement, maintenance, repair or replacement of utility and drainage systems that exist on creation of the buffer strip or are required to comply with any subdivision approval or building permit obtained from the municipality or county,

so long as any adverse impacts of utility or drainage systems on the function of the buffer strip have been avoided or minimized to the extent possible.

iii) Construction, maintenance, repair, reconstruction, or replacement of existing and future public roads crossing the buffer strip, so long as any adverse impacts of the road on the function of the buffer strip have been avoided or minimized to the extent possible.

6. ALTERNATE WETLAND PROTECTION METHODS.

a) Should application of the buffer standards in Paragraph 5 above render a parcel of record as of the date of this Rule unbuildable based on current city ordinances, the Watershed engineer may allow alternative methods to protect the wetland. Such methods must include a buffer strip no less than ten feet wide, supplemented by redirection of drainage to a wider area of buffer, or to a Best Management Practice such as a rain garden or vegetated swale.

b) The use of alternative wetland protection methods will be evaluated as part of the review of a stormwater management plan under these Rules. Alternative wetland protection methods must be in keeping with the spirit and intent of this Rule.

7. MONUMENTATION. A monument shall be required at each parcel line where it crosses a buffer strip and shall have a maximum spacing of 200 feet along the edge of the buffer strip. Additional monuments shall be placed as necessary to accurately define the edge of the buffer strip. A monument shall consist of a post and a buffer strip sign meeting Commission standards. The signs shall include warnings about mowing, disturbing or developing the buffer strip.

8. VEGETATION.

a) Where acceptable natural vegetation exists in buffer strip areas, the retention of such vegetation in an undisturbed state is required unless an applicant receives approval to replace such vegetation. A buffer strip has acceptable natural vegetation if it:

i) Has a continuous, dense layer of native vegetation that has been uncultivated or unbroken for at least 5 consecutive years; or

ii) Has an overstory of native trees and/or shrubs that has been uncultivated or unbroken for at least 5 consecutive years; or

iii) Contains a mixture of the plant communities described in Subparagraphs 8(a)(i) and (ii) above that has been uncultivated or unbroken for at least 5 years.

b) Notwithstanding the performance standards set forth in Paragraph 8(a), the Commission may determine existing buffer strip vegetation to be unacceptable if:

i) It contains undesirable plant species including but not limited to common buckthorn, reed canary grass, or species on the Minnesota State Noxious Weeds List; or

ii) It has topography that tends to channelize the flow of runoff; or

iii) For some other reason it is unlikely to retain nutrients and sediment.

iv) Where buffer strips are not vegetated or have been cultivated or otherwise disturbed within 5 years of the project review application, such areas shall be replanted and maintained with native vegetation. The buffer strip plantings must be identified on the project review application. Acceptable buffer strip design and planting methods are detailed in the reference document "Restoring and Managing Native Wetland and Upland Vegetation" (Jacobson 2006, prepared for BWSR and MnDOT).

c) Buffer strip vegetation shall be established and maintained in accordance with the requirements found in this Paragraph. During the first two full growing seasons, the owner must replant any buffer strip vegetation that does not survive. The owner shall be responsible for reseeding and/or replanting if the buffer strip changes at any time through human intervention or activities. At a minimum the buffer strip must be maintained as a "no mow" area.

9. ENCROACHMENT.

a) Buffer strips must be kept free of all materials, equipment and structures, including fences and play equipment. Buffer strips must not be grazed, cropped, logged or mown except as approved by the Commission. The topography of the buffer strips shall not be altered by any means, including paving, plowing, cutting, dredging, filling, mining, or dumping.

b) Variances.

i) Only variances meeting the standards and criteria set forth in Rule K shall be granted.

ii) Variances shall not be granted that would circumvent the intent and purposes of this Rule.

RULE J. FEES

1. POLICY. The Commission finds that it is in the public interest to require applicants to pay the cost of administering and reviewing project review applications, and inspecting approved activities to assure compliance with these Rules, rather than using the Commission's annual administrative levy for such purposes. The Commission shall by resolution establish a schedule of fees that may be amended from time to time to reflect the cost of providing each service.

2. APPLICATION. Each application for the issuance, transfer or renewal of a project review recommendation under these Rules shall be accompanied by an application fee to defray the cost of processing the application.

3. **REVIEW**. A project review applicant under these Rules shall pay a fee for the cost of the review and analysis of the proposed activity, including services of engineering, legal, and other consultants. The review fee shall be payable upon the submission of the project review application.

4. **WETLAND MITIGATION PLAN**. A project review applicant under these rules shall pay a fee for the cost of the review and analysis of a proposed activity involving a wetland mitigation plan in a municipality where the Commission is the LGU. The fee is to cover the costs of engineering, legal, and other consultants and shall be payable upon the submission of the project review application. Should the cost of said wetland mitigation plan review exceed the review fee, the application shall deposit such additional sums as are needed to pay such costs. Failure to pay such costs is grounds to deny the application or suspend review.

5. **WETLAND MITIGATION PLAN MONITORING**. A project review applicant under these rules in a municipality where the Commission is the LGU shall deposit an escrow to cover the cost of Commission monitoring and annual monitoring plan review for the five-year period. If the escrow amount is insufficient to cover the costs the Commission may require additional funds from the applicant.

6. **WETLAND MITIGATION SECURITY DEPOSIT**. A project review applicant under these rules in a municipality where the Commission is the LGU shall provide a security to assure that the replacement plan is followed. The amount of the security shall be calculated on a case-by-case basis based on the estimated cost of construction, follow up and contingency. The security may also include an amount determined by the Commission to be sufficient to protect the public in the event the replacement plan does not succeed.

7. **DEPOSITS**. The Commission will maintain an accounting for all deposits made under this Rule. No interest will be paid to applicants for funds held in deposit.

RULE K. VARIANCES

1. **WHEN AUTHORIZED**. The Commission may grant variances from the literal provisions of these Rules. A variance shall only be granted when in harmony with the general purpose and intent of the Rules in cases where strict enforcement of the Rules will cause practical difficulties or particular hardship, and when the terms of the variance are consistent with the Commission's water resources management plan and Minnesota Statutes, chapter 103D.

2. **HARDSHIP**. "Hardship" as used in connection with the granting of a variance means the land in question cannot be put to a reasonable use if used under the conditions allowed by these Rules; the plight of the applicant is due to circumstances unique to the land and

not created by the applicant; and the variance, if granted, will not adversely affect the essential character of the locality and other adjacent land. Economic considerations alone shall not constitute a hardship if a reasonable use for the land exists under the terms of these Rules. Conditions may be imposed in the granting of a variance to insure compliance and to protect adjacent land and the public health and general welfare of the Commission.

3. **PROCEDURE**. An application for a variance shall describe the practical difficulty or particular hardship claimed as the basis for the variance. The application shall be accompanied with such surveys, plans, data and other information as may be required by the Commission to consider the application.

4. **VIOLATION**. A violation of any condition imposed in the granting of a variance shall be a violation of these Rules and shall automatically terminate the variance.

RULE L. ENFORCEMENT

1. **ADMINISTRATION**. These Rules shall be administered by the Commission. The Commission shall consider applications required under these Rules and determine whether such applications should be approved, approved with conditions, or denied. Such determination shall be communicated to the member city in which the project lies and to the applicant.

2. **IMPLEMENTATION BY MEMBER CITIES**. It shall be the duty of each city to enforce and implement such determinations by the Commission under the various permitting processes and regulations of the city. Each city shall make such amendments to its official controls, regulations, and permitting processes as are necessary to provide it with the authority to enforce and implement the determinations of the Commission.

3. **FAILURE BY CITY TO IMPLEMENT**. Upon a determination by the Commission that a city has not enforced or implemented a decision of the Commission in the administration of these Rules, the Commission shall notify the city of such determination and direct that appropriate action be taken by the city. If the city does not take such action, the Commission may take such legal steps as are available to it to effect such enforcement or implementation.

RULE M. AMENDMENT OF THESE RULES

1. **AMENDMENT.** These rules may be amended from time to time by the Commission. Proposed amendments shall be reviewed by the member cities prior to adoption unless the Commission determines that said amendment is of a minor or technical nature. Minor or technical amendments include recodifying or streamlining the rules, clarifying

policies, or other actions that do not adversely affect a member city or impact the Commission's or member cities' ability to meet their water management plan goals.

2. **PROCEDURE.** Proposed major amendments to these rules shall be first considered by the Commission and then forwarded to the member cities for a 45-day comment period. Following that comment period, the Commission shall consider the proposed amendment and the comments received for approval. All amendments shall be made by resolution.

PIONEER-SARAH CREEK WATERSHED MANAGEMENT COMMISSION
RULES APPENDIX A
WET POND DESIGN STANDARDS

Permanent Pool Depth	Average 4', maximum 10'
Permanent Pond Surface Area	Greater of 2% of watershed's impervious area and 1% of the watershed
Permanent Pool Length to Width Ratio	3:1 or greater with an irregularly shaped shoreline
Side Slopes	10:1 for 10-foot bench centered on the normal water elevation and between 3:1 and 20:1 elsewhere
Side Slope Stabilization	Native seed with mix 33-261 (MnDOT 310), 34-271 (BWSR W2) or equivalent between NWL and HWL, provide 10' buffer where possible with mix 35-221 (MnDOT 330 (dry)) or mix 35-241 (MnDOT 350 (mesic))
Floatable Removal	Skimming device discharging at no greater than 0.5 fps during the 2-year event or a submerged outlet with a minimum 0.5 feet from the normal water level to the crown of the outlet pipe
Sediment Accumulation Area	Provide maintenance pads to remove sediment deltas at inlets
Permanent Pool Volume	A 4-foot mean depth and equal to 2.5-inch rain over the watershed
Source	Protecting Water Quality in Urban Areas (MPCA 2000)

SUMMARY

Pioneer-Sarah Creek Watershed Management Commission
Management Rules and Standards*

	Standard	Purpose	Applicability
Project Reviews Required	A Stormwater Management Plan consistent with all applicable management rules and standards* must be reviewed and approved prior to commencement of land disturbing activities.	To control excessive rates and volumes of runoff; manage subwatershed discharge rates and flood storage volumes; improve water quality; protect water resources; and promote natural infiltration of runoff.	All development or redevelopment projects of the following types: • Projects disturbing more than one acre of land • Projects within the 100-year floodplain • Projects adjacent to or within a lake, wetland, or watercourse • Any land disturbing activity requested by a member city to be reviewed regardless of project size • Linear projects creating more than one acre of new impervious surface
Rate Control	Peak runoff rates may not exceed existing rates for the 2-year, 10-year, and 100-year critical storm event; or the capacity of downstream conveyance facilities; or contribute to flooding	To control excessive rates and volumes of runoff; manage subwatershed discharge rates and flood storage volumes	All projects disturbing more than one acre of land. Redevelopment projects disturbing less than 50 percent of the site must meet the requirement only for the disturbed area.
Volume Manage-ment	1.1 inch of impervious surface runoff must be abstracted on site within 48 hours	To control excessive rates and volumes of runoff; manage discharge rates and flood storage volumes; protect stream channels from erosion; and promote natural infiltration of runoff.	All projects disturbing more than one acre of land. Redevelopment projects disturbing less than 50 percent of the site must meet the requirement only for the disturbed area.
Erosion and Sediment Control	Erosion control plan using Best Management Practices (BMPs) and consistent with the NPDES General Construction Permit is required	To control erosion and sediment so as to protect conveyance systems and water quality	All projects requiring a project review
Floodplain Alteration	Compensating storage is required to mitigate floodplain fill	To prevent and control flooding damage	All development or redevelopment projects within the 100-year floodplain regardless of project size
Water Quality	No net increase in total phosphorus and total suspended sediment annual load	To protect water quality	All projects disturbing more than one acre of land. Redevelopment projects disturbing less than 50 percent of the site must meet the requirement only for the disturbed area.
Buffer Strips	Vegetated buffer strips average 25 foot, minimum 10 foot wide adjacent to lakes, wetlands and other watercourses	To protect water quality; reduce erosion and sedimentation; reduce pollutants from runoff and debris; and provide habitat	All projects requiring a project review that contain or abut a wetland or watercourse
Wetland	Wetlands may not be drained, filled, excavated, or otherwise altered without an approved wetland replacement plan from the local government unit (LGU) with jurisdiction	To preserve and protect wetlands for their water quality, stormwater storage, habitat, aesthetic, and other attributes	All land disturbing activity impacting a wetland as defined by the Wetland Conservation Act (WCA)

*Important Note: Approved TMDL Implementation Plans may have additional site-specific requirements.

Appendix D
Monitoring Program

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Pioneer-Sarah Creek Watershed Management Commission
Fourth Generation Watershed Management Plan
Monitoring Program

Minnesota Rules 8410.0100 Subp. 5 states that:

> *A. Each plan must establish water quality and quantity monitoring programs that are 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 programs shall, at a minimum, include the location of sampling, the frequency of sampling, the proposed parameters to be measured, and the requirement of periodic analysis of the data.*

The Commission obtained valuable baseline data on its lakes and streams through the monitoring phase of the Watershed Restoration and Protection Strategies (WRAPS) project. There is limited data on the streams in the watershed. Several lakes in the watershed have a lengthy history of monitoring, including Lakes Independence, Sarah, and Rebecca.

A number of lakes in the watershed are listed 303(d) list of Impaired Waters for excess nutrients: Independence, Sarah, Spurzem, Hafften, North and South Whale Tail, Half Moon, Irene, Peter, and Ardmore. The MPCA removed, or delisted Lake Rebecca in 2016 based on its improved water quality. Sarah Creek is listed for excess *E. coli*. Pioneer Creek and a portion of Deer Creek (unnamed Creek to Ox Yoke Lake), were listed in 2016 for low dissolved oxygen and *E. coli*. While outside the watershed's legal boundary, Unnamed Creek (Mud Lake to Rice Lake) is within the Pioneer-Sarah Creek WRAPS boundary and was listed in 2016 for dissolved oxygen and *E. coli*.

TMDLs have been completed for the lake nutrient and stream *E. coli* impairments except for Lake Irene. Pollutant load reductions to achieve state water quality standards for the stream and lake impairments as well as protection activities for Little Long Lake and Lake Rebecca, which currently meet state water quality standards. The Commission has taken on responsibility not only for an ongoing monitoring program that meets the requirements of Minnesota Rules cited above, but that also meets any monitoring requirements of the WRAPS.

