North Fork Crow
ONE WATERSHED, ONE PLAN

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The North Fork Crow River Water Planning Partnership

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APPENDICES

Introduction






LIST OF PLAN ABBREVIATIONS

1W1P	One Watershed, One Plan
AIS	Aquatic Invasive Species
AUID	Assessment Unit Identification Number
BMP	Best Management Practice
BWSR	Board of Water and Soil Resources
CROW	Crow River Organization of Water
DWSMA	Drinking Water Supply Management Area
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
FEMA	Federal Emergency Management Agency
FSA	Farm Service Agency
HSPF	Hydrologic Simulation Program--Fortran
HUC	Hydrologic Unit Code
LGU	Local Government Unit
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
MnDNR	Minnesota Department of Natural Resources
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
NFCR	North Fork Crow River
NFCRWPP	North Fork Crow River Water Planning Partnership
NRCS	Natural Resources Conservation Service

NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
PTMApp	Prioritize, Target, Measure Application
SNA	Scientific and Natural Areas
SSTS	Subsurface Sewage Treatment Systems
SWCD	Soil and Water Conservation District
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
TP	Total Phosphorus
TU	Trout Unlimited
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WRAPS	Watershed Restoration and Protection Strategy

PLAN DEFINITIONS

- ***Action:*** A specific, tactical activity that can be conducted, completed, or accomplished to achieve a strategy. Responsibility for completion, timelines, estimated costs, and probable benefits can be associated with each action.

- ***Issue:*** An issue affecting a resource (or simply an "issue") is defined as a factor, stressor, or difficulty resulting in an adverse consequence for a potential or priority concern. A potential or priority concern can have one or many issues. An issue is a priority issue if it affects a priority concern. For instance, nitrate nitrogen causing the contamination of drinking water supply could be a priority issue affecting a priority concern (e.g. drinking water supplies).

- ***Measurable Goal***: A statement of intended accomplishment for the watershed as a whole or for each priority (level A-C) concern. Goals are meant to be simply stated and achievable, can be quantitative or qualitative, and are meant to be measurable through the implementation of strategies and actions to attain a desired outcome.

- ***Metric***: A feature, attribute, characteristic, amount or quantity that—when achieved—is expected to result in quantified progress toward a measurable goal.

- ***Potential and Priority Concerns***: A potential concern is defined as a physical, biological, chemical, or geological subset or component of a resource. A priority concern is a potential concern of elevated interest and importance compared to another physical, biological, chemical, or geological subset or component. Potential and priority concerns are typically a refinement of a resource. For example, the resource "surface water" can be further refined into several components, including streams and rivers, lakes, surface runoff, drinking water, shallow lakes, and wetlands. The targeted implementation schedule is preferentially focused on priority concerns. One or more strategies are associated with a potential or priority concern.

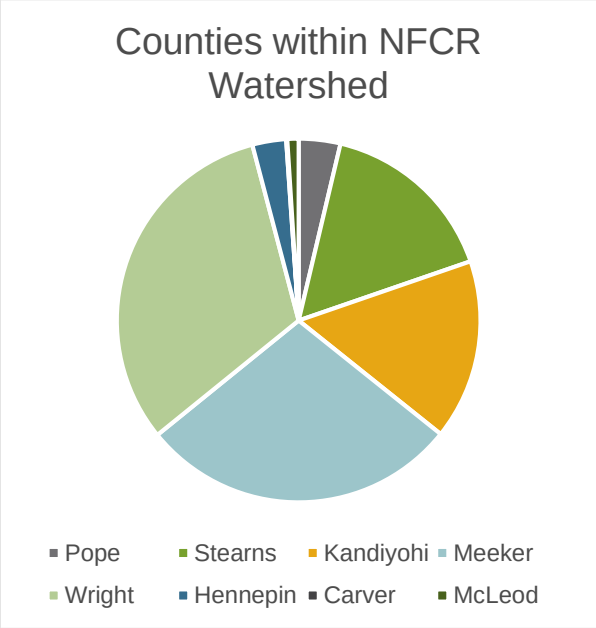
- ***Resource***: A natural, economic, educational, biotic, aesthetic, land, or similar asset. Resources are generally considered something that can be "managed" and are generally broad, such as surface water, groundwater, or education and outreach. A single goal is established for each resource.

- ***Strategy***: A narrative description of an approach or initiative for a specific priority concern. The completion of one or more strategies may be necessary to achieve a measurable goal. A strategy is the organizational framework for one or more actions being undertaken to address and resolve the issues affecting a priority concern.

EXECUTIVE SUMMARY

INTRODUCTION (SECTION 1)

The North Fork Crow River Water Planning Partnership (NFCRWPP) is an organization of six counties, six soil and water conservation districts, two watershed districts, and a joint powers board within south-central Minnesota. The NFCRWPP joined together in 2016 to develop a comprehensive One Watershed, One Plan (1W1P), aimed at creating prioritized and targeted implementation strategies that result in measurable resource improvements.

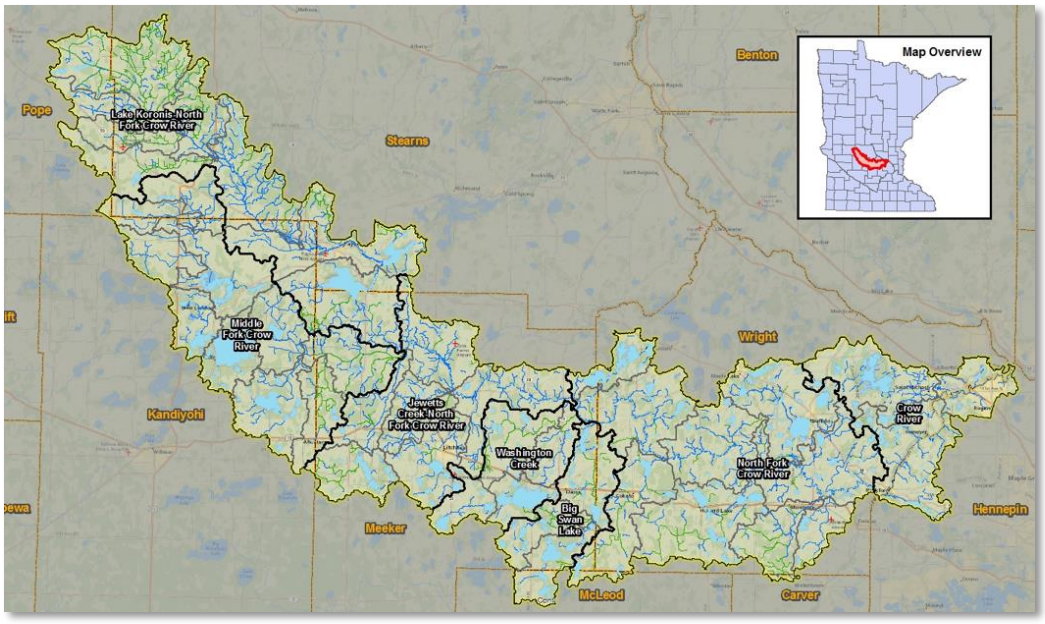


The North Fork Crow River (NFCR) Watershed area drains 1,483 square miles of predominately agricultural land. The watershed encompasses parts of Pope (3.7%), Stearns (16.0%), Kandiyohi (16.0%), Meeker (28.4%), Wright (31.7%), Hennepin (3.0%), Carver (0.1%), and McLeod (1.0%) counties.

The watershed is home to many farms

The North Fork Crow River Watershed District, Middle Fork Crow Watershed District and the Crow River Organization of Water (CROW) are also located within plan boundaries (**Figure ES-1**).

Figure ES-1: Location of the North Fork Crow River Watershed



ANALYSIS AND PRIORITIZATION OF POTENTIAL CONCERNS AND ISSUES (SECTION 2)

There are many environmental issues and resources to be managed within the large and diverse NFCR Watershed. In recognition of staff, time, and resource limitations, the NFCRWPP needed to prioritize the focus of implementation efforts during the 10-year lifespan of this plan.

The NFCRWPP developed a comprehensive list of potential resource concerns (i.e. potential concerns) and issues impacting the watershed using a combination of existing reports, data, and stakeholder input. This comprehensive list of potential concerns and issues was then prioritized through an online survey. A total of **21 potential concerns** were identified and considered during the prioritization process. Potential concerns were designated as A, B, C, D, or E priority level. From this initial list, 13 concerns emerged as "priority" (level A-C) concerns (**Table ES-1**). These priority concerns and their associated issues became the focus of initial implementation efforts within the NFCR Watershed.

It should be noted that many implementation efforts affecting one or more priority concerns permeate to lower level potential concerns, therefore benefiting those resources too. For example, streams and rivers emerged as a B-level priority concern, while surface drinking water emerged as a D-level concern. The Crow River is a defining water feature of the NFCR Watershed, and discharges to the Mississippi River. The Crow River discharge (which includes both the North and South Fork Watersheds) at times doubles the concentration of nutrients and sediment in the Mississippi River. The discharge location is upstream of the drinking water intakes of both the City of St. Paul Regional Water Services and the City of Minneapolis Water Treatment and Distribution Services. These utilities provide drinking water to nearly 1 million residential customers. Thus, when streams and rivers (e.g. Crow River and its tributaries) benefit from strategies addressing nutrients (phosphorus and nitrogen), sediment, and bacteria loading, so too does surface drinking water sources for many people downstream.

Table ES-1: Priority concerns for the North Fork Crow River One Watershed, One Plan

Highest Priority	Second Highest Priority	Third Highest Priority
"A" Level Priority Concerns	**"B" Level Priority Concerns**	**"C" Level Priority Concerns**
▪ Drinking Water (Groundwater) ▪ Lakes ▪ Agricultural Drainage Systems ▪ Surface Runoff	▪ Streams and Rivers ▪ Groundwater Supplies ▪ Wetlands ▪ Rural Development and Sustainability	▪ Lake, Shoreland, and Stream Riparian Corridors ▪ Public Knowledge and Behavior ▪ Terrestrial Habitat for Wildlife ▪ Landowner, Producer and Lakeshore Owner Engagement ▪ Urban Stormwater
		

ESTABLISHING MEASURABLE GOALS (SECTION 3)

Next, the NFCRWPP established watershed-wide measurable goals for each priority concern.

These goals are designed to:

- concentrate implementation activities where they are most likely to fix the issues impacting locally-prioritized resources; and
- track progress towards a desired outcome.

Watershed-wide measurable goals are framed around increasing the proportion of the NFCR Watershed that meet the principles of rural, urban, and shoreland stewardship.

While the NFCRWPP has developed a framework for urban and shoreland stewardship, this plan only analyzes rural stewardship in the NFCR Watershed. **"Rural stewardship"** is defined by creating solutions to water quality and water quantity challenges using a combination of management and structural best management practices (BMPs) to increase soil health. This approach can lead not only to positive environmental benefits but also create new value propositions for producers and/or landowners.

Ramping up management practices could lead to significant soil improvements

The watershed-wide measurable goal for rural stewardship is to implement management practices (e.g. cover crops, conservation tillage to increase residue, permanent cover) in 40% of all cropland areas in the watershed to increase soil health.

This plan also assigns measurable goals to each priority concern. Assigning priority concern measurable goals is a way of recognizing that additional actions are warranted to protect or restore a resource, even if the watershed-wide measurable goals of stewardship has already been met.

Priority concern measurable goals can be focused on either protecting resources in good condition or restoring resources that have deteriorated.

Goals can be focused on meeting:

- a specific desired condition (such as removing a stream from an impaired waters list by reducing the amount of pollutants reaching the waters); or
- a target for a specific priority concern and issue (such as reducing runoff depth by 0.75 inches across the watershed).

For a full list of plan measurable goals, see Section 3.

TARGETED IMPLEMENTATION AND IMPLEMENTATION PROGRAMS (SECTION 4 AND 5)

Section 4 sets the stage for targeted plan implementation. This plan presents two components to targeted implementation:

1. a **"targeted implementation schedule"**; and
2. planning region **"implementation profiles".**

The targeted implementation schedule is comprised of a set of actions that—when implemented—are expected to make reasonable progress toward plan measurable goals. These actions are categorized into **"implementation components"** within the targeted implementation schedule to estimate and summarize funding needs. Implementation components include:

- delivering **education and outreach**;
- executing local or state **regulatory** or statutory obligations;

- developing data to fill **data gaps** and complete **research**;
- implementation of **management practices**, typically including cover crops, tillage management, and fertilizer management;
- implementation of **structural BMPs,** typically include sediment and water control basins, woodchip bioreactors, controlled drainage, and grass waterways; or
- implementation of large, physical **capital improvement project** structures.

Similar actions are funded by the same implementation program. Estimated funding needs by implementation program are presented in Section 5, where details on how to implement, sources of funding, and how money flows are further defined.

The NFCRWPP used the Prioritize, Target, and Measure Application (PTMApp) to estimate feasible locations for management practices and structural BMPs, as well as the associated annual costs and anticipated benefits arising from implementation. These results are summarized in planning region implementation profiles.

Planning region implementation profiles present information about the probable number, location, and types of management practices and structural BMPs that the NFCRWPP prioritized for implementation. The implementation profiles also present information about the relationship between the fiscal investment to build such practices relative to the life-cycle cost and the practice's ability to reach water quality goals. The information within the implementation profile is useful to understand whether surface water quality goals are actually achievable through management practices and structural BMPs that treat surface runoff. Further, the profiles indicate the estimated annual cost of achieving these goals.

The NFCRWPP prioritized the 250 "best" structural BMPs within each planning region. They are considered to be the "best" based on both:

- cost-effectiveness; and
- their ability to provide the greatest reductions in annual nutrient (nitrogen and phosphorus) and sediment loads.

Table ES-2 highlights the benefits of implementing structural BMPs in the targeted implementation approach, shown by planning region relative to reduction goals for nutrients and sediment. The NFCRWPP also evaluated the environmental benefit gained from meeting the rural stewardship measurable goal. These benefits are summarized in **Table ES-3,** also by planning region.

Table ES-2: The 250 best (most cost-effective and most effective toward load reduction goal) structural practices in each planning region, with estimated cumulative load reduction progress towards State load reduction goals as estimated by PTMApp.

Planning Region	Treatment Group Type & Number of Structural BMPs	Estimated Annualized Cost	Parameter	Unit	Existing Condition at Planning Region Outlet	Load Reduction Goal		Load Reduction Expected from Implementation	Load Reduction Expected from Implementation (%)	Progress towards 10 yr. Goal (%)
						Annual Load Reduction (%)	Target Load Reduction			
Lake Koronis-North Fork Crow River	Storage (99) Filtration (151)	$157,377	Sediment	tons/yr.	20,245	25%	5,061	4,461	22%	88%
			Total Nitrogen	lbs./yr.	68,489	45%	30,820	2,927	4%	9%
			Total Phosphorus	lbs./yr.	3,608	12%	433	105	3%	24%
Middle Fork Crow River	Storage (60) Filtration (190)	$202,448	Sediment	tons/yr.	26,855	25%	6,714	2,285	9%	34%
			Total Nitrogen	lbs./yr.	93,922	45%	42,265	392	0.4%	1%
			Total Phosphorus	lbs./yr.	315	12%	38	13	4%	35%
Jewetts Creek-North Fork Crow River	Storage (45) Filtration (205)	$141,078	Sediment	tons/yr.	32,688	25%	8,172	6,243	19%	76%
			Total Nitrogen	lbs./yr.	75,566	45%	34,005	3,011	4%	9%
			Total Phosphorus	lbs./yr.	4,102	12%	492	111	3%	22%
Washington Creek	Storage (100) Filtration (150)	$541,859	Sediment	tons/yr.	19,689	25%	4,922	7,437	38%	151%
			Total Nitrogen	lbs./yr.	60,708	45%	27,319	6,776	11%	25%
			Total Phosphorus	lbs./yr.	3,070	12%	368	252	8%	68%
Big Swan Lake	Storage (60) Filtration (169) Protection (10) Biofiltration (11)	$508,824	Sediment	tons/yr.	20,404	25%	5,101	7,430	36%	146%
			Total Nitrogen	lbs./yr.	54,112	45%	24,355	5,249	10%	22%
			Total Phosphorus	lbs./yr.	2,655	12%	319	188	7%	59%
North Fork Crow River	Storage (6) Filtration (244)	$93,659	Sediment	tons/yr.	41,097	25%	10,274	9,470	23%	92%

Planning Region	Treatment Group Type & Number of Structural BMPs	Estimated Annualized Cost	Parameter	Unit	Existing Condition at Planning Region Outlet	Load Reduction Goal		Load Reduction Expected from Implementation	Load Reduction Expected from Implementation (%)	Progress towards 10 yr. Goal (%)
						Annual Load Reduction (%)	Target Load Reduction			
			Total Nitrogen	lbs./yr.	90,397	45%	40,679	2,544	3%	6%
			Total Phosphorus	lbs./yr.	5,071	12%	609	98	2%	16%
Crow River	Storage (39) Filtration (187) Protection (24)	$173,925	Sediment	tons/yr.	29,597	25%	7,399	4,694	16%	63%
			Total Nitrogen	lbs./yr.	85,265	45%	38,369	1,779	2%	5%
			Total Phosphorus	lbs./yr.	7,088	12%	851	81	1%	10%

Green cells indicate achievement of load reduction goal through implementation of all 250 best structural practices

Estimated number of practices, annualized cost, and progress toward achieving load reduction by planning region, based on implementing the “best”, most cost-effective structural practices with the greatest reductions in the annual nutrient (nitrogen and phosphorus) load delivered to the planning region outlet (regional scale) and the greatest sediment load reduction reaching the catchment outlet (i.e., local scale). Estimates developed using the Prioritize, Target and Measure Application (PTMApp). Load reduction benefits from practice implementation are cumulative and do not consider implementation of upstream practices, and therefore are likely high. Benefits arising from implementation of management practices are not evaluated in this table.

Table Interpretation (top row): In the Lake Koronis-North Fork Crow River planning region, 99 storage practices and 151 filtration practices will cost an estimated $157,377 annually to implement and maintain. Upon implementation of those 250 structural practices, PTMApp estimates that the sediment load at the outlet of the Lake Koronis-North Fork Crow River planning region will be reduced by 4,461 tons/yr., or 22% from existing conditions. This sediment load reduction corresponds to 88% of the target load reduction goal of 5,061 tons/yr. or a 25% load reduction goal, based on the Sediment Reduction Strategy.

Table ES-3: Estimated benefits from meeting rural stewardship measurable goal, compared to a stated load reduction goal target

Planning Region	Parameter	Load Reduction Goal	Est. Load Reduction Benefit	Progress Towards Load Reduction Goal
Lake Koronis - North Fork Crow	Sediment	25%	18%	71%
	Total Phosphorus	12%	7%	60%
Middle Fork Crow River	Sediment	25%	17%	67%
	Total Phosphorus	12%	9%	73%
Jewetts Creek-North Fork Crow River	Sediment	25%	16%	66%
	Total Phosphorus	12%	7%	59%
Washington Creek	Sediment	25%	14%	57%
	Total Phosphorus	12%	5%	43%
Big Swan Lake	Sediment	25%	17%	66%
	Total Phosphorus	12%	7%	60%
North Fork Crow River	Sediment	25%	22%	87%
	Total Phosphorus	12%	8%	70%
Crow River	Sediment	25%	25%	102%
	Total Phosphorus	12%	10%	84%

The ability to achieve measurable goals is largely dependent on the amount of funding available. Increased funding is expected to increase implementation of management practices, structural BMPs, and provide additional capital improvement projects.

Three implementation levels representing incremental increases in the implementation effort and funding amounts are described and evaluated within this plan:

1. baseline;
2. moderate; and
3. high implementation level.

In Section 4, all three implementation levels show increases in funding and relative increased progress toward plan goals. To summarize, only the baseline implementation level is shown here.

The baseline implementation level assumes local funding committed to plan implementation is at or near the estimated current (2015) local funding level. The baseline implementation level is inclusive of costs needed to develop a consistent education and outreach program for the watershed area, and implement education and outreach actions at or near their current level. Dollars are also included to fund research to close data gaps. The baseline implementation level assumes the financial support received to administer and enforce statutory obligations and ordinances remains unchanged, and includes funding for plan administration costs.

Costs also include the construction of three large capital improvement projects. If the actions of the baseline implementation level could be successfully completed, they would result in the implementation and anticipated load reduction benefits from **all 250 of the best structural BMPs** within each planning region (as shown in **Table ES-2**). This baseline implementation level would also achieve 10% of the rural stewardship measurable goal.

Table ES-4: Annual and total plan cost for implementation actions within the baseline implementation level

Item	Estimated Annualized Cost	Total Plan Cost (Over 10 Years)
Targeted Implementation Schedule		
Structural BMP	$2,182,800 [1]	$21,828,000
Management Practice	$2,430,825 [2]	$24,308,250
Education and Outreach	$150,000 [3]	$1,500,000
Data Gaps and Research	$100,000 [4]	$1,000,000
Regulatory	$495,000 [5]	$4,950,000
Capital Improvement	$750,000 [6]	$7,500,000
Additional Expenses		
Plan Administration	$233,000	$2,330,000
Total Estimated Funding Needs		
	$6,341,625	**$63,416,250**

[1] Includes total cost of targeted implementation approach plus 20% for technical assistance
[2] Assumes 10% of rural stewardship measurable goal is met and additional cost of $10/acre for field walkovers
[3] Estimated $150,000 per year for watershed wide activities, inclusive of upfront cost to develop uniform education and outreach program
[4] Assumes one study per year of $100,000
[5] Assumes local fiscal support of statutory obligation and ordinance implementation remains unchanged.
[6] Assumes three large investment projects

The NFCRWPP previously entered into a formal agreement through a Memorandum of Agreement to lead the 1W1P planning process for the NFCR Watershed. The parties are drafting a revised Memorandum of Agreement for the purposes of implementing this plan. Expectations are that the roles of the local Policy Committee, Planning Work Group, and Advisory Committee will shift and change focus during plan implementation. **Table ES-5** shows the probable roles and functions related to plan implementation.

Table ES-5: Anticipated roles for the North Fork Crow River Watershed 1W1P implementation

Local Committee Name	Primary Implementation Role/Functions
Local Organization Board/ Policy Committee	▪ Local funding commitments for implementation ▪ Approving the annual work plan ▪ Approving annual fiscal reports ▪ Approving annual reports submitted to Minnesota Board of Water and Soil Resources (BWSR) ▪ Annual review and confirmation of Planning Work Group priority resource concerns recommendations ▪ Direction to Planning Work Group on addressing emerging issues ▪ Approve plan amendments ▪ Implement county ordinances and state statutory responsibilities separately from plan implementation ▪ Approve grant applications ▪ Approve annual assessment
Advisory Committee	▪ Review of and input on annual work plan ▪ Identification of collaborative funding opportunities ▪ Recommendations to Planning Work Group on program adjustments ▪ Assist with execution of the targeted implementation schedule

Local Committee Name	Primary Implementation Role/Functions
Planning Work Group	▪ Identify local funding needs for implementation ▪ Review annual work plan ▪ Review annual fiscal reports ▪ Prepare annual reports submitted to BWSR ▪ Annual review and confirmation of priority resource concerns ▪ Evaluate and recommend response to emerging issues ▪ Prepare plan amendments ▪ Implement the targeted implementation schedule
Fiscal / Administrative Agent	▪ Convene committee meetings ▪ Prepare the annual work plan ▪ Prepare annual fiscal reports ▪ Prepare and submit grant applications/funding requests ▪ Compile annual results for annual assessment

1 INTRODUCTION

1.1 PREAMBLE

The North Fork Crow River Water Planning Partnership (NFCRWPP) is an organization of counties, soil and water conservation districts, watershed districts, and a joint powers board within south-central Minnesota. The formation of the coalition signifies an important step in local efforts to manage, restore, and protect water and natural resources in south-central Minnesota. The NFCRWPP prepared this plan to develop implementation strategies that are prioritized and targeted resulting in measurable resource improvements. The development of this plan provides a framework for the NFCRWPP to be an effective local organization comprised of local governments engaged in the management, restoration, and protection of resources within the North Fork Crow River One Watershed, One Plan (1W1P) area.

In 2011, members of the Local Government Water Roundtable (Association of Minnesota Counties, Minnesota Association of Watershed Districts, and Minnesota Association of Soil and Water Conservation Districts) recommended that local governments with water management responsibility should organize and develop focused implementation plans on a watershed scale.

This recommendation was followed by legislation in 2012 (Minnesota Statutes §103B.101, subd.14), which gave the Minnesota Board of Water and Soil Resources (BWSR) the authority to develop and implement a comprehensive watershed management planning approach to transform the current system of water plans—largely organized on political boundaries—to one where plans are coordinated and consolidated on a watershed basis. This legislation has come to be known as One Watershed, One Plan[1]. BWSR's vision for One Watershed, One Plan is to align local water planning on major watershed boundaries with state strategies towards prioritized, targeted, and measurable implementation plans. BWSR was granted authorization and funding for local assistance and grants to help transition from local water management plans to a watershed management approach.

Before the statewide rollout of the One Watershed, One Plan program, BWSR elected to pilot the program in five different watersheds across the state. BWSR accepted nominations in early 2014 to pilot the program. In June of 2014, the North Fork Crow River Watershed was selected to pilot the One Watershed, One Plan program, along with four other watersheds:

1. Lake Superior North
2. Red Lake River
3. Root River
4. Yellow Medicine River

BWSR's hope was to learn from these pilot plans and improve water planning across Minnesota. The ultimate goal is to create an implementable plan that meets the needs of the local community while guiding local programs and constructing on-the-ground projects that result in improvements in resource quality.

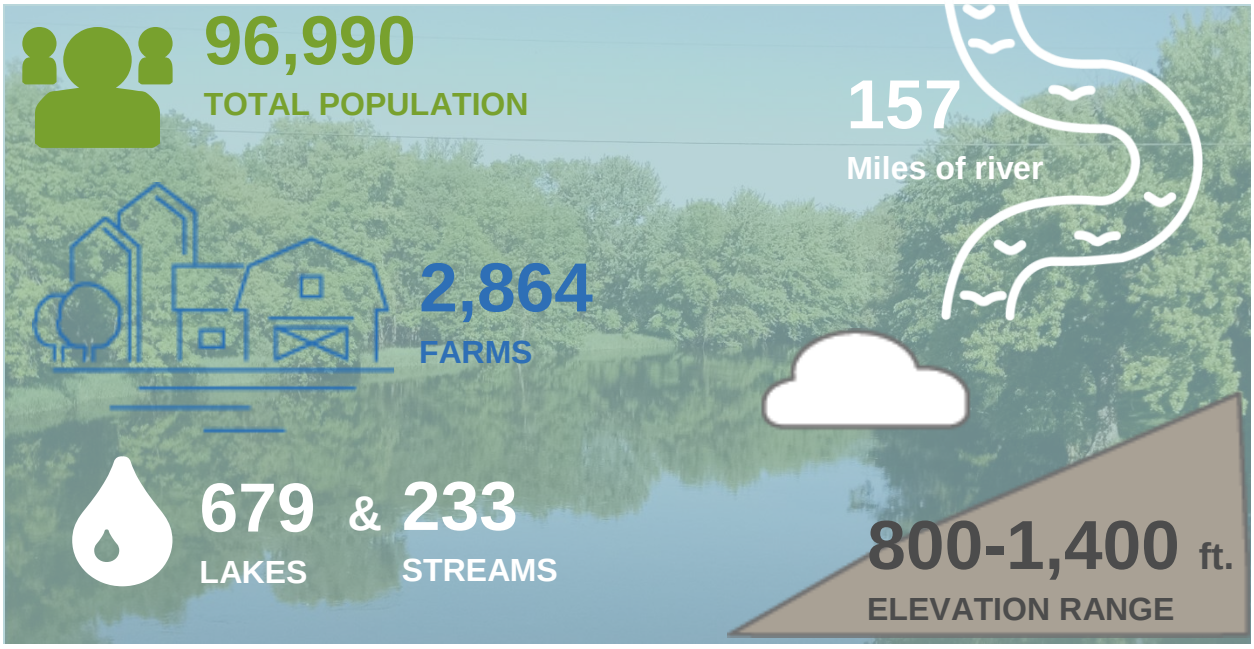
The NFCRWPP has been developed under and through a Memorandum of Agreement (**Appendix A**) adopted by the governing boards of the participating local governments. The agreement recognizes the need for a partnership to develop an approach for managing water and natural resources within the North Fork Crow River 1W1P area.

[1] Language derived from BWSR One Watershed, One Plan: An evolution of water planning in Minnesota.

1.2 PLAN AREA

The North Fork Crow River (NFCR) 1W1P area is in an agricultural region of south-central Minnesota, draining an area of 1,483 square miles (950,000 acres). The boundary of the NFCR 1W1P follows the boundary of the North Fork Crow River Watershed (Hydrologic Unit Code (HUC) 07010204). The watershed is in the Upper Mississippi River Basin and encompasses parts of Pope (3.7%), Stearns (16.0%), Kandiyohi (16.0%), Meeker (28.4%), Wright (31.7%), Hennepin (3.0%), Carver (0.1%), and McLeod (1.0%) counties. There are 31 municipalities located completely or partially within the boundaries of the watershed. The plan boundary and the subwatersheds comprising the plan area are shown in **Figure 1-1**.

Land use in the NFCR Watershed is mostly agricultural, except for the eastern portion that accounts for metro fringe urban and commercial land uses. The total population of the watershed is 96,990 with an estimated 2,864 farms. Surface waters within the watershed are abundant with 679 lakes and 233 streams segments, or assessment units (AUIDs) throughout the plan area. From its source at Grove Lake in Pope County, the North Fork Crow River runs east-southeast for a total length of 157 miles, flowing through Rice Lake and Lake Koronis until it meets the South Fork Crow River, where the confluence of the two rivers at Rockford forms the Crow River. The Crow River flows northeast until it meets the Mississippi River near Otsego and Dayton (MPCA, 2014). The watershed elevation ranges from approximately 800 to 1,400 feet above sea level, decreasing from west to east. A "Land and Water Resources Inventory" (**Appendix B)** provides more detailed information about the characteristics of the watershed within the NFCR 1W1P area.



1.3 PLAN OVERVIEW

The development of the North Fork Crow River One Watershed, One Plan is voluntary and intended to result in a more local, unified, and effective approach to managing resources. This plan includes a targeted implementation schedule, which is prioritized and intended to result in reaching measurable goals. Plan development is based on a systematic, watershed-wide, science-based approach and has been driven by local water managers and policy-makers to address priority concerns. The plan reflects the local priorities and a commitment to manage resources and implement strategies to achieve measurable goals. This plan is consistent with BWSR guidance for a comprehensive watershed management plan.

The information contained in this plan came from a compilation of:

- existing local water management plans, studies, reports, summaries and information;
- modeling;
- scientific data; and
- state plans including the North Fork Crow River Watershed Restoration and Protection Strategy (WRAPS), the North Fork Crow River Watershed Groundwater Report, and the Bonanza Valley Groundwater Management Area Plan.

This plan leverages the existing requirements for both (1) county comprehensive local water plans and (2) watershed district plans, while addressing surface and groundwater, water quality and quantity, habitat and natural features, local knowledge, development, and sustainability. The targeted implementation schedule includes the use of a broad range of tools, including capital improvements, local outreach, and the adoption of new programs necessary to achieve the goals of the plan.

This plan is organized into five plan sections:

1. This plan section (***Section 1: Introduction***) contains background information about the 1W1P initiative, the North Fork Crow River 1W1P area, and stakeholders involved in guiding plan development.

2. ***Section 2: Analysis and Prioritization of Potential Concerns and Issues*** summarizes the process planning partners used to reach understanding of an agreement on the watershed issues and priorities that will be addressed within the lifespan of the plan.

3. Within ***Section 3: Establishment of Measurable Goals***, measurable goals are assigned to each priority issue identified within Section 2.

4. ***Section 4: Targeted Implementation*** contains the "to-do" list of the plan, which includes a description of actions, where and when actions will occur, who will implement the action, the cost of implementation, and how progress is made toward goals.

5. Lastly, ***Section 5: Implementation Programs*** describes the overarching implementation programs that will be used to support the implementation of actions included within the schedule, and how those programs will be coordinated.

The NFCR Watershed can generally be divided into broad regions defined as "planning regions". For purposes of this plan, planning region boundaries were selected to correspond with the United States Geological Survey (USGS) 10-digit HUCs from the Watershed Boundary Dataset. **Figure 1-1** shows the boundaries for the planning regions within the plan area.

Planning regions are useful to help orient the reader, stakeholders, and users of the plan when discussing and describing the locations of potential concerns and issues. Maps showing the locations of potential concerns within the various planning regions are shown in *Section 2: Analysis and Prioritization of Potential Concerns and Issues.* The various actions recommended to achieve the measurable goals within the targeted implementation schedule are also framed by these planning regions. The planning regions for the North Fork Crow River 1W1P area are also consistent with the watershed boundaries used by the Minnesota Pollution Control Agency (MPCA) when developing the approach for improving water quality through their statewide WRAPS process.

1.4 PLAN PARTNERS AND ROLES IN PLAN DEVELOPMENT

The following plan partners joined together and were selected by BWSR as one of the first watersheds to pilot the 1W1P in Minnesota:

- The Crow River Organization of Water Joint Powers Board (i.e. CROW), by and through the CROW Board of Directors;
- The counties of Kandiyohi, McLeod, Meeker, Pope, Stearns, and Wright (i.e., the counties), by and through their respective County Board of Commissioners;
- The Kandiyohi, McLeod, Meeker, Pope, Stearns, and Wright soil and water conservation districts (i.e., the SWCDs), by and through their respective SWCD Board of Supervisors; and
- The Middle Fork of the Crow River and North Fork of the Crow River watershed districts (i.e., the WDs), by and through their Board of Managers.

Collectively, the entities are organized as the NFCRWPP. Through this partnership and in collaboration with other stakeholders, the following groups served during the development of this plan:

- The **Policy Committee** comprised the decision-making authority for the planning process. The committee was composed of one county commissioner and one SWCD supervisor appointed from each of the participating counties in the North Fork Crow River Watershed; one manager from each of the watershed districts in the watershed; and one member from the CROW Board of Directors.
- The **Advisory Committee** served to make recommendations to the Policy Committee regarding the planning process and plan content. The committee was composed of local, state, and federal agency staff, representatives from agricultural and conservation groups, municipalities, special interest representatives, and other stakeholder groups.
- The **Planning Work Group** guided the logistics of the planning process and drafted the plan. The Planning Work Group was composed of local governmental staff from the counties, SWCDs, WDs, and the CROW in the watershed.

The NFCRWPP used the CROW to assist with plan administration and coordination, and Houston Engineering, Inc. (HEI) to assist with plan assessment and writing.

Stakeholders within the NFCR Watershed served an important role during plan development. Bylaws were adopted to guide the decision-making process, leadership, and direction of process for the Policy Committee (see **Appendix C**). Plan preparers also developed and followed a Participation Plan (see **Appendix D**) to reasonably ensure an open process for soliciting input and obtaining comments for all serving groups and committees during plan development. Records of the various meetings conducted during the plan development process and meeting minutes are hosted on the CROW webpage: http://www.crowriver.org/NorthFork1W1P.html.

Stakeholders and the public engaged in the plan development process primarily through public meetings. The intent of the first public meeting (November 2015) was to present the North Fork Crow River 1W1P process and to gather information on local water management priorities. The public was also represented during the planning process through the involvement of existing County Local Water Planning Committees. Local committees provided their perspective to determine which potential concerns were a priority and were solicited for feedback about the strategies and actions comprising the targeted implementation schedule.

The Advisory Committee consisted of staff from the State's main water and/or plan review agencies, representatives from agricultural and conservation groups, municipalities, special interest representatives,

and other stakeholder groups in the North Fork Crow River 1W1P area. Members of the Advisory Committee served to make recommendations on plan content and the planning process, including processes to identify the range of potential concerns and issues, prioritize potential concerns, and define and describe protection and restoration strategies. The Advisory Committee also reviewed and recommended content to be included in the targeted implementation schedule. Advisory Committee members were expected to communicate plan-related activities to their respective organizations and identify practical concerns during the plan development process. Members also served a role in speaking about the plan within the community and assisting the Policy Committee in ensuring a credible process.