Fourth Generation Monitoring Program Framework

The Fourth Generation Monitoring Program has two organizing principles:

1. Continue to obtain detailed flow and water quality data on Pioneer and Sarah Creeks and on sentinel lakes, and collect data on other lakes and streams on a rotating basis; and
2. Collect data sufficient to document water quality trends, both positive and negative, and assess progress toward meeting towards meeting TMDL/WRAPS goals.

Each year the Commission will evaluate this proposed program and make modifications as necessary based on the most current data needs. The monitoring objectives guiding the Pioneer-Sarah Creek watershed monitoring program and the assessment of data are:

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

Monitoring data will be used to:

- Quantify any changes to receiving waters (lakes, streams, and wetlands) and their biota as land use conversion and development occurs.
- Convey information about the water resources in the watershed and their condition to multiple stakeholders, raising the visibility of the Commission.
- Target TMDL/WRAPS implementation and resource protection actions based on cost-effectiveness.
- Perform TMDL/WRAPS progress reviews.
- Accumulate enough information to support de-listing impaired waters that have improved to meet state water quality standards.
- Assist member cities who have Municipal Separate Storm Sewer Systems (MS4s) with their permit application and annual reporting requirements.
- Support applications for grant funding.
- Calibrate and validate hydrologic, hydraulic, and water quality models

Stream Monitoring

Table 1 sets forth the framework for stream monitoring in the Pioneer-Sarah Creek watershed for 2021-2030. Monitored parameters may vary from year to year based on current data needs such as obtaining baseline data for upcoming new standards or collecting additional data to assist in evaluating progress towards TMDL goals.

The Commission will annually monitor flow and water quality on Sarah Creek at site SCO (see Figure 1) and on Pioneer Creek at the Copeland Drive crossing (PSC) and at one additional site in the watershed per year on a rotating basis, so that each site is monitored every two to three years. These sites are: Dance Hall Creek (DHC); Loretto Creek (LC); and Spurzem Creek (SC). In addition, the Commission may from time to time undertake special stream monitoring on other tributaries where necessary, for example to measure progress toward meeting a TMDL, calibrate models or refine source assessments.

The Commission currently partners with Hennepin County Environment and Energy to offer the RiverWatch volunteer macroinvertebrate monitoring program for high school students. One site on Pioneer Creek just south of Pagenkopf Road has been monitored periodically since 2001. This is a valuable education and outreach program that provides useful information about stream health. However, the data collected through these programs is not comparable to the data used by the

MPCA to evaluate stream biotic health using the state standard Macroinvertebrate Index of Biotic Integrity. The Commission will continue to offer the RiverWatch monitoring opportunity, but the data may need to be supplemented by professional staff using the MPCA macroinvertebrate protocol and assessment. The need for and specific locations and schedule will be developed in the WRAPS.

Additional stream monitoring that may be considered based on the findings of the WRAPS/TMDLs is longitudinal and diurnal dissolved oxygen (DO) monitoring. Longitudinal monitoring assesses stream DO along the entire length of the stream in one morning. Monitoring starts near sunup at the headwaters, where a DO reading is taken. The technician then moves downstream a set distance and takes another reading, then repeats until the end of the stream is reached. This provides a snapshot of the entire stream at once early in the morning when stream DO is at its lowest. Diurnal monitoring occurs at a point in the stream where an instrument takes continuous DO measurements of a 72 hour period. This shows how DO fluctuates from low to high to low again on a daily cycle. The Commission may undertake such monitoring later in the 10-year planning period, to understand how management actions are impacting DO in the streams with DO impairments.

Lakes Monitoring

There are numerous basins in the Pioneer-Sarah Creek watershed, with 17 lakes that have at some point in time been monitored (see Table 3). Lakes Independence, Sarah, and Rebecca have an extensive record, including surface water and water column monitoring. The Commission has regularly participated in the Metropolitan Council's Citizen Assisted Lake Monitoring Program (CAMP) since 2005, although some lakes were occasionally monitored through that program as far back as 1993.

CAMP volunteers monitor surface water conditions and chemistry. They also judge the appearance of the lake, its odor, and its suitability for recreation. Ardmore, Haften, Little Long, and Peter have been monitored periodically through this program.

Three Rivers Park District monitors Lake Rebecca, and the Commission contracts with the District to annually monitor Independence, Sarah, Spurzem, Whale Tail, and Half Moon. The Commission received a Surface Water Assessment Grant to undertake 2010 and 2011 monitoring on several basins that had not previously been studied: Irene, Rattail, Robina, and Schwauppauff, and also on Mud and Rice, which are outside the legal boundary but within the hydrologic boundary. Aquatic vegetation surveys have been completed on several lakes as part of the WRAPS monitoring.

Table 1 sets forth the framework for lake monitoring in the Pioneer-Sarah Creek watershed. This framework establishes three "Sentinel Lakes" that will be monitored every year by the Three Rivers Park District for the Commission: Independence, Sarah, and Little Long Lakes. In addition, Three Rivers will continue annual monitoring on Lake Rebecca. These lakes include three high-profile recreational lakes and one lake with very good water quality (Little Long). Other lakes will be monitored on a rotating basis as shown on Table 4, either under contract with Three Rivers Park District (Half Moon, Spurzem, Rattail) or through CAMP (Ardmore, Haften, and Peter, and on Irene, Schwauppauff, and Winterhalter if volunteers can be found). The Commission will also periodically

update aquatic vegetation surveys in the sentinel lakes as shown on Table 4. The estimated cost of this monitoring program is shown on Table 2.

Other Monitoring

The Commission does not currently undertake any wetland monitoring. Hennepin County Environmental Services offers the Wetland Health Evaluation Program (WHEP), training and supervising adult volunteers to assess wetland vegetation and macroinvertebrates. The Commission may in the future elect to participate in this program if suitable sites and volunteers can be found.

The Commission may from time to time undertake special monitoring where necessary, for example monitoring upstream and downstream of a wetland to calibrate models or refine source assessments, or to do performance monitoring of installed BMPs. In addition, if the WRAPS determines that groundwater elevations are contributing to water quality or biotic integrity problems in the lakes, streams, or wetlands in the watershed, the Commission may elect to undertake groundwater elevation monitoring.

The Commission will periodically collect from the member cities, Hennepin County, MnDOT and other MS4s information about the BMPs that were installed in the watershed in the previous year. This data will assist in tracking progress toward achieving TMDL and WRAPS load reduction and protection goals.

Table 1. Pioneer-Sarah Creek WMC Third Generation proposed monitoring framework.

Resource	Activity	Purpose	Requirement	Frequency	Comments/Standards
Streams	Flow and water quality monitoring on Sarah Creek at SCO (Hwy 92 crossing) and on Pioneer Creek at PSC (Copeland Rd crossing)	Current conditions and long-term trends; TMDL compliance; annual water yield trend; calibrate models	MR 8410.0100 Subp. 5 / TMDL compliance / voluntary	Annually	Modify or add parameters as necessary
	Flow and water quality monitoring on tributary sites, rotate among: Dance Hall Creek (DHC); Loretto Creek (LC); and Spurzem Creek (SC)	Current conditions and long-term trends; TMDL compliance; annual water yield trend; calibrate models		Rotate every 2-3 years	Modify or add parameters as necessary
	DO longitudinal and diurnal assessment on impaired streams	TMDL compliance	TMDL compliance/ voluntary	Every 5 years	DO standards, biotic response
	Macroinvertebrate community	TMDL compliance	TMDL compliance/ voluntary	Every 5 years	IBI Standards
	RiverWatch volunteer stream monitoring	Current condition; trends; education & outreach	Voluntary	Annually	Educational activity
	Land Use/ stream condition/ buffer assessments	Long-term trends	Voluntary	As needed	TMDL compliance and BMP implementation
Lakes	Citizens Assisted Monitoring Program (CAMP)	Current condition; trends; education & outreach	MR 8410.0100 Subp. 5 / TMDL compliance / voluntary	6 lakes total, 2-3 lakes per year, bi-weekly	Lake water quality standards; education and outreach
	Sentinel Lakes annual monitoring	Current conditions and long-term trends		5 lakes, monthly, annually	Lake water quality standards
	Monthly monitoring through Three Rivers Park District	Current conditions and long-term trends		Monthly as needed	Lake water quality standards
	Vegetation surveys	Current conditions and long-term trends	TMDL compliance/ voluntary	Spring and fall every 5 years	Lake restoration
	DNR fish surveys	Current conditions and long-term trends	TMDL compliance/ voluntary	DNR schedule	Lake restoration
Wetlands	Wetland Health Evaluation Program	Current condition; trends; education & outreach	Voluntary	Annually	Baseline wetland health
Groundwater	Track well groundwater elevation data	Baseline for ground-water recharge/ discharge	Voluntary	As needed	Important if base flow becomes an issue
Other	Special source assessment and other monitoring	Collect one-time or periodic special monitoring, such as: inflow and outflow of target wetlands; small streams; BMP effectiveness; biology	TMDL compliance/ voluntary	As needed	Some special monitoring may require cost-share from a benefitting MS4
	Annually log BMPs undertaken in the subwatershed of each resource	Progress toward meeting load reductions	TMDL compliance/ voluntary	Annually	Member cities report annually