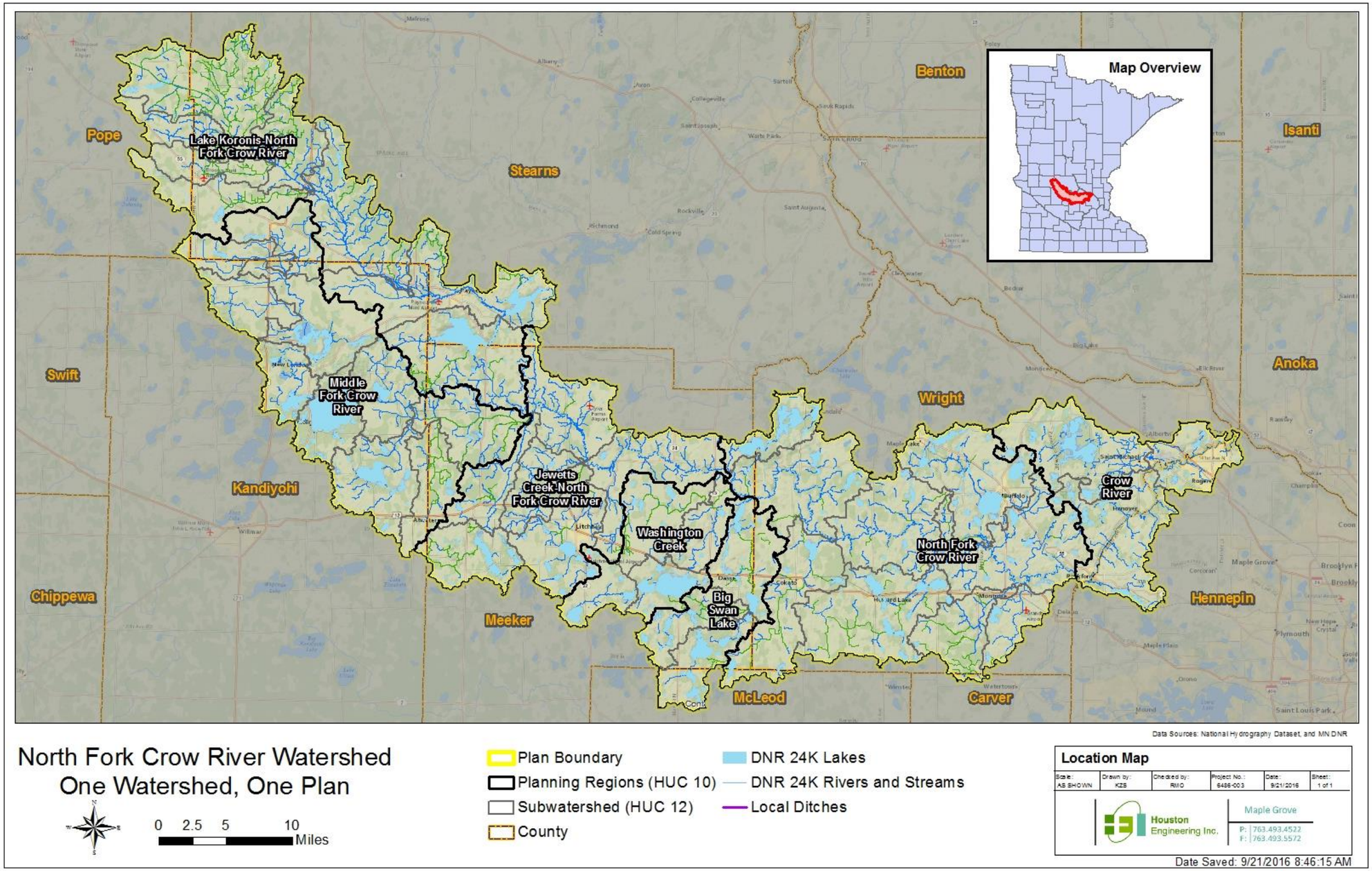
The Policy Committee made all final decisions about the content of the plan and its submittal to and approval by BWSR. The Policy Committee retained ultimate responsibility for plan direction, decisions, and content. The Policy Committee reviewed and approved the draft of the plan outline, information about the priority concerns and issues, the targeted implementation schedule, and the final 1W1P. Members of the Policy Committee also engaged in constructive discussion and debate about issues addressed by the plan and provided consensus direction to the Planning Work Group on plan development matters. The Policy Committee also reviewed and approved membership of the Advisory Committee.

Responsibility for preparing the plan resided with the Planning Work Group. The Planning Work Group comprised of local staff, local water planners, local watershed staff, and local SWCD staff for purposes of the logistical and day-to-day decision-making in the planning process. The Planning Work Group included the consultant team and other advisors responsible for assembling the draft and final plans. Members of the Planning Work Group were responsible for providing information needed for the planning process, reviewing and approving draft plan related information, and assisting in plan development. This group was also responsible for identifying potential concerns and issues affecting resources in their specific county.

1.5 INCORPORATING COMMENTS INTO THE PLAN

The Participation Plan (see **Appendix D**) was developed to reasonably ensure an open process for soliciting input and obtaining comments during plan development. Comments received from the public and from the local committees were documented, evaluated, and used to guide adjustments in plan content. For a list of all comments received and response, see **Appendix E**.

Figure 1-1: North Fork Crow River One Watershed, One Plan boundary and planning region (10-digit HUC) boundaries



Issue Prioritization






2 ANALYSIS AND PRIORITIZATION OF POTENTIAL CONCERNS AND ISSUES

This plan is a comprehensive watershed management plan as described by *One Watershed, One Plan: Plan Content for Pilot Watersheds* (**Appendix F**). According to BWSR guidance, the analysis and prioritization portion of the plan:

> *"…is intended to summarize the process planning partners used to reach understanding of an agreement on the watershed issues and priorities that will be addressed within the lifespan of the plan. Prioritizing is recognition that not all identified issues can be addressed in the timeframe of a ten-year plan—some items will be addressed before others."*

To adhere to this guidance, this plan section identifies the following:

- The steps used to identify resources, potential concerns, and issues;
- A list of the potential concerns and issues considered for prioritization;
- A final list of joint priority concerns and issues; and
- The reasons for selecting priority concerns and issues.

The outcome from the plan is a targeted implementation schedule focused on achieving measurable goals associated with the prioritized concerns and the issues impacting them.

2.1 IDENTIFYING POTENTIAL CONCERNS AND ISSUES

To identify and describe watershed resources, potential concerns, and issues affecting a potential concern, the planning process included gathering and reviewing the following data:

- Existing management plans, studies, reports, data, and information, including those within the NFCR Watershed Restoration and Protection Strategy (WRAPS), existing total maximum daily loads (TMDLs), the Bonanza Valley Groundwater Management Plan (Draft), existing county water plans and watershed district plans, and similar documents. A list of the information reviewed is included in **Appendix G**;
- Comment letters provided by state and federal agencies (**Appendix H**);
- Priority categories identified for incorporation into the NFCR Zonation model (**Appendix I**);
- Survey results from the public about watershed issues (**Appendix G**);
- Input from members of the Advisory Committee and the Planning Work Group; and
- The knowledge of local water and resource managers, including SWCD, county, watershed district, and CROW staff.

Before prioritizing issues, initial resources, potential concerns, and issues were identified and placed into a preliminary table. To organize the table, potential concerns and issues were identified and summarized by resource. The resulting table illustrates how potential concerns are refinements of a resource, and how multiple issues can impact each potential concern.

The final table was used to confirm identification, analysis, and consideration of all potential concerns and issues in the prioritization process. **Table 2-1** shows the final list of all resources, potential concerns, and issues that were considered during plan development. **Table 2-1** also shows results of the prioritization process, which will be discussed next.

Table 2-1: Resources, potential concerns, and issues affecting a potential concern for the plan area.

Resource	Potential Concern		Issue Affecting a Potential Concern	Priority
	Name	Description	Issue	Policy Committee Priority Level
1. Groundwater: Water that is held underground within the pores of rocks and soils and which reaches the ground surface				
1. Groundwater	**1.1 Drinking Water** 	Drinking water supplies are primarily groundwater, which is water within the subsurface pores of soil and rock within the aquifer. The susceptibility of the drinking water supply to contamination is driven largely by how quickly and easily water can be transported from the surface to the aquifer, and conditions within the primary aquifer recharge areas.	**1.1.1: Water Quality:** Increasing levels of nitrates, which if excessive can result in implications to human health and treatment costs for community, municipal, and individual wells	**A**
			1.1.2: Water Quality: Elevated E. coli, fecal coliform bacteria, and total coliform bacteria levels in groundwater used for drinking water, which can have implications to human health	
			1.1.3: Water Quality: Pesticides and fertilizers applied to the land surface that enter the drinking water supply posing a health risk to humans	
			1.1.4: Water Quality: Land use changes for specific areas on the landscape where surface water moves into the aquifer (i.e., Wellhead Protection Area, vulnerable Drinking Water Supply Management Area (DWSMA) boundary), which can affect how the water can be beneficially used	
	1.2 Groundwater Supplies 	The North Fork Crow River 1W1P boundary encompasses two of Minnesota's six Groundwater Provinces: The Central and Metro Provinces. Groundwater supplies within the plan area are regionally important and heavily used for commercial and agricultural use, primarily agricultural irrigation.	**1.2.1: Water Quantity:** Increasing number of active wells and total volume appropriations, impacting groundwater supplies for domestic drinking water, agricultural irrigation, livestock watering, and industry	**B**
			1.2.2: Water Quantity: Diminished rate of aquifer recharge from of an increase in the amount of impervious surface area, the lack of vegetative cover, and altered hydrology in primary recharge areas, and its impact on groundwater supplies	
			1.2.3: Water Quantity: Insufficient knowledge of groundwater resource supplies and/or condition	
			1.2.4: Water Quantity & Quality: Unsustainable withdrawal and/or groundwater quality resulting in negative impacts to base flows for wetlands, lakes and streams, resulting in reduction of aquatic habitat quality and quantity	
			1.2.5: Water Quantity & Quality: Unsustainable withdrawal and/or groundwater quality resulting in negative impacts to base flows for designated trout streams, native plant communities, and wildlife species associated with groundwater	
2. Surface Waters: Water resulting from excess precipitation leaving the landscape and collecting in streams, rivers, creeks, wetlands, lakes and ponds				
2. Surface Waters	**2.1 Streams and Rivers** 	Numerous streams and rivers are found within the North Fork Crow River 1W1P boundary. The water quality within some of these currently supports the beneficial uses of this water, while others do not. Some of these beneficial uses include swimming, fishing, support of aquatic life, drinking and irrigation. Some creeks, streams and rivers need to have the water quality improved (i.e., restored), while others need water quality maintained at or no less than the current level (protected).	**2.1.1: Water Quality:** Elevated concentrations of suspended solids and sediment approaching (protection) or exceeding (restoration) water quality standards for aquatic life	**B**
			2.1.2: Water Quality: Elevated concentrations of bacteria approaching (protection) or exceeding (restoration) water quality standards for aquatic recreation	
			2.1.3: Water Quality: Elevated concentrations of nitrate-nitrogen approaching (protection) or exceeding (restoration) water quality standards for potable uses and for aquatic life	
			2.1.4: Water Quality: Elevated concentrations of total phosphorus approaching (protection) or exceeding (restoration) water quality standards for aquatic life	
			2.1.5: Water Quality: Elevated concentrations of chloride and its impact on aquatic organisms	
			2.1.6: Water Quality: Reduced concentrations of dissolved oxygen approaching (protection) or below (restoration) tolerable levels and its impact on aquatic organisms.	
			2.1.7: Water Quantity & Quality: Modifications within the drainage area (e.g., increased impervious surface area; reduction in soil organic matter content) contributing runoff to streams and rivers, which increases the amount of sediment, nutrients and substance, which increase the risk of exceeding minimum standards and requirements	
			2.1.8: Water Quantity: Modifications within the drainage area (e.g., increased impervious surface area; reduction in soil organic matter content) contributing runoff to streams and rivers, which can increase the delivery of sediment, bank and bluff erosion, and the transport of near channel sediment	
			2.1.9: Increased spread of aquatic invasive species and its implications on environmental, economic, or human health endpoints	

A: Highest Priority **B: Second Highest Priority** **C: Third Highest Priority** **D: Second Lowest Priority** **E: Lowest Priority**

Table 2-1: Resources, potential concerns, and issues affecting a potential concern for the plan area.

Resource	Potential Concern		Issue Affecting a Potential Concern	Priority
	Name	Description	Issue	Policy Committee Priority Level
2. Surface Waters (continued)…	**2.2 Lakes** 	Hundreds of lakes are found within the North Fork Crow River 1W1P, providing recreational, aesthetic, cultural, biologic/ecologic, and economic value to the community. The water quality within some of these lakes currently supports aquatic life and recreation beneficial uses, while others do not. Some lakes need to have the water quality improved (i.e., restored), while others need water quality maintained at or no less than the current level (protected).	**2.2.1: Water Quality:** Secchi depth transparency measurements approaching (protection) or exceeding (restoration) water quality standards for aquatic life and recreation	**A**
			2.2.2: Water Quality: Elevated nutrient (total phosphorus) enrichment in lakes approaching (protection) or exceeding (restoration) water quality standards causing nuisance algal blooms, impeding aquatic life and recreation	
			2.2.3: Water Quality: Elevated levels of chlorophyll-a approaching (protection) or exceeding (restoration) water quality standards for aquatic life and recreation	
			2.2.4: Water Quality: Human-induced changes on the landscape within the drainage areas of lakes requiring protection, because the water quality exceeds minimum requirements (e.g., numeric standards)	
			2.2.5: Water Quality: Presence of ravines and their ability to rapidly route polluted runoff to surface waters	
			2.2.6: Water Quantity: Modifications within the drainage area (e.g., increased impervious surface area; reduction in soil organic matter content) contributing runoff to lakes, which increases the rate and volume of runoff, leading to excessive water levels and an accelerated transport of nutrients	
			2.2.7: Water Quality: Increased spread of aquatic invasive species and its implications on environmental, economic, or human health endpoints	
			2.2.8: Water Quality: Long-term legacy accumulation of sediment in lakes and its impact on aquatic life, recreation, and local economy.	
			2.2.9: Water Quantity: Lake levels and its impact on aquatic life, recreation, and local economy	
	2.3 Surface Runoff 	An excess of surface runoff in a watershed may lead to flooding. Flooding is the inundation of land, homes, buildings, and roads. Flooding causes infrastructure damage, economic loss, and has adverse societal consequences in the community. Flooding can also have ecological benefits by maintaining a hydrologic connection between the river and the adjacent (riparian) lands.	**2.3.1: Water Quantity:** Changes in the landscape including increases in the amount of impervious area, loss of vegetative cover, and amount of field residue, which can cause an increase in the volume of runoff, peak discharges, and water levels, causing flooding and flood damages to agricultural land, transportation systems, and building and structures	**A**
			2.3.2: Water Quantity & Quality: Changes in the landscape including increases in the amount of impervious area, loss of vegetative cover, and amount of field residue, which can cause an increase in the volume of runoff, peak discharges, and water levels, and causing problems within the conveyance system, including natural streams	
			2.3.3: Water Quantity: Loss of natural water storage on the landscape, including natural depressional areas, wetlands, and soil organic matter	
	2.4 Surface Drinking Water 	The Crow River is used as a source of drinking water for several communities. The Crow River also discharges to the Mississippi River, just upstream of intakes of both the City of St. Paul Regional Water Services and the City of Minneapolis Water Treatment and Distribution Services. The Crow River within the North Fork Crow River 1W1P boundary should therefore be protected or restored for as a surface water source for public drinking water for both cities and communities further downstream.	**2.4.1: Water Quality:** Elevated suspended solids impacting treatment and maintenance costs for communities and Twin Cities drinking water treatment	**D**
			2.4.2: Water Quality: Elevated nutrient levels (e.g., nitrates and phosphorus) impacting treatment and maintenance costs for municipal water treatment supplies	
			2.4.3: Water Quality: Elevated levels of pesticides and contaminants of emerging concern impacting treatment and maintenance costs for communities and Twin Cities drinking water treatment	
			2.4.4: Water Quality: Elevated nutrient levels (e.g., nitrates and phosphorus) in surface waters causing algal blooms and toxic blue green algae in drinking water sources	

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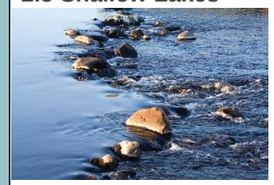
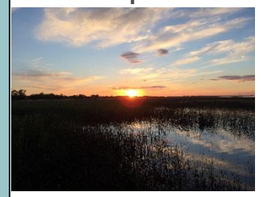
Table 2-1: Resources, potential concerns, and issues affecting a potential concern for the plan area.

Resource	Potential Concern		Issue Affecting a Potential Concern	Priority
	Name	Description	Issue	Policy Committee Priority Level
2. Surface Waters	**2.5 Shallow Lakes** 	The North Fork Crow River 1W1P boundary contains more than 200 shallow lakes. Shallow lakes are identified by permanent or semi-permanent water regimes characterized by aquatic plants and are generally less than 15 feet deep. These lakes provide critical habitat for wildlife.	**2.5.1: Water Quantity:** Loss of shallow lakes and their ability to store water due to water quality degradation, altered watersheds, modified outlets, urban development, intensive agriculture	E
			2.5.2: Water Quality: Elevated nutrient (total phosphorus) enrichment in shallow lakes approaching (protection) or exceeding (restoration) water quality standards, and its impacts on nuisance algal blooms, aquatic life, and recreation	
			2.5.3: Increased spread of invasive species and the loss of diversity within shallow lakes and a reduction in important ecological services provided	
	2.6 Wetlands 	Wetlands are frequently saturated lands with multiple potential benefits. The Minnesota Wetland Conservation Act has set the goal of no net loss of wetlands in total acreage and functions. Wetland loss and modification is an ongoing concern and focus of several state and federal agencies, and non-profit organizations.	**2.6.1: Water Quantity:** Drainage and filling of wetlands (including seeps, fens, bogs, ephemeral wetlands) resulting in increased discharge, accelerated runoff, and decreased water storage capacity, loss of nutrient filtering capacity, and wildlife habitat	B
			2.6.2: Water Quality: Elevated concentrations of suspended solids and sediment approaching (protection) or exceeding (restoration) water quality standards for aquatic life and recreation	
			2.6.3: Water Quality: Elevated concentrations of bacteria approaching (protection) or exceeding (restoration) water quality standards for aquatic life and recreation	
			2.6.4: Water Quality: Elevated nutrient (total phosphorus) enrichment in wetlands approaching (protection) or exceeding (restoration) water quality standards causing nuisance algal blooms, impeding aquatic life and recreation	
			2.6.5: Increased spread of invasive species (e.g. purple loosestrife and reed canary) threatening native plant communities	
3. Fish and Wildlife Habitat and Unique Natural Features: Visible natural features and characteristics of the landscape, often which are prominent or unique.				
3. Fish and Wildlife and Unique Natural Features	**3.1 Aquatic Habitat for Fish, Macroinvertebrates and Aquatic Life** 	The pools, riffles, runs, and bank overhangs within streams, creeks and rivers, the pooled areas of wetland, and the underwater areas of lakes and backwater areas comprise the livable space for aquatic life. A number of the waterways on the state's Impaired list are listed for impairments to fish, macroinvertebrates, and aquatic life. Frequently, these impairments are a result of degraded aquatic habitat. In addition, the North Fork Crow River 1W1P boundary area contains a number of stream reaches with high quality aquatic habitat.	**3.1.1:** Degradation of aquatic and riparian habitat associated with the physical damage to the banks and beds of creeks, streams and rivers from higher and faster flows due to development	D
			3.1.2: Physical presence of road and culvert/bridge crossings and its impacts on aquatic and riparian habitat segmentation	
			3.1.3: Increased temperatures caused by runoff from warm, impervious areas, storage in impoundments, loss of riparian vegetation, and shallow channels	
			3.1.4: Increased flows and sediment load negatively impacts stream channel pattern, profile, and function resulting in wider, shallow stream beds with fewer pools and riffles	
			3.1.5: Reduced baseflow to aquatic habitats due to increased impervious surfaces and lack of rainfall infiltration to the soil and water table	
	3.2 Terrestrial Habitat for Wildlife 	Habitat provides food, shelter, terrestrial ecological corridors, and breeding territory for animals. Many locations within the North Fork Crow River 1W1P area provide habitat for unique and rare plant and animal species. Because of their uniqueness, there is a general desire to preserve and protect these locations.	**3.2.1:** Increased habitat fragmentation, loss of habitat providing food, shelter, terrestrial ecological corridors, and breeding territory	C
			3.2.2: Decreased size and increased distance between habitat parcels for sustaining populations of plants and animals	
			3.2.3: Presence of invasive species threatening the quality of high biodiversity areas and native plant communities	
			3.2.4: Degradation and fragmentation of unique habitats such as old growth forests and native prairies due to developmental pressures	

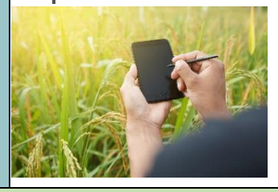
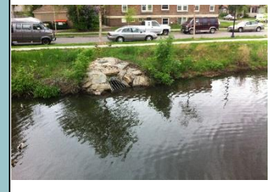
A: Highest Priority **B: Second Highest Priority** **C: Third Highest Priority** **D: Second Lowest Priority** **E: Lowest Priority**

Table 2-1: Resources, potential concerns, and issues affecting a potential concern for the plan area.

Resource	Potential Concern		Issue Affecting a Potential Concern	Priority
	Name	**Description**	**Issue**	**Policy Committee Priority Level**
	3.3 Lake Shoreland and Stream Riparian Corridors 	Lake shorelands are lands within 1,000 feet of a lake. Stream riparian corridors are the land areas adjacent to a creek, stream, river or similar water body characterized by perennial vegetation and relatively frequent flooding. For lake shorelands and stream riparian corridors, perennial vegetation preferably consists of native plant species. Lake shorelands and riparian corridors serve important functions including filtering runoff, habitat and travel corridors for fish and wildlife, and aesthetic enjoyment. Both lake shoreland and riparian corridors are sometimes subject to regulatory controls (e.g., shoreland ordinance; floodplain requirements).	**3.3.1:** Increased development along lakes causing loss of native and perennial shoreland plants for pollutant filtering, capturing precipitation, increasing bank stability, and habitat connectivity	**C**
			3.3.2: Increasing amounts of impervious surfaces in lake and riparian areas and delivery of pollutants (e.g. sediment, nutrients) impacting water quality and aquatic habitat in receiving water bodies	
			3.3.3: Presence of culverts and bridges placed on perennial streams and rivers acting as barriers to fish movement and a reduction in longitudinal connectivity and reduction in ecosystem services	
			3.3.4: The siting and number of locations for legal and controlled public access along streams, rivers and lakes	
			3.3.5: Presence, width, and quality of vegetated areas adjacent to streams and rivers within urban and rural landscapes for filtering surface runoff, providing shading and maintaining surface water temperatures, habitat connectivity, and increasing bank stability	
	3.4 Lands of Concern 	Lands of concern include the protection of ecologically valuable lands and lands near existing protected lands and high-growth areas.	**3.4.1:** Threats to existing public lands (WMA, parks, etc.) from encroaching development and changing land uses	**E**
			3.4.2: Elevated contribution of sediment and elevated risk of flooding in roadways with inadequate culvert designs and installations	
			3.4.3: Maintaining lands close to existing development and the ecosystem services they provide	
4. Local Knowledge Base and Technical Capacity: The collective understanding of water-related matters within the community and the ability to respond to and resolve water related issues.				
4. Local Knowledge Base and Technical Capacity	**4.1 Public Knowledge of and Behavior Relative to Water Issues** 	The behavioral changes needed to understand the relationship between daily decisions and the effect on water requires knowledge, beginning at an early age and continuing through adulthood. The necessary behavioral changes are most effective when based on positive relationships and experiences. These positive relationships are often driven by education and outreach efforts that inform and engage urban, rural, and shoreland owner residents to better understand context.	**4.1.1:** Lack of watershed-wide sound and credible education and outreach program about water management focused on the next generation (youth and grade school aged children) for building future water awareness	**C**
			4.1.2: Lack of watershed-wide sound and credible education and outreach program intended for general public audiences (urban and rural) for gaining an understanding of natural resources and water related issues (e.g. drinking water protection, including maintenance of SSTSs, proper disposal of hazardous chemicals, stormwater runoff, low impact development, BMPs, properly sealing wells, pharmaceutical disposal and emerging contaminants), and changing behaviors adverse to wise water management	
			4.1.3: Lack of watershed-wide sound and credible education and outreach program for gaining a better understanding of water issues (e.g. stormwater quality, road salt and sand application, and illicit discharge), the adverse and beneficial consequences of decisions as they relate to water management and necessary behavioral changes, for local units of government staff, local offices, and elected public officials	
	4.2 Landowner, Producer and Lakeshore Owner Engagement in Water Management 	How private lands are managed affects water resources. Some programs focused on implementing practices to improve water quality and reduce the rate and volume of runoff, go unused for a variety of reasons. Understanding, engaging, and communicating with landowners, agricultural producers and those controlling the land resource is needed to facilitate effective water resources management with the plan area. Increased implementation of practices may result from increased capacity and understanding.	**4.2.1:** Lack of and quality of watershed-wide education and outreach programs to communicate information about incentive and cost-share programs and their benefits to landowners	**C**
			4.2.2: Lack of and quality of watershed-wide education and outreach programs to communicate information about incentive and best management practices and agricultural profitability	
			4.2.3: Lack of understanding within the community about on-farm production decisions, the relationship to water management and water quality, and the fiscal and operational implications of best management practice placement	
			4.2.4: Lack of knowledge about the benefits of existing best management practices and their water quality and water management value	

A: Highest Priority **B: Second Highest Priority** **C: Third Highest Priority** **D: Second Lowest Priority** **E: Lowest Priority**

Table 2-1: Resources, potential concerns, and issues affecting a potential concern for the plan area.

Resource	Potential Concern		Issue Affecting a Potential Concern	Priority
	Name	**Description**	**Issue**	**Policy Committee Priority Level**
	4.3 Technology, Tools, Funding, and Existing Capabilities 	New tools and technology are frequently being developed for use in water resources management. To take advantage of these tools, there is often a need to build and maintain the technical capacity to use them. There is also a need to provide effective and efficient plan administration and implementation through coordination of roles and consistent funding.	**4.3.1:** Maintenance of sufficient technical capacity to use emerging technologies and tools at the local level	**E**
			4.3.2: The inability to identify defensible metrics for describing and communicating measurable goals and the amount progress toward achieving the goals	
			4.3.3: Lack of clarity about the coordination of roles and responsibilities among local, state and federal agencies for the delivery of programs and pooling of resources focused on managing water issues	
			4.3.4: Piecemeal approach and lack of long term and consistent funding for water management programs at the local level	
			4.3.5: Lack of consistent and effective watershed-wide approach to a regulatory program, including ordinances and rules	
5. Local Development and Sustainability: The management of urban and rural land use through sustainable development				
	5.1 Urban Development and Sustainability 	A number of cities and municipalities are located within the North Fork Crow 1W1P area. Many of these urban communities are experiencing strong residential and commercial developmental pressures. Increased urban development increases the amount of impervious surface, which can impact surface and groundwater resources.	**5.1.1:** Increases in the amount of impervious surface and the rate, volume and duration of runoff associated with increases in soil erosion and nutrient loading	**E**
			5.1.2: Use of fertilizers and pesticides in urban landscapes and their effect on surface water quality	
			5.1.3: Household hazardous waste in urban landscapes and their effect on surface water quality	
			5.1.4: Pharmaceuticals and chemicals of emerging concerns in urban landscapes and their effect on surface water quality	
			5.1.5: Illicit discharges in urban landscapes and its effect on surface water quality	
	5.2 Rural Development and Sustainability 	The sustainability of the rural environment is a cornerstone of ensuring a prosperous rural economy. Factors that typify rural sustainability include using agricultural practices, which maintain soil health, the judicious use of fertilizers and pesticides in agricultural operations especially in sensitive environmental settings, and using smart methods to dispose of animal and human wastes. Practices implemented to improve water resources should complement and be consistent with maintaining and enhancing rural environmental health.	**5.2.1:** Decreased soil health and its impact on agricultural productivity and water holding capacity	**B**
			5.2.2: Increased developmental pressures and the loss of farmland and farms	
			5.2.3: Increased sheet, rill, and wind erosion, and its impact on soil loss, agricultural productivity, and deposits in drainage systems	
			5.2.4: The disposal and use of wastes including those from animal operations and humans in a safe and efficient manner	
6. Water Resources Infrastructure: The natural and human-made systems important for managing the rate, volume and quality of water				
6. Water Resources Infrastructure	**6.1 Urban Stormwater** 	Urban land use has a notable effect on water quality due to stormwater runoff. Stormwater systems play a role in conveying water. With increased urban development, the amount of impervious surfaces increases, increasing stormwater runoff rates and yielding impacts to water quantity and quality.	**6.1.1:** Increasing amounts of impervious surfaces in urban landscapes and delivery of pollutants (e.g. sediment, phosphorus, bacteria, oils, toxins, debris) and elevated water temperatures to receiving water bodies	**C**
			6.1.2: Increasing amounts of impervious surfaces in lake and riparian areas and delivery of pollutants (e.g. sediment, phosphorus, bacteria, oils, toxins, debris) impacting water quality and aquatic habitat in receiving water bodies	
			6.1.3: Urban stormwater velocity and its impact on stream widening, bank erosion, downcutting, and loss of riparian canopy, and decreasing time for water to run off the land and reach a stream or waterbody	
			6.1.4: Insufficient storage for water quality treatment and runoff retention	
			6.1.5: Amount of knowledge about and control of the use of fertilizers within urban landscapes	
			6.1.6: Consideration of consequences to natural channels and waterways related to changes in the rate of runoff, volume and runoff and water levels, in the design and construction of urban stormwater management systems	

A: Highest Priority **B: Second Highest Priority** **C: Third Highest Priority** **D: Second Lowest Priority** **E: Lowest Priority**

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Resource	Potential Concern		Issue Affecting a Potential Concern	Priority
	Name	Description	Issue	Policy Committee Priority Level
	6.2 Agricultural Drainage Systems 	A number of culverts and bridges under roads, and tile, ditch, and drainage systems including the creeks, streams, rivers, and natural waterways have a role in safely conveying water. These are important infrastructure features within the North Fork Crow River watershed.	**6.2.1:** Lack of understanding, agreement and consensus about the hydrologic impacts of pattern tile drainage within rural landscapes and the fiscal benefits provided to producers, creating a barrier to constructive solutions to water management	**A**
			6.2.2: Consequences of open tile intake drainage systems related to the delivery of nutrients to receiving water bodies	
			6.2.3: The interpretation of public drainage and public water statutes, causing differing expectations about the ecological and natural resource value and benefits of constructed public drainage systems including the need for baseflow to support aquatic life	
			6.2.4: Presence, width and quality of vegetated areas adjacent to agricultural drainage systems compared to other alternative practices, for improving water quality	
			6.2.5: Presence of institutional, fiscal and social barriers associated with the creative modification and use of existing agricultural drainage systems to achieve innovate water management solutions	
			6.2.6: Ability to debate and recognize agronomic and economic considerations of the landowner, in the implementation of environmental policy	
	6.3 Water Control Structures 	The design, construction, and management of new and existing water control structures provides the opportunity to manage water quantity as well as reduce sediment in runoff.	**6.3.1:** Aging infrastructure within rural and urban landscape, now no longer capable of providing their original or modified purposes for managing water	**D**
			6.3.2: Legacy accumulation of sediment behind water control structures and its impact on water storage capacity	
	6.4 Point Sources 	The return of water from industrial operations, permitted feedlots, and wastewater discharges discharged back into rivers are examples of point sources. These discharges can affect the amount and quality of water.	**6.4.1:** Adequacy and efficiency of using individual sewage treatment systems (ISTSs) for wastewater treatment for private residences and small communities	**D**
			6.4.2: Downstream water quality consequences from permitted discharges (e.g. wastewater treatment facilities, feedlots) to waterways	

A: Highest Priority **B: Second Highest Priority** **C: Third Highest Priority** **D: Second Lowest Priority** **E: Lowest Priority**

2.2 PRIORITIZING POTENTIAL CONCERNS AND ISSUES

As described by BWSR guidance, this plan is not expected to address all identified potential concerns and issues during its ten-year lifespan. This plan does not "reject" any potential concerns, but rather places potential concerns into priority levels. These priority levels are used to guide creation of measurable goals, and the timeline and aggressiveness of implementation within the targeted implementation schedule.

During plan development, participants followed a thorough and rigorous process to complete the analysis and prioritization of potential concerns and issues. Potential concerns and issues as inventoried within **Table 2-1** were prioritized by soliciting stakeholders' preference on what potential concerns were most important to them. This preference was solicited through an online survey, using SurveyMonkey software.

The North Fork Crow 1W1P Prioritization of Potential Concerns Survey was available from June 16, 2016 until July 13, 2016 (**Appendix J**). The survey was targeted to several stakeholder groups within the NFCR Watershed, including:

- Members of the Policy Committee;
- Members of the Advisory Committee;
- Members of the Planning Work Group;
- Local Government Units/staff;
- Local Water Planning Committees/Citizen Advisory Committees; and
- The public.

The *North Fork Crow 1W1P Prioritization of Potential Concerns Survey* was distributed through email and online advertising. Online advertising included social media blasts of the survey link (Twitter and Facebook), and hosting the survey link on 1W1P planning partners' homepages. ***Nearly 100 responses were received.*** Within the survey, each survey participant was allotted a total of 10 points to express preference for the importance of the 21 potential concerns. The 10 allocated points were placed throughout the 21 potential concerns to indicate which potential concerns are most important to the surveyed stakeholder. All ten points could be allocated to a single potential concern or allocated among multiple potential concerns, with a larger number of points indicating greater importance.

Responses were totaled and ranked both by individual stakeholder groups and as an aggregated group of survey participants. Potential concerns were ranked in order based on number of points cast for each potential concern. **Potential concerns were then preliminarily categorized as an A, B, C, D, or E priority level for each stakeholder group**:

- **"A" Priority Level:** Potential concerns at the top 1/5 rank were classified as "A" priority level, indicating the highest priority;
- **"B" Priority Level:** the top mid-range 1/5 of potential concerns were classified as "B" priority level;
- **"C" Priority Level:** potential concerns in the middle 1/5 ranks were classified as "C" priority level;
- **"D" Priority Level:** the lower mid-range 1/5 were classified as "D" priority level;
- **"E" Priority Level:** the potential concerns in the lowest 1/5 ranks were classified as "E" priority level, the lowest priority category.

The Planning Work Group reviewed the preliminary prioritization results and provided a recommendation for the Policy Committee to establish the final prioritization. The Policy Committee unanimously voted to consider all stakeholder participant groups with equal weight, and to assign final priority ranks based on the rank of all stakeholder participant groups aggregated together. The resulting potential concern classifications are presented in **Table 2-2**, and will be discussed in greater detail next.

Table 2-2: The ranked list of potential concerns with priority level classifications, resulting from the Analysis and Prioritization of Issues process.

	Priority Level
Priority Concerns:	
Drinking Water (Groundwater)	A
Lakes	A
Agricultural Drainage Systems	A
Surface Runoff	A
Streams and Rivers	B
Groundwater Supplies	B
Wetlands	B
Rural Development and Sustainability	B
Lake Shoreland and Stream Riparian Corridors	C
Public Knowledge and Behavior Relative to Water Issues	C
Terrestrial Habitat for Wildlife	C
Landowner, Producer, and Lakeshore Owner Engagement in Water Management	C
Urban Stormwater	C
Potential Concerns	
Aquatic Habitat for Fish, Macroinvertebrates and Aquatic Life	D
Drinking (Surface) Water	D
Point Sources	D
Water Control Structures	D
Shallow Lakes	E
Urban Development and Sustainability	E
Technology, Tools, Funding, and Existing Capabilities	E
Lands of Concern	E

2.3 PRIORITY CONCERNS AND ISSUES

The plan establishes priority concerns consistent with guidance provided by BWSR. Because of the "Analysis and Prioritization of Issues Process", each potential concern was designated as an A, B, C, D, or E priority level. While all potential concerns are important and worthy of local management efforts, limited resources for implementing solutions are available and not all potential concerns can be addressed within the timeframe of a ten-year plan. Therefore, priority levels designate the timeline or aggressiveness of addressing issues impacting potential concerns with the plan.

Those potential concerns identified as A, B, and C level concerns (herein "priority concerns") will be the focus of initial implementation efforts, with A level priority concerns having the highest focus. Those potential concerns designated as D and E priority levels are not anticipated to be directly addressed within this plan, and therefore will not be assigned measurable goals or included within the targeted implementation schedule. Priorities may shift during plan implementation, based on opportunity for collaboration, stacked benefits, or new data and information. Priority issues will be considered and addressed as necessary through annual evaluations and local work plan development (see **Section 5**).

The Policy Committee established the priority concerns reflecting their responsibility in developing this locally-focused plan. However, as many issues affecting one or more priority concerns permeate to lower level potential concerns, this plan will have benefits to lower level potential concerns. An example is

useful for illustration purposes. The drinking (surface) water potential concern is identified as a “D” level priority. Lakes and streams and rivers are designated as “A” and “B” level priority concerns respectively. Many issues affecting lakes and streams and rivers are related to sediment, phosphorus, nitrogen, and bacteria levels in surface waters. Therefore, strategies and actions focused on sediment, phosphorus, nitrogen, and bacteria levels to improve lakes and streams and rivers, will also have benefits to surface drinking water.

Potential and priority concern maps were developed for each concern regardless of priority level, to geographically map where potential and priority concerns are located. This allows for the development of a targeted implementation schedule focused on specific locations on the landscape. Identifying the locations of priority and potential concerns on the landscape also allows for identifying the sources and relative importance of various issues (e.g., source of nitrate loads) affecting a specific concern (e.g., drinking water (groundwater)). Therefore, strategies and actions can be tailored to the locations causing the problem.