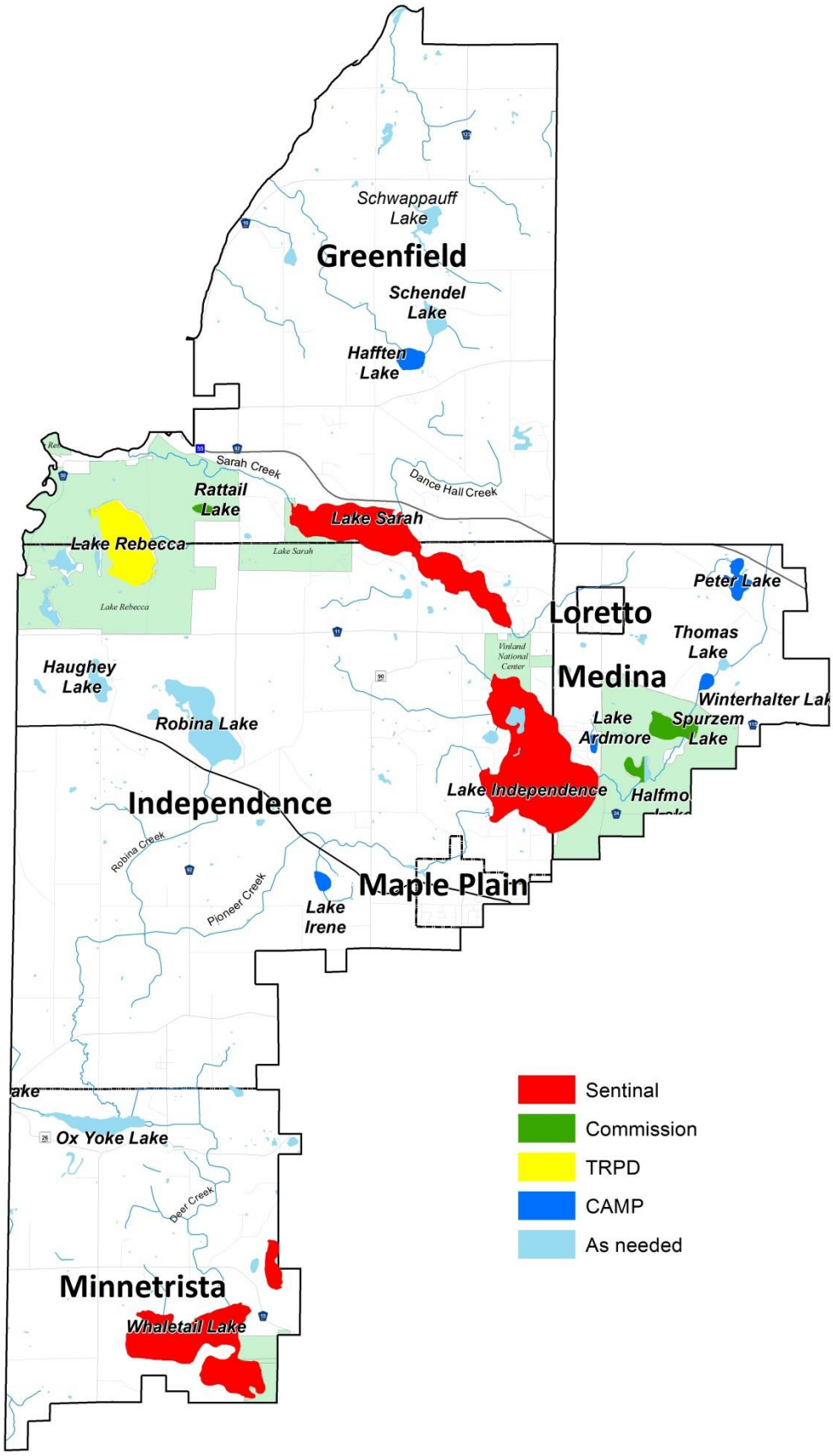

Figure 1. Pioneer-Sarah Creek WMC Third Generation Monitoring Program - Lakes

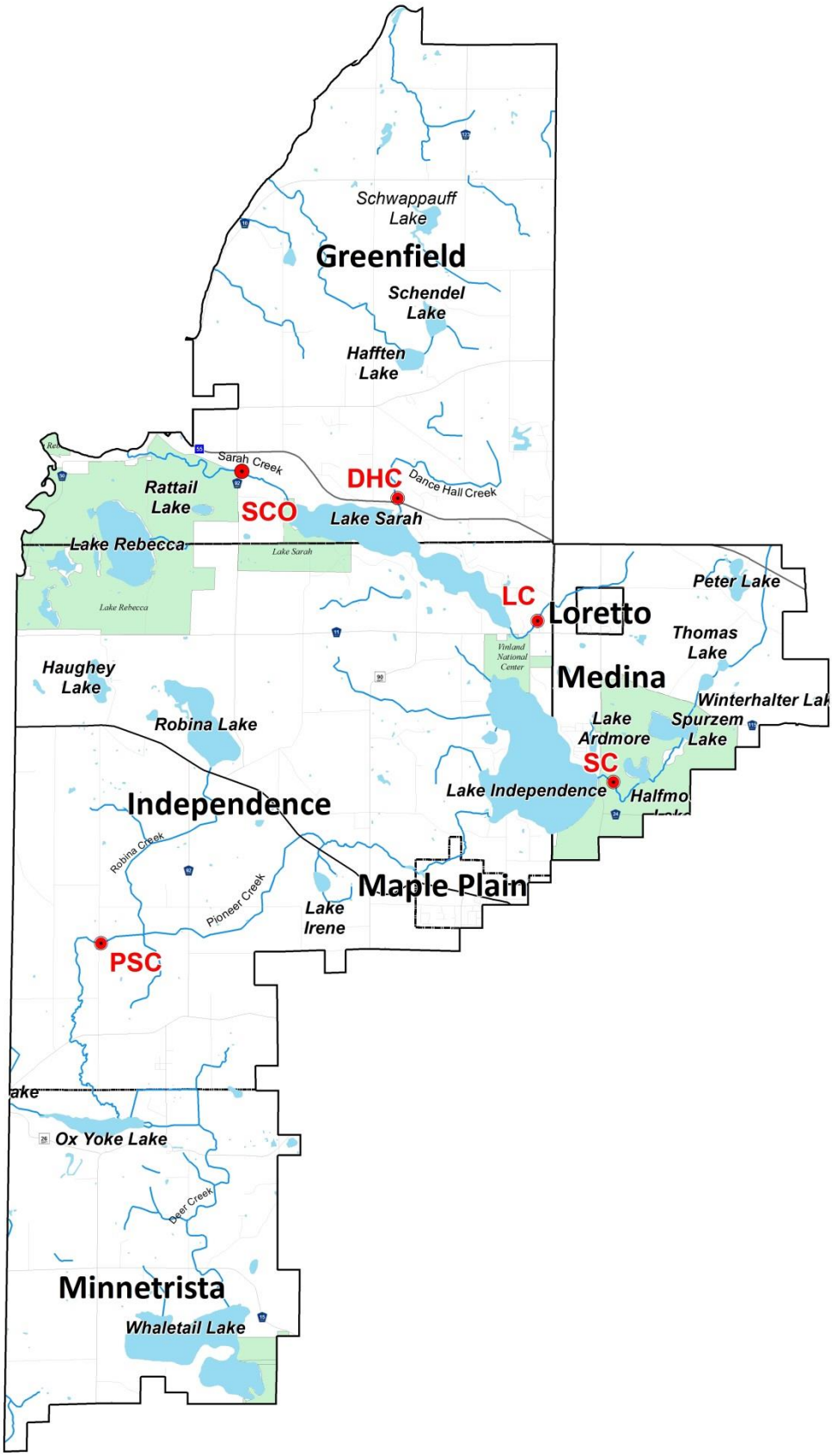

Figure 2. Pioneer-Sarah Creek WMC Third Generation Monitoring Program-Streams

Appendix E
Education and Outreach Plan

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Pioneer-Sarah Creek Watershed Management Commission
Fourth Generation Watershed Management Plan
Education and Outreach Plan

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.

STAKEHOLDER EDUCATIONAL GOALS

Stakeholders and target audiences are individuals or groups to whom education is being directed. The Plan has identified the following target audiences and general educational goals for each. Often more than one target audience will benefit from an educational activity.

1. All property owners
   a. Understand that they live in a watershed and know where their stormwater runoff goes
   b. Understand nutrient sources and the impacts of excess nutrients on lakes and streams
   c. Understand how runoff rates and volumes affect lakes and streams
   d. Understand and undertake Best Management Practices (BMPs) to reduce nutrient loads and runoff volume
   e. Participate in volunteer activities or events
2. Lakeshore property owners
   a. Know the water quality status of their lake, and the types and magnitude of improvements needed
   b. Know both the major beneficial aquatic plants in their lake as well as the major invasives
   c. Have a general understanding of limnology (lake science)
   f. Understand and undertake Best Management Practices such as lakeshore buffers and proper application of fertilizer, herbicides, and pesticides
3. Government: elected and appointed officials, staff, board and commission members
   a. Have a general understanding of watersheds, water resources and where stormwater to and from the city goes
   b. Understand the water resources implications of land use change
   c. Are aware of water management policies and actions of other local, watershed, regional, and state organizations
   g. Understand how to incorporate water resources management actions into development and redevelopment as well as city operations
4. Educators and students
   a. Incorporate water resources education and activities into curricula
   b. Participate in family education and outreach events centered around water
   c. Have opportunities for volunteer monitoring, service projects, and other hands-on learning
   h. Educators are aware of and have access to continuing education centered around water
5. Agriculture and animal operators
   a. Understand and use Best Management Practices such as proper manure management and targeted fertilizer application
   b. Undertake conservation and nutrient management actions

IMPLEMENTATION STRATEGIES

- Expand education and outreach opportunities by coordinating with other entities such as Hennepin County.
- 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 Hennepin County to undertake targeted education and outreach to agricultural and other landowners in the watershed.

2020-2025 PRIORITY AREAS FOR EDUCATION AND OUTREACH

In setting its annual work plan, the Commission will review education and outreach priorities and develop specific education and outreach actions for the coming year. These actions may be ongoing or programs or activities; participation in programs or activities sponsored by other organizations; suggestions or information for member city implementation; or other actions depending on the education and outreach priorities. The following are the priority areas for the first few years of the Fourth Generation Plan:

1. Sponsor watershed and water resources training opportunities such as NEMO (Nonpoint Education for Municipal Officials) for the Commissioners, and as available for member city councils and staff.
2. Collaborate with Hennepin County staff to undertake ongoing Commissioner education on various introductory and continuing education topics.
3. Work cooperatively with Hennepin County staff to reach out to urban, rural, and agricultural property owners
4. Disseminate education materials to all stakeholders about actions they can take to protect and improve water quality.
5. Maintain a website and social media presence with up to date and fresh content.
6. Participate with collaborative groups such as Watershed Partners.

Table 1. Pioneer-Sarah Creek Third Generation Watershed Management Plan Education and Public Outreach Activities.

Activity	Educational Outcomes	Example Actions	Estimated Cost	Schedule/ Frequency
Collaborate with Hennepin County staff to provide Commissioner and landowner education and outreach	▪ Enhance Commissioner knowledge ▪ Raise profile of Commission ▪ Coordination of messages ▪ Increased public outreach	▪ Short presentations on a variety of topics at each Commission meeting as ongoing education ▪ Accompany county staff at outreach activities such as small group meetings	Minimal	Monthly
Convene Citizen Advisory Committees (CAC) as necessary	▪ Coordination and implementation of education and outreach program ▪ Increased public outreach	▪ Meet as necessary to coordinate and implement education and outreach ▪ Use email and social media to coordinate efforts and enhance community participation and communication ▪ Make recommendations to Commission ▪ Represent the Commission at education and outreach events	Variable	As necessary
Coordinate programming with collaborative groups	▪ Consistency of message across wider area ▪ Youth education ▪ Adult education ▪ Increased visibility for Commission	▪ Participate in developing education campaigns ▪	Variable	As necessary
Coordinate with other organizations to provide continuing education opportunities to elected and appointed officials	▪ Enhance understanding of watersheds and water resources ▪ Increase awareness of trends in regulations, maintenance, public opinions, etc.	▪ Sponsor Northland NEMO or other workshops for all Commissioners, City Councils, and Planning Commissions ▪ Provide tailored education and outreach activities such as workshops, presentations, written materials, and on-line resources	$300 Annually	At least once per year
Maintain website	▪ Ability to provide a wide range of information to users for self-directed education	▪ Maintain and update website	$2,200 Annually	Ongoing
Sponsor volunteer water quality monitoring, watershed clean-up activities, and volunteer planting and maintenance opportunities	▪ Engage and educate residents, students, and other interested parties through hands-on activities ▪ Support positive actions to protect and improve water resources ▪ Increased visibility for and knowledge of Commission	▪ Sponsor volunteer lake, stream, and wetland monitoring ▪ Encourage and facilitate volunteer events ▪ Hold an annual family water quality event	$500 Annually + volunteer monitoring budget	Ongoing

Activity	Educational Outcomes	Example Actions	Estimated Cost	Schedule/ Frequency
Distribute electronic and printed educational materials	▪ Distribution of useful information to assist in implementing BMPs	▪ Post electronic information on Commission and County website ▪ Distribute printed materials to member cities, and make available at events	$300 Annually Cities fund repro cost	Printed– 1 per year Electronic – at least 3 new items per year
Contribute press releases and information material to local media	▪ Distribution of useful information to assist in implementing BMPs ▪ Increased visibility for and knowledge about Commission	▪ Submit press releases on programs and projects in the watersheds ▪ Submit press releases with useful, timely information	$330 Annually	At least 3 times/year
Coordinate programming with other Metro organizations	▪ Consistency of message across wider area ▪ Access to additional education and outreach materials	▪ Continue membership in Blue Thumb and Watershed Partners ▪ Coordinate with NEMO	$1,000 Annually	Annual and ongoing
Provide education, outreach, and financial assistance to lake associations, schools, faith based-groups, community organizations, and other groups	▪ Improve general understanding of watersheds and water resources ▪ Encourage the adoption of practices that protect water resources ▪ Increase visibility for and knowledge of Commission	▪ Sponsor annual lake association summit ▪ Provide small grants as incentives to implement volunteer events and demonstration projects ▪ Provide small grants to educators to enhance environmental and water resources education in the schools	$3,000 - 5,000 Annually	Ongoing
			$15,980 to $17,980	

Appendix F
Capital Improvement Program (CIP)

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Pioneer-Sarah Creek Watershed Management Commission
Third Generation Watershed Management Plan
Capital Improvement Projects and Funding

Projects proposed for the Capital Improvement Program (CIP) are shown in Table F.1 and described in more detail following the table. This initial CIP was prepared from projects submitted by the member cities and reviewed and prioritized by the Commission's Technical Advisory Committee (TAC). Projects and studies that implemented Lake Independence and Lake Sarah TMDL load reduction or other actions were given the highest priority.

It is anticipated that this CIP will be reviewed annually, and additional projects and studies may be added by plan amendment as submitted by the member cities or as recommended by the TAC.
It is the intent of the Commission to finance these projects using its current Cost Share Policy as funds are available and through local funds and grants as available.

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Table F.1. Capital Improvement Program.

Note: See project descriptions following the tables. PSC = Pioneer-Sarah WMC

Priority	Project Name	Total Cost	Commission Share	Potential Funding Source(s)	Engaged Landowner	2020	2021	2022	2023	2024	2025	2026-2030
Lake Independence Drainage Area												
1	Lake Independence TMDL Review & Management Plan	$30,000	$30,000	PSC, Independence, Medina	NA		30,000					
2	Lake Independence Area BMPs	$100,000	$25,000	PSC, Independence, Medina, County	Not yet			10,000		10,000		5,000
1	Subwatershed Assessment: Spurzem Area	$60,000	$15,000	PSC, Medina, Loretto	NA			15,000				
2	Spurzem Area BMPs	$100,000	$25,000	PSC, Medina, Loretto, County	Not yet				10,000		10,000	5,000
1	Lake Ardmore Management Plan	$10,000	$10,000	PSC, Medina	NA				10,000			
2	Ardmore Lake Alum Treatment	$20,000	$5,000	PSC, Medina	NA					5,000		
2	Half Moon Lake Alum Treatment	$45,000	$11,250	PSC, TRPD	NA							11,250
2	Peter Lake Alum Treatment	$65,000	$16,250	PSC, Medina	NA							16,250
2	Spurzem Lake Alum Treatment	$62,000	$15,500	PSC, TRPD	NA							15,500
3	Lake Independence Alum Treatment	$1,390,468	$250,000	PSC, Med, Ind, TRPD	NA							250,000
Lake Sarah Drainage Area												
1	SedimentSsampling in Lake Sarah	$12,000	$3,000	PSC, Independence, Greenfield	NA		3,000					
2	Lake Sarah TMDL Review & Management Plan	$25,000	$25,000	PSC, Independence, Greenfield	NA			25,000				
2	Dancehall Creek SWA BMPs	$200,000	$50,000	PSC, Greenfield, County	Not yet		10,000		10,000		10,000	20,000
2	JB Gully Stabilization	$75,000	$18,750	PSC, Ind, County	Not yet			18,750				
1	Lake Sarah Curlyleaf Pondweed Treatment	$28,000	$8,000	PSC, Ind, Greenfield, lake assn	NA	8,000	8,000					
3	Lake Sarah Alum Treatment	$250,000	$62,500	PSC, Ind, Greenfield	NA						62,500	
Pioneer Creek Drainage Area												
1	Whaletail South Alum Treatment	$300,646	$75,160	PSC, TRPD	NA	75,160						
1	Pioneer Creek @ Pagenkopf Rd Carp Barrier	$75,000	$18,750	PSC, Independence	NA	18,750						
2	CSAH 91/ CR92 Supplemental BMPs	$100,000	$25,000	PSC, County	NA		25,000					
3	Wetland Restorations/ Deer & Unnamed Creeks	$50,000	$12,500	PSC, Minnetrista	Not yet		6,250				6,250	
3	Channel Restorations/ Deer & Unnamed Creeks	$60,000	$15,000	PSC, Minnetrista	Not yet			7,500				7,500
Crow River Drainage Area												
1	Lake Rebecca Alum Treatment	$225,000	$56,250	PSC, TRPD	NA				53,250			
3	Subwatershed Assessment: Hafften, Schendel, Schwauppauff	$15,000	$3,750	PSC, Greenfield	NA							3,750
Ongoing Opportunity Based Projects - Watershed Wide												
2	Stormwater BMPs / retrofits	varies	$10,000	PSC, County	Not yet		5,000		5,000			
2	Feedlot / Manure Management BMPs	varies	$10,000	PSC, County	Not yet			5,000		5,000		
2	Agricultural Practice BMPs	varies	$10,000	PSC, County	Not yet				5,000		5,000	
	TOTAL	**$3,298,114**	**$806,660**			101,910	87,250	81,250	93,250	20,000	93,750	334,250

Project Descriptions

Unless otherwise noted, it is assumed that the Commission's share will be as shown on Table F.1, with the balance funded by the member city, supplemented as necessary through grant funds and stakeholder and land owner financial participation.

Lake Independence Drainage Area

Lake Independence TMDL Review and Management Plan
The Lake Independence TMDL was completed in 2007. 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. This project is a progress review and development of a Lake Management Plan for Lake Independence, including updating watershed and lake response modelling and TMDL load reduction targets. The progress review will also update the TMDL implementation plan, including actions for the upstream impaired lakes. The focus of this plan will be on holistic, whole-lake ecological management that includes actions to manage aquatic vegetation and fish communities and internal load in addition to watershed load reductions.

Lake Independence Area BMPs
The City of Independence had previously completed a subwatershed assessment for that part of the city that is tributary to Lake Independence. The report identified 64 potential BMPs, including wetland restorations, hydrologic restorations, gully stabilizations, residential rain gardens, grassed waterways, and other practices to reduce phosphorus and sediment loading to the lake. Most of these are on private property. This project is to provide cost share for those practices as willing landowners become available. http://www.pioneersarahcreek.org/independence-sra.html

Subwatershed Assessment-Spurzem Drainage Area
This project is the completion of a subwatershed assessment of the drainage area to Spurzem Lake to identify potential BMPs and estimate their costs and removals.