2.3.1 “A” LEVEL PRIORITY CONCERNS

“A” level priority concerns are considered the initial focus for implementation efforts. These priority concerns received the highest ranks, indicating the highest expressed preference during the prioritization process, and were confirmed as highest priority by the Policy Committee.

“A” level priority concerns include:

- Drinking water (Groundwater) (see **Figure 2-1a and 2-1b**);
- Lakes (see **Figure 2-2**);
- Agricultural Drainage Systems (see **Figure 2-3**); and
- Surface Runoff (see **Figure 2-4**).

Table 2-1 provides a description of each priority concern with an “A” level priority designation.

Figures 2-1 through **2-4** identify the locations of “A” level priority concerns on the landscape which can be mapped. These figures also show the sources and relative importance of various issues (e.g., source of nitrate loads to drinking water supplies) affecting a specific priority concern.

Figure 2- 1a: Drinking water (groundwater) priority concern locations within the plan area (map 1 of 2).

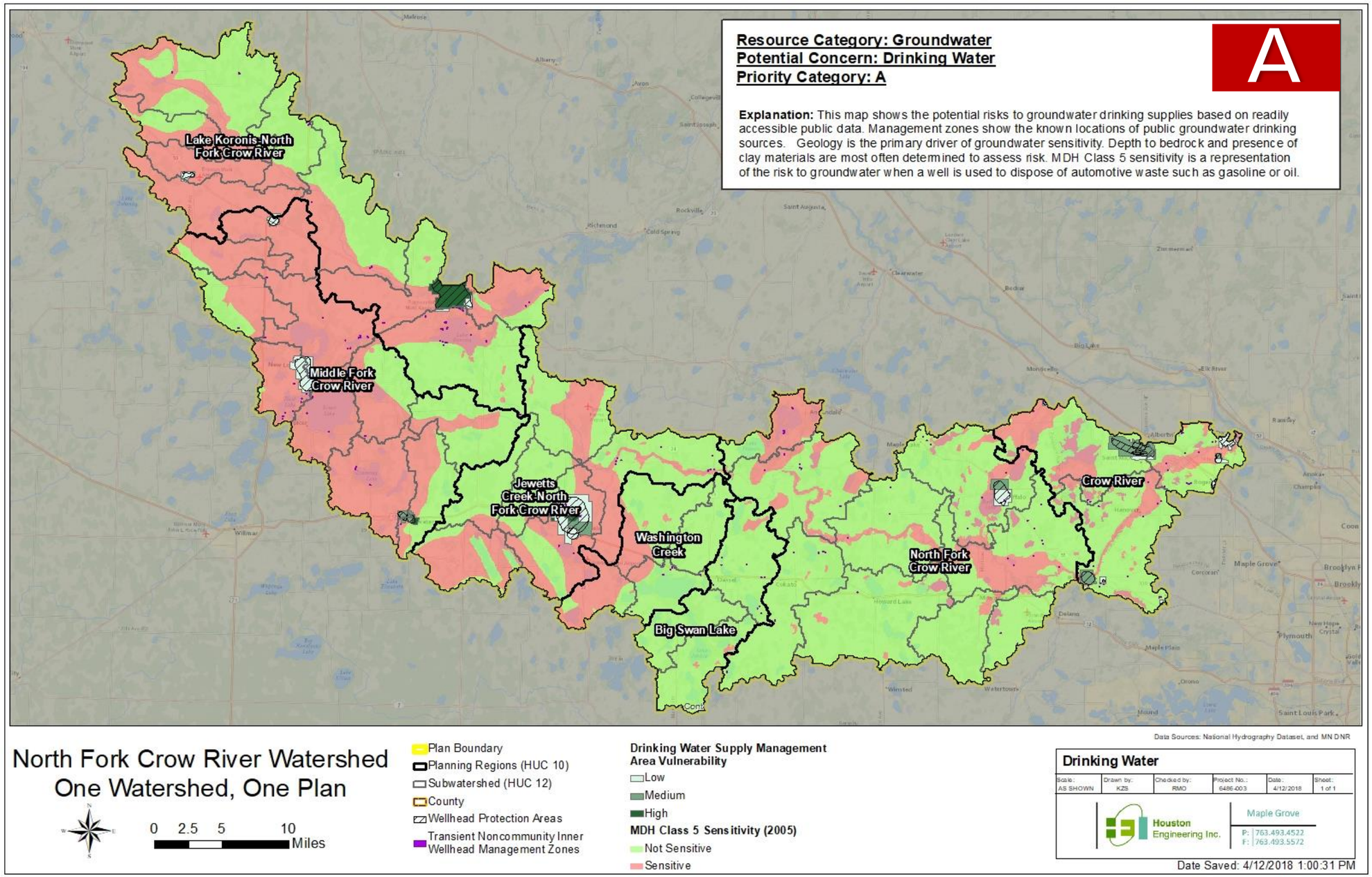


Figure 2- 1b: Drinking water (groundwater) priority concern locations within the plan area (map 2 of 2).

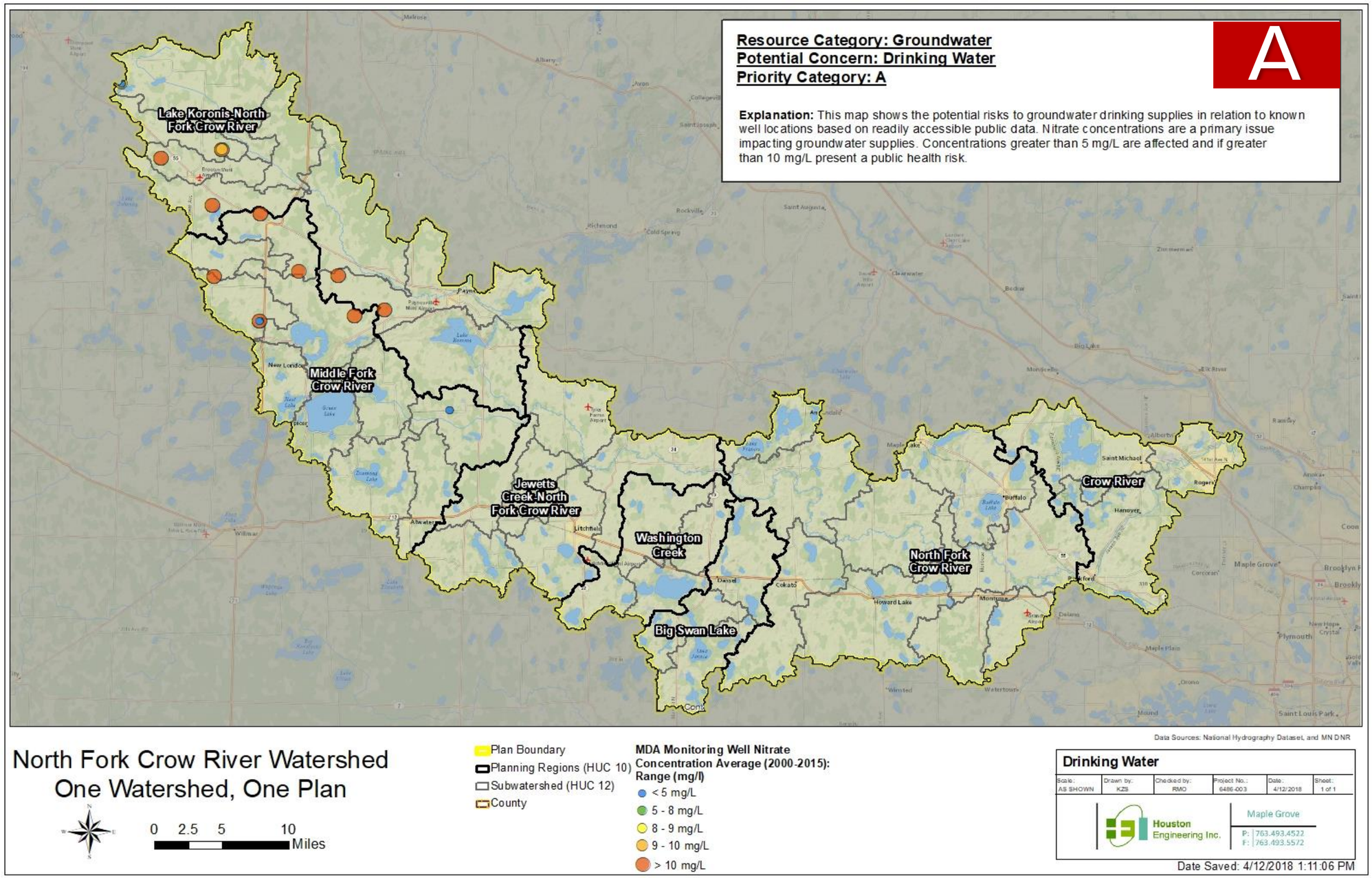


Figure 2- 2: Lake priority concern locations within the plan area.

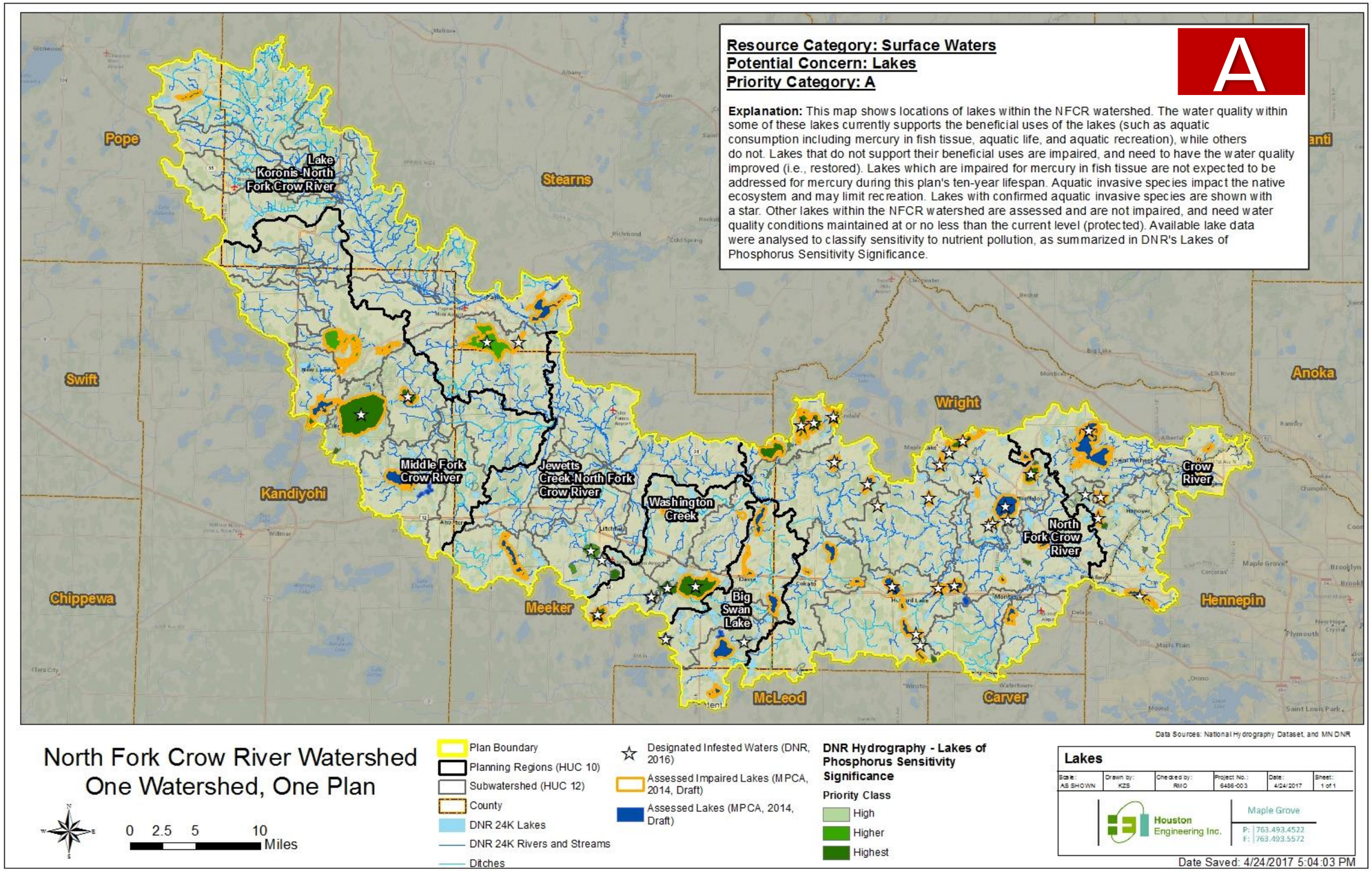


Figure 2- 3: Agricultural drainage system priority concern locations within the plan area.

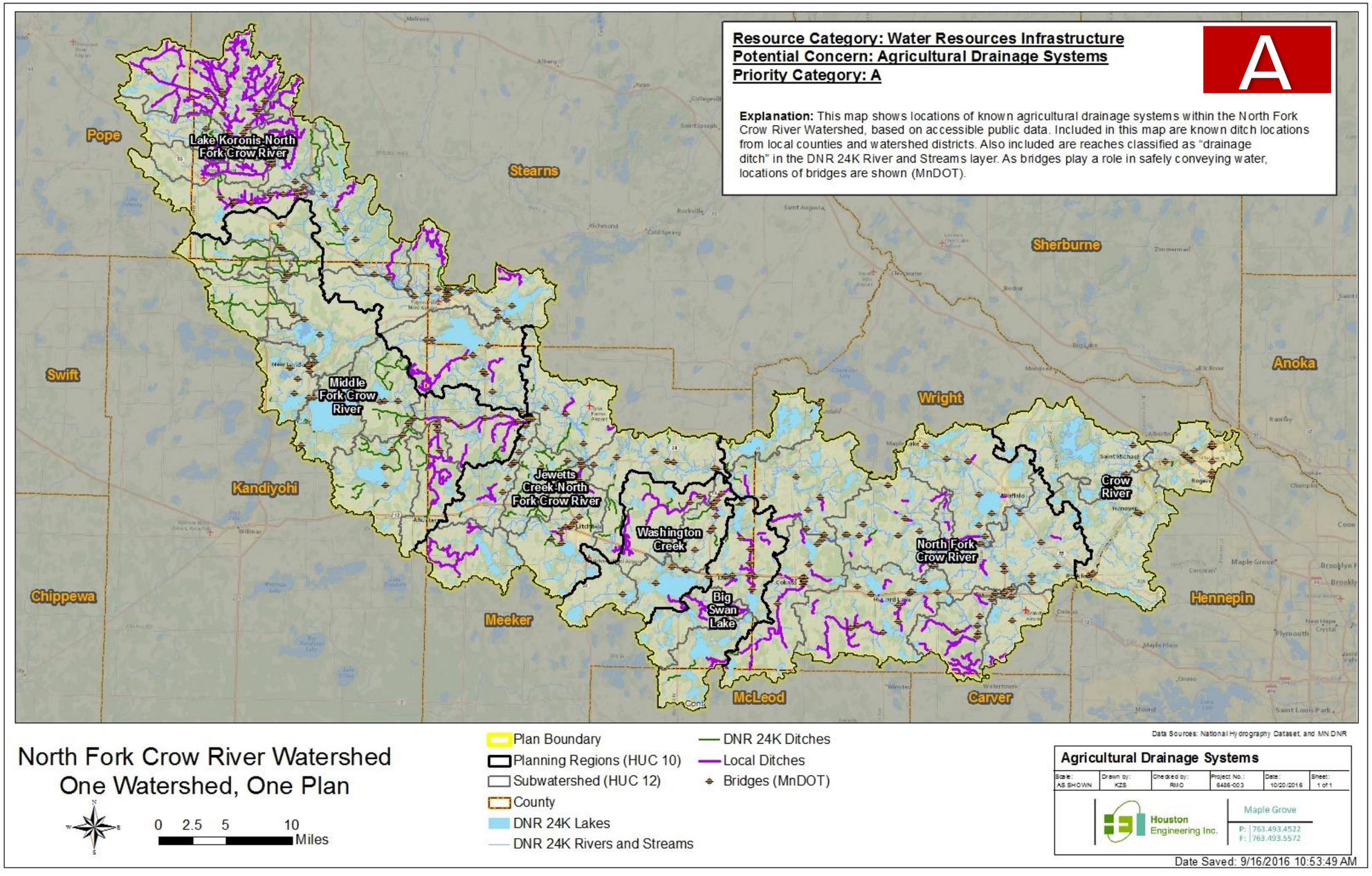
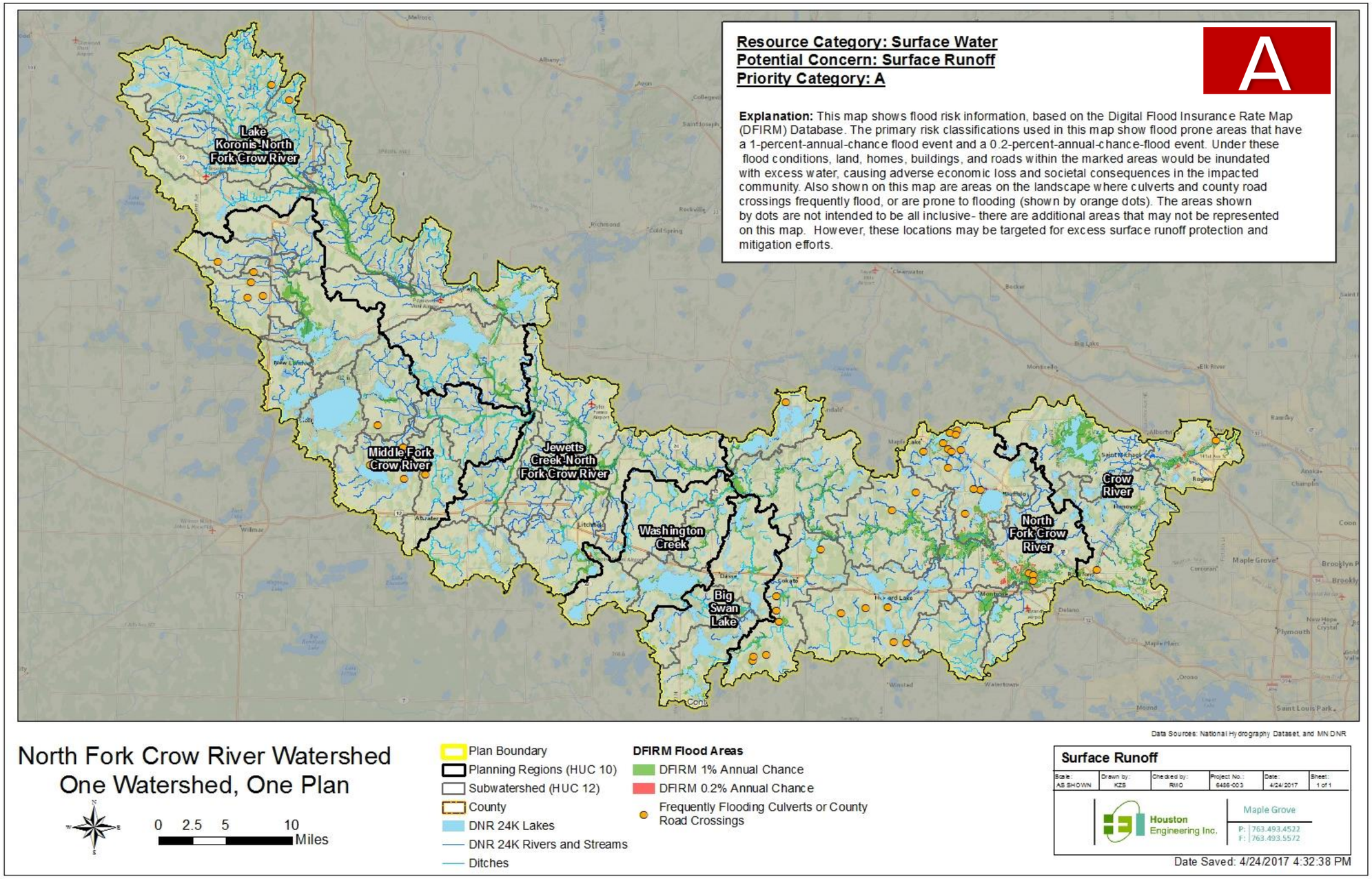


Figure 2- 4: Surface runoff priority concern locations within the plan area.



2.3.2 "B" LEVEL PRIORITY CONCERNS

"B" level priority concerns are considered the second priority for implementation. These priority concerns received the second highest proportion of points during the prioritization process and were confirmed by the Policy Committee as having the second highest priority.

"B" level priority concerns include:

- Streams and Rivers (see **Figure 2-5**);
- Groundwater Supplies (see **Figure 2-6**);
- Wetlands (see **Figure 2-7**); and
- Rural Development and Sustainability (see **Figure 2-8**).

Table 2-1 provides a description of each priority concern with "B" level priority designation.

Figures 2-5 through **2-8** identify the locations of "B" level priority concerns on the landscape which can be mapped. These figures also show the sources and relative importance of various issues (e.g., locations of high demand groundwater users to groundwater supplies) affecting a specific priority concern.

Figure 2- 5: Streams and rivers priority concern locations within the plan area.

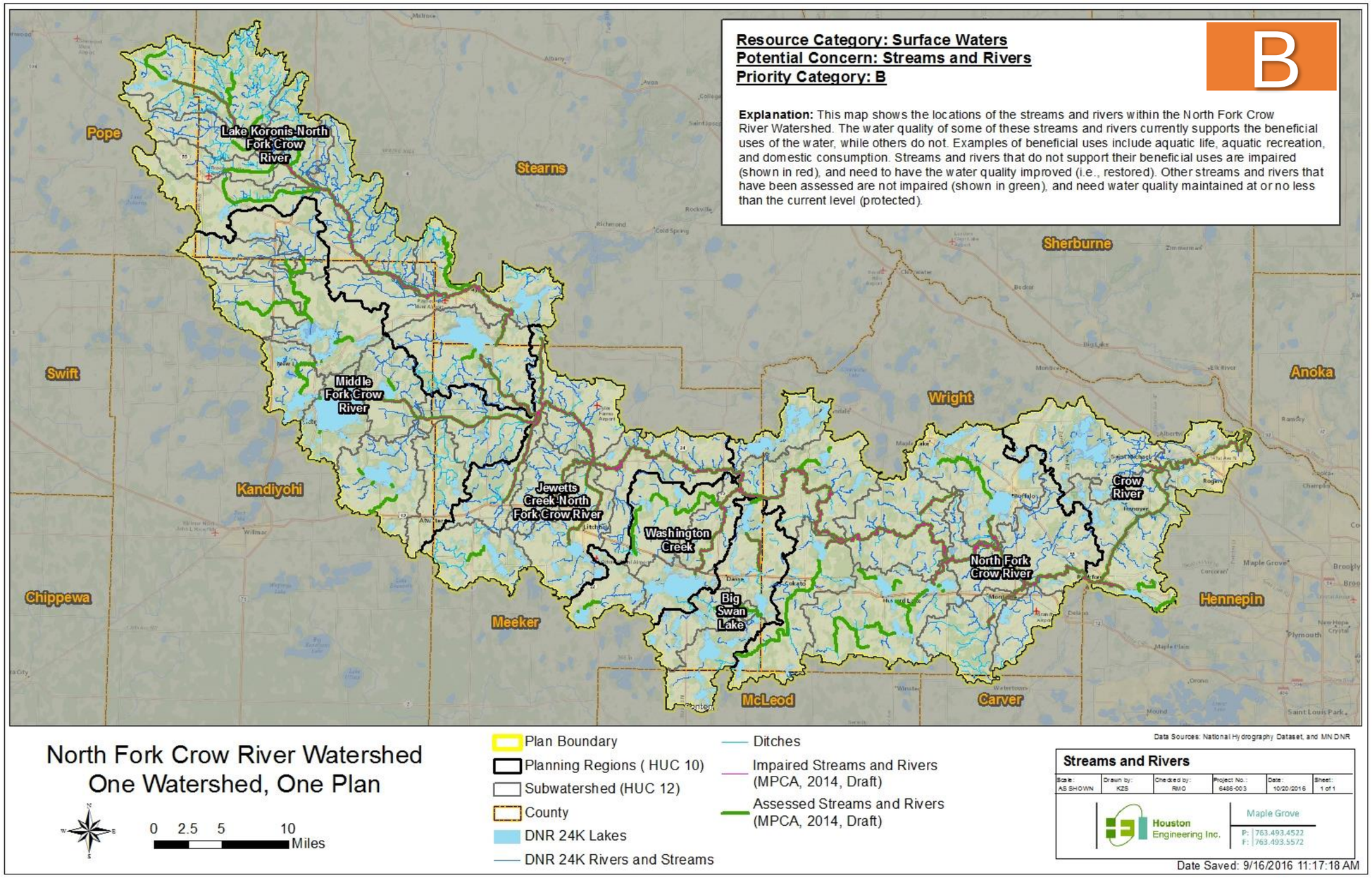


Figure 2- 6: Groundwater supplies priority concern locations within the plan area.

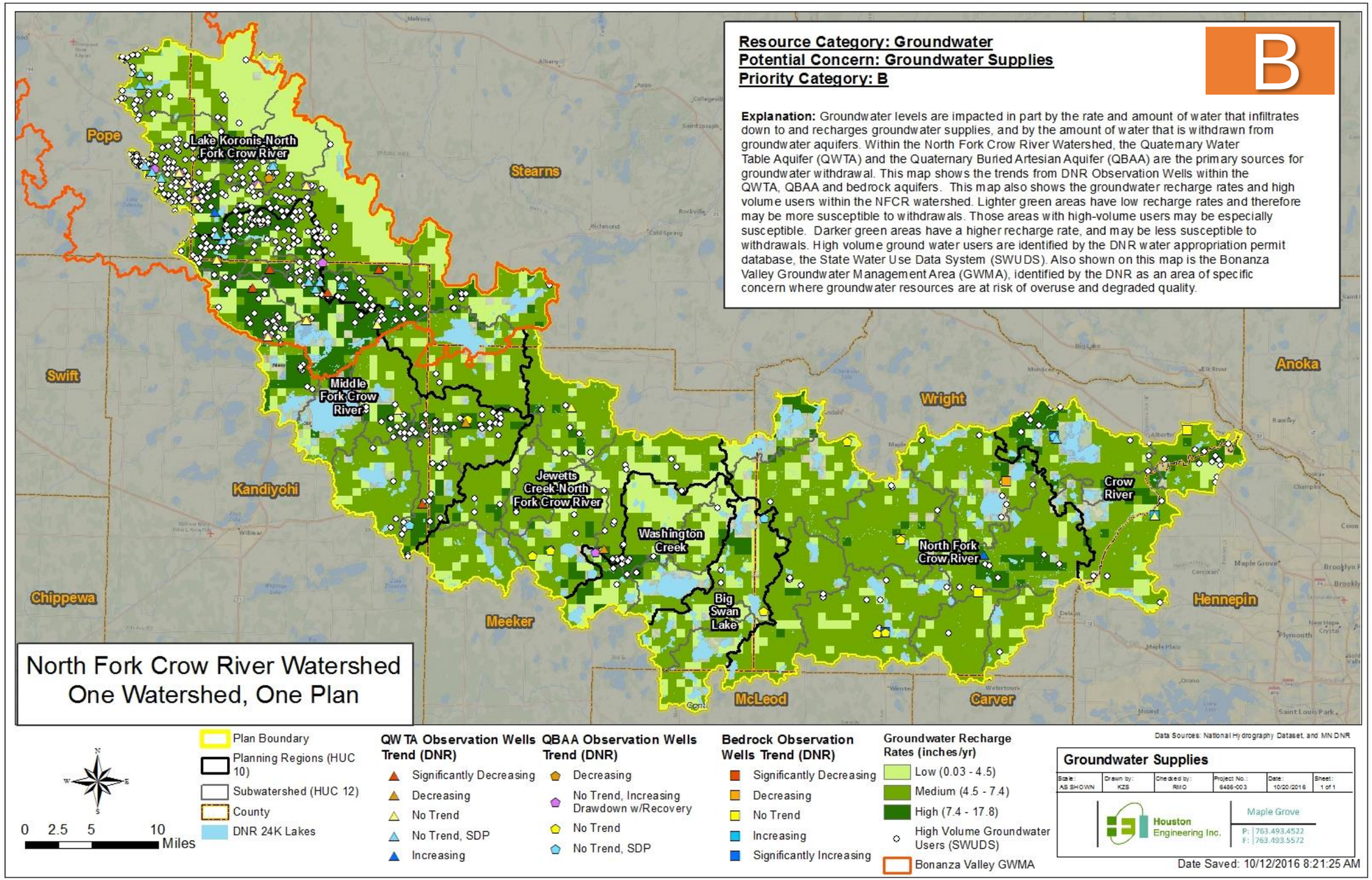


Figure 2- 7: Wetland priority concern locations within the plan area.

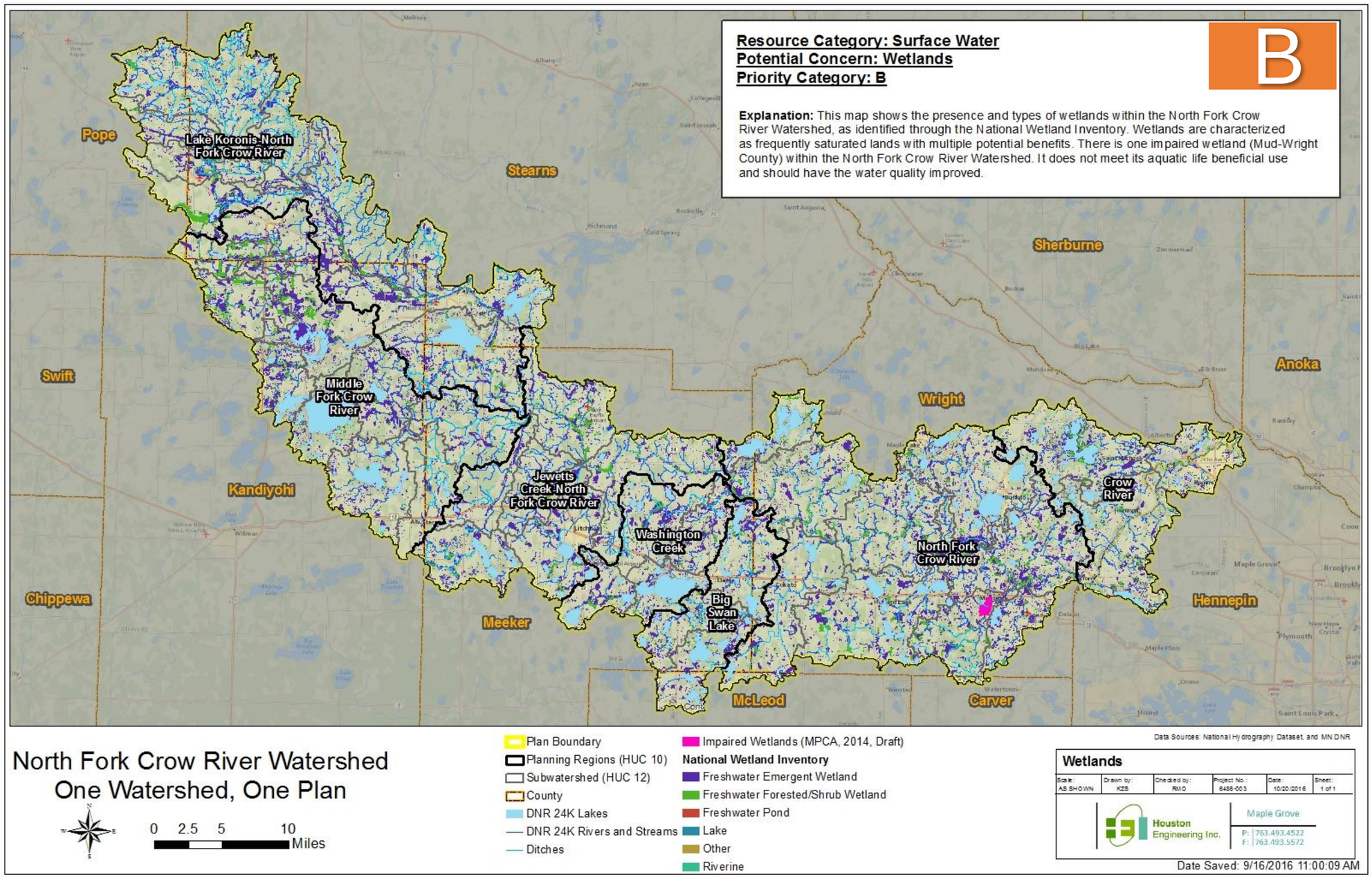
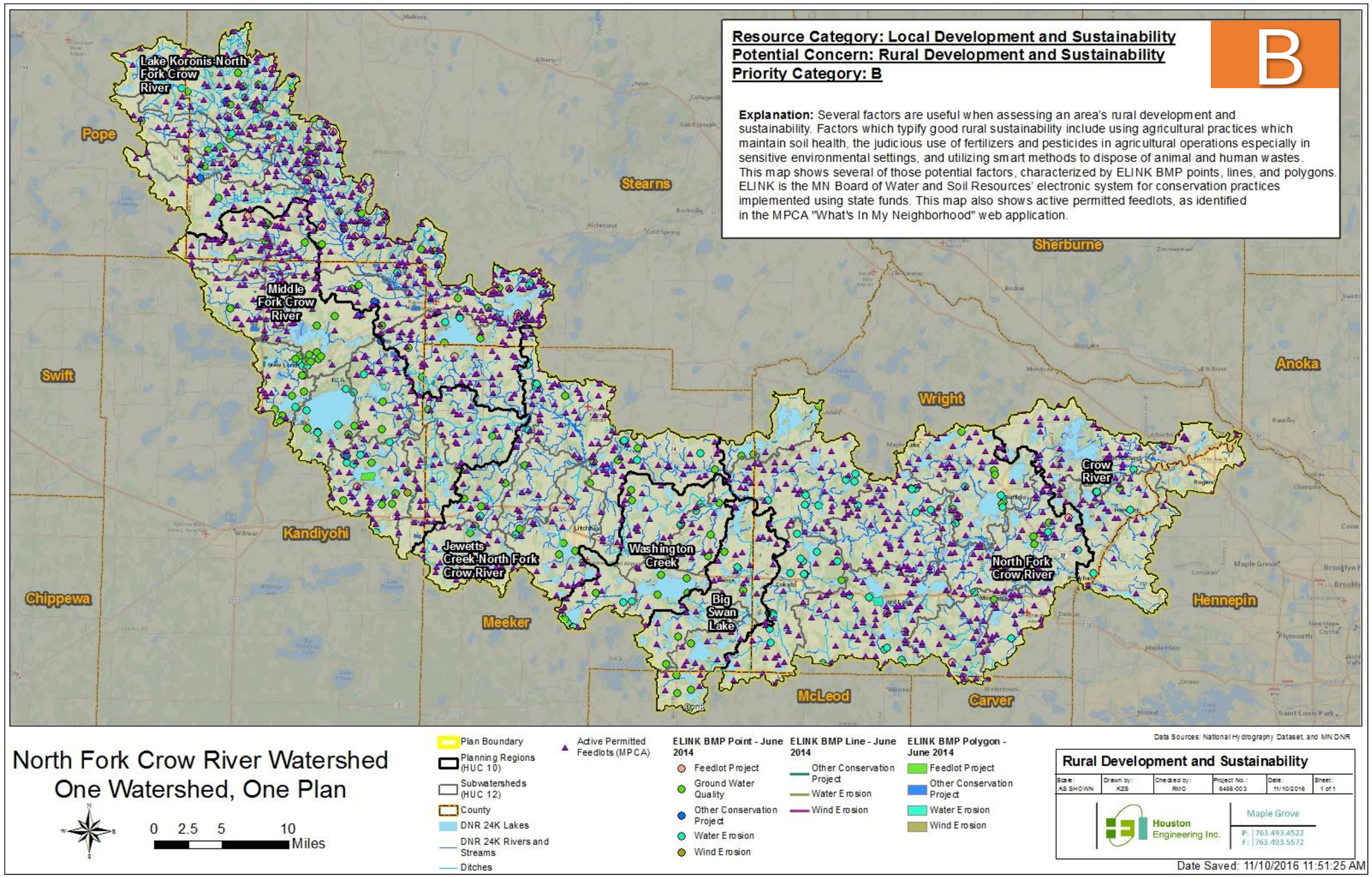


Figure 2- 8: Rural development and sustainability priority concern locations within the plan area.



2.3.3 "C" LEVEL PRIORITY CONCERNS

"C" level priority concerns are considered the third priority for targeting implementation. These priority concerns received the third highest proportion of points during the prioritization process and were confirmed by the Policy Committee as having the third highest priority.

"C" level priority concerns include:

- Lake Shoreland and Stream Riparian Corridors (see **Figure 2-9**);
- Public Knowledge and Behavior Relative to Water Issues;
- Terrestrial Habitat for Wildlife (see **Figure 2-10**);
- Landowner, Producer, and Lakeshore Owner Engagement in Water Management; and
- Urban Stormwater (see **Figure 2-11**).

Table 2-1 provides a description of each priority concern with "C" level priority designation.

Figures 2-9 through **2-11** identify the locations of "C" level priority concerns on the landscape which can be mapped. These figures also show the sources and relative importance of various issues (e.g., increases in impervious surfaces to urban stormwater) affecting a specific priority concern.

Figure 2-9: Lake shoreland and stream riparian corridor priority concern locations within the plan area.

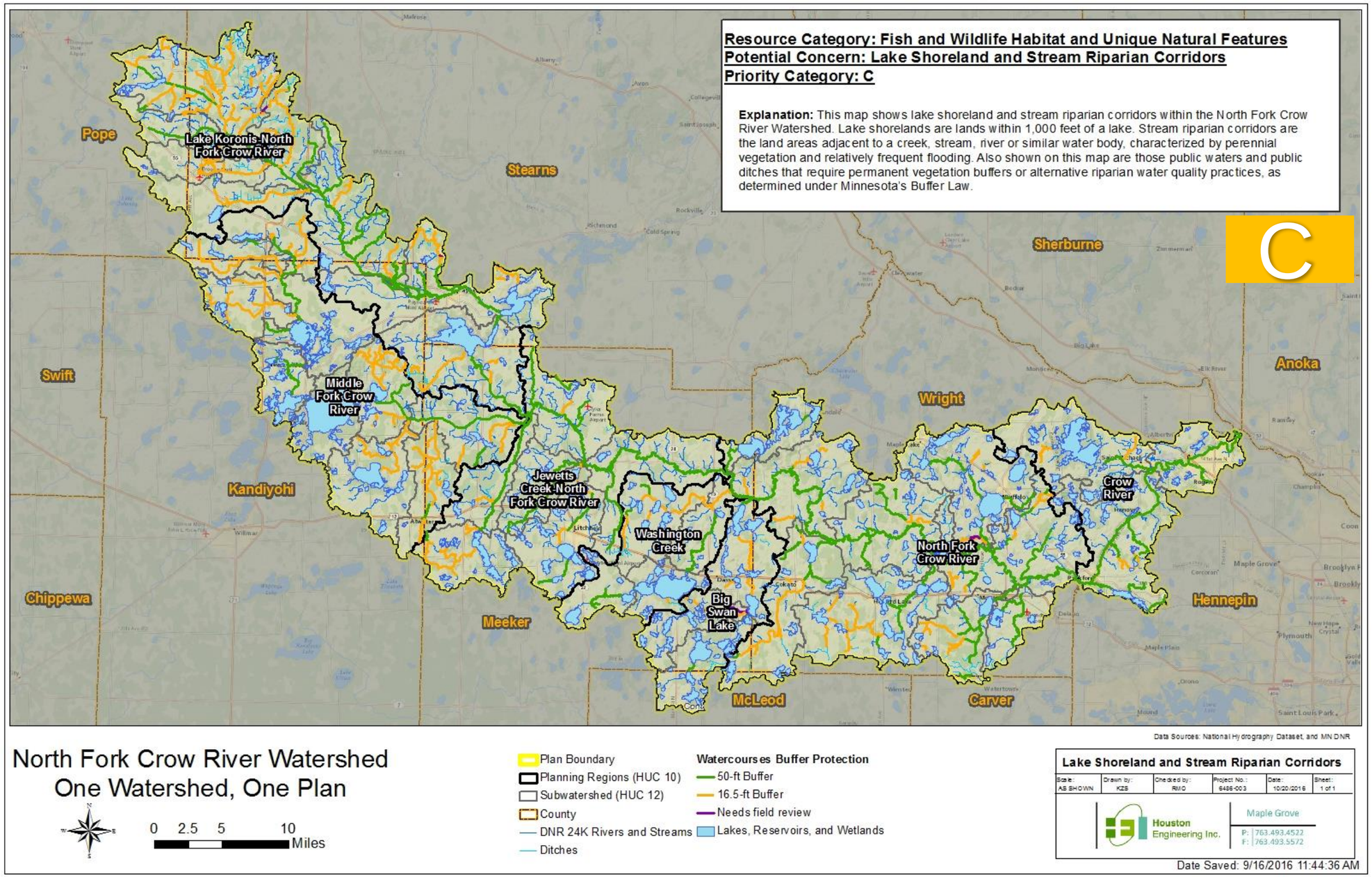


Figure 2-10: Terrestrial habitat for wildlife priority concern locations within the plan area.

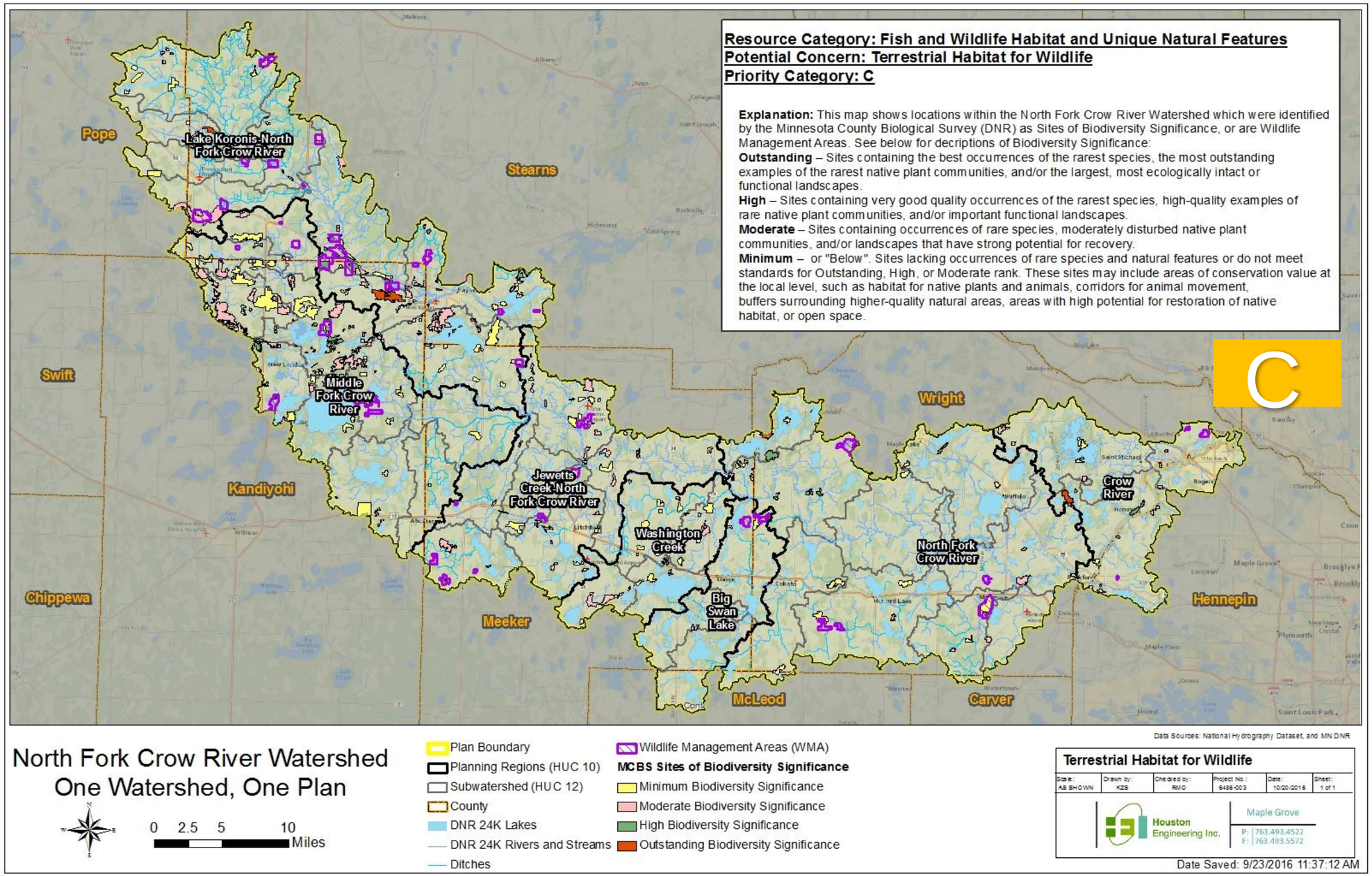
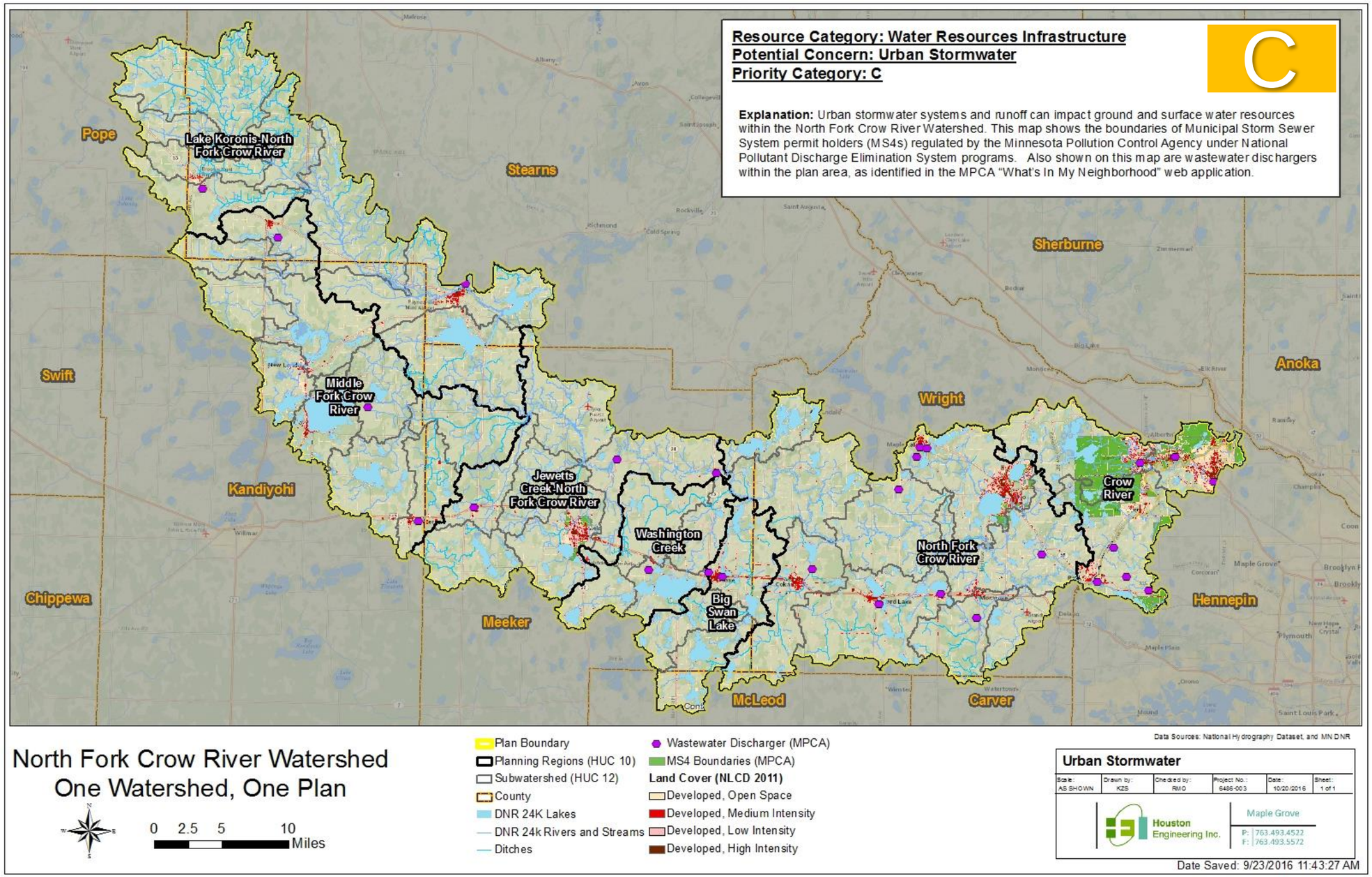


Figure 2-11: Urban stormwater priority concern locations within the plan area.



2.3.4 "D" LEVEL POTENTIAL CONCERNS

"D" level potential concerns are not anticipated to be directly addressed within this plan, and are therefore referred to as a "potential" rather than a "priority" concern. These potential concerns received the second lowest proportion of points during the prioritization process and were confirmed by the Policy Committee as having the second lowest priority.

"D" level potential concerns include:

- Aquatic Habitat for Fish, Macroinvertebrates, and Aquatic Life (see **Figure 2-12**);
- Drinking Water (Surface Water) (see **Figure 2-13**);
- Point Sources (see **Figure 2-14**); and
- Water Control Structures (see **Figure 2-15**).

Table 2-1 provides a description of each potential concern with "D" level priority designation.

Figures 2-12 through **2-15** identify the locations of "D" level potential concerns on the landscape which can be mapped. These figures also show the sources and relative importance of various issues (e.g., wastewater dischargers to point sources) affecting a specific potential concern.

Figure 2-12: Aquatic habitat for fish, macroinvertebrates, and aquatic life potential concern locations within the plan area.

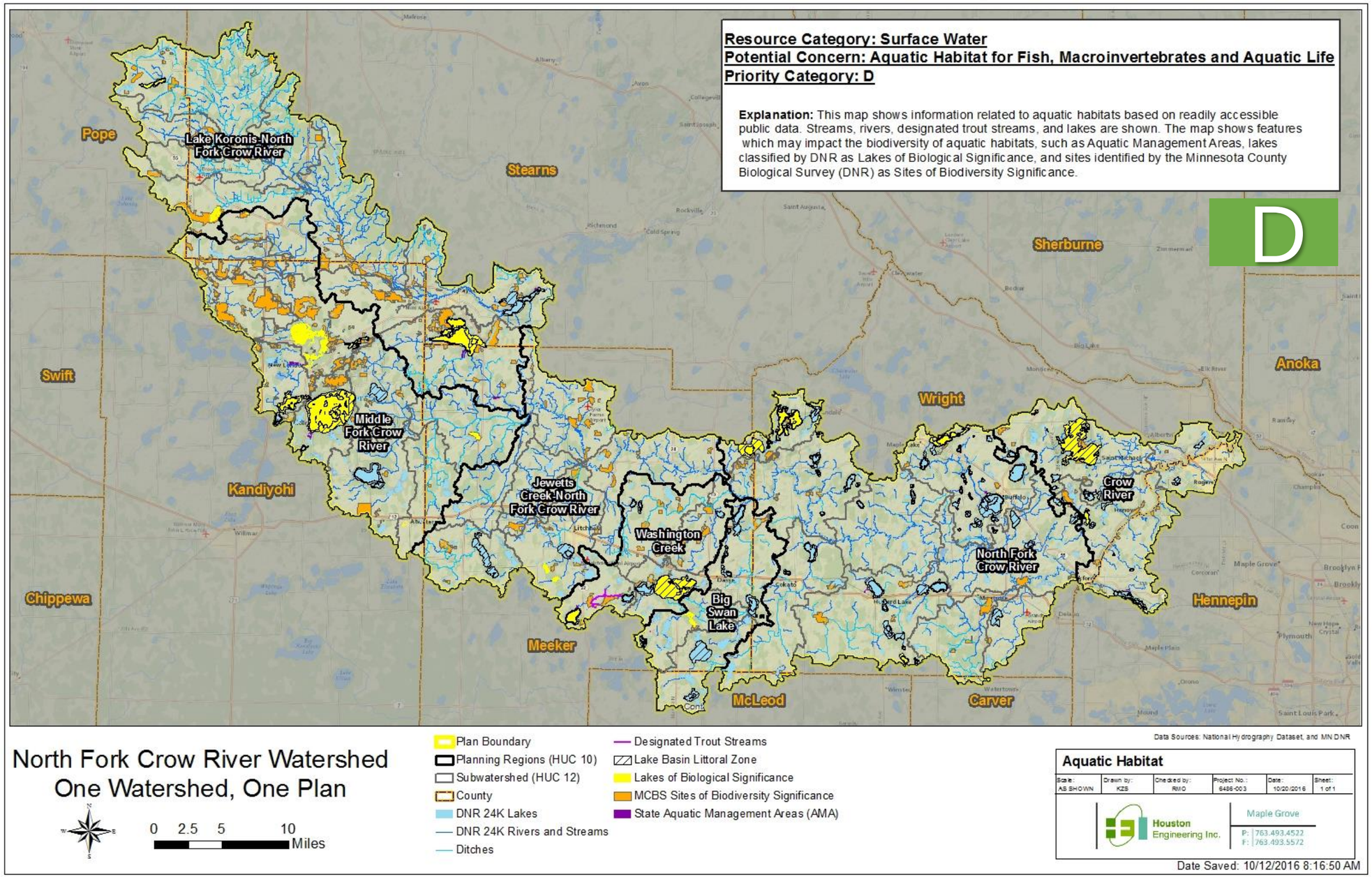
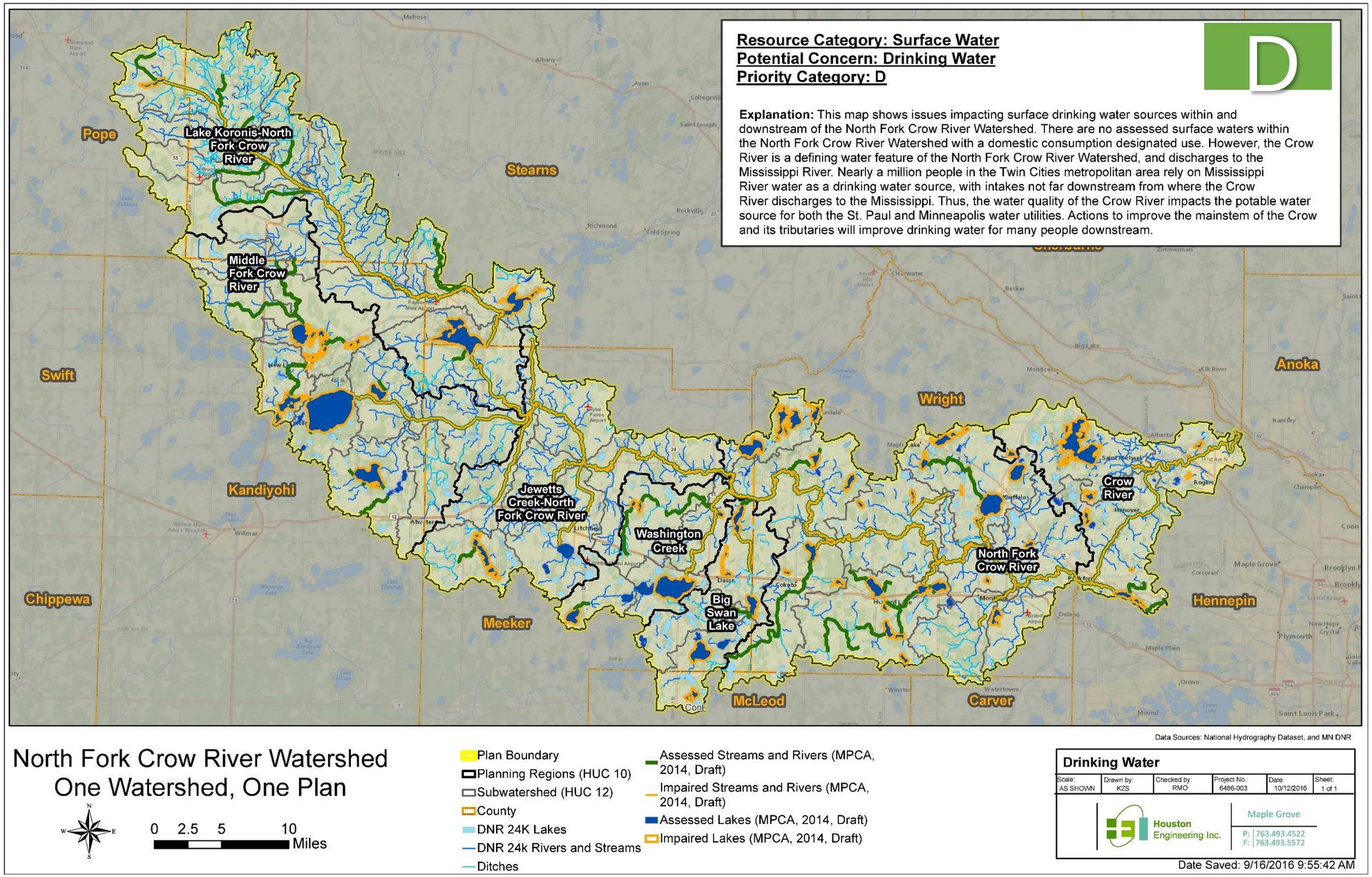


Figure 2-13: Drinking (surface) water potential concern locations within the plan area.



North Fork Crow River Watershed
One Watershed, One Plan

N W E S

0 2.5 5 10 Miles

- Plan Boundary
- Planning Regions (HUC 10)
- Subwatershed (HUC 12)
- County
- DNR 24K Lakes
- DNR 24k Rivers and Streams
- Ditches
- Assessed Streams and Rivers (MPCA, 2014, Draft)
- Impaired Streams and Rivers (MPCA, 2014, Draft)
- Assessed Lakes (MPCA, 2014, Draft)
- Impaired Lakes (MPCA, 2014, Draft)

Data Sources: National Hydrography Dataset, and MN DNR

Drinking Water

Scale:	Drawn by:	Checked by:	Project No.:	Date:	Sheet:
AS SHOWN	KZS	RMO	6486-003	10/12/2016	1 of 1

Houston Engineering Inc.
Maple Grove
P: 763.493.4522
F: 763.493.5572

Date Saved: 9/16/2016 9:55:42 AM

Figure 2-14: Point sources potential concern locations within the plan area.

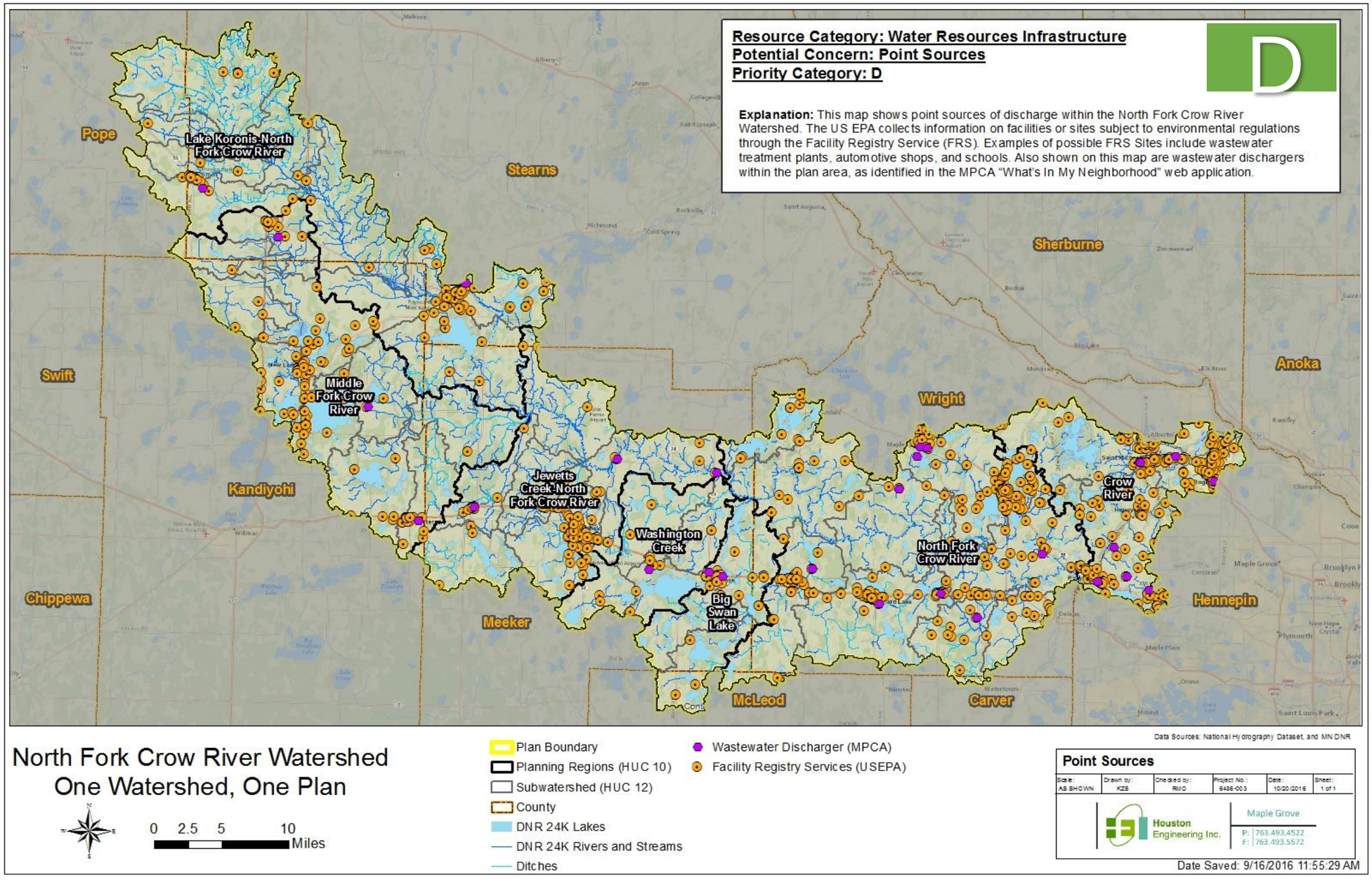
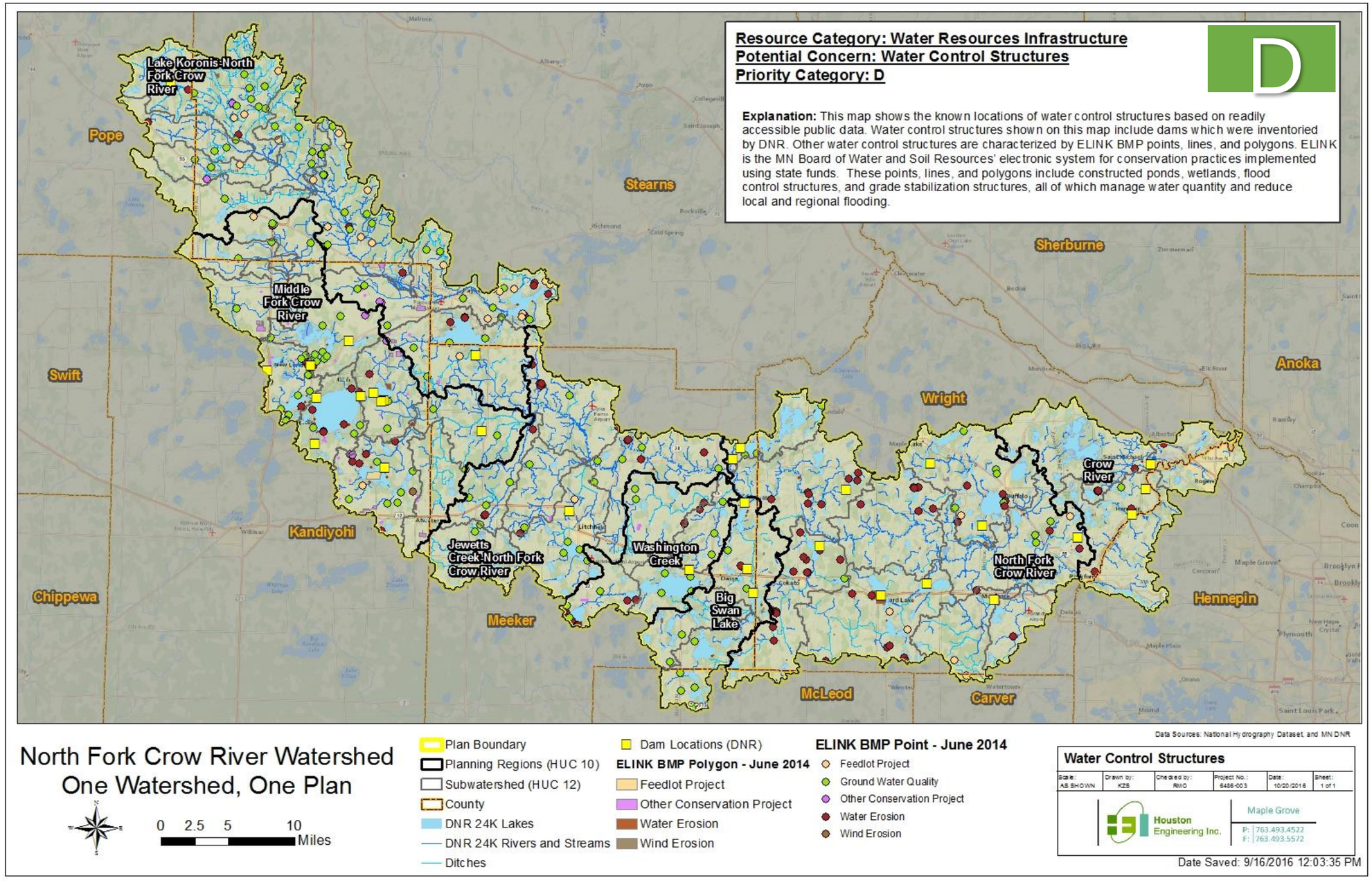


Figure 2-15: Water control structure potential concern locations within the plan area.



2.3.5 "E" LEVEL POTENTIAL CONCERNS

"E" level potential concerns are not anticipated to be directly addressed within this plan, and are therefore referred to as a "potential" rather than a "priority" concern. These potential concerns received the lowest proportion of points during the prioritization process and were confirmed by the Policy Committee as having the lowest priority.

"E" level potential concerns include:

- Shallow Lakes (see **Figure 2-16**);
- Urban Development and Sustainability (see **Figure 2-17**);
- Technology, Tools, Funding, and Existing Capabilities; and
- Lands of Concern (see **Figure 2-18**).

Table 2-1 provides a description of each potential concern with "E" level priority designation.

Figures 2-16 through **2-18** identify the locations of "E" level potential concerns on the landscape which can be mapped. These figures also show the sources and relative importance of various issues (e.g., hazardous waste sites to urban development and sustainability) affecting a specific potential concern.

Figure 2-16: Shallow lakes potential concern locations within the plan area.

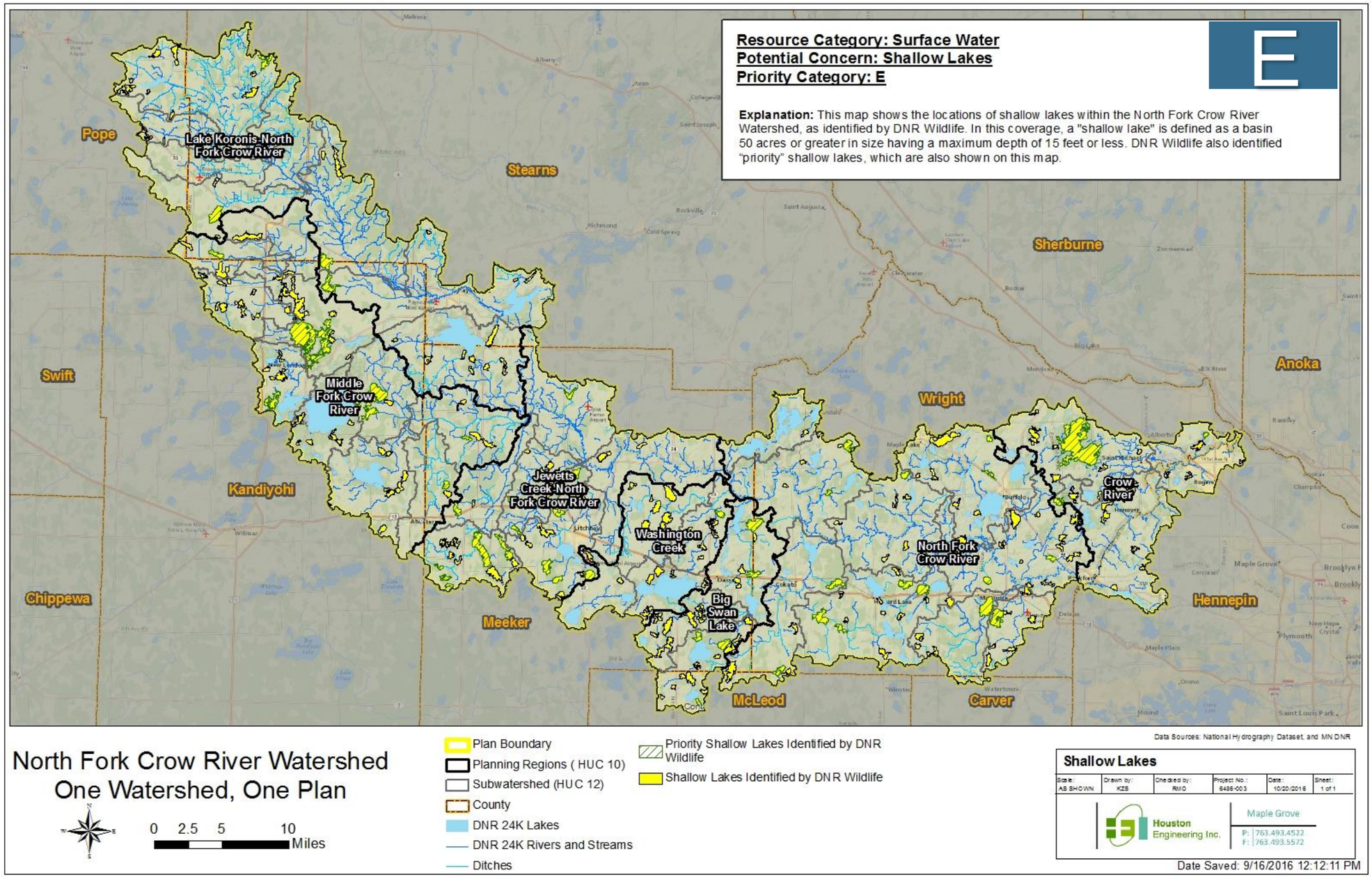


Figure 2-17: Urban development and sustainability potential concern locations within the plan area.