Spurzem Area BMPs
Following completion of the subwatershed assessment, this project is to share in the cost of implementing BMPs to reduce phosphorus and sediment loading to Spurzem Lake or the upstream tributary lakes.

Lake Ardmore Management Plan
The Commission and the city of Medina have recently completed some BMPs in the Lake Ardmore drainage area. This lake is tributary to Lake Independence. This project is the development of a holistic, whole-lake ecological management that includes actions to manage aquatic vegetation and fish communities and internal load in addition to watershed load reductions.

Ardmore Lake Alum Treatment
The purpose of the project is to significantly reduce the sediment phosphorus release during anoxic conditions through the application of aluminum sulfate in Ardmore Lake, which is upstream of Lake Independence. The reduction of phosphorus internal loading in Ardmore will significantly improve the in-lake water quality conditions and is necessary to achieve the MPCA in-lake water quality standards.

Half Moon Lake Alum Treatment
The purpose of the project is to significantly reduce the sediment phosphorus release during anoxic conditions through the application of aluminum sulfate in Half Moon Lake, which is upstream of Lake Independence. The reduction of phosphorus internal loading in Half Moon will significantly improve the in-lake water quality conditions and is necessary to achieve the MPCA in-lake water quality standards.

Peter Lake Alum Treatment
The purpose of the project is to significantly reduce the sediment phosphorus release during anoxic conditions through the application of aluminum sulfate in Peter Lake, which is upstream of Lake Independence. The reduction of phosphorus internal loading in Peter will significantly improve the in-lake water quality conditions and is necessary to achieve the MPCA in-lake water quality standards.

Spurzem Lake Alum Treatment
The purpose of the project is to significantly reduce the sediment phosphorus release during anoxic conditions through the application of aluminum sulfate in Spurzem Lake, which is upstream of Lake Independence. The reduction of phosphorus internal loading in Spurzem will significantly improve the in-lake water quality conditions and is necessary to achieve the MPCA in-lake water quality standards.

Lake Independence Alum Treatment
The project is to significantly reduce the sediment phosphorus release during anoxic conditions through the application of aluminum sulfate in Lake Independence, which will significantly improve the in-lake water quality conditions. The control of internal load in Lake Independence is necessary to achieve the MPCA in-lake water quality standards. The Commission considers Independence a Sentinel Lake. A TMDL study was completed in 2007 that identified internal loading as a significant portion of the total loading that impacts water quality conditions.

Lake Sarah Drainage Area

Lake Sarah Sediment Sampling
Prior to completing the proposed TMDL Review and Management Plan, sampling the sediment in Lake Sarah would provide a more accurate estimate of internal load released from sediments. This is critical for partitioning phosphorus load between external and internal sources and in determining the types of BMPs and their priority.

Lake Sarah TMDL Review and Management Plan
The Lake Sarah TMDL was completed in 2011. A subwatershed assessment has been completed for the Dance Hal Creek drainage area. Stakeholders have completed several watershed and in-lake implementation actions since that time. Additional monitoring data has been or will be collected. This project is a progress review and development of a Lake Management Plan for Lake Sarah, including updating watershed and lake response modelling and TMDL load reduction targets. The progress review will also update the TMDL implementation plan. The focus of this plan will be on holistic, whole-lake ecological management that includes actions to manage aquatic vegetation and fish communities and internal load in addition to watershed load reductions.

Dance Hall Creek Drainage Area BMPs
The Lake Sarah TMDL identified flow discharging from Dance Hall Creek into Lake Sarah as a significant source of nutrient load to the lake. In 2014, the City of Greenfield partnered with Hennepin County

Environmental Services, Three Rivers Park District, and the Commission to complete a subwatershed assessment of the Dance Hall Creek drainage area. This project would implement high-priority BMPs identified in that study. http://www.pioneersarahcreek.org/dance-hall-creek.html

JB Gully Stabilization
Stabilization of a gully/creek that is conveying excess phosphorus and sediment to Lake Sarah. While located on private property willing landowners have been identified.

Lake Sarah Curlyleaf Pondweed Treatment
In partnership with the DNR and the Lake Sarah Improvement Association, apply herbicide (Aquathol) to non-native curly-leaf pondweed (CLP) which was included in the TMDL Implementation Plan as a solution to the large in-lake load for Lake Sarah (900 lbs/yr or 17% overall load).

Lake Sarah Alum Treatment
The purpose of the project is to significantly reduce the sediment phosphorus release during anoxic conditions through the application of aluminum sulfate in Lake Sarah. The reduction of phosphorus internal loading in Sarah will significantly improve the in-lake water quality conditions and is necessary to achieve the MPCA in-lake water quality standards.

Pioneer Creek Drainage Area

Whaletail South Alum Treatment.
The purpose of the project is to significantly reduce the sediment phosphorus release during anoxic conditions through the application of aluminum sulfate in South Whaletail Lake. The reduction of phosphorus internal loading in South Whaletail Lake will significantly improve the in-lake water quality conditions. The control of internal load in South Whaletail Lake is necessary to achieve the MPCA in-lake water quality standards.

Pioneer Creek Pagenkopf Road Carp Barrier.
The project is to install a carp barrier on Pioneer Creek at the downstream end of the culvert located at Pagenkopf Road. A carp movement study indicated that fish are moving in large numbers in the spring through Pioneer Creek to access shallow lakes located downstream of Lake Independence to spawn. A barrier would (1) prohibit carp movement from moving back and forth between Lake Independence and the downstream shallow lakes through Pioneer Creek at Pagenkopf, and (2) provide an opportunity to remove carp at the barriers in the spring to reduce overall biomass

Supplemental BMPs for CSAH12/CR92 Reconstruction.
Hennepin County and MNDOT are working jointly to improve safety along CSAH12 at its intersection with County Road 92. Stormwater BMPs, specifically two ponds, will be implemented to treat runoff from new impervious surface created with this project. This CIP proposes to install additional BMPs, specifically at least one iron-enhanced sand filter or spent-lime filter, to better treat dissolved phosphorus and other pollutants prior to discharge into Robina Creek. This project only includes BMPs that go above-and-beyond permit requirements.

Wetland Restorations/ Deer & Unnamed Creeks.
The project is the restoration of two wetland systems to address the dissolved oxygen impairment and improve hydrology and water quality in the Deer and Unnamed Creek flow through wetland systems. The purpose is to decrease sediment oxygen demand and improve the overall water quality.

Channel Restorations/ Deer & Unnamed Creeks
The project is channel restoration through development of low-flow channels in impaired Unnamed and Deer Creeks. The goal is to complete approximately 2000 linear feet of channel restoration, 1000 feet per project. The purpose is to decrease width and increase velocity, meandering, riffles, and aeration throughout the waterbodies.

Crow River Drainage Area

Lake Rebecca Alum Treatment
The purpose of the project is to reduce the sediment phosphorus release during anoxic conditions through the application of aluminum sulfate in Rebecca Lake. The reduction of phosphorus internal loading in Rebecca will be necessary to ensure that the lake continues to meet the MPCA water quality standards. Lake Rebecca had an alum treatment in 2010/2011 to reduce the internal loading of sediment phosphorus release. The overall effectiveness of the alum treatment has been reduced overtime, and a bump treatment will be needed to ensure that the lake continues to meet the MPCA water quality standards. A study will be completed in 2020 to evaluate the existing alum-phosphorus binding capacity through sediment phosphorus release analysis.

Subwatershed Assessment-Hafften, Schendel, Schwauppauff
This project is the completion of a subwatershed assessment of the drainage area to Hafften, Schendel, Schwauppauff Lakes and the Crow River to identify potential BMPs, and estimate their costs and removals.

Ongoing Opportunity Based Projects - Watershed Wide

Stormwater BMPs/Retrofits, Feedlot/Manure Management BMPs, Agricultural Practice BMPs
The Commission has a partnership with Hennepin County Environment and Energy staff as they work with private landowners to undertake stormwater and agricultural management practices. As opportunities arise throughout the watershed, the Commission may supplement County cost-share funds to assist and incentivize those landowners to achieve phosphorus, sediment, and bacterial loading to the waters in the watershed.

2019 Three Rivers Park District Carp Monitoring Report
Carp Biomass Assessment in Lake Independence
Carp Movement & Nursery Location Monitoring

Prepared for Three Rivers Park District (TRPD)

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Summary
This report summarizes carp monitoring work completed by Carp Solutions in 2019. The main objectives in 2019 were to gather an updated carp biomass estimate in Lake Independence using electrofishing surveys, and monitor carp movement to potential nursery locations using PIT antennas setup at three locations in the watershed. Five different electrofishing surveys were completed on Independence between July and September, with average carp biomass density from each survey ranging from 72 kg/ha to 308 kg/ha, and an average of the five surveys of 142 kg/ha. It would appear the carp population in Independence is slightly above the ecologically damaging threshold of 100 kg/ha. There is a strong potential for the population to increase given carp movement to peripheral shallow lakes which could be serving as carp nurseries. To monitor and quantify this carp movement, between work completed in 2018 and additional carp implanted with PIT tags in 2019, a total of 205 carp were implanted with PIT tags in the watershed. Of the 205 PIT tagged carp, 60 were implanted in Ardmore Lake in 2018 (although 15 PIT tagged carp were confirmed dead from a winterkill event during the winter of 2018-2019), 88 were implanted in Independence in 2018 and 57 were implanted in Independence in 2019. PIT antennas were in place at three locations: Hwy 19 crossing over Spurzem Creek, Pagenkopf Road crossing over Pioneer Creek, and Ardmore Creek. Carp movement was minimal at the Hwy 19 Spurzem Creek location, with only one carp detected at this antenna in June 2019. Carp movement was greater at the other two locations, with 18 carp detected at the Ardmore Creek antenna, with most of those being detected in April 2019 moving towards Ardmore. At the Pioneer Creek antenna at Pagenkopf Road, 36 carp were detected moving towards Ox Yoke Lake and Rice Lake, likely to spawn. This carp movement study verifies that carp are moving in large numbers in the spring through Pioneer Creek and Ardmore Creek, likely to shallow lakes to spawn. Carp Solutions recommends a strategic use of barriers at these connections to block carp movement, or block and remove carp. Once carp

movement to these spawning locations is prevented, carp removal may be warranted in Independence to attempt to lower the population below the 100 kg/ha ecologically damaging threshold. Removal at the barriers each spring could be a very cost-effective method to remove carp each year. Removal with Carp Solution's baited box-net trapping system could also be deployed in Independence as another removal technique.

Results

Objective 1: Carp population and biomass estimate within Lake Independence

Carp Solutions completed five boat electrofishing surveys in Lake Independence on separate days between July and September 2019 to estimate the carp population. Surveys were conducted on July 12, July 23, August 30, September 6 and September 13 following standard boat electrofishing methods described in Bajer et al. 2012. During each survey, we completed four 20-minute transects at different locations in the lake. A total of 54 carp were captured during the five surveys, all were measured and implanted with a PIT tag, and released. Table 1 details the results from each transect from each survey and identifies the transect numbers which correspond to Figure 1, which shows locations for all the transects. The number of carp caught varied among the transects and survey dates, although carp did seem to be caught from all areas of the lake. From each survey, a CPUE was determined and converted to a biomass density in kg/ha. Biomass density from each survey date ranged from 72 kg/ha to 308 kg/ha, with an average biomass density of the five surveys of 142 kg/ha. Table 2 provides a summary of carp population data from the surveys.

Table 1: Data from 2019 boat electrofishing surveys. Color coded transect locations correspond to the map in figure 1. Transect CPUE is in carp caught per hour (each transect was 20 minutes long). All fish caught in these surveys were measured and the average weight was estimated from these lengths.

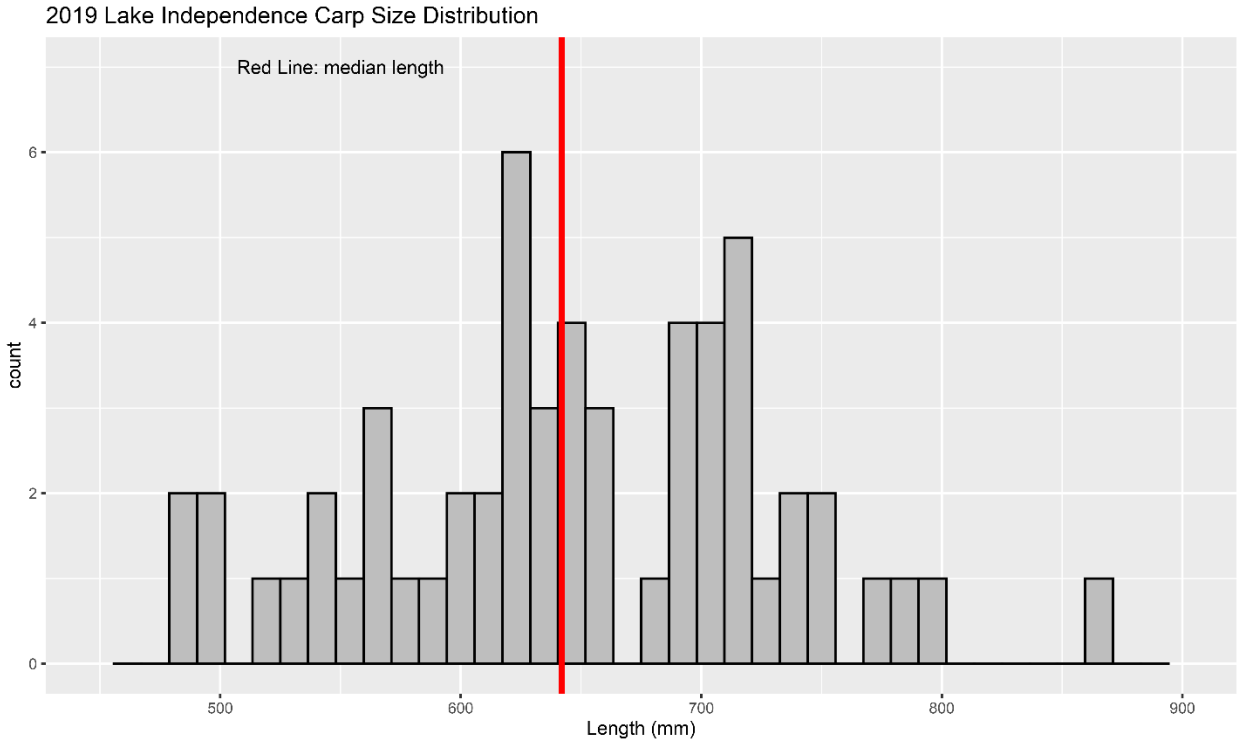
Date	Transect Location	Carp Caught	Transect CPUE	Mean Length (mm)	Mean estimated weight (kg)
7/12/2019	2	1	3	712	4.6
7/12/2019	5	0	0	NA	NA
7/12/2019	9	2	6	491	1.6
7/12/2019	6	6	18	600	2.8
7/23/2019	8	9	27	683	4.1
7/23/2019	9	5	15	625	3.2
7/23/2019	3	8	24	650	3.6
7/23/2019	2	1	3	642	3.4
8/30/2019	1	8	24	712	4.6
8/30/2019	4	0	0	NA	NA
8/30/2019	5	1	3	620	3.1
8/30/2019	9	0	0	NA	NA
9/6/2019	8	5	15	645	3.5
9/6/2019	9	0	0	NA	NA
9/6/2019	9	0	0	NA	NA
9/6/2019	4	2	6	546	2.2
9/13/2019	6	0	0	NA	NA
9/13/2019	9	0	0	NA	NA
9/13/2019	5	0	0	NA	NA
9/13/2019	4	6	18	611	3

Figure 1: Map of Lake Independence showing the locations of electrofishing transects. The color coded transect numbers correspond to Table 1.

Table 2: Summary of carp population data from electrofishing surveys. Catch per unit effort (CPUE) is in units of carp caught per hour (each transect was 20 minutes long). All carp were measured, and the weight was estimated from that length. The carp population was estimated from the CPUE, along with the biomass density in kg of carp per hectare.

Date	Transects	Catch	CPUE	Average Length (mm)	Est. Weight (kg)	Carp Population Estimate	Biomass Density Estimate (kg/ha)
7/12/2019	4	9	6.75	588	2.7	11728	93.7
7/23/2019	4	23	17.25	657	3.7	28380	308.2
8/30/2019	4	9	6.75	702	4.4	11728	152.8
9/6/2019	4	7	5.25	616	3.1	9349	85.1
9/13/2019	4	6	4.5	611	3	8160	72.5
Total	20	54					
Average	4	10.8	8.1	635	3.4	13869	142.5

Figure 2: Size distribution of carp caught using boat electrofishing in 2019. Units are in millimeters.



Objective 2 – Carp Movement Monitoring

Three PIT antennas were installed in the watershed in 2018 to begin tracking carp movement from Independence to connected shallow waterbodies that could be serving as carp nurseries. Carp Solutions maintained these antennas through February 2020, providing monthly data downloads at each site and maintaining the systems to ensure optimum read range of PIT tagged fish in the system. Figure 3 shows the location of the antennas. Antennas were placed in streams connecting Lake Independence to Ardmore Lake (Ardmore PIT), to Spurzem Chain of Lakes (Hwy 19) and a connection to Ox Yoke and Rice Lake (Pagenkopf). To monitor and quantify this carp movement, between work completed in 2018 and additional carp implanted with PIT tags in 2019, a total of 205 carp were implanted with PIT tags in the watershed. Of the 205 PIT tagged carp, 60 were implanted in Ardmore Lake in 2018, 88 were implanted in Independence in 2018 and 57 were implanted in Independence in 2019. During the winter of 2018-2019, TRPD staff observed a winterkill event in Ardmore Lake. TRPD staff proceeded to scan as many dead carp as they could for PIT tags and were able to confirm 15 dead PIT tagged carp. Appendix a provides a table with the PIT tag numbers and date and location of where the carp were captured and implanted with PIT tags. This table also identifies which tagged carp were found dead in Ardmore Lake during the 2018-2019 winter. The 15 dead Ardmore carp were all originally tagged in Ardmore Lake on July 2, 2018. The 15 dead PIT tagged carp represents 25% of the tagged carp in Ardmore, the remaining 45 PIT tagged carp could be alive or it's possible some of them also died. We discuss overall carp movement observations at each antenna location in the following pages. Appendix b also provides a more detailed list of all PIT tagged carp and detection dates at each antenna.

Figure 3. PIT Antenna Locations

Hwy 19 PIT Antenna

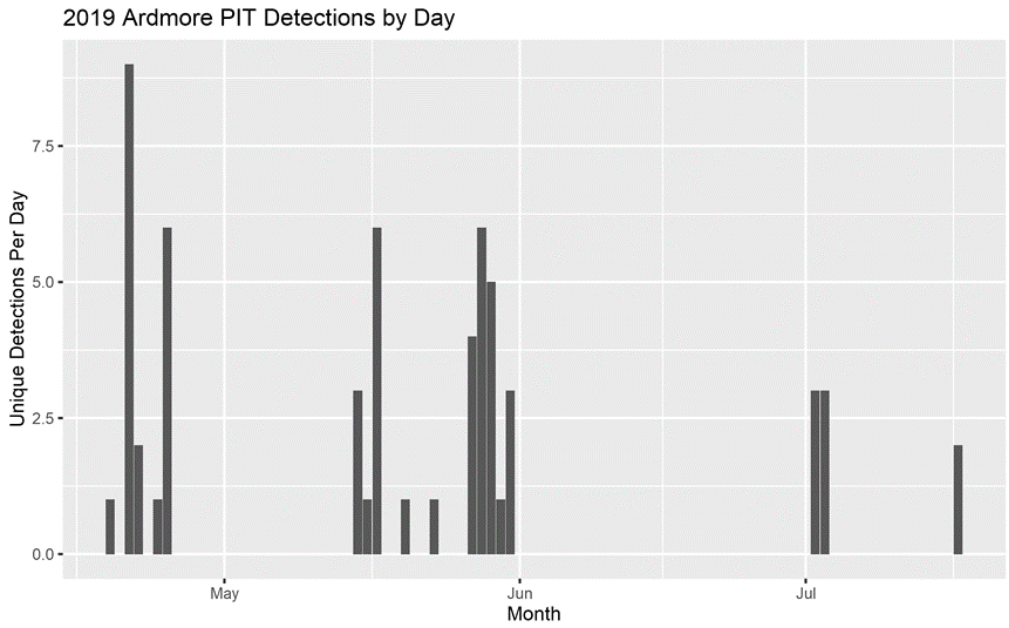
This antenna was located in Spurzem Creek at the Hwy 19 crossing and connects Lake Independence to the Spurzem Chain of Lakes. This site was slightly impacted this season due to high water levels and some power issues early on. It would appear from January 2019 to March 2019, there were power issues of the antenna at this site. These power issues were resolved in March and the site functioned well from March through July 2019. During the monthly check in August, we detected some malfunction with the PIT reader box at this location. The reader box was replaced on September 4, 2019 and the antenna has functioned well since then. These issues occurred sometime between our July 22nd visit to the system, which showed the system fully functional, and our August 30th visit to the system, in which we detected the issue. We are unsure how this malfunction impacted fish detections during that time period, as there was very limited carp movement at this system all year. Only one carp was detected at this antenna in 2019, which is similar to what was observed in 2018 as well. The one detection in 2019 occurred on June 5, 2019. This carp was originally tagged in Lake Independence in 2018. This tagged carp was also detected earlier in the year on May 30, 2019 at the Pagenkopf PIT antenna, suggesting this fish may have moved toward Ox Yoke or Rice Lake to spawn, and was moving back through Independence and through Spurzem Creek towards the Spurzem Chain of Lakes.

Ardmore PIT Antenna

This antenna was located in Ardmore Creek between Lake Independence and Ardmore Lake. There were power issues with this antenna in 2018 when the antenna was originally setup to run off solar power. On March 29, 2019, this antenna was moved to another location on the creek and connected to permanent power from a nearby resident. Since the relocation, this site has been fully functional with no power loss. In 2019, there 18 detections of tagged carp passing through this antenna between April 19, 2019 and July 17, 2019. 14 of those tagged carp were originally tagged in 2018 in Lake Independence. Of those 14 originally tagged in Independence, 13 of them were first detected at the antenna between April 21st and April 25th, 2019 presumably headed toward Ardmore Lake to spawn. In some cases, there were multiple detections during this time period as carp likely swam back and forth in the stream channel prior to heading into the lake. Most of those carp were again detected back at the antenna between May 15th and May 29th, presumably headed back towards Independence. The other 1 carp that was originally tagged in Independence wasn't detected at the antenna until May 20, 2019. A few of those carp were again detected in July, suggesting movement of fish between Independence and Ardmore can occur throughout the summer, however, most of the movement appears to occur in the spring aligning with timing for spawning migration. The other four carp detected at this antenna were originally tagged in Ardmore Lake in 2018. This suggests the winterkill event that occurred in Ardmore the winter of 2018-2019 was only a partial winterkill, and at least some of the PIT tagged carp survived. It's difficult to determine how this winterkill event effected the carp population in Ardmore, as noted in previous years reports, the carp population in Ardmore Lake can change substantially year to year with adult carp migration, juvenile recruitment and mortality. However, we know that at least a portion of the carp population survived the winterkill event, and that 4 of the carp originally tagged in

Ardmore Lake in July 2018 were detected at the Ardmore antenna in 2019. 3 of those carp were first detected at the antenna between April 19th and April 21st, and some returned late May. A couple of those carp were also detected in July, again suggesting there is carp movement between Independence and Ardmore throughout the season. One carp had multiple detections in late May, and then in July this carp was also detected at the Pagenkopf antenna and never returned to Ardmore. This suggests some carp may move between Ardmore, Independence and possibly down towards Ox Yoke and Rice Lake. It would appear the Ardmore Lake connection is an important site of carp recruitment for Lake Independence, and a barrier to block movement and potentially remove carp at the barrier would be warranted.

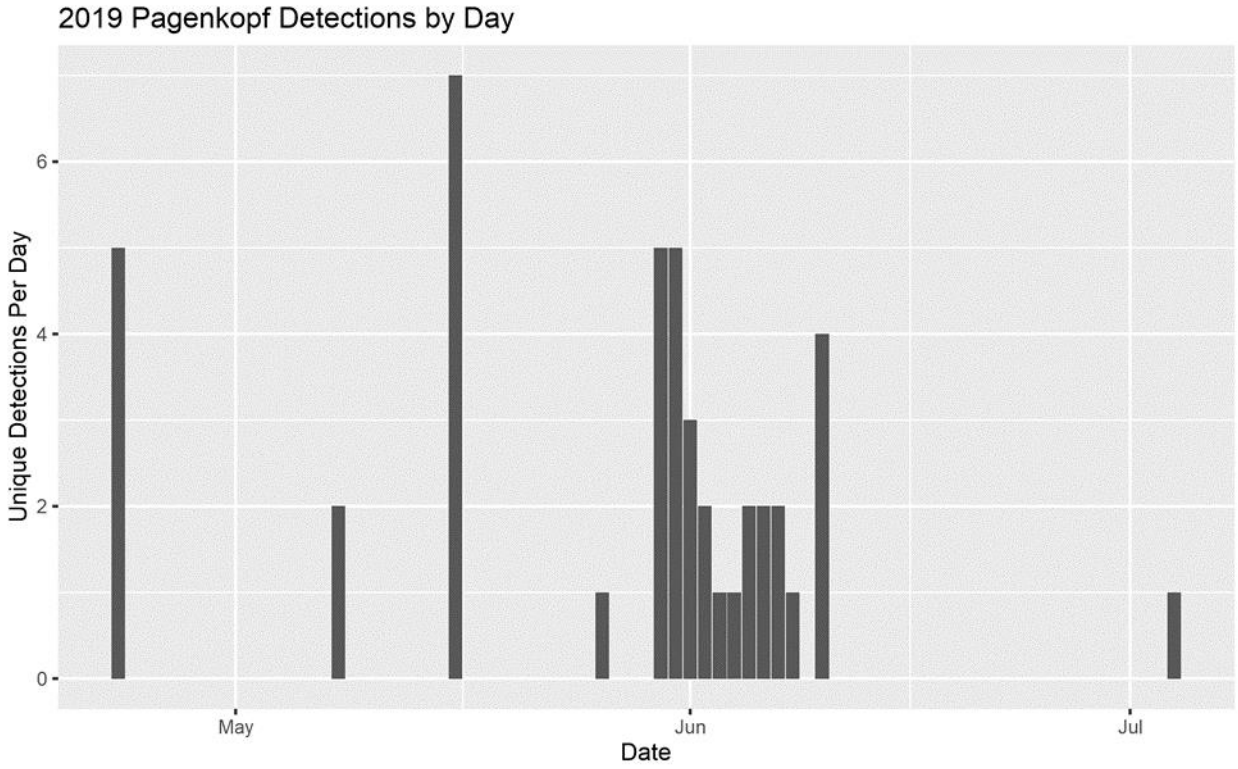
Figure 4. The number of carp detected at the Ardmore Creek site per day.



<u>Pagenkopf PIT Antenna</u>

This antenna was in place in Pioneer Creek, which connects Lake Independence to Ox Yoke and Rice Lake. The antenna located at the culvert at this location was replaced on May 3, 2019 to increase functionality, but this site operated without power loss all season and had good functionality the remainder of the season. There were 36 detections of tagged carp at this location between April 23, 2019 and July 4, 2019. All but one of these fish were originally tagged in Lake Independence. One fish was originally tagged in Ardmore Lake, and this also happened to be the only fish detected at this site in July (Figure 5). Detection dates at the Pagenkopf antenna varied more than the other antennas. Some carp were first detected in late April, others were first detected in May or June. Interestingly, only 8 of these carp were detected a second time at this antenna. It would appear carp from Lake Independence are frequently using this stream to move through Pioneer Creek, likely towards Ox Yoke or Rice Lake. Carp Solutions would recommend a barrier at this connection to prevent movement and limit carp recruitment in the system. This would also provide a good opportunity to remove carp as they move through the creek each spring.

Figure 5. The number of tagged common carp that were detected by day at the Pagenkopf Avenue site.



Carp Movement Study Conclusions:

The 2019 PIT data are similar to 2018. The carp appear to be moving out of Lake Independence in the direction of Ox Yoke and Rice Lakes past the Pagenkopf Avenue site, likely as part of a spawning migration. Similarly, carp are moving from Lake Independence into Ardmore Lake through Ardmore Creek. While the majority of movement occurs in the spring at both these locations, there is movement later in the season as well. The Highway 19 antenna has only detected one carp each year, therefore, it does not appear that there is a significant migration up Spurzem Creek. The data collected by the PIT antennas in 2018 and 2019 seasons verifies that the carp are moving out of Lake Independence into Pioneer Creek and Ardmore Creek. We recommend a strategic use of barriers to be considered at these locations. These barriers can be used to just block carp movement, or to block and remove. Removal in the creek during spawning migrations might be the most cost-effective method for carp management in the system.