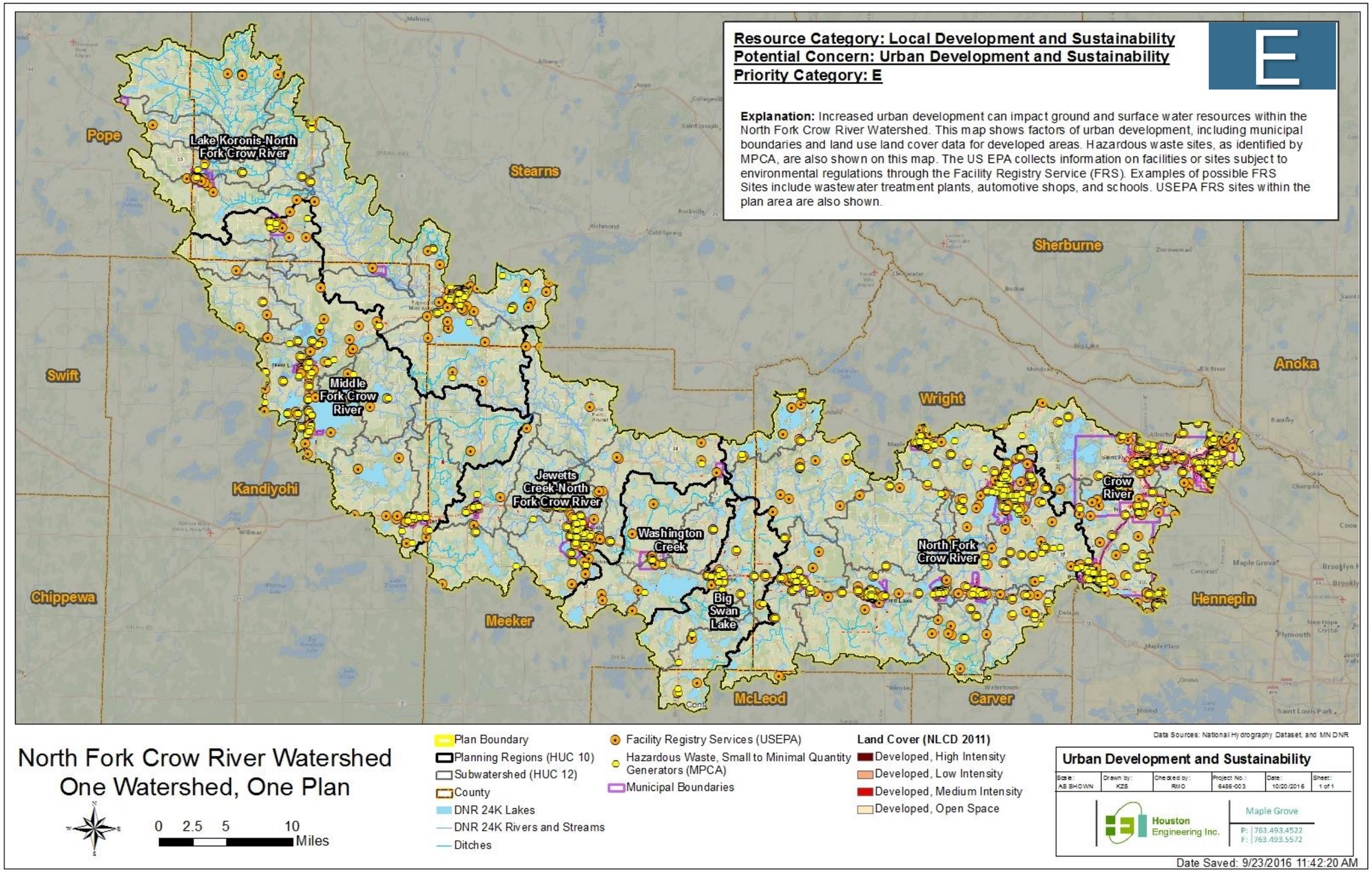
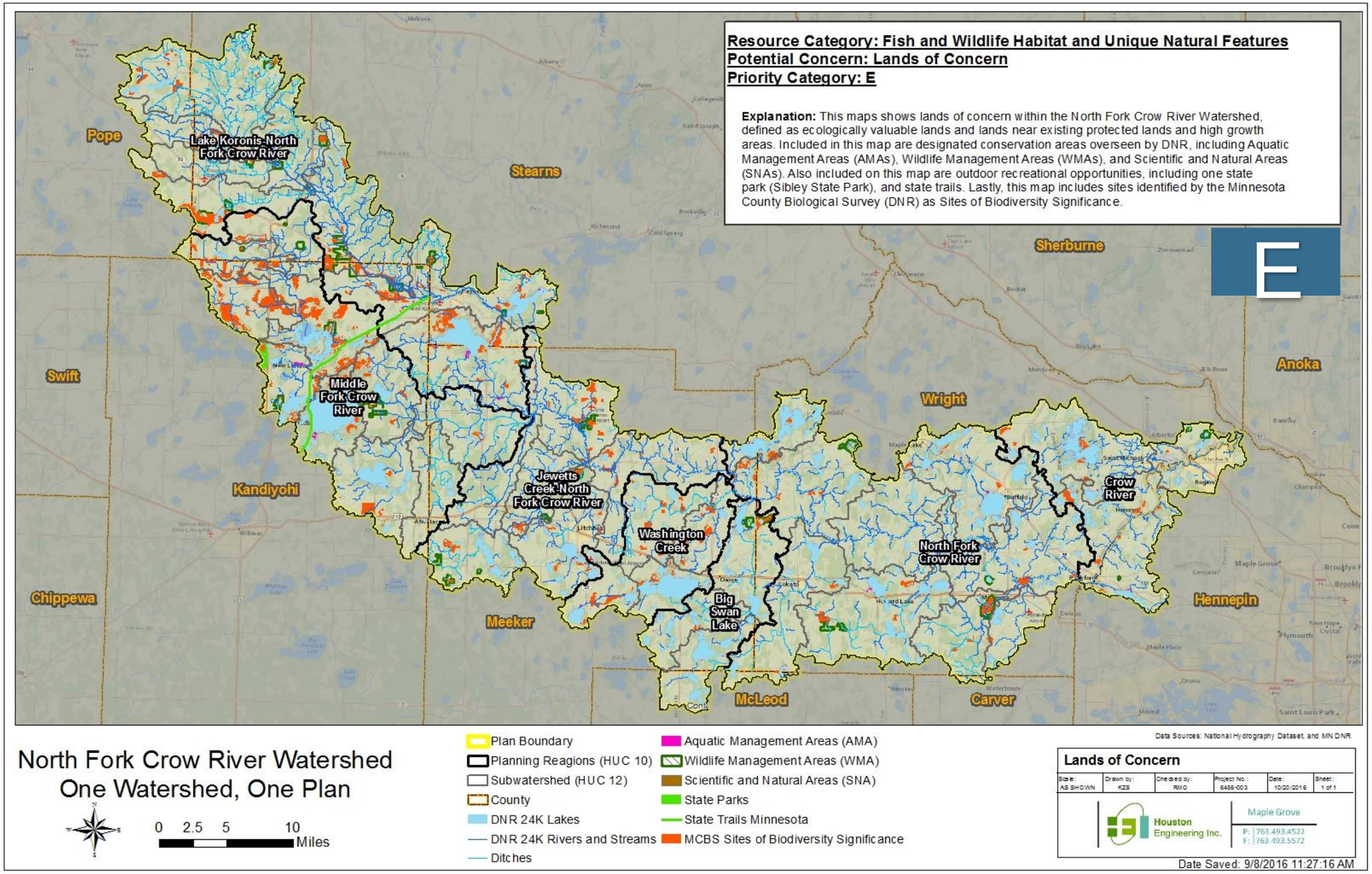


Figure 2-18: Lands of concern potential concern locations within the plan area.



2.4 EMERGING ISSUES

This section presents an assessment of reasonably foreseeable or "emerging" issues. Emerging issues are those that lack detailed information, which are sometimes prominent in the media, and may affect the resources within the NFCR Watershed at some time in the future. The assessment of emerging issues has been compiled from a variety of sources including:

- A review of previous studies, reports, and scientific papers;
- The collective experience of staff and technical advisors;
- Specific requests from the members of the NFCR 1W1P Committees; and
- A general understanding of resource management trends.

A summary of the technical resources reviewed during plan development to identify concerns and issues including emerging issues is shown in **Appendix G**.

The detail describing emerging issues varies depending on the source of the information. An emerging issue is described in greater detail when the source of information is a final scientific study or report. The amount of detail can be considerably less when the source of information is firsthand observation or experience. Therefore, many of the emerging issues are only generally described to indicate the lack of detailed information.

The identification of emerging issues affects the content of this plan. Action items are included within the targeted implementation schedule (**Section 4**) to provide better clarity about the technical data needed to address emerging issues. Emerging issues are expected to be periodically monitored by plan participants, with respect to how they may affect plan implementation.

This section lays out a framework for addressing emerging issues during the lifespan of the plan. These issues include scientific and technical matters influencing the priorities established by the plan. These issues also include non-technical emerging issues, including potential administration and fiscal limitations and barriers for implementing actions identified within the targeted implementation schedule, and improved water and resource policy to aid with plan implementation.

2.4.1 SCIENTIFIC AND TECHNICAL EMERGING ISSUES

2.4.1.1 CLIMATE CHANGE AND INFRASTRUCTURE RESILIENCE

According to the US Environmental Protection Agency (EPA), the climate of the earth is changing. Projections by the Intergovernmental Panel on Climate Change suggest that temperatures in Minnesota could increase by about 4°F (with a range of 2-7°F) in winter, spring, and fall, and by somewhat less in summer. Precipitation is projected to increase by around 15% in winter, summer, and fall, with little change projected for spring.

If the climate warms, ice-cover of lakes and streams may melt earlier. Many lakes and streams in the northern hemisphere already are showing these effects. Earlier snowmelt runoff would cause streamflows to peak sooner in the spring, leading to baseflow conditions earlier in the year (Minnesota State Climatology, 2017).

According to the 2003 report on climate change by the Soil and Water Conservation Society (SWCS), total precipitation amounts in the United States and the Great Lakes region of Canada are increasing, as are storm intensities. Precipitation records in the nearby Twin Cities area indicate that the annual average precipitation has increased, as shown in the following examples:

- **Minneapolis-St. Paul Airport Station –** the average annual precipitation has increased from 28.32 inches (1961-1990 average) to 29.41 inches (1971-2000 average), a 3.8% increase (data from the Climatology Working Group website: http://climate.umn.edu/)
- **St. Paul Station –** the average annual precipitation has increased from 30.30 inches (1961-1990 average, from the MnDNR State Climatology Office) to 32.59 inches (1971-2000 average, from the Midwestern Regional Climate Center website: http://mcc.sws.uiuc.edu/climate_midwest/mwclimate_data_summaries.htm), a 7.6% increase.

It is important to understand these changes in regional climatic trends because they impact water resources and their management. As noted by the SWCS, increased storm intensities result in increased soil erosion and increased runoff. Also, the MPCA warns that these more frequent, intense precipitation events may increase flooding (MPCA, 2013).

This plan recognizes the potential implications of climate change by encouraging the use of updated design standards for water resource infrastructure, based on National Oceanic and Atmospheric Administration (NOAA) Atlas 14. Plan participants also recognize the importance of this issue when designating 100-year floodplain boundaries, and the inherent uncertainty in defining the boundary location.

2.4.1.2 CONTAMINANTS OF EMERGING CONCERN

A contaminant can generally be defined as a substance in a place where it doesn't belong. According to the Minnesota Department of Health (MDH), contaminants of emerging concern are substances that have been released to, found in, or have the potential to enter Minnesota waters (groundwater or surface water). Contaminants do not have guidance on how much substance is safe to drink and can pose either real or perceived health threats or have new or changing health or exposure information (MDH, 2016).

In the last decade, national and statewide studies have revealed that many contaminants of emerging concern are found in the aquatic environment. They can include pharmaceuticals, pesticides, industrial effluents, personal care products that are washed down drains and processed by municipal wastewater treatment plants, and others (MDH, 2016). These contaminants are being found in Minnesota's waters, in part because there are better methods for finding substances at lower levels, additional substances are being looked for, new substances are being used, and old substances are being used in new ways (MDH, 2016). There is a growing concern that even at low concentrations, these contaminants—or mixtures of them—may adversely affect fish, wildlife, ecosystems, and human health.

Plan participants recognize the need to provide public water supplies free from contaminants of emerging concern. The plan addresses this emerging issue through implementation programs that reduce the source of contaminants of emerging concern from entering water resources, and reduce the volume of water entering groundwater and surface water resources.

2.4.1.3 IMPROVING SOIL HEALTH

Land use in the watershed is mostly agricultural, with an estimated 2,864 farms.

Land use in the NFCR Watershed is mostly agricultural, with an estimated 2,864 farms. This predominant land use emphasizes how valuable good soil health is for the watershed, as healthy soils drive the sustainability of agricultural production.

Healthy soils perform several essential functions, including cycling nutrients, regulating water flow, and providing physical stability and support (USDA, 2016). As such, managing to improve soil heath increases the soil's nutrient cycling capacity, providing potential financial benefits to the producer by reducing the need for additional, synthetic inputs.

Additionally, managing for healthy soil improves the organic content of soils, thereby providing water retention benefits. Managing soils to improve soil health should be a standard practice for all producers, and is addressed through land stewardship initiatives, as defined in **Section 3**.

2.4.1.4 INVASIVE SPECIES

Avoiding the spread of invasive species—both in water and on land—is an emerging concern

Invasive species are species that are not native to the ecosystem under consideration. Their introduction causes—or is likely to cause—economic or environmental harm or harm to human health. These species are aggressive competitors, threatening the quality of high biodiversity areas and native communities. Invasive species can be aquatic or terrestrial in nature. In Minnesota, present and actively managed aquatic invasive species include, but are not limited to Eurasian watermilfoil, purple loosestrife, zebra mussels, and spiny water fleas. Terrestrial invasive species in Minnesota include common buckthorn, gypsy moth, and white nose syndrome of bats.

There is an abundance of surface waters within the NFCR Watershed that are heavily used for aquatic recreation and consumption. ***As such, one of the issues addressed by the plan is how to prevent and/or control the spread of aquatic invasive species.*** Minnesota has several state laws intended to minimize the introduction and spread of invasive species of wild animal and aquatic plants in the state. It is illegal to transport any prohibited invasive species, such as Eurasian watermilfoil or zebra mussels, or to launch a boat or trailer with these species attached.

This plan recognizes the importance of managing and preventing the spread of both terrestrial and aquatic invasive species. The plan addresses this emerging concern through implementation programs that protect surface water resources and wildlife habitat.

2.4.1.5 SEDIMENT SOURCES

Land use in the NFCR Watershed is mostly agricultural. Soil loss through wind and water erosion on agricultural fields can be routed to nearby surface waters, impacting water quality by increasing

suspended sediment concentrations in a water column. However, erosion from agricultural fields is not the only source of sediment to surface waters. Unstable banks and near channel sources have found to be large contributors to the overall delivery of sediment to surface waters, yet these sediment sources are more resource-intensive to assess from a watershed perspective.

Plan participants recognize the need to take a comprehensive approach to managing sediment delivery to surface waters within the NFCR Watershed. The plan addresses this emerging issue through implementation of actions that improve knowledge of near-channel and in-channel sources, stabilize stream channels, and reduce delivery of runoff to surface waters. This is also addressed through rural, urban, and shoreland land stewardship initiatives in **Section 3**.

2.4.1.6 WATER CONSERVATION

Water conservation is a key component of ensuring the sustainability of groundwater resources within the NFCR Watershed. This is especially pertinent in the Bonanza Valley aquifer system, a regionally important groundwater resource that is highly used by area landowners for high capacity use, the majority of which is for crop irrigation. Within the Bonanza Valley aquifer system, the high density of existing users and the rapidly increasing demand for water for high-capacity systems is yielding significant concerns for the sustainability of the aquifer resource for water quality and the ability of future generations to meet their needs.

The sustainability of groundwater supplies can also impact the health of natural resources and ecosystem services. There are many unique ecological features directly connected to groundwater resources within the NFCR Watershed, including calcareous fens, wetlands, lakes, a trout stream, watercourses, native plant communities, and state and federally-listed threatened and endangered plant and animal species (MnDNR, 2016, Draft). Declining groundwater levels can have negative ramifications on these communities and the environmental services they provide.

Water conservation has the capacity to reduce consumption of groundwater resources. This may include irrigation conservation management practices (e.g. irrigation scheduling, drop nozzles, soil moisture monitoring, low pressure conversion and precision irrigation), or water conservation from municipalities, industries, and other water users in the NFCR Watershed.

This plan recognizes the importance of managing both surface and groundwater resources for sustainable supplies. The plan addresses this emerging concern through implementation programs that:

- research and document surface and groundwater levels;
- seek to understand and promote innovative solutions to reduce the consumption of groundwater supplies (e.g. water reuse and irrigation best management practices); and
- manage for sustainable groundwater use.

2.4.1.7 HYDROLOGIC IMPACTS OF SUBSURFACE DRAINAGE

Subsurface (tile) drainage is used in Minnesota and locally within the NFCR Watershed to provide drainage for agricultural lands. Proper soil drainage has demonstrated the capacity to improve agricultural production by ensuring timely planting and field operations, minimizing soil compaction and buildup of salts, promoting conditions for good seedbed establishment and germination, and minimizing high water table stresses to growing crops (Sands, 2016).

However, these drainage systems can positively and/or negatively impact hydrology. These changes can potentially alter the timing and magnitude of the delivery of water, decreasing base flow of streams, and increasing peak discharge and the likelihood of flooding.

This plan recognizes the need to understand the hydrologic impacts of subsurface drainage on rural and downstream landscapes. Plan partners will address this emerging issue through implementation programs aimed at:

- learning the current extent and conditions of subsurface drainage within the watershed area;
- understanding the fiscal benefits of subsurface drainage systems provided to producers; and
- promoting implementation of innovative practices to curb the hydrologic impacts of existing subsurface drainage systems.

2.4.2 NON-TECHNICAL EMERGING ISSUES

Various policy and funding considerations related to plan implementation are emerging issues. The policy and funding emerging issues identified here are addressed through the execution of specific actions described by the targeted implementation schedule. These actions are generally focused on engaging the state agencies and the legislature to make effective and constructive changes to enhance plan implementation.

2.4.2.1 FUNDING FOR PLAN IMPLEMENTATION

Funding is one of the primary constraints when executing the targeted implementation schedule. This plan shows that the ability to execute actions within the targeted implementation schedule and achieve the measurable goals requires more fiscal and staff resources at the local level than is available to the NFCRWPP (**Section 4**).

The NFCRWPP is expected to carry more of the responsibility to implement state and federal goals (e.g., attaining state water quality standards). An expectation that the NFCRWPP will achieve these common goals without additional funding seems unreasonable. Because of their connection to landowners, the State envisions that the SWCDs, counties, and watershed districts are critical partners. These groups have also been identified as key agents of implementation through WRAPS, TMDLs, and the Clean Water Accountability Act.

The targeted implementation schedule in this plan represents a coherent, comprehensive approach to mark progress toward measurable goals. Raising cost-share dollars for state and federal grants is problematic. Relying on competitive grants to achieve the measurable goals seems unreasonable and makes success tenuous. Therefore, block funding on an annual basis is needed. This plan includes actions to achieve a consistent funding mechanism and reasonably ensure implementation success.

2.4.2.2 LAND ASSET MANAGEMENT

Land assets include land purchased in fee title and easements acquired for resource protection. Resolution is needed for both a process and the fiscal resources to maintain land assets after acquisition. Once acquired, these assets need to be managed. A lack of management has the potential to result in the loss of the public benefits for which they were originally acquired. Resolution is also needed to identify the best way to offset the loss in the local tax base.

This plan recognizes the need to maintain land assets after acquisition. Plan partners will address this emerging issue through implementation programs aimed at both acquiring and maintaining land for resource protection purposes.

2.4.2.3 CONSERVATION PRACTICE DELIVERY MECHANISM

An improved method to effectively deliver conservation programs is needed. Both technical and financial resources at the local level to implement conservation programs are limited. Some agricultural policies encourage the agricultural producer to maximize yield, in conflict with other policies. This plan recognizes

the need to improve conservation delivery through implementation programs aimed to increase engagement with agricultural landowners, producers, urban residents, and lakeshore owners within the plan area.

2.4.2.4 COMMUNITY ATTITUDES, AWARENESS, AND ENGAGEMENT

Making progress toward achieving the measurable goals within this plan requires successfully engaging those who use and interact with water and modifying their attitudes and behaviors. This plan includes specific tools intended to engage members of the community and modify behavior. These tools include components of the Education and Outreach Initiative and the BMP Cost Share Initiative (**Section 5**). The use of local ordinances and administering statutory obligations also can influence behavior.

2.4.2.5 COLLABORATION BETWEEN AGENCY AND NON-AGENCY ENTITIES

The responsibility for improving resource conditions within the plan area is increasingly being placed on local government. This responsibility often comes in the absence of sufficient funding to implement the necessary efforts. Roles and responsibilities between agency and non-agency entities can also be clouded. This plan addresses the issue of collaboration between agencies and non-agency entities by identifying specific roles and responsibilities within the targeted implementation schedule. The plan also includes strategies to resolve funding issues, including the need for implementation block grants.

2.4.2.6 INCONSISTENT ADMINISTRATION AND ENFORCEMENT OF MN RULES AND STATUTES

Administration and enforcement of Minnesota Administrative Rules and statutes is an important aspect of managing and protecting the State's water quality. Examples of these rules and statutes include:

- the regulation of animal feedlots (Minnesota Administrative Rules Chapter 7020);
- shoreland and floodplain management (Minnesota Administrative Rules Chapter 6120);
- and soil erosion (Minnesota Statutes Chapter 103F).

Local governments provide administration and enforcement of these rules and statutes. However, there is commonly inconsistent administration and enforcement of these rules between jurisdictional boundaries. There is also lack of staff and resources to adequately administer and enforce the rules and statutes. Negligent administration and enforcement in one jurisdictional boundary may negatively impact water quality and quantity of jurisdictional boundaries downstream.

Planning partners within the NFCR Watershed recognize the value that consistent application of Minnesota Rules and Statutes can have on water quality and quantity at a major watershed scale. The plan addresses this emerging issue in the targeted implementation schedule, with actions that focus on identifying problem areas with the NFCR Watershed, and the consistent application of existing rules and statues within the plan area.

2.4.2.7 FARM LAW LEGISLATION (NATIONAL AND INTERNATIONAL)

Changes to international and national legislation has large ramifications on the types, magnitude, and profitability of crops produced in the Minnesota. For example, legislation promoting corn growth for ethanol production may impact the amount of corn and rotation of crops in an agricultural area. Conversely, legislation incentivizing production of alternative crops (e.g. switchgrass) for alternative fuels may also impact cropping practices. Types and productivity of crops may also be impacted by legislative changes to crop insurance support (e.g. the farm bill).

This plan recognizes the impact that national and international legislation has on local agricultural production. The plan addresses this emerging issue by supporting standard practices for all producers

(e.g. managing for good soil health) and is addressed throughout the plan by programs that encourage this.

2.4.2.8 REGULATORY CERTAINTY AND PRIVACY

As in the rest of the state, producers in the NFCR Watershed must remain in compliance with water quality rules and laws. These rules and laws may change, depending on research and political environments. In addition, enforcement of changing rules and laws, or targeting of management practices from accelerated research may impede on a landowner's view of privacy, as access to high resolution aerial photography and fine-scaled digital elevation models may target a landowner's property for enforcement or outreach activities.

This plan recognizes the divergence between required and voluntary participation in watershed management activities. This difference is noted in the targeted implementation schedule through actions that focus on required participation (statutory obligations and ordinances) and actions that focus on voluntary participation (education and outreach; BMP implementation). To ensure the privacy of local landowners is protected, field practices are reported at the planning region scale within the plan.

2.4.3 PROCESS FOR ADDRESSING EMERGING ISSUES AND DATA GAPS

Inevitably, issues emerge that lack sufficient data, research, or information. While a substantial effort was made to develop a comprehensive list of resources, potential concerns, and issues, it is possible that some issues were missed or that new issues emerge during the lifespan of the plan. Examples include the discovery of a new contaminant or aquatic invasive species within the NFCR Watershed, or a change in the policies or administration of a member local government unit. Should an unanticipated issue emerge during the lifespan of the plan, the issue will be considered and addressed as necessary through annual evaluations and local work plan development (see **Section 5**). If the emerging issues are substantial enough, plan amendments will be considered based on procedures laid out in **Section 5.5.5** of this plan.

Gaps in technical knowledge continually need to be closed. Rather than delaying planning or implementation actives when these gaps arise, the NFCRWPP will consider these gaps during self-assessments (see **Section 5.5.4**) and develop action(s) to address them on an as-needed basis.

These actions(s) could be things such as specific implementation activities, support of additional research or data monitoring and collection, or increased education and outreach. Any gaps documented during the initial plan development are addressed by the "Data Gaps and Research Initiative" described within plan **Section 5**.

Measurable Goals

3 ESTABLISHMENT OF MEASURABLE GOALS

The *One Watershed, One Plan, Plan Content for Pilot Watersheds* outlines content requirements for drafting a plan through the One Watershed, One Plan pilot program. The BWSR guidance states that the Establishment of Measurable Goals portion of the plan will contain the following elements:

> "*Each priority issue*[1] *must have associated measurable goals for addressing the issue. Some goals will be watershed-wide; however, the majority should be focused on a specific subwatershed, natural resource, or local government. Goals for prevention of future water management problems should also be considered."*

Based on this guidance, measurable goals were established for the watershed as a whole (**watershed-wide measurable goal**) and for each specific priority concern (**priority concern measurable goal**). These goals were developed using a variety of information sources, including:

- Goals from existing management plans, studies, reports, data and information, including WRAPS, TMDLs, local water plans, state strategies, and similar documents (**Appendix G)**;
- The results of analysis performed using the Priorities, Target, and Measure Application (PTMApp);
- Input received during public meetings and surveys;
- Input from Advisory Committee members;
- Input from Policy Committee members; and
- The knowledge of local water and resource managers provided by the Planning Work Group.

This plan section describes the framework for strategies and actions which —when implemented— generate progress toward the watershed-wide and priority concern measurable goals.

3.1 STRATEGIES AND ACTIONS

Because of the need to establish a common language for communicating information, the following definitions were developed and are used to organize this plan section:

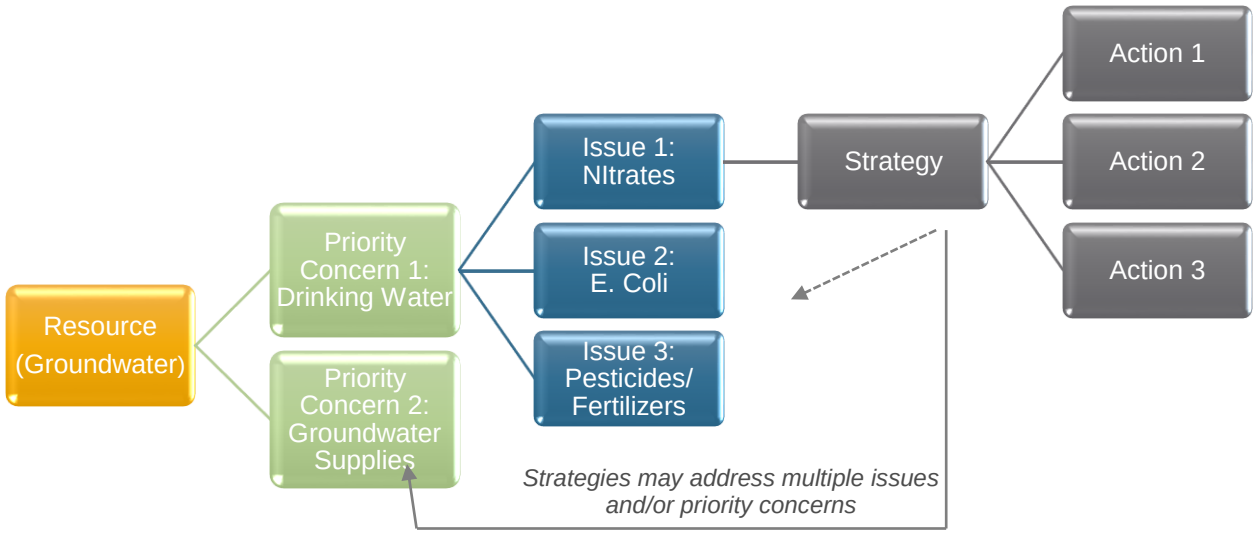
- ***Measurable Goal***: A statement of intended accomplishment for the watershed or for each priority (level A-C) concern. Goals are meant to be simply stated and achievable, can be quantitative or qualitative. They are meant to be measurable through the implementation of strategies and actions to attain a desired outcome.
- ***Metric***: A feature, attribute, characteristic, amount or quantity that—when achieved—is expected to result in a quantifiable amount of progress toward attaining a measurable goal.
- ***Strategy***: A narrative description of an approach or initiative for a specific priority concern. The completion of one or more strategies may be necessary to achieve a measurable goal. A strategy is the organizational framework for one or more actions being undertaken to address and resolve the issues affecting a priority concern.
- ***Action***: A specific, tactical activity that can be conducted, completed, or accomplished to achieve a strategy. Responsibility for completion, timelines, estimated costs, and probable benefits can be associated with each action.

[1] The BWSR guidance uses the term "issue" whereas this plan uses the terms priority concerns and issue (affecting a priority concern).

Figure 3-1 shows the organizational framework for strategies and actions and their relationship to priority concerns and resources. Resources and priority concerns organize strategies and actions. Strategies are developed to address each issue impacting a priority concern. Each strategy is comprised of multiple actions. The implementation of actions generates progress toward a measurable goal. As some strategies and actions have multiple benefits, strategies may benefit more than one priority (or potential) concern.

Strategies and actions have been developed to address issues affecting priority and potential concerns, regardless of priority level. The strategies and actions addressing priority concerns - when combined with the implementation responsibility, cost, and a timeline - comprise the targeted implementation schedule (see **Section 4**). The complete list of strategies and actions developed for all priority and potential concerns is presented in **Appendix K.**

Figure 3-1: The framework for strategies and actions within the North Fork Crow River Watershed 1W1P. Framework is demonstrated using groundwater as an example.



3.2 CATEGORIZING ACTIONS

During implementation, each action will need to be assigned both (1) a cost, and (2) a description or strategy for how implementation of that action is funded. In **Section 5**, "implementation programs" are described to summarize how actions will be funded. "Implementation components" are presented here to categorize actions. In **Sections 4** and **5**, these implementation components will be tied to an implementation program, explaining how each action will be funded. Each action is categorized into one of six implementation components:

1. ***Structural BMP***: Actions that prescribe the implementation of structural best management practices (BMPs). Typical examples include: sediment and water control basins, woodchip bioreactors, controlled drainage, and grass waterways.

2. ***Management Practice****:* Actions that prescribe an activity, technique, or methodology that can be thought of as an industry or sector accepted standard operating procedure. Cover crops, tillage management, and fertilizer management are typical management practices.

3. ***Education and Outreach***: Actions that aim to increase public engagement, improve communication, and help understanding to improve a priority resource concern.

4. ***Data Gaps and Research***: Actions that are focused on research activities aimed to close a data gap and continue existing monitoring activities.

5. ***Regulatory***: Actions that pertain to common and consistent administration and enforcement of statutory responsibilities, local regulations, and local ordinances.

6. ***Capital Improvement:*** Actions that consist of a major non-recurring expenditure for the construction, repair, retrofit, or increased utility or function of physical facilities, infrastructure, or environmental features.

A detailed description of how each of these implementation components are funded (through implementation programs) is provided within **Section 4 and 5**.

3.3 WATERSHED-WIDE MEASURABLE GOALS: LAND STEWARDSHIP

This plan frames measurable goals around the principals of land stewardship.

This plan frames watershed-wide measurable goals around principles of land stewardship.

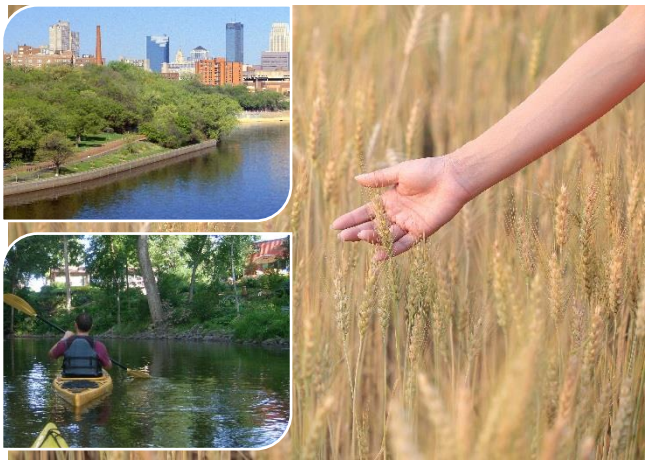
For the purposes of this plan, "land stewardship" is defined as:

"creating solutions to water quality and quantity challenges using a combination of management practices and structural best management practices (BMPs), in recognition that attaining priority concern measurable goals cannot be accomplished though structural BMPs alone."

Incorporation of stewardship in a watershed plan is a new idea.

It is included as a watershed-wide measurable goal in this plan to promote, on watershed-scale:

- the protection of public health, through the presence of safe drinking water supplies, surface water quality suitable for public use, and the maintenance and protection of high quality resources;
- a safe and secure food supply, achieved in part through maintaining and building soil health, reducing soil loss, and maintaining and increasing modern agricultural yields;
- the retention of water where it falls on the land surface, to the extent possible;
- the restoration and protection of the public uses of lake, streams and rivers;
- conservation delivered to the ground, preferentially at locations meeting the economic value proposition of the land owner; and
- the economic stability and viability of the community.



Stewardship is subdivided into three categories: Urban, Rural, and Shoreland

Stewardship is subdivided into three categories: urban, rural, and shoreland. These stewardship categories reflect not only where people live, interact with, and affect the environment, but also establish shared responsibility for achieving stewardship goals among all residents within a plan area.

Environmental benefits are realized as the proportion of the rural, urban and shoreland areas meeting principles of stewardship increases within the plan area. This can be accomplished through watershed-wide actions. As stewardship increases, the quality of priority concerns is also expected to increase.

There are three main reasons for defining and relying on the concept of stewardship as a measurable goal during plan implementation. First, issues affecting priority concerns are connected to the human activities that occur on rural, urban, and shoreland areas. For example, in rural areas when the rate of soil loss is lower than the rate at which soil can naturally rebuild, the long-term productivity of the soil is maintained, as are agricultural yields. Within urban areas, the adoption of Minimal Impact Design Standards (MIDS) for managing stormwater runoff is more likely to minimize sediment and nutrient loads to downstream lakes and rivers. In shoreland areas, maintaining sufficient distance from the normal water level of a lake reduces the likelihood of bank failure and erosion.

The second reason for framing implementation around stewardship is creating a positive, solution-oriented dialogue about how to address issues impacting priority concerns. The dialogue becomes focused on the long-term viability and benefits to the community, which result from watershed-wide activities, while simultaneously improving priority concern conditions.

The final reason is to begin connecting stewardship to sustainability claims made by agribusiness. Many large agribusinesses are working toward verifying sustainability claims. The metrics used for stewardship are directly connected to water quality improvement and could be used as a surrogate for the water quality index within the Fieldprint calculator and Field to Market (see https://calculator.fieldtomarket.org/fieldprint-calculator/) and other tools determined during yearly planning.

This plan establishes criteria that can be analyzed to estimate the proportion of the plan area currently attaining principles of urban, rural, and shoreland stewardship. Although criteria have been developed for all three categories of stewardship, only the criteria for rural stewardship were advanced in this plan. Action items have been included in the targeted implementation schedule to fill critical information gaps and advance use of urban and shoreland stewardship during plan implementation.

Because the concept of rural stewardship in a watershed plan is relatively new—and the quality, amount, and types of existing data to apply the method are limited—considerable caution is needed when interpreting the rural stewardship results. Though imperfect, rural stewardship is used in this plan as a means of testing and evaluating the approach in watershed planning. Although defining stewardship seems reasonably straightforward, information and data gaps can limit the value of the approach. This plan includes a means to address the information and data gaps during plan implementation.

3.3.1 RURAL STEWARDSHIP

Both environmental benefits and benefits for producers can be realized through land stewardship

For purposes of this plan, "rural stewardship" is defined by creating solutions to water quality and quantity challenges using a combination of management practices and structural BMPs to increase soil health, ***thereby accruing positive environmental benefits and positive value propositions in terms of benefits for a producer or landowner.***

An increase of soil health can be associated with increased yields. An increase in soil health can also be associated with decreased sediment and nutrient delivery to surface waters, and increased water holding capacity of the soils, resulting in decreases in runoff volume delivered to streams. These environmental benefits are a positive outcome of framing implementation around stewardship, and can be important in achieving the priority concern measurable goals.

A suite of criteria has been established for this plan to define rural stewardship, estimate the current proportion of the plan area meeting rural stewardship, establish a watershed-wide rural stewardship measurable goal and assess progress during plan implementation (**Table 3-1**). Rural stewardship criteria are categorized as a "vulnerability criteria" or a "management practice". Vulnerability criteria are numerical values, typically expressed as the amount of a substance leaving the landscape, which—when exceeded—is expected to diminish soil productivity and therefore, agricultural yields. Threshold criteria are intended to be agronomic, rather than resource[2] based.

An area of land that exceeds vulnerability criteria reflects both probable adverse agronomic outcomes and a greater potential to contribute runoff, sediment, nitrogen, or phosphorus either to surface water or groundwater. Evaluating cropland area based on these vulnerability criteria is useful in identifying "critical source areas" where above-average amounts of sediment or nutrients leave the landscape. Critical areas represent hotspots for the preferential implementation of on-the-ground management practices or structural BMPs to protect soil and reduce delivery of sediment and nutrients downstream.

[2] Agronomic criteria are related to yields. Resource based criteria are intended to protect or restore a downstream resource. Establishing agronomic criteria can be challenging. Consequently, a statistical benchmark approach is utilized by this plan.

Ideally the vulnerability criteria would be numeric values that represent some maximum "acceptable" agronomic value[3]. The values used within the plan instead represent a "benchmark" for the plan area. For example, the sediment, phosphorus, and nitrogen-surface criteria benchmark values represent the 75th percentile for fields within the plan area. Fields exceeding these values are considered "critical areas" for the purposes of further evaluation to assess whether loss rates are abnormally high.

Table 3-1 shows the specific criteria used to assess the proportion of land areas currently achieving rural stewardship in the plan area. No data are available for several of the vulnerability criteria or management practices. These data gaps are expected to be filled as the plan is implemented by cost-sharing field walkovers through the BMP Cost-Share Initiative (**Section 5**) and used to update the information within the plan.

Table 3-1: Criteria used to classify rural stewardship within the plan area. Current vulnerability values at the field scale defined through the Prioritize, Target and Measure Application (PTMApp).

Criteria	Criteria Value Used to Identify Critical Source Areas	Criteria Type	Used to Assess Current Stewardship Category? (Y/N)	Source
Sediment Loss Rate	Land equaling or exceeding the estimated 75th percentile annual soil loss rate (tons/acre/year), delivered to a waterway.	Vulnerability	Yes	Benchmark (not agronomic) value based the revised Universal Soil Loss Equation and sediment delivery estimate from PTMApp.
Phosphorus Loss Rate to Surface Waters	Land equaling or exceeding the estimated 75th percentile annual surface total phosphorus loss rate (lbs./acre/year), delivered to a waterway.	Vulnerability	Yes	Benchmark (not agronomic) value based on the total phosphorus annual yield delivered to a waterway. Total phosphorus estimated from PTMApp.
Nitrogen (Surface) Loss Rate to Surface Waters	Land equaling or exceeding the estimated 75th percentile annual total nitrogen loss rate (lbs./acre/year), delivered to a waterway.	Vulnerability	No	Develop in the future.
Nitrogen-Subsurface Leaching Rate	No criterion	Vulnerability	No	Develop in the future.
Nutrient Management	4R nutrient stewardship certification, Minnesota Department of Agriculture or University of MN Extension recommendations	Management Practice	No	4R certification (http://4rcertified.org/); MDA Nitrogen Fertilizer Management Plan (2015); University of Minnesota Extension (2011).
Soil Health	Non-conventional tillage practices (no-till, ridge till, strip-till and mulch-till) and cover crops which improve soil heath by increasing soil organic content and decrease the sediment loss rate vulnerability criterion (above)	Management Practice	No	Acres subject to no-till, ridge till, strip-till and mulch-till; assumed to increase organic matter content by 1% from current condition.

[3] The Natural Resource Conservation Service Conservation Effects Assessment Project (CEAP), has established maximum values for sediment, surface nitrogen, surface phosphorus and subsurface nitrogen, but these are resource-based on national in scope.

Criteria	Criteria Value Used to Identify Critical Source Areas	Criteria Type	Used to Assess Current Stewardship Category? (Y/N)	Source
Manure Management	Permit Conditions	Management Practice	Yes	Minnesota Rules Chapter 7020; all lands subject to a NDPES permit are assumed compliant with application location and rate conditions.
Pesticide Application	Licensed/Certified Applicators	Management Practice	Yes	Minnesota Department of Agriculture (2016); University of Minnesota Extension (2011); all lands subject to a NDPES permit are assumed compliant with application location and rate conditions.
Irrigation	Irrigation Best Management Practices	Management Practice	No	Irrigation Best Management Practices are currently lacking for Minnesota. Criterion could be use of water conservation measures on areas exhibiting high nitrogen infiltration risk.

3.3.1.1 METHODOLOGY FOR ANALYZING RURAL STEWARDSHIP

This plan analyzed rural stewardship within the plan area at the field scale, using cropland "common land unit" data. Results from the Prioritize, Target and Measure Application (PTMApp) were used to analyze and map the critical source areas for sediment and total phosphorous loss rate vulnerability metrics, or those cropland areas that were in the highest 75th percentile for sediment and total phosphorus yields.

These were the first criteria used to initially place a field in one of three stewardship categories:

1. Rural stewardship "Probability Low";
2. Rural stewardship "Probability Depends on Practice Effectiveness"; and
3. Rural stewardship "Probability Likely" (**Table 3-2**). Those cropland fields that exceeded the 75th percentile for sediment or total phosphorus were placed in rural stewardship category "Probability Low".

The presence of existing management practices and structural BMPs mitigate the amount of sediment, phosphorus, and nitrogen reaching the field edge and a waterway. Therefore, fields that were categorized in the "Probability Low" category could be promoted up from this category to rural stewardship "Probability Depends on Practice Effectiveness", based on the presence of existing management or structural BMPs.

The stewardship approach considers the benefits of structural BMPs through use of BWSR eLINK data (**Table 3-2**). Cropland fields in the "Probability Low" category were moved up to "Probability Depends on Practice Effectiveness" *if* BWSR eLINK data references a practice already in place on the field.

In the absence of field scale data to assess management practices, county level data on fertilizer management was used to adjust acres in each stewardship category for each planning region, based on likely coverage of management practices.

Table 3-2: Rural stewardship categories derived from the stewardship criteria and information about existing Best Management Practice locations within Board of Water & Soil Resources (BWSR) online eLINK database.

Rural Stewardship Category	Conditions Used to Assess Stewardship	
	Sediment and Phosphorus Vulnerability Criteria	Best Management Practice (BMP) Information from eLINK
Probability Low	Land exceeding vulnerability criteria, meaning amount of **sediment or phosphorus** leaving field is relatively High	No BMPs in field determined from existing databases (e.g., eLINK)
Probability Depends on Practice Effectiveness	Land exceeding vulnerability criteria, meaning amount of **sediment or phosphorus** leaving field is relatively High	BMPs in field determined from existing databases (e.g., eLINK)
Probability Likely	Land is not exceeding vulnerability criteria, meaning amount of **sediment *and* phosphorus** leaving field is relatively Low	BMPs in field determined from existing databases (e.g., eLINK)

Based on the rural stewardship analysis for the NFCR Watershed, the estimated area of each planning region by rural stewardship category is shown in **Table 3-3**.

Table 3-3: Estimated cropland acres in each planning region by rural stewardship category.

Planning Region	Total Cropland Acres	Estimated Acres Probability Low	Estimated Acres Depends on Practice Effectiveness	Estimated Acres Probability Likely
Lake Koronis- North Fork Crow River	203,661	96,672	32,379	74,610
Middle Fork Crow River	143,309	62,163	22,825	58,321
Jewetts Creek- North Fork Crow River	120,313	62,235	16,505	41,574
Washington Creek	48,249	24,353	7,074	16,822
Big Swan Lake	45,879	27,746	5,302	12,832
North Fork Crow River	194,084	97,083	28,501	68,499
Crow River	48,913	21,433	7,764	19,716
Total for Plan Area	**804,408**	**391,684**	**120,351**	**292,373**
Total Percentage of Plan Area		**48.7%**	**15.0%**	**36.3%**

Some lands within the plan area have conservation plans completed by the NRCS or are “certified” by the MDA. If data becomes available, those lands with conservation plans or certified can be automatically considered in the “Probability Likely” rural stewardship category. However, information about lands covered by farm plans is subject to privacy protection.

3.3.1.2 RURAL STEWARDSHIP WATERSHED-WIDE MEASURABLE GOAL

Setting a watershed-wide measurable goal for rural stewardship is a two-step process. The watershed-wide stewardship measurable goal is focused on increasing the proportion of the plan area that meets principles of rural stewardship. Thus, the first step in defining the rural stewardship measurable goal focuses only on those acres in the rural stewardship categories "Probability Low" and "Probability Depends on Practice Effectiveness."

40% of the NFCR Watershed has soil data showing a current low probability level of land stewardship

Protecting and improving soil health is a key component of rural stewardship. The Soil Organic Matter (SOM) content is used as a surrogate for soil health. Therefore, the second step in defining the rural stewardship measurable goal is focused on cropland with estimated SOM > 1% and =< 4 %. The SOM range of > 1% and =< 4 % was based on an evaluation of soils in the watershed area through Soil Survey Geographic Database (SSURGO) soils data.

Based on an analysis of SSURGO soils, there are ***324,109 acres of cropland in the watershed area*** that are in rural stewardship categories of "Probability Low" and "Probability Depends on Practice Effectiveness" which also have SOM content > 1% and =< 4 %. ***This represents 40.3% of the total watershed area.***

Management practices such as cover crops, conservation tillage to increase residue, and permanent cover (e.g., alfalfa, prairie grass) can be implemented to improve soil health, or the SOM content. The watershed-wide measurable goal for rural stewardship is aimed at implementing these management practices in cropland areas with rural stewardship categories of "Probability Low" and "Probability Depends on Practice Effectiveness," to increase SOM content by 1%:

Measurable Goal: Implement management practices (e.g. cover crops, conservation tillage to increase residue, permanent cover, etc.) in 40% of all cropland areas in the watershed to increase SOM content by 1%. Areas to be managed are cropland areas categorized as rural stewardship "Probability Low" and "Probability Depends on Practice Effectiveness" which have SOM content > 1% and =< 4 %.

Metric: Percentage of plan area classified as "Probability Low" and "Probability Depends on Practice Effectiveness" rural stewardship categories

3.3.2 URBAN STEWARDSHIP

The criteria that can be used to describe urban stewardship are shown in **Table 3-4**. These criteria are largely derived from various state or federal programs or guidance documents and can be used to identify the number of cities in the plan area achieving urban stewardship. The criteria are largely focused on whether a city has developed and implemented practices and procedures to manage priority concerns. Potential urban stewardship criteria are presented here to illustrate their use during plan implementation. Due to significant data gaps during plan development, these criteria have not yet been evaluated. These data gaps are expected to be filled as the plan is implemented. Actions to do so are included in the targeted implementation schedule (**Section 4**).

Table 3-4: Criteria which can be used to classify whether a city and the area within the city meets urban stewardship. A city must meet all criteria to meet principles of urban stewardship.

Criteria Parameter	Criteria	Criteria Type	Used to Assess Current Stewardship Level? (Y/N)
Stormwater	Written stormwater management plan, adopted and implemented through ordinance, rules, or other processes.	Management Practice	Yes
Stormwater	Adopted Minimal Impact Design Standards (or similar) for stormwater.	Management Practice	Yes
Stormwater	Rules or ordinance which includes components for managing runoff volumes and pollutant loads associated with development.	Management Practice	Yes
Stormwater	Municipal Separate Storm Sewer System permitted city and demonstrating reasonable progress toward waste load allocations for lakes and rivers within City boundary.	Management Practice	Yes
Lakes	Determined to be making “reasonable progress” toward implementation of the waste load allocation established by a completed by Total Maximum Daily Load study.	Management Practice	Yes
Floodplains	Floodplains defined. Participant in FEMA floodplain program.	Management Practice	Yes
Groundwater	Delineated Drinking Water Source Management area and Wellhead Protection Area if supply community water supply is groundwater.	Management Practice	Yes
Wastewater	Compliance with National Point Discharge Elimination System permit.	Management Practice	Yes
Critical Areas Protection	County-wide and city ordinances in place for the protection of critical areas. Areas subject to erosion are known / mapped.	Management Practice	Yes

3.3.3 SHORELAND STEWARDSHIP

The criteria that can be used to characterize shoreland stewardship are shown in **Table 3-5**. These criteria are intended to address activities occurring within proximity to lakes, rivers, and streams with the potential to affect priority concerns. Potential shoreland stewardship criteria are presented to illustrate their use during plan implementation. Due to significant data gaps during plan development, these criteria have not yet been evaluated. These data gaps are expected to be filled as the plan is implemented. Actions to do so are included in the targeted implementation schedule (**Section 4**).

Table 3-5: Criteria which can be used to classify whether a lake, river, or stream reach meets the shoreland stewardship.

Criteria Parameter	Criteria	Criteria Type	Used to Assess Current Stewardship Level? (Y/N)
Disturbance	Littoral area is not “disturbed” defined as manipulated or modified submergent or emergent vegetation.	Management Practice	N
Disturbance	No visual evidence of shoreline erosion, bank failure, bluff failure, or accelerated erosion.	Management Practice	N

Criteria Parameter	Criteria	Criteria Type	Used to Assess Current Stewardship Level? (Y/N)
Disturbance	Shoreline maintains a minimum distance of 16-feet with established, perennial vegetation.	Management Practice	N
Waste	No concentrated livestock with direct access to water.	Management Practice	N
Waste	Septic system is properly functioning, maintained and in compliance with current design standards.	Management Practice	N
Management	Shoreline manages runoff from immediately adjacent property (e.g., through the presence of perennial vegetation, proper slopping or structural practices.)	Management Practice	N
Management	Shoreline utilizes low impact lawn management; i.e., proper fertilizer rates, reduced herbicide and pesticide use, proper disposal of lawn waste disposal.	Management Practice	N
Management	Shoreline compliant with zoning standards.	Management Practice	N

3.4 PRIORITY CONCERN MEASURABLE GOALS

This plan assigns measurable goals to each priority concern. Priority concern measurable goals are assigned to recognize that additional actions are warranted to protect or restore a resource, even if the watershed-wide measurable goals of urban, rural, and shoreland stewardship are met. The measurable goal and metric for each priority concern is described in this section.

In many instances, priority concern measurable goals are framed around the concepts of "protection" and "restoration." A priority concern is assigned **a "protection" measurable goal** when the condition currently or during the ten-year duration of this plan:

1. Is better than the minimum condition defined by state or federal environmental standards and criteria (e.g., numeric water quality standards); or
2. Is considered "unique" by recognition from a formal state or federal designation (e.g., habitats within a Scientific and Natural Areas; threatened and endangered species); or
3. Is a component of the landscape, present in a limited amount, and provides essential ecosystem function and services at the landscape scale.

Protection is not intended to focus on all resources that exceed some minimum threshold. Instead, protection is preferentially weighted to the truly exceptional resources, or those resources facing imminent threat of becoming degraded.

Priority concerns are assigned **a "restoration" measurable goal** when the resource condition currently, or during the ten-year duration of this plan:

1. Is poorer than the minimum condition defined by local, state or federal environmental standards and criteria (e.g., fails to meet numeric water quality standards); or
2. Is considered "unique" by recognition from a formal local, state or federal designation (e.g., habitats within Scientific and Natural Areas) and is currently degraded; or

3. Is a component of the landscape that is present in a limited amount, and is providing an amount of essential ecosystem function and services below the needed amount at the landscape scale and provides vital connections to existing intact ecosystems (restoring habitat fragmentation).

Due to the comprehensive nature of this plan, a variety of priority concerns are subject to restoration. Based on the definition of "restoration", the priority concerns warranting restoration fail to achieve some minimum threshold condition.

3.4.1 DRINKING WATER (GROUNDWATER)

Groundwater resources that need protection include public and private drinking water supplies with nitrate-nitrogen concentrations equal to or less than natural background and transitional levels (**Figure 3-2**). Natural background concentrations are assumed to represent natural background nitrate concentrations, or "ambient conditions" without human impact (< 1.0 mg/L) (MDH, 1998). Transitional nitrate-nitrogen concentration levels exceed background concentrations, but many or may not represent human influence (< 3.0 mg/L) (MDH, 1998).

There are many ways to protect groundwater resources, including managing water within Drinking Water Supply Management Areas (DWSMAs) and sealing abandoned or unused wells. The measurable goals and associated metrics for the protection of groundwater used for drinking water supplies are as follows:

Measurable Goal (Protection): Apply structural BMPs or management practices to 80% of the high nitrogen infiltration risk areas (see **Section 4**) to minimize the likelihood of nitrate-nitrogen leaching to tile systems and groundwater. Priority for the implementation of practices is given to high nitrogen infiltration risk areas within DWSMAs.

Metric: Area subject to structural BMPs or management practices.

Measurable Goal (Protection): Maintain a less-than-10% exceedance rate of public and private drinking water supply wells exceeding a nitrate-nitrogen concentration of 10 mg/l per the MDA Nitrogen Fertilizer Management Plan.

Metric: Percentages of wells exceeding 10 mg/l nitrate-nitrogen concentrations.

Measurable Goal (Protection): Maintain unaffected private and public drinking water supply wells with nitrate-nitrogen concentrations at or near a concentration representative of background and transitional levels (>3 mg/l).

Metric: Number of private and public water supplies with nitrate-nitrogen concentrations maintained below 3 mg/l.

Measurable Goal (Protection): Seal 150 unused and abandoned wells per year, with 20 being targeted to areas of high and moderately high nitrogen infiltration risk (see **Section 4**) and Drinking Water Supply Management Areas.

Metric: Number of wells sealed.

The State has recommended restoration be considered when groundwater concentrations exceed the natural background or transitional nitrate-nitrogen concentration of 3 mg/l (**Figure 3-2**) (MDH, 1998). Therefore, groundwater resources used for drinking water merit restoration if nitrate-nitrogen concentrations of public and/or private water supplies are greater than 3 mg/l, based on available water chemistry data.

The aggressiveness of restoration efforts largely depend on groundwater concentrations of nitrate-nitrogen levels, with higher levels necessitating more restoration efforts than lower levels near background conditions. To meet this need, measurable goals for the restoration of groundwater used for drinking water supplies have been divided into three restoration subcategories as follows:

1) Measurable Goal (Restoration- Lower Urgency): Reduce the number of public and private drinking water supplies that have nitrate-nitrogen concentrations considered moderately elevated above background concentrations.

- **Metric**: Number of public and private drinking water supplies with nitrate-nitrogen concentrations > 3 mg/l but ≤ 7 mg/l.

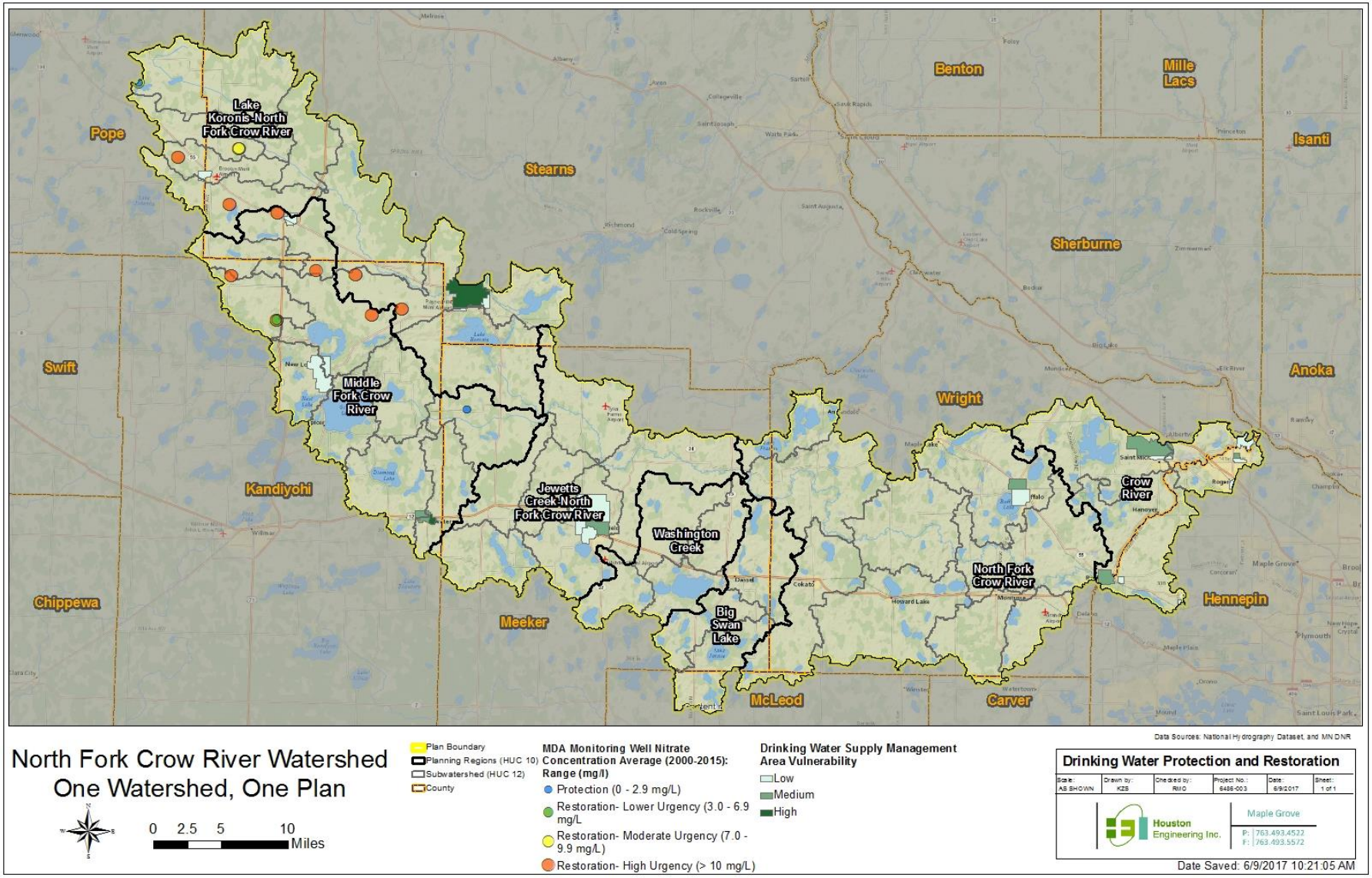
2) Measurable Goal (Restoration- Moderate Urgency): Reduce the number of private and public drinking water supplies that have nitrate-nitrogen concentrations representing a possible future health concern.

- **Metric**: Number of private and public water supplies with nitrate-nitrogen concentrations ranging from > 7 mg/l to < 10 mg/l.

3) Measurable Goal (Restoration- High Urgency): Restore private and public drinking water supplies that have nitrate-nitrogen concentrations that currently represent a health concern.

- **Metric**: Number of private and public water supplies with nitrate-nitrogen concentrations which equal or exceed the nitrate-nitrogen maximum contaminant level (10 mg/l) under the Safe Drinking Water Act.

Figure 3-2: Drinking water (groundwater) resources meriting protection and restoration based on Minnesota Department of Agriculture monitoring well nitrate concentration averages from years 2000-2015.



3.4.2 GROUNDWATER SUPPLIES (QUANTITY)

The upper portion of the NFCR Watershed coincides with the southeastern extent of the Bonanza Valley aquifer system, a regionally important groundwater resource, which is highly utilized for crop irrigation. The Bonanza Valley aquifer system has been recently designated as a Groundwater Management Area by the Minnesota DNR (MnDNR) for several reasons, including the high density of existing users, the rapidly increasing demand for water for high-capacity systems, and potential negative implications for ecosystem services. There is concern for the sustainability of groundwater supplies to support ecosystems (e.g., stream base flow), maintain good water quality, and satisfy future irrigation needs. The MnDNR is currently undergoing a major planning process with the goal of ensuring sustainable use of this system while assessing any significant issues to natural resources to ensure sustainability and continuation of ecosystem services throughout this area (MPCA, 2014).

The Minnesota Legislature created groundwater management areas as a tool for the MnDNR to address difficult groundwater-related resource challenges. The purpose of the Bonanza Valley Groundwater Management Area (GWMA) pilot planning project is to guide MnDNR actions in managing the appropriation and use of groundwater within the GWMA. Many of the management actions developed will result in improved information gathering, development of management tools, and processes that will form the foundation for better decisions regarding long-term aquifer sustainability in this system.

Increasing demands for groundwater will require improved information to make land-use decisions. There are currently 58 measured observation wells within the Bonanza Valley GWMA. Additional groundwater level monitoring wells are needed to improve the information to make good decisions. Stream and lake monitoring networks will be enhanced by adding additional gage sites to determine the effects of groundwater withdrawals on surface water systems. Additional groundwater level monitoring in municipal areas and high-density use areas will be needed to assess long-term sustainability watershed-wide.

Encouraging accurate record keeping of water use is critical. Ensuring local government unit (LGU) decision makers are connected with the raw data and interpretation of the data should help sync development, land use decisions, and water permitting. More coordination will be needed between local units of government as water users in and outside of municipal boundaries are competing for the same water resources. Efficient use of water resources and finding approaches to limit demands will be necessary if water use continues to rise.

Protecting and maintaining groundwater supply is likely less costly than restoring an over-appropriated aquifer. Therefore, measurable goals and associated metrics for groundwater supplies are as follows:

Measurable Goal (Protection): Treat 10% of land in "high" recharge areas with low nitrogen infiltration risk (see **Section 4**) with recharge management practices, defined as practices, which increase soil organic matter content or increase infiltration to the aquifer. Priority given to the Bonanza Valley Groundwater Management Area or areas covered by DWSMAs

Metric: Number of acres in "high" recharge areas treated with recharge management practices.

Measurable Goal (Protection): Sustain the groundwater basin, aquifer, or aquifer system without rendering groundwater supplies unreliable and causing a long-term progressive lowering of groundwater level.

Metric: Number of groundwater basins, aquifer or aquifer systems not showing a statistically significant decrease in level, exceeding natural level changes caused by variations in recharge rates and climate.

3.4.3 STREAMS AND RIVERS

Defining protection and restoration for streams and rivers is important for identifying resource management needs and aligning with state funding priorities. BWSR's Nonpoint Priority Funding Plan for Clean Water Funding Implementation and Minnesota's Clean Water Roadmap place priority on protection and restoration activities focused on stream and river reaches that are nearly and slightly impaired. To meet local needs of aligning implementation efforts with state-level funding priorities, protection and restoration categories and subcategories for streams and rivers were developed and mapped for use within this plan. Priority implementation for streams and rivers can be led by maps identifying reaches that are nearly or barely impaired, therefore aligning with BWSR's Nonpoint Priority Funding Plan.

Protection and restoration categories and subcategories were based on a statistical evaluation of available water quality monitoring data. The monitoring data is based on stream or river segments, called Assessment Unit Identification Numbers (AUIDs). Monitoring data and management strategies are commonly specific to a particular water quality parameter (e.g. total suspended solids, E.coli). Therefore, protection and restoration categories and subcategories are defined for each AUID, based on monitoring data for each water quality parameter.

Streams and rivers in the “protection” category are further broken down into three subcategories:

1. **Above-Average Quality:** Portions of a stream or river in this subcategory exhibit water quality conditions that significantly exceed numeric water quality standards for a given parameter (**Figure 3-3)**.
2. **Potential Impairment Risk:** Portions of a stream or river in this subcategory exhibit conditions “near” but not exceeding numeric water quality standards for a given parameter (**Figure 3-4**).
3. **Threatened Impairment Risk:** Lastly, stream or river reaches in this subcategory are very near exceeding water quality standards, and run the greatest risk of becoming impaired (**Figure 3-5**).

Streams and rivers in the “restoration” category are further broken down into two subcategories:

1. **Low Restoration Effort:** Portions of a stream or river in the Low Restoration Effort subcategory exhibit water quality conditions near designated numeric water quality standards for a given parameter, therefore requiring relatively low efforts for restoration (**Figure 3-6**).
2. **High Restoration Effort:** Conversely, stream or river reaches in the High Restoration Effort subcategory exhibit water quality conditions that are no longer near designated numeric water quality standards for a given parameter, therefore requiring relatively high efforts for restoration (**Figure 3-7**).

If a TMDL study has been completed a stream or river reach, the measurable goal for that stream or river is to meet the load allocation as determined by the completed TMDL study. If a stream or river is categorized for restoration and does not have a completed TMDL study, the measurable goal for that stream or river is to reduce existing loads to meet state water quality standards.

Measurable Goal (Protection): Increase stream and river length categorized as Above-Average Quality, Potential Impairment Risk, and Threatened Impairment Risk for a water quality parameter.

> **Metric**: Stream and river length in Above-Average Quality, Potential Impairment Risk, and Threatened Impairment Risk protection categories with the estimated annual sediment and phosphorus load (as estimated by PTMApp) equal to or less than the existing load.

Measurable Goal *if TMDL study is completed* (Restoration): Decrease stream and river length categorized as Low Restoration Effort (converted to Threatened Impairment Risk or better) and High Restoration Effort (converted to Low Restoration Effort or better) for a given water quality parameter. Use load allocation as whether a stream or river length achieves the goal.

> **Metric**: Stream and river length classified as Low Restoration Effort and High Restoration Effort, with the estimated load (as estimated by PTMApp) equal to or less than the load allocation established by the TMDL study.

Measurable Goal *if TMDL study is not completed* (Restoration): Decrease stream and river length categorized as Low Restoration Effort (converted to Threatened Impairment Risk or better) and High Restoration Effort (converted to Low Restoration Effort or better) for a given water quality parameter.

> **Metric**: Stream and river length classified as Low Restoration Effort and High Restoration Effort.

Figure 3-3: Surface waters exhibiting Above Average Quality for a given water quality parameter, and therefore merit protection.

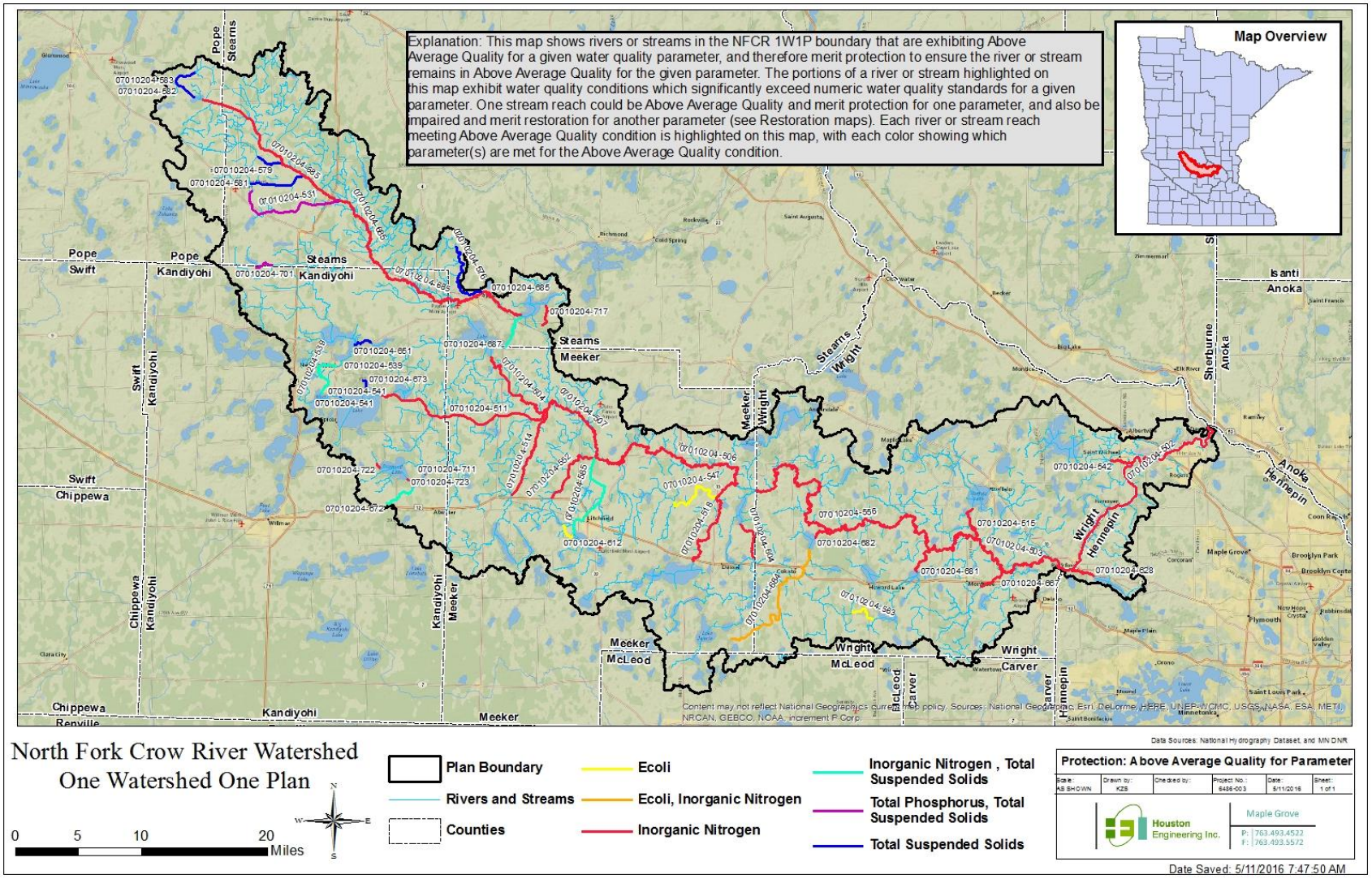


Figure 3-4: Surface waters exhibiting Potential Impairment Risk for a given water quality parameter, and therefore merit protection.

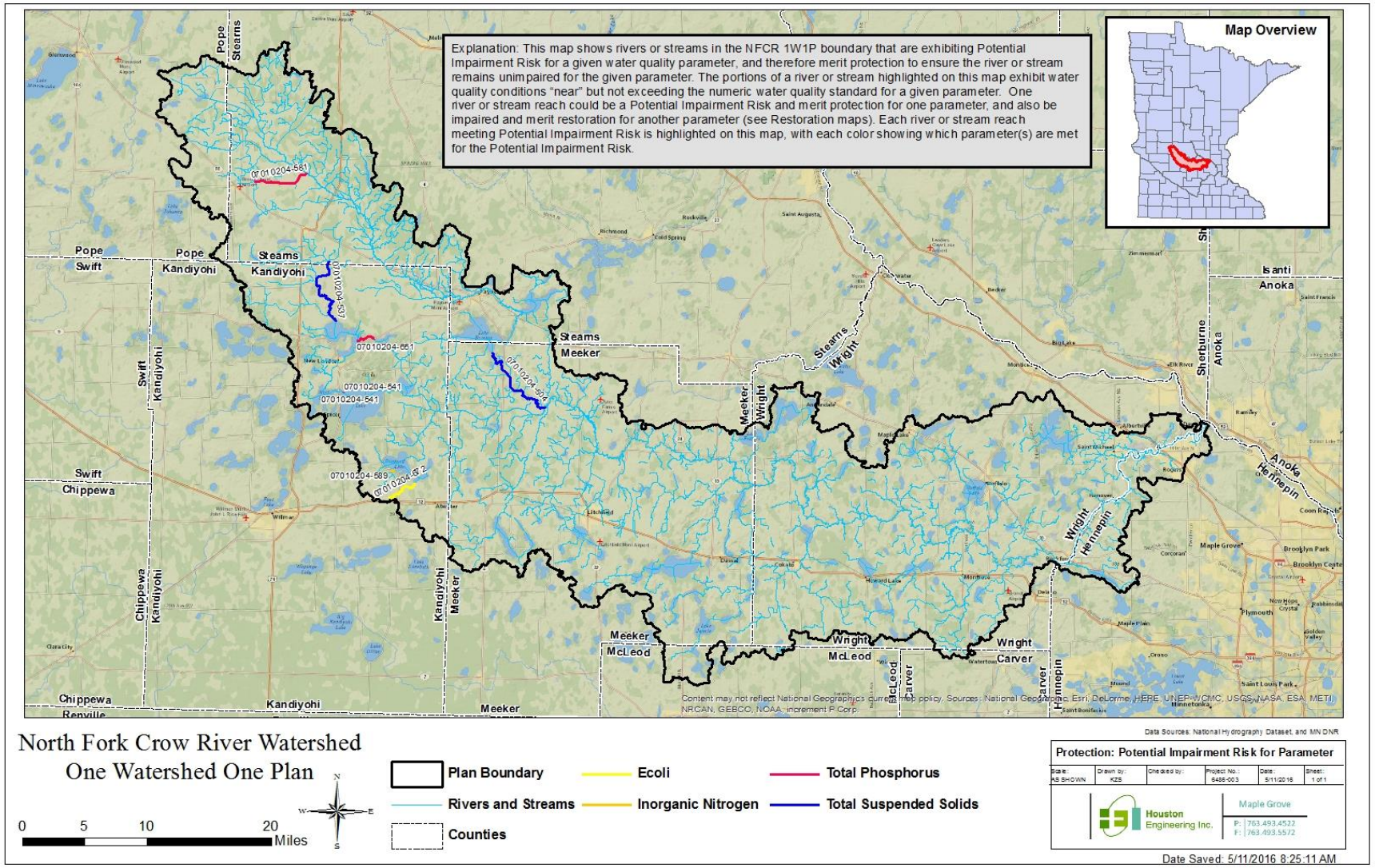


Figure 3-5: Surface waters exhibiting Threatened Impairment Risk for a given water quality parameter, and therefore merit protection.

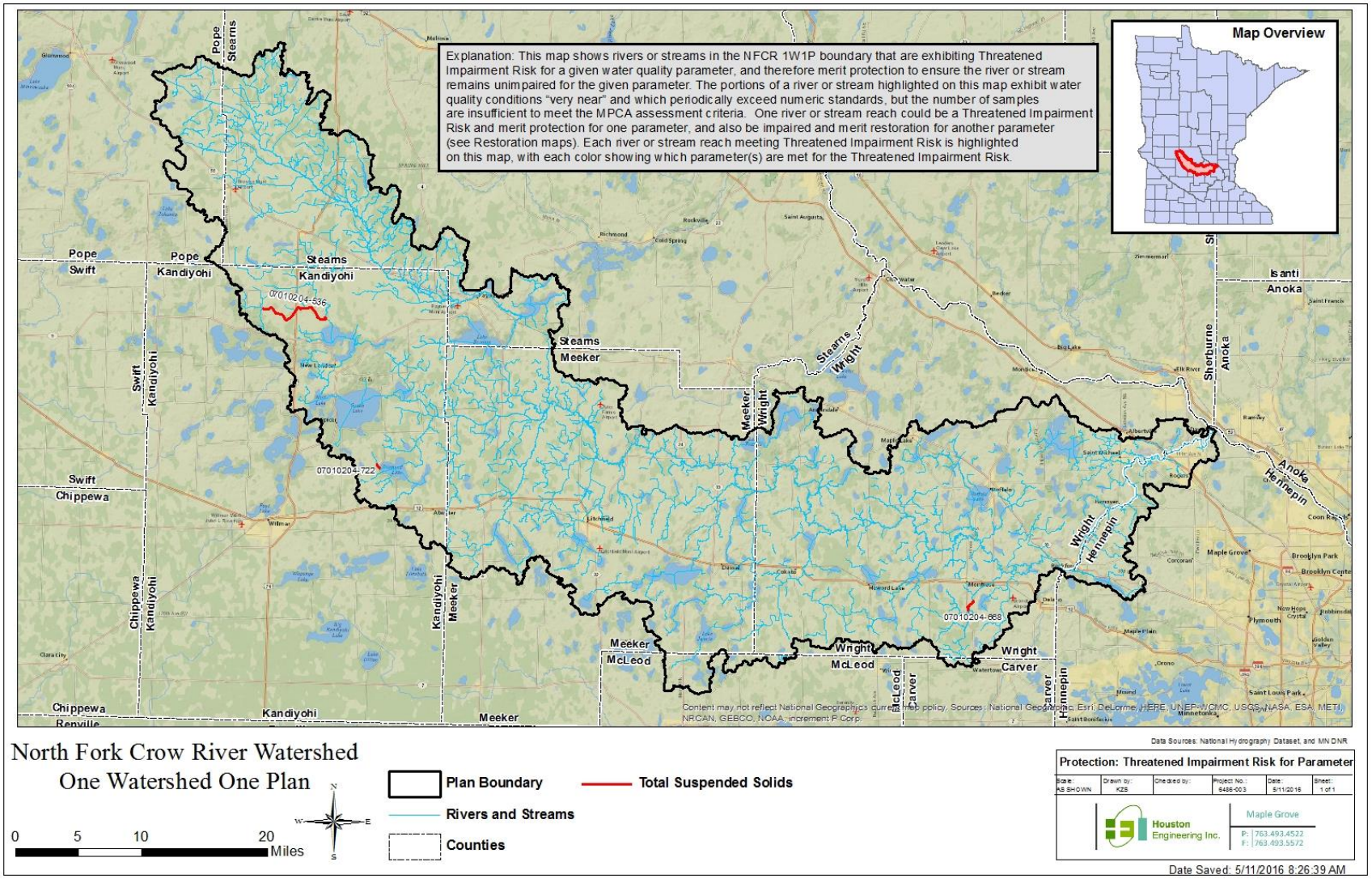


Figure 3-6: Surface waters classified as Restoration: Low Restoration Effort by water quality parameter.