Management Recommendations

Carp Solutions would recommend implementing strategies to limit carp recruitment in this system as a top priority. Carp biomass in Independence is likely above the 100 kg/ha threshold where carp can provide ecological damage, with a biomass density estimate for the lake of 142 kg/ha based on the five electrofishing surveys in 2019. Carp are likely providing an impact on the aquatic plant community within the littoral area of Lake Independence and may be a contributing factor towards poor water quality in the lake, however, given the moderate density of carp in the lake, they are probably not the main driver at this time. Lake Independence would appear to be at a high risk of the carp population increasing though due to carp recruitment and addressing this should be a top priority to prevent the carp population from increasing to more damaging levels. Carp movement data suggests that carp are likely using Ardmore Lake as a carp nursery, as well as Ox Yoke and Rice Lake. If no action is taken to limit recruitment, it's very likely that the carp population in Independence would continue to grow with new year classes of carp adding to the system.

Barriers would be recommended to block carp movement to Ardmore Lake and in Pioneer Creek to block movement to Ox Yoke and Rice Lake. Physical barriers can be a good option, although they often require frequent maintenance to clear off debris and vegetation and ensure they are functioning properly. When physical barriers are installed, Carp Solutions recommends effectiveness monitoring of the barrier. This can be done by installing PIT antennas on each side of the barrier to assess if carp are blocked by the barrier. This is a sound method to evaluate the effectiveness of physical barriers if there is enough PIT tagged fish in the system. Periodic electrofishing in the spring in Lake Independence to implant additional PIT tags would also be recommended along with placement of the antennas. Physical barriers, however, may not be able to stop the movement of juvenile carp due to small size of those fish.

Electric barriers are another option. Carp Solutions offers a low-voltage Electric Guidance/Barrier System (EGS) that can be used strategically in the springtime to prevent carp movement, and when paired with our trapping system, could subsequently remove migrating carp. The benefits of this system are it doesn't require ongoing maintenance and cleaning like a physical barrier, and can be used strategically in the springtime during peak carp migration, and then removed from the site, allowing native fish passage the remainder of the year. Also, the EGS would work for all sizes of migrating carp, including juveniles.

Once carp recruitment is addressed, Carp Solutions would recommend implementing carp removal strategies to lower the carp population in Lake Independence below the ecological damaging threshold of 100 kg/ha. Strategies could include springtime trapping in streams as carp migration occurs, or through removals during the summer/fall months using Carp Solution's patented box-net trapping system, or a combination of both. Carp Solutions would welcome exploring these options further and finding a solution that would best fit your needs. Carp Solutions has valued the partnership with Three Rivers Park District over the last several years and is committed to providing a high level of carp management services, supported by years of science and research and development of our methods and offerings. Thank you again for the opportunity to work with you on this project.

Appendix a. PIT tag numbers with date and lake implanted

DATE	LAKE	LENGTH (mm)	PIT	SEX	Confirmed Dead
5/7/2018	INDEPENDENCE	542	226000103358		
5/7/2018	INDEPENDENCE	570	226000103332		
5/7/2018	INDEPENDENCE	732	226000103334		
5/7/2018	INDEPENDENCE	561	226000103365		
5/7/2018	INDEPENDENCE	701	226000103345		
5/15/2018	INDEPENDENCE	532	226000967922		
5/15/2018	INDEPENDENCE	622	226000103313		
5/15/2018	INDEPENDENCE	600	226000103383		
5/15/2018	INDEPENDENCE	439	226000103333		
5/15/2018	INDEPENDENCE	792	226000103310		
5/15/2018	INDEPENDENCE	864	226000103354		
5/16/2018	INDEPENDENCE	107	226000103372		
5/16/2018	INDEPENDENCE	803	226000103389		
5/16/2018	INDEPENDENCE	720	226000103338		
5/16/2018	INDEPENDENCE	782	226000103335		
5/16/2018	INDEPENDENCE	805	226000103385		
5/16/2018	INDEPENDENCE	519	226000103347		
5/16/2018	INDEPENDENCE	782	226000103335		
5/18/2018	INDEPENDENCE	501	226000103317	M	
5/18/2018	INDEPENDENCE	805	226000103373		
5/18/2018	INDEPENDENCE	757	226000103390		
5/18/2018	INDEPENDENCE	701	226000103314		
5/18/2018	INDEPENDENCE	722	226000103360		
5/18/2018	INDEPENDENCE	720	226000103305	M	
5/18/2018	INDEPENDENCE	815	226000103386		
5/18/2018	INDEPENDENCE	772	226000103321		
5/18/2018	INDEPENDENCE	691	226000103387	M	
5/18/2018	INDEPENDENCE	737	226000103384	M	
5/18/2018	INDEPENDENCE	692	226000103306	M	
5/18/2018	INDEPENDENCE	632	226000103328	M	
5/18/2018	INDEPENDENCE	668	226000103325	M	
5/18/2018	INDEPENDENCE	821	226000103331		
5/18/2018	INDEPENDENCE	702	226000103312		
5/18/2018	INDEPENDENCE	737	226000103319		
5/18/2018	INDEPENDENCE	772	226000103380		
5/18/2018	INDEPENDENCE	700	226000103370		
5/18/2018	INDEPENDENCE	815	226000103361		

5/18/2018	INDEPENDENCE	751	226000103367		
5/18/2018	INDEPENDENCE	727	226000103346	M	
5/18/2018	INDEPENDENCE	682	226000103351	M	
5/18/2018	INDEPENDENCE	722	226000103353	M	
5/18/2018	INDEPENDENCE	722	226000103344	M	
5/18/2018	INDEPENDENCE	710	226000103294	M	
5/18/2018	INDEPENDENCE	808	226000103349		
5/18/2018	INDEPENDENCE	710	226000103350	M	
5/18/2018	INDEPENDENCE	690	226000103348		
5/18/2018	INDEPENDENCE	771	226000103320		
5/18/2018	INDEPENDENCE	688	226000103309	M	
5/18/2018	INDEPENDENCE	750	226000103339		KILLED BY BOWFISHERMEN
5/18/2018	INDEPENDENCE	685	226000103375		
5/18/2018	INDEPENDENCE	730	226000103382	M	
5/18/2018	INDEPENDENCE	714	226000103340		
5/18/2018	INDEPENDENCE	710	226000103392		
5/18/2018	INDEPENDENCE	735	226000103369		
5/18/2018	INDEPENDENCE	816	226000103304		
5/18/2018	INDEPENDENCE	688	226000103302	M	
5/18/2018	INDEPENDENCE	715	226000103308	M	
5/18/2018	INDEPENDENCE	774	2260001033363		
5/18/2018	INDEPENDENCE	639	226000103371	M	
5/18/2018	INDEPENDENCE	634	226000103301		
5/18/2018	INDEPENDENCE	673	226000103330	M	
5/18/2018	INDEPENDENCE	629	226000103364		
5/18/2018	INDEPENDENCE	752	226000103326		
6/25/2018	INDEPENDENCE	355	226000103318		
6/25/2018	INDEPENDENCE	652	226000103342		
6/25/2018	INDEPENDENCE	729	226000103296		
6/25/2018	INDEPENDENCE	763	226000103298		
6/25/2018	INDEPENDENCE	735	226000103379		
6/25/2018	INDEPENDENCE	812	226000103361		
6/25/2018	INDEPENDENCE	694	226000103391		
6/25/2018	INDEPENDENCE	710	226000103324		
6/25/2018	INDEPENDENCE	557	226000103323		
6/25/2018	INDEPENDENCE	722	226000103359		
6/25/2018	INDEPENDENCE	501	226000103357		
6/25/2018	INDEPENDENCE	707	226000103368		
6/25/2018	INDEPENDENCE	690	226000103356		
6/25/2018	INDEPENDENCE	712	226000103362		
6/25/2018	INDEPENDENCE	748	226000103327		
6/25/2018	INDEPENDENCE	551	226000103343		
6/25/2018	INDEPENDENCE	802	226000103315		

6/25/2018	INDEPENDENCE	779	226000103376		
6/25/2018	INDEPENDENCE	749	226000103337		
6/25/2018	INDEPENDENCE	671	226000103307		
6/25/2018	INDEPENDENCE	407	226000103300		
6/25/2018	INDEPENDENCE	760	226000103374		
6/25/2018	INDEPENDENCE	772	226000103377		
6/25/2018	INDEPENDENCE	711	226000103303		
6/25/2018	INDEPENDENCE	865	226000103299		
7/2/2018	ARDMORE	523	226000103378		Ardmore winterkill 2018-19
7/2/2018	ARDMORE	442	226000103297		
7/2/2018	ARDMORE	450	226000103388		
7/2/2018	ARDMORE	423	226000103336		
7/2/2018	ARDMORE	720	226000103366		Ardmore winterkill 2018-19
7/2/2018	ARDMORE	506	226000103352		
7/2/2018	ARDMORE	540	226000103316		
7/2/2018	ARDMORE	390	226000103341		Ardmore winterkill 2018-19
7/2/2018	ARDMORE	552	226000103381		
7/2/2018	ARDMORE	550	226000103329		
7/2/2018	ARDMORE	665	226000103295		
7/2/2018	ARDMORE	390	226000103311		
7/2/2018	ARDMORE	748	226000103355		
7/2/2018	ARDMORE	446	226000103322		
7/2/2018	ARDMORE	822	226000103690		
7/2/2018	ARDMORE	495	226000103643		
7/2/2018	ARDMORE	469	226000103606		
7/2/2018	ARDMORE	544	226000103596		
7/2/2018	ARDMORE	531	226000103630		
7/2/2018	ARDMORE	400	226000103612		
7/2/2018	ARDMORE	491	226000103659		Ardmore winterkill 2018-19
7/2/2018	ARDMORE	490	226000103651		
7/2/2018	ARDMORE	516	226000103674		Ardmore winterkill 2018-19
7/2/2018	ARDMORE	489	226000103613		
7/2/2018	ARDMORE	362	226000103622		Ardmore winterkill 2018-19
7/2/2018	ARDMORE	550	226000103329		
7/2/2018	ARDMORE	509	226000103683		Ardmore winterkill 2018-19
7/2/2018	ARDMORE	474	226000103644		
7/2/2018	ARDMORE	526	226000103662		
7/2/2018	ARDMORE	520	226000103661		
7/2/2018	ARDMORE	579	226000103686		
7/2/2018	ARDMORE	531	226000103685		
7/2/2018	ARDMORE	510	226000103620		
7/2/2018	ARDMORE	462	226000103679		
7/2/2018	ARDMORE	485	226000103691		

7/2/2018	ARDMORE	510	226000103614		
7/2/2018	ARDMORE	431	226000103598		
7/2/2018	ARDMORE	524	226000103615		Ardmore winterkill 2018-19
7/2/2018	ARDMORE	391	226000103640		
7/2/2018	ARDMORE	511	226000103609		
7/2/2018	ARDMORE	550	226000103682		Ardmore winterkill 2018-19
7/2/2018	ARDMORE	520	226000103676		
7/2/2018	ARDMORE	555	226000103618		Ardmore winterkill 2018-19
7/2/2018	ARDMORE	662	226000103692		
7/2/2018	ARDMORE	515	226000103619		Ardmore winterkill 2018-19
7/2/2018	ARDMORE	457	226000103602		
7/2/2018	ARDMORE	540	226000103636		
7/2/2018	ARDMORE	512	226000103635		Ardmore winterkill 2018-19
7/2/2018	ARDMORE	498	226000103663		
7/2/2018	ARDMORE	730	226000103603		
7/2/2018	ARDMORE	538	226000103646		
7/2/2018	ARDMORE	542	226000103655		Ardmore winterkill 2018-19
7/2/2018	ARDMORE	542	226000103597		
7/2/2018	ARDMORE	665	226000103671		
7/2/2018	ARDMORE	540	226000103677		
7/2/2018	ARDMORE	510	226000103668		
7/2/2018	ARDMORE	556	226000103687		Ardmore winterkill 2018-19
7/2/2018	ARDMORE	705	226000103657		
7/2/2018	ARDMORE	522	226000103629		Ardmore winterkill 2018-19
7/2/2018	ARDMORE	505	226000103633		
7/12/2019	INDEPENDENCE	712	226000497881		
7/12/2019	INDEPENDENCE	497	226000497830		
7/12/2019	INDEPENDENCE	485	226000497844		
7/12/2019	INDEPENDENCE	564	226000497858		
7/12/2019	INDEPENDENCE	533	226000497847		
7/12/2019	INDEPENDENCE	609	226000497894		
7/12/2019	INDEPENDENCE	501	226000497897		
7/12/2019	INDEPENDENCE	643	226000497838		
7/12/2019	INDEPENDENCE	747	226000497836		
7/23/2019	INDEPENDENCE	691	226000497337		
7/23/2019	INDEPENDENCE	626	226000497339		
7/23/2019	INDEPENDENCE	703	226000497346		
7/23/2019	INDEPENDENCE	719	226000497317		
7/23/2019	INDEPENDENCE	598	226000497391		
7/23/2019	INDEPENDENCE	662	226000497369		
7/23/2019	INDEPENDENCE	657	226000497333		
7/23/2019	INDEPENDENCE	788	226000497338		
7/23/2019	INDEPENDENCE	701	226000497303		