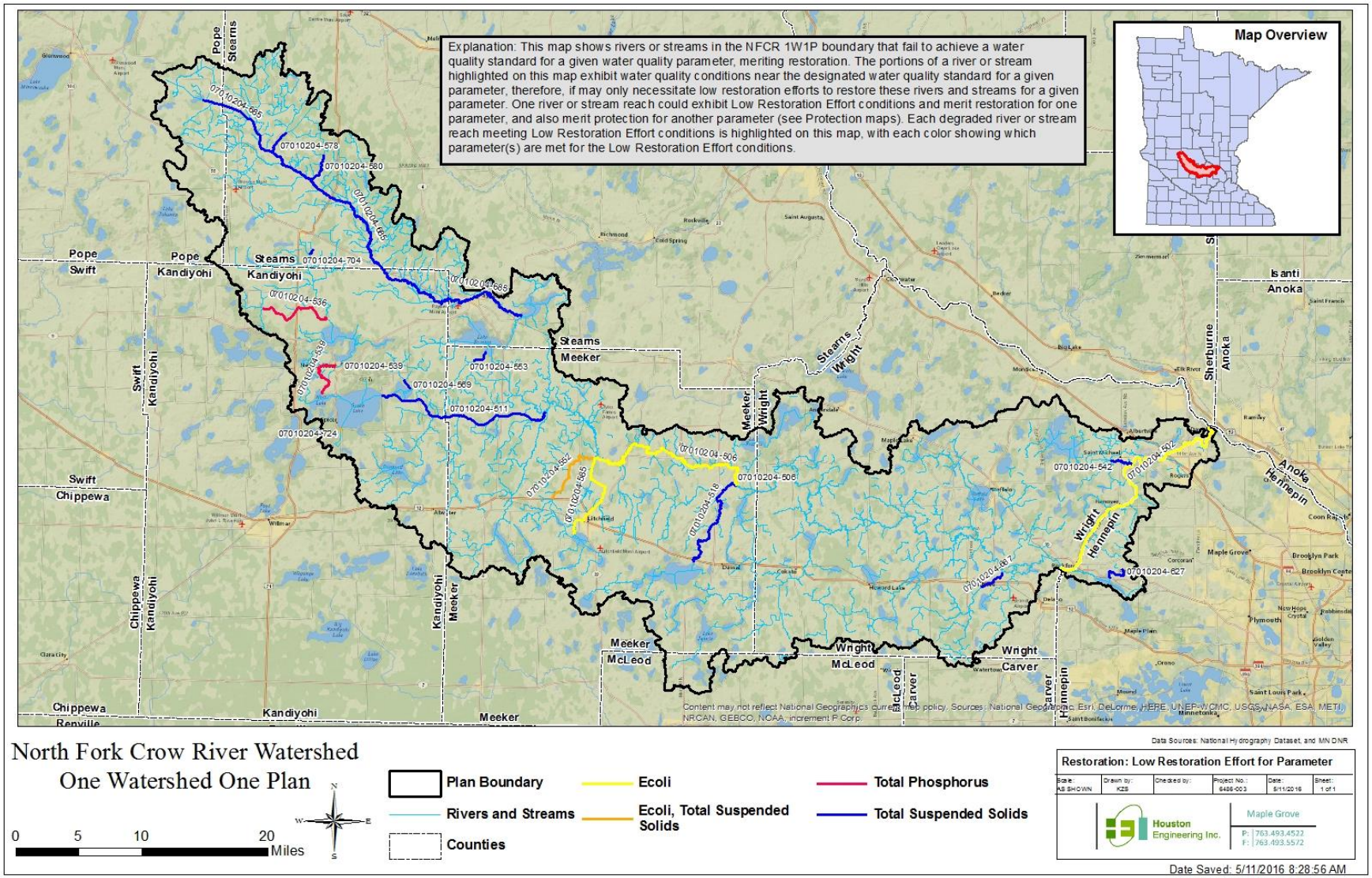
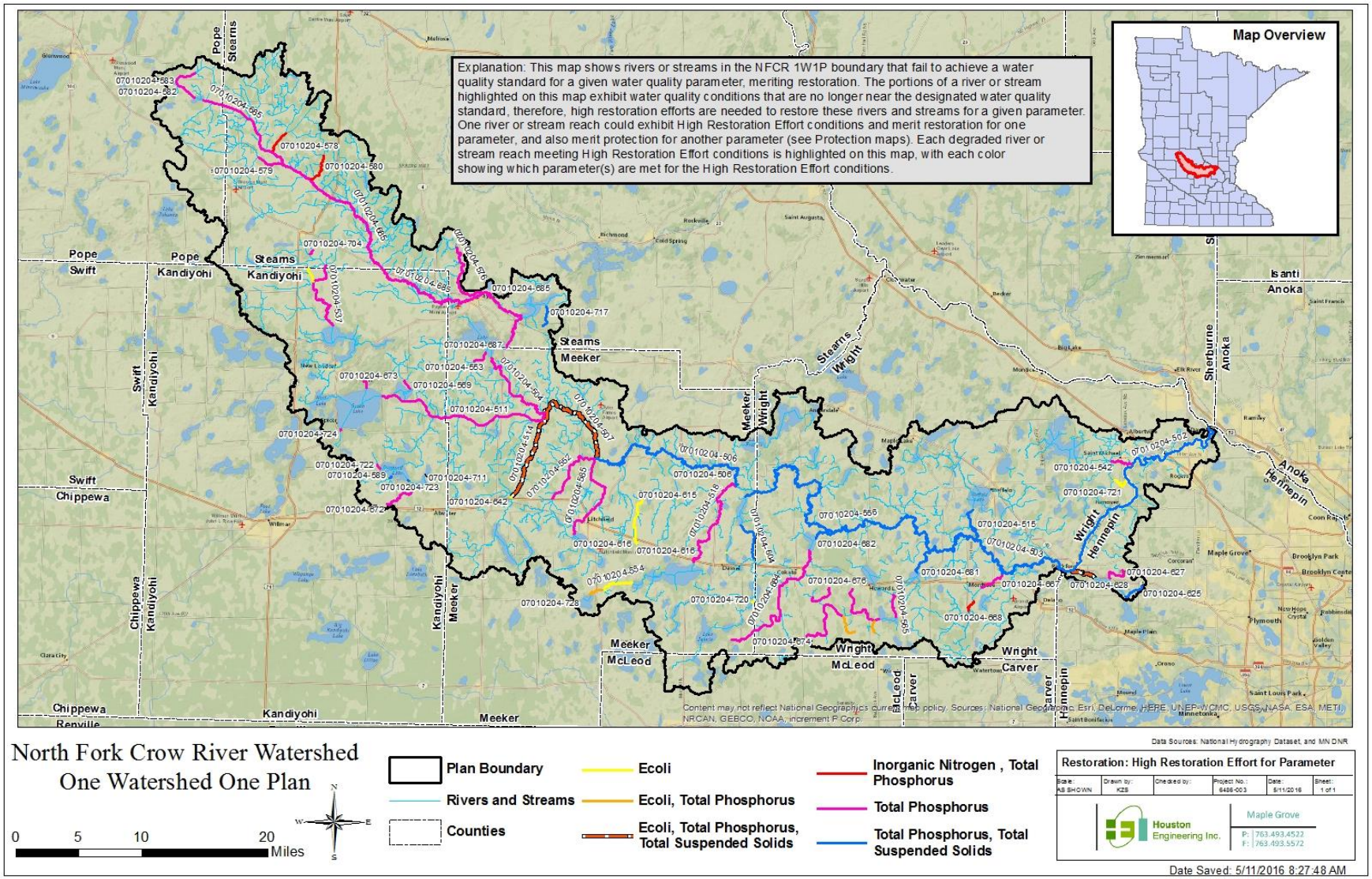


Figure 3-7: Surface waters classified as Restoration: High Restoration Effort by water quality parameter



3.4.4 LAKES

Protecting the quality of lakes that meet water quality standards is an important consideration in watershed restoration and protection efforts. Protecting lakes with high water quality—and those at risk of becoming impaired—can be just as important as restoring impaired lakes when avoiding further degradation of Minnesota's waters.

All lakes that currently meet water quality standards should be protected from future water quality degradation to maintain beneficial uses. These lakes vary in their degree of sensitivity to change and this should be considered when implementing a protection strategy. Protection for lakes that meet water quality standards can be ranked considering the following attributes:

- Waters meeting water quality standards but with downward trends in water quality;
- Waters having known or anticipated future water quality threats;
- Waters with suspected but not confirmed impairments; and
- High quality or unique waters deserving special attention.

Several state agencies are developing a "Lakes Protection Strategy" to help watershed stakeholders set water quality protection goals for unimpaired lakes. Excess nutrients (i.e. phosphorus) loading is a threat to many of Minnesota's lakes, and reducing or maintaining low nutrient pollution loads is critical to achieving the state's clean water goals. As such, several state agencies have jointly developed the Lakes of Phosphorus Sensitivity Significance (LPSS), which is a critical component of the Lakes Protection Strategy. This plan leverages the LPSS data where available, as a resource for identifying and ranking lakes in need of protection.

At the time of this writing, 88 lakes within the NFCR Watershed have been analyzed for phosphorus sensitivity through the LPSS. Phosphorus sensitivity was estimated for each of these 88 lakes by predicting how water clarity is reduced with additional phosphorus loading to the lake. A phosphorus sensitivity significance index was formulated to prioritize lakes as they relate to Minnesota Pollution Control Agency's (MPCA) policy objective of focusing on "high quality, unimpaired lakes at greatest risk of becoming impaired." The phosphorus sensitivity significance index, which is a function of phosphorus sensitivity, lake size, lake total phosphorus concentration, proximity to MPCA's phosphorus impairment thresholds, and watershed disturbance, was used to determine the lake's priority class.

For each lake, a total phosphorus (TP) load target and load goal were computed. The target TP for each lake was identified as the 25th percentile of the in-lake summer mean TP concentration. This target concentration is then used to estimate the TP load reduction needed to achieve the target load. The TP load reduction goal is the estimated reduction (pounds/year) in the total phosphorus load to meet the TP load goal.

Lake protection measurable goals align with the phosphorus load target assigned by the LPSS or approved TMDL. Priority implementation for lakes can be led by priorities within the LPSS or TMDL. Protection measurable goals are also inclusive of protection from the spread of aquatic invasive species. Currently 38 lakes have been designated as "infested" within the NFCR Watershed.

Measurable Goal if LPSS lake (Protection): Meet TP target load reduction goals established by State agencies.

Metric: Number of unimpaired lakes.

Measurable Goal if not LPSS lake (Protection): Maintain or decrease existing loads entering the lake, as estimated by PTMApp (Nondegradation).

Metric: Pollutant load (as estimated by PTMApp) delivered to lake.

Measurable Goal (Protection): Limit the spread of infested lakes, with containment of existing infested lakes.

Metric: Number of inspections and decontaminations completed per year.

Some lakes within the plan area do not meet water quality standards, and therefore merit "restoration." If a lake is categorized as a restoration lake and has a TMDL completed, the measurable goal for that lake is to meet its load allocation (nonpoint source load that includes source other than surface runoff). If the restoration lake lacks a completed TMDL, the measurable goal is to reduce the estimated annual total phosphorus load to a lake by 10% to align with the goals of the LPSS until a formal TMDL is written.

Measurable Goal *if TMDL study is completed* (Restoration): Decrease the number of impaired lakes. Use TMDL load allocation as whether a lake achieves the goal.

Metric: Number of lakes unimpaired.

Measurable Goal *if TMDL study is not completed* (Restoration): Decrease annual total phosphorus loads entering the lake by 10% (as estimated by PTMApp).

Metric: Phosphorus load (as estimated by PTMApp) delivered to lake.

Measurable Goal (Restoration): Manage current infested lakes within the NFCR Watershed.

Metric: Number of acres/lbs. treated in infested lakes.

3.4.5 SURFACE WATER RUNOFF

Excess surface water runoff leads to flood damages, accelerated bank erosion and stream channel movement, increased movement of sediment and the loss of aquatic habitat. Excess surface runoff can also lead to road overtopping and washouts and damage to land and buildings. The term "altered hydrology" is a term commonly used within Minnesota to describe the changes associated with excess surface runoff.

Establishing measurable goals for surface water runoff can be challenging. Mapping the locations, frequency, and duration of flooding could be used to establish measurable goals. However, information about the location of private damages is rarely available because it is normally not collected as part of a disaster declaration. Although efforts were made to identify the location of road damages from county engineers, this was only partially successful (**Figure 2-4**).

An altered hydrology analysis was completed for the NFCR Watershed to determine how hydrology in its current form has changed from the natural flow regime within the watershed (**Appendix L**) to establish a measurable goal for surface water runoff. For the purposes of this analysis, altered hydrology is defined as a discernable change in specific metrics derived from stream discharge, occurring through an entire annual hydrologic cycle, which exceed the measurement error compared to a historic condition (HEI, 2016). One goal of this analysis was to quantify the discernable change in hydrology derived from stream discharge, and set goals to mitigate the adverse consequences caused by this change.

The NFCR Watershed altered hydrology analysis first determined the benchmark, or "historic", condition defining the natural flow regime and the current, or "modern" hydrologic conditions in the watershed. Using mean daily discharge data from the USGS gage at Crow River at Rockford, MN, (USGS ID: 05280000), the altered hydrology analysis was performed for two 35-year time periods:

- **1940-1975** is defined as historic time; and
- **1980-2015** defined the modern time period.

Table 3-6 provides a summary of the altered hydrology metrics. Overall, the streamflow metrics in the Crow River at the USGS gaging station at Rockford have increased, except for peak discharge with a return period greater than 10 years. **Table 3-7** shows that the hydrology of the watershed has been altered for the modern period compared to the historic (benchmark) period.

The preferred spatial scale for completing this altered hydrology analysis is the 12-digit Hydrologic Unit Code (HUC) or in the case of the NFCR Watershed 1W1P plan area, the 10-digit HUC planning region. There is still a need to test the altered hydrology analysis approach using continuous simulation models like SWAT and HSPF. An action item in the targeted implementation schedule reflects this need (**Section 4**).

Goals for addressing the change in hydrology were estimated using three methods (for full description of methods, see **Appendix L**). Each method is based on different assumptions and altered the metrics for a specific "altered hydrology" group (**Table 3-6**). The method recommended to guide the surface runoff measurable goal for this planning purpose is focused on the aquatic habitat and geomorphic ability to transport sediment, and uses the change in the cumulative volume for mean daily discharges, exceeding the 1.5-year return period event. The cumulative total volume when the daily average discharge exceeds the 1.5-year peak discharge includes all flows above the 1.5-year peak, which can include storms with much larger return periods. The change in average annual cumulative volume above the 1.5-year peak flow for the Crow River is ~104,000 acre-feet or 0.75 inches across the entire watershed draining to the gage. This method is based on the changes in the observed data and, because it includes all flows above the 1.5-year flow, relies on the two periods having a similar distribution of flows. Since the flow record in the Crow River includes flow above the 10-year flow in the historic period only, this estimate may be underestimated.

The drainage area of the Crow River upstream of Rockford is inclusive of both the NFCR Watershed and the South Fork Crow River Watershed. To adjust this goal to pertain to only the NFCR Watershed, an average depth of 0.75 inches of storage was assumed over the entirety of the NFCR Watershed area (1,483 square miles), yielding an estimated storage goal of 59,320 acre-feet. The actual amount of storage needed exceeds 59,320 acre-feet, as the storage placed on the landscape is not expected to be 100% effective in removing volume from peak of the hydrograph (HEI, 2016). To achieve the estimated mitigation goal, structural practices and management practices may be needed. These should be evaluated specifically through a hydrologic study or the use of appropriate tools and models.

The method used to the estimate the measurable goal currently requires the use of measured daily streamflow values collected at a monitoring location and only one gage exists with sufficient period of record. The goal therefore, pertains to the entire plan boundary. Separate goals would ideally be developed at a smaller scale, perhaps for each 12-digit HUC watersheds. Future work is needed to downscale the goal to a smaller watershed scale.

Measurable Goal: Achieve the altered hydrology goals established using the historic period (1940- 1975) for the USGS gage at Crow River at Rockford, MN, as the desired benchmark condition by reducing and managing runoff volume. Interim volume reduction goal for the watershed is a 0.5 inch reduction in runoff depth on average across the watershed. Long-term goal for the watershed is to meet altered hydrology mitigation goal of reducing runoff depth 0.75 inches across the watershed.

Metric: Acre-feet of volume reduced through rural (primarily by increasing soil organic matter), urban, and shoreland stewardship management and floodwater storage within structural BMPs, or proportion of the plan area with a reduction in runoff depth of 0.5 inches across the watershed.

Table 3-6: Summary of altered hydrology metrics.

Group	Metric	% Difference	Altered Hydrology Metric	Evidence of Altered Hydrology for Group
Aquatic Habitat	10-year, Annual Minimum 30-day Mean Daily Discharge	118.40%	+	Yes - increase
	10-year, Annual Minimum 7-day Mean Daily Discharge	121.60%	+	
	Median November (Winter Base) Flow	329.80%	+	
Aquatic Organism Life Cycle	Magnitude of Monthly Runoff Volumes	77.2% - 207.8%	+	Maybe - increase
	Distribution of Monthly Runoff Volumes	-30.7% - 71.5%	O	
	Timing of Annual Peak Discharge	10.70%	+	
	Timing of Annual Minimum Discharge	4.50%	O	
Riparian Floodplain (Lateral) Connectivity	10-year Peak Discharge Rate	7.70%	O	Yes - decrease
	50-year Peak Discharge Rate	-18.4%	-	
	100-year Peak Discharge Rate	-27.1%	-	
	Average Cumulative Volume above the Historic 10-year Peak Discharge	-52.3%	-	
	Average Cumulative Volume above the Historic 50-year Peak Discharge	-100%	-	
	Average Cumulative Volume above the Historic 100-year Peak Discharge	-100%	-	
Geomorphic Stability and Capacity to Transport Sediment	1.5-year Peak Discharge Rate	51.0%	+	Yes - increase
	2-year Peak Discharge Rate	44.6%	+	
	Average Cumulative Volume above the Historic 1.5-year Peak Discharge	100.8%	+	
	Average Cumulative Volume above the Historic 2-year Peak Discharge	65.4%	+	
	Duration above the Historic 1.5-year Peak Discharge	108.0%	+	
	Duration above the Historic 2-year Peak Discharge	125.2%	+	
	Flow Duration Curve	-15.1% - 190.8%	+	

+ symbol indicates metric exhibits altered hydrology and an increase for the modern period compared to the historic period
o symbol indicates fails to exhibit altered hydrology for the modern period compared to the historic period
- symbol indicates metric exhibits altered hydrology and a decrease for the modern period compared to the historic period

Table 3-7: Summary of altered hydrology metrics. Hydrology is considered altered if percent of the total metrics exceeding the altered hydrology metrics is greater than 50%.

Category	Number (% of total)
No. of Metrics Used	20
No. of Positive Metrics Exceeding Altered Hydrology Criteria	12 (60%)
No. of Neutral Metrics	3 (15%)
No. of Negative Metrics Exceeding Altered Hydrology Criteria	5 (25%)
No. of Metric Exceeding Altered Hydrology Criteria	**17 (85%)**

3.4.6 WETLANDS

Wetlands are frequently saturated lands with multiple potential benefits, including habitat, pollutant reduction, and water storage. Within the NFCR Watershed, wetlands are lost through drainage, development, and modification by receiving additional runoff. The Minnesota Wetland Conservation Act (WCA) has set the goal for no-net-loss of wetlands in total acreage and functions. WCA will define goals for the watershed. The measurable goals for wetland priority concerns are based on the premise of protection to attain no-net-loss of wetland acreage and to maintain and increase the prevalence of large wetland blocks.

Measurable Goal (Protection): No net loss in acreage and functions of wetlands.

Metric: Acres of wetlands.

Measurable Goal (Protection): Maintain and increase the number of large wetland blocks with a minimum size (i.e., block size) and mixture of features (i.e., proportion of cropland, grassland, wetland, open space) necessary to sustain ecosystem services representative of a terrestrial landscape within the plan area. Block sizes of 4 square miles with approximately 60% cropland, 10% woodland and forest, 15% wetland, and 15% grassland are desired.

Metric: Number of large wetland blocks.

3.4.7 TERRESTRIAL HABITAT

Habitat provides food, shelter, terrestrial ecological corridors, and breeding territory for animals. Some locations within the NFCR Watershed provide habitat for unique and rare plant and animal species. Because of their uniqueness, there is a general desire to preserve and protect these locations. Terrestrial habitat resources meriting protection under context of this plan, or “protected land” include features, species, or habitats with special legal or administrative recognition or unique ecological characteristics, including:

- Rare plants, rare animals, and native plant species designated by the Minnesota County Biological Survey (MCBS) as Minnesota Sites of Biodiversity Significance and Native Plant Communities;
- Native prairie;
- State and federal conservation easements specific to habitat; and
- Wildlife Management Areas (WMAs).

Measurable goals addressing terrestrial habitat are based around the premise of protection and are as follows:

Measurable Goal (Protection): Maintain or increase acreage of protected land for public use and good habitat quality for recreational use.

Metric: Acres of habitat.

Measurable Goal (Protection): Maintain or increase large areas of contiguous grassland (preferably native vegetation) with minimum block size of 300 acres; or adjacent to other existing terrestrial habitat blocks. Priority given to remnant prairie and oak savannah communities.

Metric: Number of grassland blocks implemented greater than 300 acres or grassland area implemented adjacent to existing terrestrial habitat blocks.

Measurable Goal (Protection): Maintain and increase the number of large terrestrial habitat blocks with a minimum size (i.e., block size) and mixture of features (i.e., proportion of cropland, grassland, wetland, open space) necessary to sustain ecosystem services representative of a terrestrial landscape within the plan area. Block sizes of 4 square miles with approximately 60% cropland, 10% woodland and forest, 15% wetland, and 15% grassland are desired.

Metric: Number of large terrestrial habitat blocks.

Measurable Goal (Protection): Maintain or increase the quality of existing terrestrial habitat, as measured through diversity index of terrestrial species and presence of rare species and native communities.

Metric: Number and type of terrestrial species documented.

3.4.8 LAKE SHORELAND AND STREAM RIPARIAN CORRIDORS

Lake shoreland and stream riparian corridors are those areas with immediate proximity to lakes, streams, and rivers. Properly functioning lake shorelands and stream riparian corridors provide essential ecosystem function and services at the landscape scale including:

- Runoff filtering
- Habitat
- Travel corridors for fish and wildlife, and aesthetic enjoyment

Degraded shorelands and, particularly riparian corridors characterized by a lack of quality in vegetation, can manifest in poor stability and high sediment supply through bank erosion (MPCA, 2014).

During the 2015 Legislative session, the State of Minnesota passed the Buffer and Soil Loss Legislation (Minnesota Statue 2014, section 103B.101), commonly referred to as the Minnesota Buffer Law. The legislation added 103F.48 Riparian Protection and Water Quality Practices, which requires a 50-foot average continuous buffer of perennial vegetation with a 30-foot minimum width around all public waters (and a 16.5-foot minimum width continuous buffer of perennial vegetation along all public drainage systems). Buffers or acceptable alternative water quality practices must be in place on or before November 1, 2017 for public waters.

The measurable goals for lake shoreland and stream riparian corridor priority concerns are based on the ecosystem benefits these corridors provide. The measurable goals associated with the priority concern could largely be met through the shoreland stewardship watershed-wide measurable goal, for which a framework has been established for future use during plan implementation.

Measurable Goal: Maintain or increase the amount of area within the riparian corridor providing multiple ecosystem benefits (reduced erosion; increased wildlife habitat; presence of migration corridor; water quality improvement). The area includes land subject to Minnesota Buffer Law, adjusted to meet landowner business needs. Priority given to habitat block sizes with a minimum of 300 feet in width and 1,500 feet in length with connections to other habitat blocks.

Metric: Feet of waterway meeting conditions for ecological habitat corridors.

Measurable Goal: Increase the proportion of land adjacent to lakes, streams, rivers, and waterways to achieve shoreland stewardship by 80% above current condition.

Metric: Acreage of waterway meeting shoreland stewardship.

3.4.9 PUBLIC KNOWLEDGE AND BEHAVIOR RELATIVE TO WATER ISSUES

The measurable goals for public knowledge are derived from an evaluation of how many citizens are reached during education and outreach events being implemented by the NFCRWPP. Through shared services, expectations are that education and outreach materials to increase public knowledge will be developed for use and delivery within each county, watershed district, and joint powers board to ensure consistency across the NFCR Watershed (discussed further in **Section 5**).

Measurable Goal: Increase the number citizens reached during outreach events as part of the Public Knowledge Campaign within the Education and Outreach Initiative to increase annual public participation levels. Baseline participation levels across counties to be determined during creation of the Public Knowledge and Behavior Campaign.

Metric: Number of events and outreach materials developed that increase annual public participation levels.

3.4.10 LANDOWNER, PRODUCER, AND LAKESHORE OWNER ENGAGEMENT IN WATER MANAGEMENT

The measurable goals for Landowner, Producer, and Lakeshore Owner Engagement in Water Management are derived from an evaluation of how effective existing programs within the NFCR Watershed have been at implementing practices to improve the condition of resources within the plan area. Through shared services, expectations are that programs and engagement materials to increase implementation of practices will be developed for use and delivery within each county, watershed district, and joint powers board to ensure consistency across the NFCR Watershed (discussed further in **Section 5).**

Measurable Goal: Use field walkovers in rural areas, landowner visits along shoreland areas, and consultations within urban areas for community outreach. Outreach is expected to increase use of cost-share programs by delivering conservation and expanding knowledge about the proportion of the plan area achieving stewardship. Complete 125 field walkovers, city consultations, or shoreland owner visits over the duration of the plan.

Metric: Number of walkovers, consultations, and visits completed, and proportion that lead to implementation.

3.4.11 RURAL DEVELOPMENT AND SUSTAINABILITY

The issues facing the Rural Development and Sustainability priority concern are independent of protection versus restoration, and are addressed through watershed-wide measurable goals for rural stewardship.

To align with this watershed-wide measurable goal, the goal for the rural development and sustainability priority concern is as follows:

Measurable Goal: Implement management practices (e.g. cover crops, conservation tillage to increase residue, permanent cover, etc.) in 40% of all cropland areas in the watershed to increase Soil Organic Matter (SOM) content by 1%. Areas to be managed are cropland areas categorized as rural stewardship "Probability Low" and "Probability Depends on Practice Effectiveness", which have SOM content > 1% and =< 4 %.

Metric: Percentage of plan area classified as "Probability Low" and "Probability Depends on Practice Effectiveness" rural stewardship categories

3.4.12 URBAN STORMWATER

Issues and measurable goals associated with the urban stormwater priority concern can largely be met through the urban stewardship. The parameters and criteria used to describe and classify a city as meeting the stewardship criteria are largely derived from various state or federal programs or guidance documents. Included is a parameter that assesses urban stewardship based on a city's stormwater programs. To align with these watershed-wide measurable goals, the measurable goal for the urban stormwater priority concern is to have a net increase in cities meeting the urban stewardship criteria:

Measurable Goal: Increase the number of cities meeting urban stewardship criteria.

Metric: Number of cities meeting urban stewardship.

3.4.13 AGRICULTURAL DRAINAGE SYSTEMS

Drainage is an important infrastructure need for producing agricultural crops. However, drainage also presents a challenge because of the need to balance the need for drainage relative to possible downstream impacts. Agricultural public drainage systems can easily be overwhelmed with too much water, reflected by an increase in both the amount (i.e., volume) and rate (i.e., peak discharge) of water being conveyed. Within the public drainage system this can lead to an increase in bank failure and the need for maintenance.

The measurable goal for agricultural drainage systems was developed to address these concerns by establishing a goal for the volume and rate of water conveyed. This measurable goal is derived from the altered hydrology analysis for the NFCR Watershed (HEI, 2016) (**Appendix L**). The storage goal of 59,320 acre-feet throughout the NFCR Watershed is used as a measurable goal for agricultural drainage systems. This reflects the change in the amount and rate of runoff for common runoff events (i.e., those equal to or less than the 2-year return period event), for which public drainage systems are commonly designed.

The measurable goal for the structural integrity of the drainage system was also developed to align with the watershed-wide measurable goal for rural stewardship.

Measurable Goal: Treat 40% of all cropland areas in in watershed with management practices (cover crops, conservation tillage to increase residue, permanent cover, etc.) to increase Soil Organic Matter (SOM) content 1%, thereby making progress toward surface runoff (altered hydrology) measurable goals. Areas to be treated are cropland areas categorized as rural stewardship "Probability Low" and "Probability Depends on Practice Effectiveness" which have SOM content > 1% and =< 4 %.

Metric: Acre-feet of volume reduced through management practices or structural BMPs, or proportion of the plan area with a reduction in runoff depth of 0.5 inches across the watershed

Targeted Implementation






4 TARGETED IMPLEMENTATION

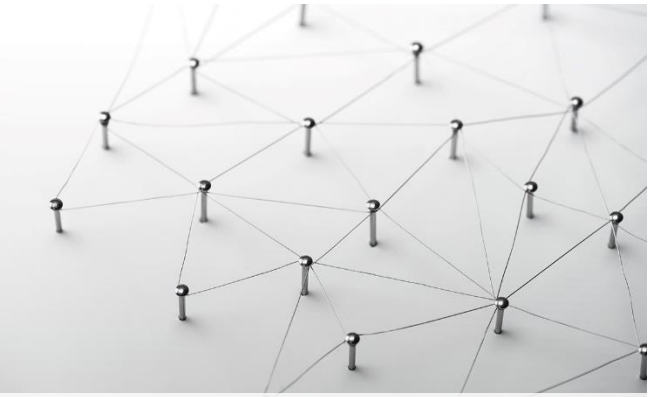
4.1 PURPOSE AND STRUCTURE

There are two components to targeted implementation:

1. A **"targeted implementation schedule":** The targeted implementation schedule is comprised of a set of actions that—when implemented—are expected to make reasonable progress toward plan measurable goals.

2. **Planning region "implementation profiles":** Planning region implementation profiles summarize current resource conditions and present information about the potential number, location, and types of management practices and structural BMPs for implementation. The implementation profile also presents information about the relationship between the fiscal investment to implement structural BMPs relative to the lifecycle cost and stated surface water quality load reduction goals. The information within the implementation profile is useful for understanding whether surface water quality goals are achievable through activities that affect surface runoff and the estimated cost of achieving the goals.

Both implementation concepts are presented graphically in **Figure 4-1**.



The targeted implementation schedule brings plan concepts into reality

The targeted implementation schedule includes many actions intended to be implemented watershed-wide to ensure consistency. These actions are categorized into "implementation components" within the targeted implementation schedule for the purposes of estimating and summarizing funding needs (**Section 3.2**). Implementation components include:

- delivering education and outreach programs;
- executing local or state regulatory or statutory obligations; or
- developing data to fill data gaps and complete research.

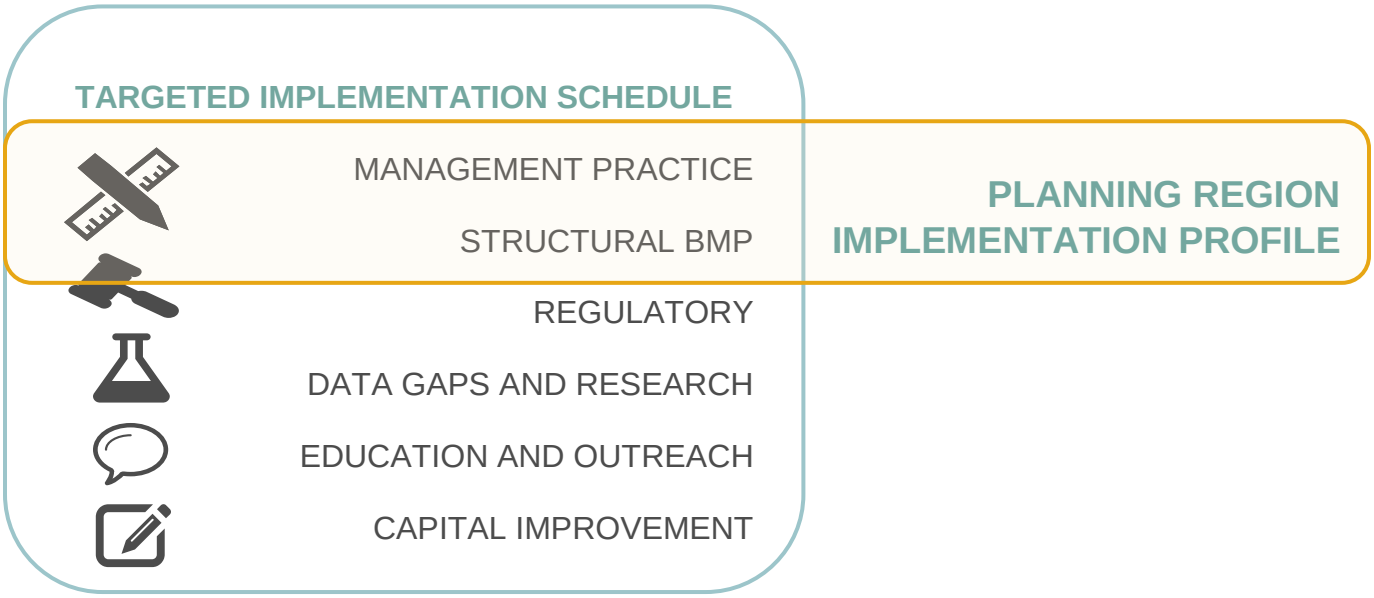
Like actions are funded by the same implementation program. The estimated funding needs by implementation program are presented in **Section 5.4**.

The targeted implementation schedule also includes actions focused on delivering conservation on the ground and constructing projects. These actions include building larger projects like capital improvements (see **Section 5.2**), management practices, and structural BMPs. Typical structural BMPs include water and sediment control basins (WASCOBS), woodchip bioreactors, controlled drainage, and grass waterways. Typical management practices include cover crops, tillage management, and fertilizer management. The probable numbers, locations, and types of structural BMPs vary by planning region because regional concerns differ among the planning regions.

The ability to achieve measurable goals—and the speed at which they are realized—depends on the local capacity to complete the actions within the implementation schedule, and therefore, the amount of funding available. The amount of funding is uncertain. Therefore, the level of effort for implementation (i.e., numbers of actions and practices) is assumed to be like the current expenditure of resources within the plan area. Should additional funding be available, the numbers of acres subject to management

practices, numbers of structural BMPs implemented, and numbers of capital improvements constructed is increased (see **Section 4.8** for further explanation).

Figure 4-1: Structure of the targeted implementation schedule as it relates to the planning region implementation profiles



4.2 TARGETED IMPLEMENTATION SCHEDULE

The targeted implementation schedule is shown in **Table 4-1.** The targeted implementation schedule contains:

- A brief description of each action addressing a priority concern;
- The action's implementation component and location;
- The role and entities responsible for implementing the action;
- The implementation program which will fund the action;
- When implementation will occur within the 10-year timeframe of the plan; and
- The priority concern addressed by the action.

Within the targeted implementation schedule, the "location" for the implementation of actions refers to one of two categories:

1. **Watershed-wide:** Actions in the education and outreach, regulatory, data gaps and research, and capital improvement implementation components are implemented watershed-wide, to ensure consistency and effectiveness at a watershed-scale.

2. **Planning Region:** Locations for implementing actions in the management practice and structural BMP implementation components are assigned "planning region" locations, as these locations will be defined within each planning region implementation profile (**Section 4.6**).

Specific information and locations relative to capital improvement projects are in **Section 5.2.**

Assigning roles and responsibilities for implementation will lead to much greater success

The implementation schedule includes actions intended to be completed by others, including:

- state agencies
- federal agencies
- non-governmental organizations (NGO)

It is important to include actions that other groups will complete as part of the planning process, as it recognizes the work of others and clarify roles.

Roles and responsibilities for implementation are identified by assigning a "lead" (local, state, or federal), a "lead entity," and "partners" to each action.