7/23/2019	INDEPENDENCE	642	226001036783		
7/23/2019	INDEPENDENCE	613	226001036723		
7/23/2019	INDEPENDENCE	598	226001036768		
7/23/2019	INDEPENDENCE	573	226001036748		
7/23/2019	INDEPENDENCE	698	226001036790		
7/23/2019	INDEPENDENCE	662	226001036784		
7/23/2019	INDEPENDENCE	628	226001036772		
7/23/2019	INDEPENDENCE	722	226001036777		
7/23/2019	INDEPENDENCE	687	226001036758		
7/23/2019	INDEPENDENCE	523	226001036794		
7/23/2019	INDEPENDENCE	561	226001036787		
7/23/2019	INDEPENDENCE	713	226001036724		
7/23/2019	INDEPENDENCE	704	226001036895		
7/23/2019	INDEPENDENCE	642	226001036786		
8/13/2019	INDEPENDENCE	691	226001040691		
8/13/2019	INDEPENDENCE	624	226001040624		
8/13/2019	INDEPENDENCE	740	226001040740		
8/30/2019	INDEPENDENCE	538	226001036803		
8/30/2019	INDEPENDENCE	791	226001036815		
8/30/2019	INDEPENDENCE	751	226001036812		
8/30/2019	INDEPENDENCE	866	226001036851		
8/30/2019	INDEPENDENCE	590	226001036855		
8/30/2019	INDEPENDENCE	738	226001036867		
8/30/2019	INDEPENDENCE	710	226001036845		
8/30/2019	INDEPENDENCE	712	226001036811		
8/30/2019	INDEPENDENCE	620	226001036891		
9/6/2019	INDEPENDENCE	560	226000103560		
9/6/2019	INDEPENDENCE	772	226000103772		
9/6/2019	INDEPENDENCE	621	226000103621		
9/6/2019	INDEPENDENCE	625	226000103625		
9/6/2019	INDEPENDENCE	645	226000103645		
9/6/2019	INDEPENDENCE	540	226000103540		
9/6/2019	INDEPENDENCE	552	226000103552		
9/13/2019	INDEPENDENCE	633	226001040246		
9/13/2019	INDEPENDENCE	528	226001040269		
9/13/2019	INDEPENDENCE	685	226001040260		
9/13/2019	INDEPENDENCE	705	226001040257		
9/13/2019	INDEPENDENCE	480	226001040292		
9/13/2019	INDEPENDENCE	635	226001040242		

Appendix b. PIT detections by location and date

PIT	DATE	LAKE	LENGTH (MM)	Year	Detected at HWY 19	Detected at Pagekopf			Detected at Ardmore				
226000103358	05/07/18	INDEPENDENCE	542	2018									
226000103332	05/07/18	INDEPENDENCE	570	2018					4/22/2019	5/15/2019	5/23/2019	5/27/2019	5/28/2019
226000103334	05/07/18	INDEPENDENCE	732	2018		5/16/2019	5/26/2019						
226000103365	05/07/18	INDEPENDENCE	561	2018					4/25/2019	5/17/2019	5/27/2019		
226000103345	05/07/18	INDEPENDENCE	701	2018									
226000967922	05/15/18	INDEPENDENCE	532	2018									
226000103313	05/15/18	INDEPENDENCE	622	2018		6/7/2019							
226000103383	05/15/18	INDEPENDENCE	600	2018					4/21/2019	5/17/2019			
226000103333	05/15/18	INDEPENDENCE	439	2018									
226000103310	05/15/18	INDEPENDENCE	792	2018									
226000103354	05/15/18	INDEPENDENCE	864	2018									
226000103372	05/16/18	INDEPENDENCE	107	2018		4/23/2019							
226000103389	05/16/18	INDEPENDENCE	803	2018		6/1/2019							
226000103338	05/16/18	INDEPENDENCE	720	2018		6/6/2019							
226000103335	05/16/18	INDEPENDENCE	782	2018									
226000103385	05/16/18	INDEPENDENCE	805	2018									
226000103347	05/16/18	INDEPENDENCE	519	2018		5/31/2019							
226000103335	05/16/18	INDEPENDENCE	782	2018									
226000103317	05/18/18	INDEPENDENCE	501	2018									
226000103373	05/18/18	INDEPENDENCE	805	2018		6/8/2019							
226000103390	05/18/18	INDEPENDENCE	757	2018		5/30/2019							
226000103314	05/18/18	INDEPENDENCE	701	2018					4/24/2019	4/25/2019			
226000103360	05/18/18	INDEPENDENCE	722	2018									
226000103305	05/18/18	INDEPENDENCE	720	2018		6/10/2019							
226000103386	05/18/18	INDEPENDENCE	815	2018					4/25/2019	5/17/2019			
226000103321	05/18/18	INDEPENDENCE	772	2018									
226000103387	05/18/18	INDEPENDENCE	691	2018									
226000103384	05/18/18	INDEPENDENCE	737	2018		6/10/2019							
226000103306	05/18/18	INDEPENDENCE	692	2018		5/31/2019							
226000103328	05/18/18	INDEPENDENCE	632	2018	6/5/2019	5/30/2019							
226000103325	05/18/18	INDEPENDENCE	668	2018		5/16/2019							
226000103331	05/18/18	INDEPENDENCE	821	2018									
226000103312	05/18/18	INDEPENDENCE	702	2018		6/1/2019							
226000103319	05/18/18	INDEPENDENCE	737	2018		5/8/2019							
226000103380	05/18/18	INDEPENDENCE	772	2018		4/23/2019	5/31/2019						
226000103370	05/18/18	INDEPENDENCE	700	2018									
226000103361	05/18/18	INDEPENDENCE	815	2018		5/16/2019	6/4/2019						
226000103367	05/18/18	INDEPENDENCE	751	2018									
226000103346	05/18/18	INDEPENDENCE	727	2018									
226000103351	05/18/18	INDEPENDENCE	682	2018		5/16/2019							
226000103353	05/18/18	INDEPENDENCE	722	2018									
226000103344	05/18/18	INDEPENDENCE	722	2018					4/21/2019	5/15/2019			
226000103294	05/18/18	INDEPENDENCE	710	2018		6/10/2019							
226000103349	05/18/18	INDEPENDENCE	808	2018									
226000103350	05/18/18	INDEPENDENCE	710	2018					4/25/2019	5/17/2019	5/30/2019	5/31/2019	7/3/2019
226000103348	05/18/18	INDEPENDENCE	690	2018		5/16/2019	6/5/2019						
226000103320	05/18/18	INDEPENDENCE	771	2018									
226000103309	05/18/18	INDEPENDENCE	688	2018		5/16/2019							
226000103339	05/18/18	INDEPENDENCE	750	2018									
226000103375	05/18/18	INDEPENDENCE	685	2018		5/30/2019							
226000103382	05/18/18	INDEPENDENCE	730	2018		4/23/2019	5/31/2019	6/1/2019					
226000103340	05/18/18	INDEPENDENCE	714	2018		6/6/2019							
226000103392	05/18/18	INDEPENDENCE	710	2018									
226000103369	05/18/18	INDEPENDENCE	735	2018		4/23/2019	5/16/2019						
226000103304	05/18/18	INDEPENDENCE	816	2018									
226000103302	05/18/18	INDEPENDENCE	688	2018									
226000103308	05/18/18	INDEPENDENCE	715	2018									
226000103363	05/18/18	INDEPENDENCE	774	2018									
226000103371	05/18/18	INDEPENDENCE	639	2018									

226000103301	05/18/18	INDEPENDENCE	634	2018					4/21/2019	5/17/2019	5/28/2019	7/2/2019	7/3/2019
226000103330	05/18/18	INDEPENDENCE	673	2018									
226000103364	05/18/18	INDEPENDENCE	629	2018									
226000103326	05/18/18	INDEPENDENCE	752	2018									
226000103318	6/25/2018	INDEPENDENCE	355	2018									
226000103342	6/25/2018	INDEPENDENCE	652	2018		6/2/2019							
226000103296	6/25/2018	INDEPENDENCE	729	2018		6/10/2019							
226000103298	6/25/2018	INDEPENDENCE	763	2018		5/30/2019							
226000103379	6/25/2018	INDEPENDENCE	735	2018		6/7/2019							
226000103361	6/25/2018	INDEPENDENCE	812	2018		5/16/2019	6/4/2019						
226000103391	6/25/2018	INDEPENDENCE	694	2018					5/20/2019	5/27/2019	5/28/2019	5/29/2019	
226000103324	6/25/2018	INDEPENDENCE	710	2018									
226000103323	6/25/2018	INDEPENDENCE	557	2018					4/21/2019	4/25/2019	5/27/2019	5/28/2019	
226000103359	6/25/2018	INDEPENDENCE	722	2018		6/3/2019							
226000103357	6/25/2018	INDEPENDENCE	501	2018									
226000103368	6/25/2018	INDEPENDENCE	707	2018		5/31/2019							
226000103356	6/25/2018	INDEPENDENCE	690	2018									
226000103362	6/25/2018	INDEPENDENCE	712	2018									
226000103327	6/25/2018	INDEPENDENCE	748	2018		4/23/2019							
226000103343	6/25/2018	INDEPENDENCE	551	2018					4/21/2019	5/29/2019	5/31/2019		
226000103315	6/25/2018	INDEPENDENCE	802	2018		5/30/2019							
226000103376	6/25/2018	INDEPENDENCE	779	2018		5/8/2019	6/2/2019						
226000103337	6/25/2018	INDEPENDENCE	749	2018									
226000103307	6/25/2018	INDEPENDENCE	671	2018		6/5/2019			4/21/2019	4/25/2019			
226000103300	6/25/2018	INDEPENDENCE	407	2018					4/22/2019	5/29/2019	7/2/2019		
226000103374	6/25/2018	INDEPENDENCE	760	2018									
226000103377	6/25/2018	INDEPENDENCE	772	2018					4/21/2019	5/17/2019	7/2/2019	7/17/2019	
226000103303	6/25/2018	INDEPENDENCE	711	2018									
226000103299	6/25/2018	INDEPENDENCE	865	2018									
226000103378	7/2/2018	ARDMORE	523	2018					4/19/2019				
226000103297	7/2/2018	ARDMORE	442	2018									
226000103388	7/2/2018	ARDMORE	450	2018									
226000103336	7/2/2018	ARDMORE	423	2018									
226000103366	7/2/2018	ARDMORE	720	2018									
226000103352	7/2/2018	ARDMORE	506	2018									
226000103316	7/2/2018	ARDMORE	540	2018									
226000103341	7/2/2018	ARDMORE	390	2018									
226000103381	7/2/2018	ARDMORE	552	2018									
226000103329	7/2/2018	ARDMORE	550	2018									
226000103295	7/2/2018	ARDMORE	665	2018									
226000103311	7/2/2018	ARDMORE	390	2018									
226000103355	7/2/2018	ARDMORE	748	2018									
226000103322	7/2/2018	ARDMORE	446	2018									
226000103690	7/2/2018	ARDMORE	822	2018									
226000103643	7/2/2018	ARDMORE	495	2018									
226000103606	7/2/2018	ARDMORE	469	2018									
226000103596	7/2/2018	ARDMORE	544	2018									
226000103630	7/2/2018	ARDMORE	531	2018									
226000103612	7/2/2018	ARDMORE	400	2018									
226000103659	7/2/2018	ARDMORE	491	2018									
226000103651	7/2/2018	ARDMORE	490	2018									
226000103674	7/2/2018	ARDMORE	516	2018									
226000103613	7/2/2018	ARDMORE	489	2018									
226000103622	7/2/2018	ARDMORE	362	2018									
226000103329	7/2/2018	ARDMORE	550	2018									
226000103683	7/2/2018	ARDMORE	509	2018									
226000103644	7/2/2018	ARDMORE	474	2018									
226000103662	7/2/2018	ARDMORE	526	2018									
226000103661	7/2/2018	ARDMORE	520	2018									
226000103686	7/2/2018	ARDMORE	579	2018									
226000103685	7/2/2018	ARDMORE	531	2018									
226000103620	7/2/2018	ARDMORE	510	2018									
226000103679	7/2/2018	ARDMORE	462	2018									
226000103691	7/2/2018	ARDMORE	485	2018									
226000103614	7/2/2018	ARDMORE	510	2018									

226000103598	7/2/2018	ARDMORE	431	2018									
226000103615	7/2/2018	ARDMORE	524	2018									
226000103640	7/2/2018	ARDMORE	391	2018									
226000103609	7/2/2018	ARDMORE	511	2018									
226000103682	7/2/2018	ARDMORE	550	2018									
226000103676	7/2/2018	ARDMORE	520	2018									
226000103618	7/2/2018	ARDMORE	555	2018									
226000103692	7/2/2018	ARDMORE	662	2018					4/21/2019	5/28/2019	5/29/2019	5/31/2019	7/17/2019
226000103619	7/2/2018	ARDMORE	515	2018									
226000103602	7/2/2018	ARDMORE	457	2018		7/4/2019			5/15/2019	5/16/2019	5/28/2019	5/29/2019	
226000103636	7/2/2018	ARDMORE	540	2018									
226000103635	7/2/2018	ARDMORE	512	2018									
226000103663	7/2/2018	ARDMORE	498	2018									
226000103603	7/2/2018	ARDMORE	730	2018					4/21/2019	7/3/2019			
226000103646	7/2/2018	ARDMORE	538	2018									
226000103655	7/2/2018	ARDMORE	542	2018									
226000103597	7/2/2018	ARDMORE	542	2018									
226000103671	7/2/2018	ARDMORE	665	2018									
226000103677	7/2/2018	ARDMORE	540	2018									
226000103668	7/2/2018	ARDMORE	510	2018									
226000103687	7/2/2018	ARDMORE	556	2018									
226000103657	7/2/2018	ARDMORE	705	2018									
226000103629	7/2/2018	ARDMORE	522	2018									
226000103633	7/2/2018	ARDMORE	505	2018									
226000497881	7/12/2019	INDEPENDENCE	712	2019									
226000497830	7/12/2019	INDEPENDENCE	497	2019									
226000497844	7/12/2019	INDEPENDENCE	485	2019									
226000497858	7/12/2019	INDEPENDENCE	564	2019									
226000497847	7/12/2019	INDEPENDENCE	533	2019									
226000497894	7/12/2019	INDEPENDENCE	609	2019									
226000497897	7/12/2019	INDEPENDENCE	501	2019									
226000497838	7/12/2019	INDEPENDENCE	643	2019									
226000497836	7/12/2019	INDEPENDENCE	747	2019									
226000497337	7/23/2019	INDEPENDENCE	691	2019									
226000497339	7/23/2019	INDEPENDENCE	626	2019									
226000497346	7/23/2019	INDEPENDENCE	703	2019									
226000497317	7/23/2019	INDEPENDENCE	719	2019									
226000497391	7/23/2019	INDEPENDENCE	598	2019									
226000497369	7/23/2019	INDEPENDENCE	662	2019									
226000497333	7/23/2019	INDEPENDENCE	657	2019									
226000497338	7/23/2019	INDEPENDENCE	788	2019									
226000497303	7/23/2019	INDEPENDENCE	701	2019									
226001036783	7/23/2019	INDEPENDENCE	642	2019									
226001036723	7/23/2019	INDEPENDENCE	613	2019									
226001036768	7/23/2019	INDEPENDENCE	598	2019									
226001036748	7/23/2019	INDEPENDENCE	573	2019									
226001036790	7/23/2019	INDEPENDENCE	698	2019									
226001036784	7/23/2019	INDEPENDENCE	662	2019									
226001036772	7/23/2019	INDEPENDENCE	628	2019									
226001036777	7/23/2019	INDEPENDENCE	722	2019									
226001036758	7/23/2019	INDEPENDENCE	687	2019									
226001036794	7/23/2019	INDEPENDENCE	523	2019									
226001036787	7/23/2019	INDEPENDENCE	561	2019									
226001036724	7/23/2019	INDEPENDENCE	713	2019									
226001036895	7/23/2019	INDEPENDENCE	704	2019									
226001036786	7/23/2019	INDEPENDENCE	642	2019									
226001040691	8/13/2019	INDEPENDENCE	691	2019									
226001040624	8/13/2019	INDEPENDENCE	624	2019									
226001040740	8/13/2019	INDEPENDENCE	740	2019									
226001036803	8/30/2019	INDEPENDENCE	538	2019									
226001036815	8/30/2019	INDEPENDENCE	791	2019									

226001036812	8/30/2019	INDEPENDENCE	751	2019									
226001036851	8/30/2019	INDEPENDENCE	866	2019									
226001036855	8/30/2019	INDEPENDENCE	590	2019									
226001036867	8/30/2019	INDEPENDENCE	738	2019									
226001036845	8/30/2019	INDEPENDENCE	710	2019									
226001036811	8/30/2019	INDEPENDENCE	712	2019									
226001036891	8/30/2019	INDEPENDENCE	620	2019									
226000103560	9/6/2019	INDEPENDENCE	560	2019									
226000103772	9/6/2019	INDEPENDENCE	772	2019									
226000103621	9/6/2019	INDEPENDENCE	621	2019									
226000103625	9/6/2019	INDEPENDENCE	625	2019									
226000103645	9/6/2019	INDEPENDENCE	645	2019									
226000103540	9/6/2019	INDEPENDENCE	540	2019									
226000103552	9/6/2019	INDEPENDENCE	552	2019									
226001040246	9/13/2019	INDEPENDENCE	633	2019									
226001040269	9/13/2019	INDEPENDENCE	528	2019									
226001040260	9/13/2019	INDEPENDENCE	685	2019									
226001040257	9/13/2019	INDEPENDENCE	705	2019									
226001040292	9/13/2019	INDEPENDENCE	480	2019									
226001040242	9/13/2019	INDEPENDENCE	635	2019									

March 24, 2020

Judie Anderson, Chair
Pioneer Sarah Creek Watershed Management Commission
3235 Fernbrook Lane
Plymouth, MN 55447

RE: Maple Plain Local Surface Water Management Plan
Review File No. 22429-1

Dear Ms. Anderson:

The Metropolitan Council (Council) has completed its review of the City of Maple Plain's Local Surface Water Management Plan (plan). The plan has been reviewed based on several unique characteristics specific to the City of Maple Plain:

- The City has a total area of approximately 829 acres (1.3 square miles),
- The City's 2020 population is estimated to be 1,870 and is expected to increase to 2,320 by 2040,
- The City is nearly fully developed, with more redevelopment than new development occurring,
- The City contains a portion of Pioneer Creek and several wetland areas,
- The City is located within two watershed management organizations (WMOs): the Minnehaha Creek Watershed District (MCWD), and the Pioneer-Sarah Creek Watershed Management Commission (PSCWMC),
- The City has adopted the WMO's rules and regulations by reference for stormwater rate and volume control, erosion and sediment control, nutrient loading, and wetland, lake, stream, and floodplain management for their respective areas within the City,
- The WMOs are the local government units responsible for administering the Wetlands Conservation Act within their respective parts of the City, and
- The WMOs exercise regulatory authority, and the City cooperates with the WMOs to review development plans, in their areas of the city.

Given these circumstances, the Plan meets the requirements for a local water management plan and is consistent with Council policies and the Council's *Water Resources Policy Plan.*

Thank you for the opportunity to review the City's plan. If you have any questions regarding these comments, please contact Joe Mulcahy at 651-602-1104.

Sincerely,

Sam Paske
Assistant General Manager, MCES,
Environmental Quality Assurance Dept.

cc: Mark Kaltsas, PLA, Terramark
Judy Johnson, Metropolitan Council District 1
Freya Thamman, Metropolitan Council Sector Representative
Raya Esmaeili, Metropolitan Council Referrals Coordinator
Joe Mulcahy, Water Resources Assessment Section

HENNEPIN COUNTY

MINNESOTA

Subwatershed Assessments

Environment and Energy | Kris Guentzel & Paul Stewart

What is a Subwatershed assessment (SWA)

- Comprehensive review of :
  - “Hotspots” for sediment and phosphorus erosion
  - Opportunities to address hotspots
    - Source control: stops erosion at the source
      - e.g. nutrient management plan, septic repair
    - Mitigation practice: captures and/or treats erosion downstream
      - e.g. stormater pond, alum treatment

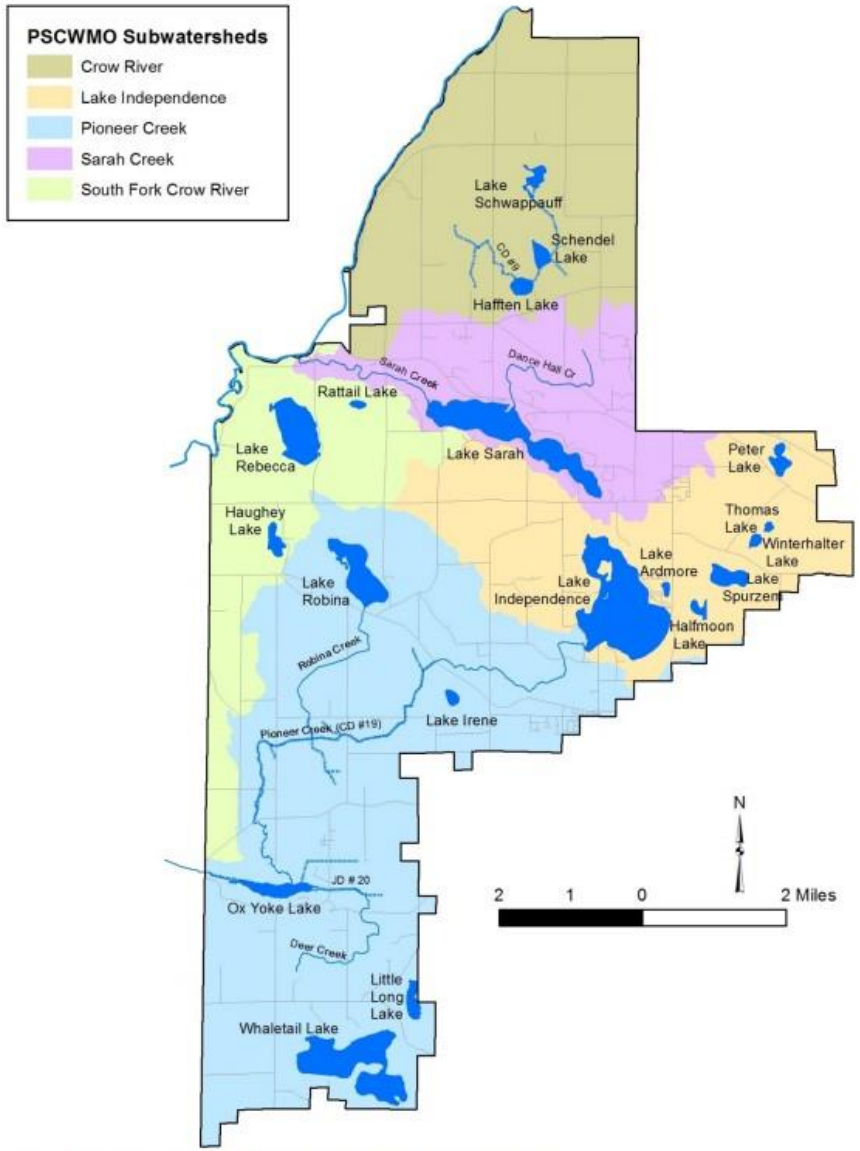


Figure 2.1. Pioneer-Sarah Creek watershed drainage systems.
Source: Minnesota DNR.

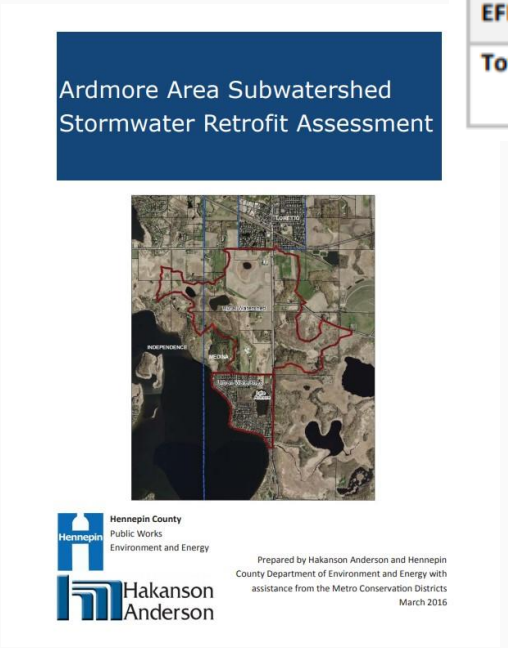
What are the Main Components

- Desktop Analysis and Field Review
- BMP Identification
- Conceptual Design
  - More complex practices may require more detailed study
- BMP Cost and “Benefit” Calculations
  - Cost: additional design, construction, O&M
  - Benefit: Pounds of sediment and phosphorus captured annually
- BMPs Ranked by Cost-Effectiveness
  - Dollars/Pound Treatment over design life

Once the SWA is Completed

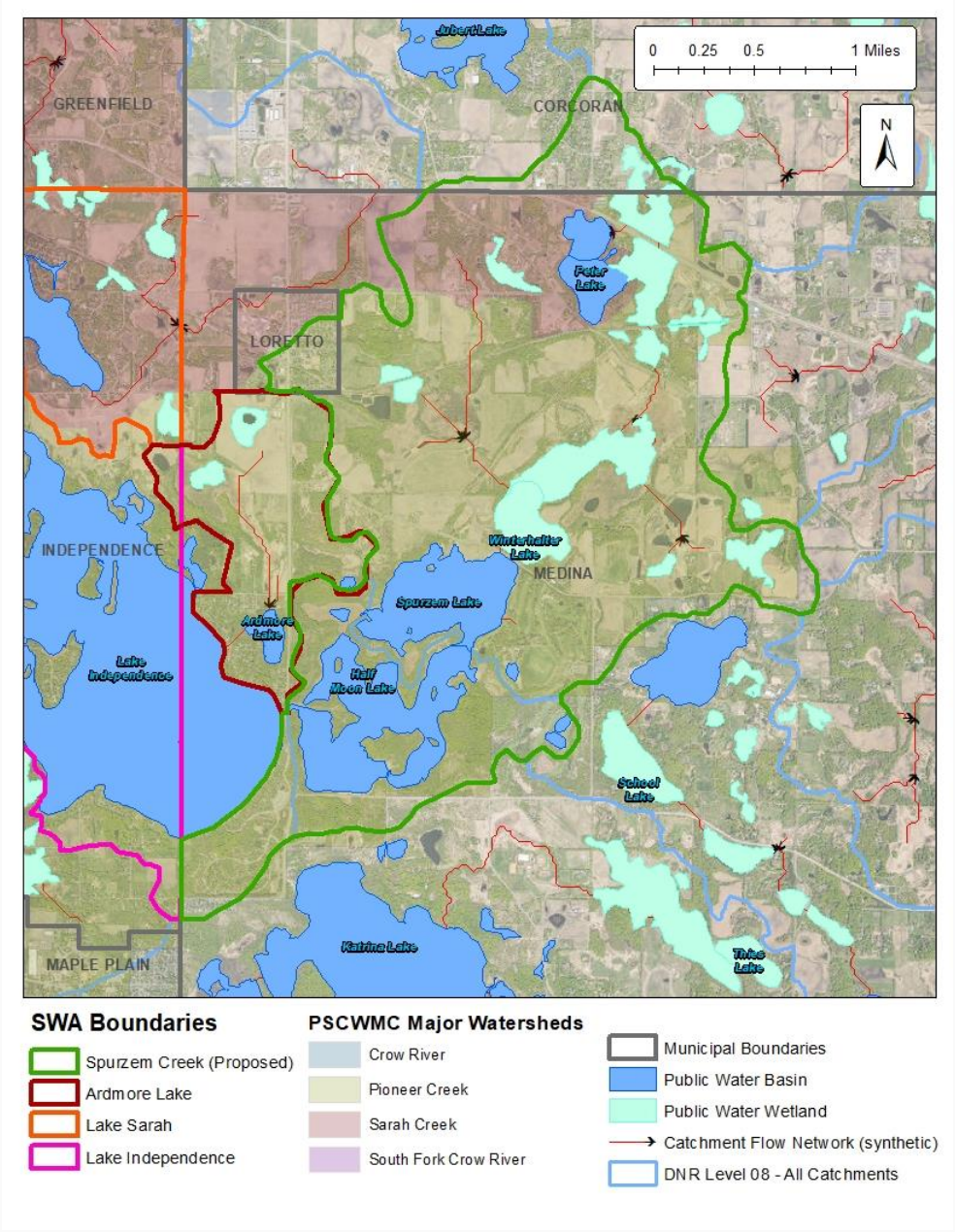
- Ranked list of practices by cost-effectiveness
- Use ranked list to guide landowner outreach
- Begin Implementation!

Table 2U. Project Ranking				
BMP ID	TP Decrease (lbs/yr)	Project Life (Years)	Project Cost	Cost-Benefit ($/ lbs TP)
GS1	3.4	20	$18,850	$277
SR1	2.0	20	$22,000	$550
PD2*	1.8	30	$47,650	$882
ISF1*	3.1	30	$87,500	$941
RG1	1.1	20	$21,400	$973
PD4	1.2	30	$47,350	$1,315
PD1	1.8	30	$76,350	$1,414
PD5†	1.0	30	$43,750	$1,458
RG2	0.6	20	$18,400	$1,533
PD3	1.1	30	$51,550	$1,562
SS1	0.2	20	$13,200	$3,300
EFD1†	1.4	50	$318,000	$4,542
Totals‡	14.2 / 15.9		$360,500 / $674,600	



Exploring New SWA

- Spurzem Creek (Cities of Medina and Corcoran)
- Upstream of Lake Independence
- Identified in TMDL/WRAPs as significant P source to Lake Independence
- Would address upland erosion prior to alum treatment



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