- **Implementation Lead:** The "lead" designates whether the responsibility for implementing an action is at the local government or some other level (i.e., by a state agency, federal agency or NGO collaborator).
- **Implementation Lead Entity:** The "lead entity" is the specific agency or local governmental unit responsible for implementing the action, but does not assume sole responsibility for completing the action.
- **Implementation Partners:** "Partners" are also assigned to recognize collaborative efforts for implementation. Listed partner entities within the targeted implementation schedule are not all-inclusive.

The targeted implementation schedule has been adjusted to reflect the anticipated combined local, state, federal, and NGO fiscal and technical commitments. To execute the strategies and actions described within the plan, all participants will need to exercise considerable intergovernmental and NGO coordination and cooperation.

Table 4-1: The North Fork Crow River One Watershed, One Plan Targeted Implementation Schedule. Actions are not listed in order of importance. Structural BMPs and management practices (shaded light blue) are further described in implementation profiles.

Action No.	Action Description	Implementation Component	Location	Lead	Lead Entity	Partners	Funded By	Cost	Start	End	Benefits to…	
											Resource Category	Priority Concerns
1	Implement and maintain existing BMPs that reduce leaching within Drinking Water Supply Management Areas (DWSMAs) and recharge areas that are highly vulnerable to contamination. Implement and maintain existing BMPs within priority locations that reduce vertical movement of nitrate into groundwater.	Structural BMP / Management Practice	Planning Region	Local	SWCD	MDA, County, Cities, NRCS, WD	BMP Cost Share Initiative	See Planning Region Implementation Profile			Groundwater	Drinking Water
2	Implement and maintain existing BMPs that are focused on improving or maintaining soil health and soil organic content, including but not limited to conservation tillage and residue management, crop rotation methods, and the use of cover crops.	Management Practice	Planning Region	Local	SWCD	NRCS, Extension Service, Crop advisors, WD	BMP Cost Share Initiative	See Planning Region Implementation Profile			Groundwater	Drinking Water; Groundwater Supplies
											Surface Water	Streams and Rivers; Lakes; Surface Runoff; Wetlands
											Local Development and Sustainability	Rural Development and Sustainability
3	Develop and help implement nutrient management plans for agricultural producers that follow operational best management practice recommendations, summarized within the MDA Nitrogen Fertilizer Management Plan and consistent with University of Minnesota recommendations.	Management Practice	Planning Region	Local	SWCD	WD, MDA, NRCS, Crop advisors	BMP Cost Share Initiative	See Planning Region Implementation Profile			Groundwater	Drinking Water
											Surface Water	Streams and Rivers; Lakes; Wetlands
											Local Development and Sustainability	Rural Development and Sustainability
4	Develop and implement manure management plans for agricultural producers that follow operational best management practice recommendations, summarized within the MDA Nitrogen Fertilizer Management Plan and consistent with University of Minnesota recommendations.	Management Practice	Planning Region	Local	SWCD	MPCA, MDA, NRCS	BMP Cost Share Initiative	See Planning Region Implementation Profile			Groundwater	Drinking Water
											Surface Water	Streams and Rivers; Wetlands
											Local Development and Sustainability	Rural Development and Sustainability
5	Promote the development of pesticide management plans that follow operational best management practice recommendations, including Licensed Applicators Statute.	Management Practice	Planning Region	Local	SWCD	NRCS, Crop advisors	BMP Cost Share Initiative	See Planning Region Implementation Profile			Groundwater	Drinking Water
6	Encourage the use of precision agriculture through education, technical, and financial assistance.	Management Practice	Planning Region	Local	SWCD	WD, NRCS, Extension Service, Crop advisors, SWCD, MDA	BMP Cost Share Initiative	See Planning Region Implementation Profile			Groundwater	Drinking Water
7	Provide technical and financial assistance to landowners to implement animal waste management systems. Manage water using runoff control measures in accordance with accepted design standards and practice.	Structural BMP	Planning Region	Local	SWCD	NRCS, County	BMP Cost Share Initiative	See Planning Region Implementation Profile			Groundwater	Drinking Water
											Surface Water	Streams and Rivers; Lakes; Wetlands
8	Provide education, financial incentives, and technical support to increase the percentage of irrigated acres that employ conservation irrigation practices, such as variable rate application and low flow drip nozzles.	Management Practice	Planning Region	Local	SWCD	WD, NCRS, County	BMP Cost Share Initiative	See Planning Region Implementation Profile			Groundwater	Groundwater Supplies
9	Implement and maintain existing storage BMPs within priority locations.	Structural BMP	Planning Region	Local	SWCD / WD	NRCS	BMP Cost Share Initiative	See Planning Region Implementation Profile			Surface Water	Streams and Rivers; Lakes; Wetlands
											Water Resources Infrastructure	Urban Stormwater; Agricultural Drainage Systems
10	Promote BMPs that enhance hydrologic storage by increasing perennial native vegetation in upland and riparian areas that provide connections to expand riparian access. These actions also provide benefits to restoring stream stability and equilibrium where it is found to be impaired. Hydrologic storage could most directly be increased by restoring wetlands.	Structural BMP	Planning Region	Local	SWCD / WD	NRCS	BMP Cost Share Initiative	See Planning Region Implementation Profile			Surface Water	Streams and Rivers; Surface Runoff; Wetlands
11	Implement and maintain existing BMPs that stabilize ravines, gullies, and gully heads.	Structural BMP	Planning Region	Local	SWCD	NRCS	BMP Cost Share Initiative	See Planning Region Implementation Profile			Surface Water	Streams and Rivers; Lakes; Wetlands
12	Proactively cleanout build-up of debris from water resources and stormwater ponds.	Structural BMP	Planning Region	Local	SWCD	DNR	BMP Cost Share Initiative	See Planning Region Implementation Profile			Surface Water	Streams and Rivers; Lakes; Wetlands
13	Work with landowners and drainage authorities to install two-stage ditch systems for multiple benefits including improved drainage and ditch bank stability and sediment transport, increased habitat (e.g., riffle and pool	Structural BMP	Planning Region	Local	SWCD / WD	County, Extension Service, DNR	BMP Cost Share Initiative	See Planning Region Implementation Profile			Surface Water	Streams and Rivers; Lakes; Wetlands

Table 4-1: The North Fork Crow River One Watershed, One Plan Targeted Implementation Schedule. Actions are not listed in order of importance. Structural BMPs and management practices (shaded light blue) are further described in implementation profiles.

Action No.	Action Description	Implementation Component	Location	Lead	Lead Entity	Partners	Funded By	Cost	Start	End	Benefits to…	
											Resource Category	Priority Concerns
	habitat in low flows) and pollutant removal of nitrogen. Implement and maintain existing BMPs that provide perennial vegetative cover within the Right Of Way (ROW) of the public drainage system to increase stream roughness, and decrease bank erosion.										Water Resources Infrastructure	Agricultural Drainage Systems
14	Implement and maintain existing BMPs that treat surface runoff within priority locations. Implement and maintain existing BMPs within priority locations that reduce nutrient loading to waterbodies by treating surface and shallow sub-surface runoff before entering ditches and streams.	Structural BMP	Planning Region	Local	SWCD	WD, NRCS	BMP Cost Share Initiative	See Planning Region Implementation Profile			Surface Water	Streams and Rivers; Lakes; Wetlands
15	Use managed and rotational grazing methods to manage animal wastes, prevent livestock entry into surface waterbodies, and improve soil health.	Management Practice	Planning Region	Local	SWCD / WD	MDA, NRCS, Extension	BMP Cost Share Initiative	See Planning Region Implementation Profile			Surface Water	Streams and Rivers; Wetlands
											Fish and Wildlife and Unique Habitat Features	Lake Shoreland and Stream Riparian Corridors
16	Implement and maintain existing BMPs that provide perennial vegetative cover within the riparian corridor to decrease bank erosion, increase stream shading, and reduce water temperature.	Management Practice	Planning Region	Local	SWCD / WD	DNR, NRCS, TU	BMP Cost Share Initiative	See Planning Region Implementation Profile			Surface Water	Streams and Rivers
17	Explore and promote protection of natural and pervious lands through such programs as acquisition, property tax credits and easements.	Structural BMP	Planning Region	Local	SWCD / WD	DNR, TNC, NRCS, USFWS	BMP Cost Share Initiative	See Planning Region Implementation Profile			Surface Water	Lakes
											Fish and Wildlife and Unique Habitat Features	Lake Shoreland and Stream Riparian Corridors
											Water Resources Infrastructure	Urban Stormwater
18	Implement and maintain existing BMPs within riparian areas that improve connectivity within riparian corridors and floodplains.	Structural BMP	Planning Region	Local	SWCD / WD	NRCS, DNR, TU, USFWS	BMP Cost Share Initiative	See Planning Region Implementation Profile			Surface Water	Surface Runoff
19	Promote and implement practices to restore natural hydrology, such as the adoption of drainage water management and the restoration of drained wetlands and altered streams for multiple benefits. Support research of modified agricultural drainage systems. Support innovative water management solutions to conventional tile drainage systems.	Structural BMP	Planning Region	Local	SWCD / WD	NRCS, DNR	BMP Cost Share Initiative	See Planning Region Implementation Profile			Surface Water	Surface Runoff
20	Implement and maintain practices that provide a minimum 10-year level of protection for agricultural lands, including upland and floodplain storage projects, conservation, and/or flowage easements.	Structural BMP	Planning Region	Local	SWCD / WD	NRCS	BMP Cost Share Initiative	See Planning Region Implementation Profile			Surface Water	Surface Runoff
21	Implement and maintain existing BMPs to manage native plant and animal communities, such as forestland, prairies, wetlands, oak savannahs, etc.	Structural BMP	Planning Region	Local	SWCD / WD	DNR, TNC, U of M, NRCS, USFWS	BMP Cost Share Initiative	See Planning Region Implementation Profile			Fish and Wildlife and Unique Habitat Features	Terrestrial Habitat
22	Promote protection of lands identified as areas of moderate, high, and outstanding biodiversity and/or areas identified as MBS Sites of Biodiversity Significance and Native Plant Communities through such programs as acquisition, property tax credits and easements.	Structural BMP	Planning Region	Local	SWCD	NRCS, DNR	BMP Cost Share Initiative	See Planning Region Implementation Profile			Fish and Wildlife and Unique Habitat Features	Terrestrial Habitat
23	Encourage use and management of conservation easement programs in marginal, erodible land.	Structural BMP	Planning Region	Local	SWCD	DNR, TNC, NRCS, USFWS	BMP Cost Share Initiative	See Planning Region Implementation Profile			Local Development and Sustainability	Rural Development and Sustainability
24	Inspect, maintain and improve the integrity of existing urban structures that route and treat stormwater runoff to prevent downstream stream erosion and flooding and improve water quality.	Structural BMP	Planning Region	Local	Cities	County, SWCD, MPCA	BMP Cost Share Initiative	See Planning Region Implementation Profile			Water Resources Infrastructure	Urban Stormwater
25	Encourage implementation and maintenance of BMPs that treat urban stormwater discharge.	Structural BMP	Planning Region	Local	Cities, County, WD	MPCA, SWCD	BMP Cost Share Initiative	See Planning Region Implementation Profile			Water Resources Infrastructure	Urban Stormwater
26	Implement and maintain existing drainage management BMPs and conservation drainage practices to control ground water elevation, reduce water volume yield, and remove pollutants from tile discharge before it enters surface waters.	Structural BMP	Planning Region	Local	SWCD / WD	Townships, NRCS, SWCD	BMP Cost Share Initiative	See Planning Region Implementation Profile			Water Resources Infrastructure	Agricultural Drainage Systems

Table 4-1: The North Fork Crow River One Watershed, One Plan Targeted Implementation Schedule. Actions are not listed in order of importance. Structural BMPs and management practices (shaded light blue) are further described in implementation profiles.

Action No.	Action Description	Implementation Component	Location	Lead	Lead Entity	Partners	Funded By	Cost	Start	End	Benefits to…	
											Resource Category	Priority Concerns
27	Provide one-on-one consultations with landowners and producers about agricultural BMPs, field productivity benefits of BMPs, and available financial incentive options for funding them.	Management Practice	Watershed-Wide	Local	SWCD	NRCS, MDA, Extension	BMP Cost Share Initiative	See Planning Region Implementation Profile			Local Knowledge Base and Technical Capacity	Landowner, Producer, and Lake Shore Owner Engagement
28	Tailor recommended BMPs to each field based on the economic and environmental capacity of each area of a field, such as precision agriculture.	Management Practice	Watershed-Wide	Local	SWCD	NRCS, MDA	BMP Cost Share Initiative	See Planning Region Implementation Profile			Local Development and Sustainability	Rural Development and Sustainability
29	Seal abandoned and unused wells, particularly those wells which may impact public or private drinking water supplies, such as those found within DWSMAs or multi-aquifer wells.	Regulatory	Watershed-Wide	Local	SWCD / County	WD, MDA, MDH, NRCS	Existing Budget	See 4.8	Ongoing or Current Program		Groundwater	Drinking Water
30	Administer adopted land use and zoning ordinances to manage possible sources of nitrate contamination (e.g., subsurface sewage treatment systems; manure management; land development), and pathogenic bacterial contamination (e.g., subsurface sewage treatment systems; manure management; concentrated livestock access to streams) and consider potential adverse effects within DWSMAs.	Regulatory	Watershed-Wide	Local	County	City, MDA	Existing Budget	See 4.8	Ongoing or Current Program		Groundwater	Drinking Water
											Surface Water	Streams and Rivers; Lakes; Wetlands
31	Plan land use patterns and evaluate zoning changes and project proposals with the goal of reducing the amount of potential contaminants in sensitive groundwater recharge areas/vulnerable DWSMAs.	Regulatory	Watershed-Wide	Local	County / City	City, MDA	Existing Budget	See 4.8	Ongoing or Current Program		Groundwater	Drinking Water
32	Bring Subsurface Sewage Treatment Systems (SSTSs) into compliance to reduce nutrient and bacterial loading from small, unsewered communities and homes with inadequate wastewater treatment.	Regulatory	Watershed-Wide	Local	County	SWCD, CROW, MPCA, MDA	Existing Budget	See 4.8	Ongoing or Current Program		Groundwater	Drinking Water
											Surface Water	Streams and Rivers; Lakes; Wetlands
33	Provide educational and financial assistance to promote maintenance of compliant SSTSs.	Regulatory	Watershed-Wide	Local	County	WD, SWCD, MPCA, MDA	Existing Budget	See 4.8	Ongoing or Current Program		Groundwater	Drinking Water
											Surface Water	Streams and Rivers; Lakes; Wetlands
34	Maintain compliance with National Point Discharge Elimination System (NPDES) Permits for point sources.	Regulatory	Watershed-Wide	State	MPCA	N/A	Existing Budget	See 4.8	Ongoing or Current Program		Groundwater	Drinking Water
											Surface Water	Streams and Rivers; Lakes; Wetlands
35	Meet all statutory requirements of the State of Minnesota (MN Rules 6120.250- 3900) that regulate the subdivision, use, and development of shorelands of public waters, in addition to the Buffer and Soil Erosion Legislation.	Regulatory	Watershed-Wide	Local	SWCD, County, City	DNR, BWSR	Existing Budget	See 4.8	Ongoing or Current Program		Surface Water	Streams and Rivers; Lakes; Surface Runoff; Wetlands
											Fish and Wildlife and Unique Habitat Features	Lake Shoreland and Stream Riparian Corridors
											Local Development and Sustainability	Rural Development and Sustainability
36	Encourage stormwater sediment reduction in existing and developing rural subdivisions and urban areas, including implementing existing construction stormwater permit programs and installing MIDS requirements. Promote incorporation of MIDs requirements (or similar) into local zoning ordinances.	Regulatory	Watershed-Wide	Local	City	SWCD, County, WD	Existing Budget	See 4.8	Ongoing or Current Program		Surface Water	Streams and Rivers; Lakes; Wetlands
											Water Resources Infrastructure	Urban Stormwater
37	Explore possibility of an ordinance restricting open intakes on drainage tiles that outlet directly into lakes.	Regulatory	Watershed-Wide	Local	WD	SWCD, City, County	Existing Budget	See 4.8	Ongoing or Current Program		Surface Water	Lakes
38	Develop and apply resources to assess and estimate wetland loss.	Regulatory	Watershed-Wide	Local	County / SWCD	BWSR	Existing Budget	See 4.8	Ongoing or Current Program		Surface Water	Streams and Rivers; Lakes; Wetlands
39	Administer zoning regulations that encourage development practices that preserve and enhance natural and pervious areas, such as native prairies and old growth forests.	Regulatory	Watershed-Wide	Local	County	SWCD, City	Existing Budget	See 4.8	Ongoing or Current Program		Surface Water	Lakes
											Fish and Wildlife and Unique Habitat Features	Terrestrial Habitat; Lake Shoreland and Stream Riparian Corridors
											Water Resources Infrastructure	Urban Stormwater

Table 4-1: The North Fork Crow River One Watershed, One Plan Targeted Implementation Schedule. Actions are not listed in order of importance. Structural BMPs and management practices (shaded light blue) are further described in implementation profiles.

Action No.	Action Description	Implementation Component	Location	Lead	Lead Entity	Partners	Funded By	Cost	Start	End	Benefits to…	
											Resource Category	Priority Concerns
40	Inventory shoreland violations and map shoreland stewardship on lakes in each county.	Regulatory	Watershed-Wide	Local	County / SWCD	WD, CROW	Existing Budget	See 4.8	Ongoing or Current Program		Fish and Wildlife and Unique Habitat Features	Lake Shoreland and Stream Riparian Corridors
41	Use the floodplain management ordinance and land use and zoning approvals to minimize the likelihood of future flood damages.	Regulatory	Watershed-Wide	Local	County	City, DNR	Existing Budget	See 4.8	Ongoing or Current Program		Surface Water	Surface Runoff
42	Implement and enforce applicable county ordinances and the Wetland Conservation Act (WCA) to retain wetland quantity, function, and value.	Regulatory	Watershed-Wide	Local	County	SWCD, City, DNR, BWSR	Existing Budget	See 4.8	Ongoing or Current Program		Surface Water	Wetlands
											Local Development and Sustainability	Rural Development and Sustainability
43	Adhere to Minnesota Statutes and Rules pertaining to invasive species (Minnesota Statute 84D and Minnesota Rules 6216) and the Noxious Weed Law (Minnesota Statutes Sections 18.76 to 18.91).	Regulatory	Watershed-Wide	Local	County	DNR, MDA	Existing Budget	See 4.8	Ongoing or Current Program		Fish and Wildlife and Unique Habitat Features	Terrestrial Habitat
44	Administer Minnesota Rules Chapter 7080 through 7083 managing SSTS and Minnesota Rules Chapter 7020 managing feedlots to protect surface and groundwater quality.	Regulatory	Watershed-Wide	Local	City / County	SWCD, MPCA	Existing Budget	See 4.8	Ongoing or Current Program		Local Development and Sustainability	Rural Development and Sustainability
45	Encourage the use of BMPs on active construction sites to reduce amount of erosion. Refer to MN Rule Chapter 7090 Storm water regulatory program for guidance for activities that do not fall under permitting requirements or are in non-MS4 communities.	Regulatory	Watershed-Wide	Local	County / City	SWCD, MPCA	Existing Budget	See 4.8	Ongoing or Current Program		Water Resources Infrastructure	Urban Stormwater
46	Administer Minnesota Rules Chapter 103D	Regulatory	Watershed-Wide	Local	WD	SWCD, County, City, DNR	Existing Budget	See 4.8	Ongoing or Current Program		Surface Water	Streams and Rivers; Lakes; Surface Runoff; Wetlands
											Water Resources Infrastructure	Agricultural Drainage Systems
47	Review and update local regulations that address storm water erosion and runoff control, grading plan approval, and grading drainage standards.	Regulatory	Watershed-Wide	Local	City / County	SWCD, MPCA	Existing Budget	See 4.8	Ongoing or Current Program		Water Resources Infrastructure	Urban Stormwater
48	Collaborate with cities in watershed to encourage use of Low Impact Design criteria (or similar) during development planning. Cities that request help will be prioritized for funding to upgrade procedures.	Regulatory	Watershed-Wide	Local	Cities	SWCD, WD, CROW, County	Existing Budget	See 4.8	Ongoing or Current Program		Water Resources Infrastructure	Urban Stormwater
49	Regulate the reconstruction and repair of dams and other water control structures.	Regulatory	Watershed-Wide	Local	WD	County, DNR, US Corps of Engineers	Existing Budget	See 4.8	Ongoing or Current Program		Water Resources Infrastructure	Urban Stormwater
												Agricultural Drainage Systems
50	Complete the delineation and mapping of DWSMAs and the boundaries of Wellhead Protection Areas	Data Gaps and Research	Watershed-Wide	State	MDH	County, SWCD	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater	Drinking Water
51	Monitor nitrate levels in private wells.	Data Gaps and Research	Watershed-Wide	State	MDA	MDH, SWCD, WD, CROW, Township	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater	Drinking Water; Groundwater Supplies
52	Monitor groundwater for pesticides and/or other contaminants.	Data Gaps and Research	Watershed-Wide	State	MDA	MPCA, SWCD, WD, CROW	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater	Drinking Water; Groundwater Supplies
53	Continue research to map and model groundwater and monitor basic groundwater flow.	Data Gaps and Research	Watershed-Wide	State	DNR	MGS, SWCD, WD, CROW	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater	Drinking Water; Groundwater Supplies
54	Identify areas that are less susceptible to contaminant threats as possible future well locations to supply future drinking water needs.	Data Gaps and Research	Watershed-Wide	State	MDH	DNR, City, County, SWCD, MGS, WD, CROW	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater	Drinking Water
55	Consider Minneapolis and St. Paul Source Water Protection Areas as part of an evaluation of how existing or new land use activities or redevelopment may impact the quality of the Mississippi River as a drinking water source.	Data Gaps and Research	Watershed-Wide	Local	City / County	MDH, Met Council	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater	Drinking Water
56	Promote the development of a spill response plan that addresses high volume railroad corridors, pipelines, and other large contaminant threats in relation to the locations of community wells, DWSMA vulnerability and potential impacts to the Mississippi River as a drinking water source.	Data Gaps and Research	Watershed-Wide	Local	City / County	MDH, Met Council	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater	Drinking Water

Table 4-1: The North Fork Crow River One Watershed, One Plan Targeted Implementation Schedule. Actions are not listed in order of importance. Structural BMPs and management practices (shaded light blue) are further described in implementation profiles.

Action No.	Action Description	Implementation Component	Location	Lead	Lead Entity	Partners	Funded By	Cost	Start	End	Benefits to…	
											Resource Category	Priority Concerns
57	Map, monitor, and model surface water BMPs and their impacts on groundwater recharge in different land use patterns and hydrogeologic settings.	Data Gaps and Research	Watershed-Wide	State	DNR	MDA, Extension, SWCD	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater	Drinking Water; Groundwater Supplies
58	Incorporate mapped contamination plumes into local land use decision-making process. For example, consider groundwater contamination as part of stormwater BMP decision-making, to reduce the risk of spreading groundwater contamination.	Data Gaps and Research	Watershed-Wide	State	MPCA, MDA	WD, MDH, Met Council, DNR, County, City	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater	Drinking Water
59	Develop and implement a program to assess the number of failing and non-conforming SSTSs within the plan area, and the estimate impact to area water resources.	Data Gaps and Research	Watershed-Wide	Local	County	SWCD, WD, CROW, BWSR	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Streams and Rivers; Lakes; Surface Runoff; Wetlands
60	Set criteria for and manage groundwater supply for sustainable use, based on an evaluation of historical and projected water demand.	Data Gaps and Research	Watershed-Wide	State	DNR	MGS, MDH	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater	Groundwater Supplies
61	Fill gaps in the groundwater level observation well network by installing additional, strategically located long-term groundwater observation wells.	Data Gaps and Research	Watershed-Wide	State	DNR	MGS, MDH	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater	Groundwater Supplies
62	Develop criteria and baseline conditions for shoreland stewardship within the watershed.	Data Gaps and Research	Watershed-Wide	Local	SWCD	WD, DNR	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water Fish and Habitat and Unique Natural Features	Streams and Rivers Lake Shoreland and Stream Riparian Corridors
63	Develop technical team to devise reasonable action plan or possible changes to shoreland rules to reflect what the public will accept and still protect the resource.	Data Gaps and Research	Watershed-Wide	Local	County / SWCD	WD, CROW	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Fish and Wildlife and Unique Habitat Features	Lake Shoreland and Stream Riparian Corridors
64	Identify non-conforming feedlots and target to bring into compliance. Number of feedlots targeted for compliance for each county is based on area of the county in the watershed and the number of non-conforming feedlots identified.	Data Gaps and Research	Watershed-Wide	Local	County	SWCD, WD, CROW, BWSR	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater Surface Water	Drinking Water Streams and Rivers; Lakes; Surface Runoff; Wetlands
65	Monitor precipitation and increase the number of volunteer rain gauge readers to evaluate short and long-term trends and their relationship to groundwater supplies and lake levels.	Data Gaps and Research	Watershed-Wide	Local/State	State Climatology	County, SWCD	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater Surface Water	Groundwater Supplies Lakes
66	Develop a comprehensive hydrologic and hydraulic model for culvert and bridge design to determine timing and magnitude of peak discharge of existing conditions, the duration of discharge, and base flow conditions. Use proper hydrologic and hydraulic design standards for road crossings to provide flood protection, while considering fish passage and environmental needs.	Data Gaps and Research	Watershed-Wide	State	DNR	MnDOT, USFWS, US Corps of Engineers, DNR, City	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water Water Resources Infrastructure	Streams and Rivers; Surface Runoff Agricultural Drainage Systems
67	Set peak discharge, volume reduction goals and sediment load goals to achieve stable geomorphologic conditions.	Data Gaps and Research	Watershed-Wide	State	MPCA	DNR	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water Water Resources Infrastructure	Streams and Rivers; Surface Runoff Agricultural Drainage Systems
68	Define basic geomorphic characteristics for stable reaches including bank full discharge, channel cross sectional area, slope, and bed composition.	Data Gaps and Research	Watershed-Wide	State	DNR	N/A	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Streams and Rivers; Surface Runoff
69	Inventory the locations and cause of unstable stream and river reaches and prioritize them for implementation by addressing the root cause of instability, as well as on-site implementation	Data Gaps and Research	Watershed-Wide	Local	SWCD	DNR	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Streams and Rivers
70	Set soil health and soil loss standards to meet principles of rural, urban, and shoreland stewardship.	Data Gaps and Research	Watershed-Wide	State/Fed	NRCS, Cities	Extension	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Streams and Rivers; Lakes; Wetlands
71	Complete sufficiently detailed sediment mass balances for affected reaches that identify the source and relative magnitude of sediment leading to impairments.	Data Gaps and Research	Watershed-Wide	State	MPCA / DNR	MDA	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Streams and Rivers; Lakes; Wetlands
72	Determine the location and value of existing physical barriers relevant to fish management and aquatic invasive species (AIS) control.	Data Gaps and Research	Watershed-Wide	State	DNR	County, SWCD, U of M		See 4.8			Surface Water	Streams and Rivers; Lakes; Surface Runoff

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Action No.	Action Description	Implementation Component	Location	Lead	Lead Entity	Partners	Funded By	Cost	Start	End	Benefits to…	
											Resource Category	Priority Concerns
							Data Gaps and Research Initiative		Ongoing or As Determined in Annual Work Plan		Fish and Habitat and Unique Natural Features	Lake Shoreland and Stream Riparian Corridors
73	Form committee to explore collaborative efforts in dealing with AIS including education, control, rapid response, and inspections.	Data Gaps and Research	Watershed-Wide	Local	SWCD / WD / CROW / County	DNR	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Streams and Rivers
74	Pursue funding to provide technical and financial assistance to control, manage, and prevent invasive species.	Data Gaps and Research	Watershed-Wide	Local	SWCD / WD	DNR	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Streams and Rivers; Lakes; Wetlands
											Fish and Habitat and Unique Natural Features	Terrestrial Wildlife
75	Maintain current and historical GIS records of invasive species using the MnDNR database.	Data Gaps and Research	Watershed-Wide	Local	DNR	SWCD / CROW	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Streams and Rivers; Lakes; Wetlands
											Fish and Habitat and Unique Natural Features	Terrestrial Wildlife
76	Determine the location and severity of ravines within lake drainage areas.	Data Gaps and Research	Watershed-Wide	State	DNR	WD, Extension, SWCD	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Lakes
77	Implement monitoring efforts to develop lake level trends for analysis.	Data Gaps and Research	Watershed-Wide	State	MPCA / DNR	SWCD, WD	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Lakes
78	Investigate and document surface water and groundwater known areas of interactions in the NFCR Watershed.	Data Gaps and Research	Watershed-Wide	State	DNR	MGS, MDH, MDA, U of M	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater	Groundwater Supplies
											Surface Water	Lakes
79	Research existing conditions of lake bed sediment deposits and its interaction with native plant communities.	Data Gaps and Research	Watershed-Wide	State	DNR	Extension	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Lakes
80	Prepare and maintain formal maps to define the boundary of the riparian area adjacent to perennial streams and rivers, as a way to focus the implementation of incentive-based initiatives.	Data Gaps and Research	Watershed-Wide	Local	SWCD	County, DNR, TNC, MDA	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Surface Runoff
											Fish and Habitat and Unique Natural Features	Lake Shoreland and Stream Riparian Corridors
81	Define impact of altered hydrology on surface runoff and water resources within the watershed and use results to generate quantitative storage goals for each planning region to mitigate impacts of altered hydrology.	Data Gaps and Research	Watershed-Wide	Local	SWCD / WD	County, DNR	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Surface Runoff
82	Establish bankfull elevations to determine floodplain connectivity and stream incision.	Data Gaps and Research	Watershed-Wide	State	DNR / FEMA	N/A	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Surface Runoff
83	Define, develop, maintain, and make available the most current floodplain maps.	Data Gaps and Research	Watershed-Wide	State / Federal	DNR / FEMA	County, SWCD	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Surface Runoff
84	Develop and maintain an inventory of urban and agricultural locations on the landscape that are prone to flood damages.	Data Gaps and Research	Watershed-Wide	Local	County / City	SWCD, WD	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Surface Runoff
85	Locate, identify, and protect all calcareous fens not yet on the MnDNR Commissioner's List.	Data Gaps and Research	Watershed-Wide	State	DNR	BWSR, SWCD, WD	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Wetlands
86	Review and investigate WCA consistency and review possibility of shared services	Data Gaps and Research	Watershed-Wide	Local	NFCRWPP	BWSR, DNR	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Wetlands
87	Continue to develop and maintain a database inventory of existing BMPs with associated costs of implementation.	Data Gaps and Research	Watershed-Wide	State	BWSR	NRCS, MPCA, MDA	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Local Knowledge Base and Technical Capacity	Landowner, Producer, and Lake Shore Owner Engagement
88	Promote programs that recognize and/or provide incentives to landowners for the multiple benefits resulting from implementation of BMPs, including	Data Gaps and Research	Watershed-Wide	State	SWCD	NRCS, County, MPCA, MDA		See 4.8			Local Development and Sustainability	Rural Development and Sustainability

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Action No.	Action Description	Implementation Component	Location	Lead	Lead Entity	Partners	Funded By	Cost	Start	End	Benefits to…	
											Resource Category	Priority Concerns
	improved water quality, resilience against flood damage, and protected/enhanced wildlife habitat and biodiversity.						Data Gaps and Research Initiative		Ongoing or As Determined in Annual Work Plan		Water Resources Infrastructure	Agricultural Drainage Systems
89	Identify information sources to better classify rural stewardship within the plan area, including where existing nutrient management plans, soil health and tillage practices, and irrigation best management practices are currently being implemented.	Data Gaps and Research	Watershed-Wide	Local	SWCD	NRCS, County, MPCA, MDA	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Local Development and Sustainability	Rural Development and Sustainability
90	Identify information sources to better classify urban stewardship within the plan area.	Data Gaps and Research	Watershed-Wide	Local	SWCD	Cities, MPCA	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Streams and Rivers; Lakes; Surface Runoff
											Water Resources Infrastructure	Urban Stormwater
91	Inventory urban infrastructure to assess downstream flooding and water quality degradation from storm events.	Data Gaps and Research	Watershed-Wide	Local	Cities	County, SWCD, MPCA, WD	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Water Resources Infrastructure	Urban Stormwater
92	Assess capacity to productively reuse stormwater runoff through either rainwater harvesting (collection of roof runoff) or stormwater capture and reuse.	Data Gaps and Research	Watershed-Wide	State/Local	MPCA, Cities	MDH, MPCA, SWCD, WD	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Water Resources Infrastructure	Urban Stormwater
93	Explore a pilot area and inventory of known field tile locations for BMP implementation.	Data Gaps and Research	Watershed-Wide	Local	CROW	SWCD	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Water Resources Infrastructure	Agricultural Drainage Systems
94	Support research that characterizes the quantity and quality of tile drainage and its impacts on recharge to local groundwater aquifers. Encourage projects that monitor the outfalls of select agricultural tile lines to better understand effects on ecosystem functions.	Data Gaps and Research	Watershed-Wide	State	U of M	SWCD, WD, USGS, colleges and universities	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Water Resources Infrastructure	Agricultural Drainage Systems
95	Develop terrestrial habitat existing conditions map with number and location of large terrestrial habitat blocks (4 square miles with approximately 60% cropland, 10% woodland and forest, 15% wetland and 15% grassland) within the plan area.	Data Gaps and Research	Watershed-Wide	State	DNR	County, SWCD, WD, BWSR, CROW	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Fish and Habitat and Unique Natural Features	Terrestrial Wildlife
96	Develop and maintain a database of the number of irrigation wells used for agricultural purposes and the area subject to irrigation.	Data Gaps and Research	Watershed-Wide	State	DNR	SWCD, WD, BWSR, CROW	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater	Groundwater Supplies
											Surface Water	Streams and Rivers; Surface Runoff
											Water Resources Infrastructure	Agricultural Drainage Systems
97	Maintain monitoring site at the Crow River in Rockford, MN (USGS ID: 05280000) to continue the generation of streamflow and water quality data for evaluating trends and changes.	Data Gaps and Research	Watershed-Wide	State	USGS, DNR, MPCA	N/A	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Streams and Rivers
98	Maintain and make improvements to the Nitrate Infiltration Risk Map to increase its utility in guiding management practice and structural BMP implementation decisions.	Data Gaps and Research	Watershed-Wide	State	MDH	SWCD	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater	Drinking Water
99	Conduct assessments of the condition and functionality of existing dams.	Data Gaps and Research	Watershed-Wide	Local	WD	County, DNR, US Corps of Engineers	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Water Resources Infrastructure	Agricultural Drainage Systems
												Urban Stormwater
100	Assist public water suppliers in implementing their wellhead protection plans.	Data Gaps and Research	Watershed-Wide	Local	Public Water Suppliers	MDH, WD, Counties, Cities, SWCD	Data Gaps and Research Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater	Drinking Water
101	Develop Education and Outreach Initiative with two campaigns: (1) the General Public Knowledge and Behavior Campaign, and (2) the Landowner, Producer and Lake Shore Owner Engagement Campaign	Education and Outreach	Watershed-Wide	Local	NFCRWPP	N/A	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Local Knowledge Base and Technical Capacity	Public Knowledge; Landowner, Producer, and Lake Shore Owner Engagement
102	Implement an education/outreach campaign for the responsible use, storage, and disposal of pesticides	Education and Outreach	Watershed-Wide	Local	City / County	MDA, SWCD	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater	Drinking Water

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Action No.	Action Description	Implementation Component	Location	Lead	Lead Entity	Partners	Funded By	Cost	Start	End	Benefits to…	
											Resource Category	Priority Concerns
103	Encourage municipalities to use practices that promote water conservation and efficiency. Some examples include tiered billing rates that reward conservation, improved meters and leak detection, rebates for water-saving appliances and irrigation best practices including turf irrigation technologies (e.g. golf course, schools)	Education and Outreach	Watershed-Wide	Local	Cities	MDH, SWCD, County, DNR, WD	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater	Groundwater Supplies
104	Encourage watershed residents and businesses through educational and outreach efforts to adopt conservation and water reuse practices, such as capturing stormwater for irrigation and planting native vegetation / lawns that do not require as much water.	Education and Outreach	Watershed-Wide	Local	City, County	MDH, SWCD, DNR, Township	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Groundwater	Groundwater Supplies
105	Promote education about source control within rural subdivisions and urban areas to promote a reduction of chloride loading to waterbodies. Encourage stormwater chloride source reduction in rural subdivisions and urban areas.	Education and Outreach	Watershed-Wide	Local	City / County	MDH, SWCD, DNR, Met Council	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Streams and Rivers
106	Perform education and outreach initiatives targeted to general public / lakeshore owners about threats of invasive species, and ways to identify, prevent, and control them.	Education and Outreach	Watershed-Wide	Local	County, SWCD, CROW	DNR, WD	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Streams and Rivers; Lakes
											Fish and Wildlife and Unique Habitat Features	Terrestrial Habitat; Lake Shoreland and Stream Riparian Corridors
107	Facilitate conversations with local stakeholders and local government units (LGUs) in regards to increased watercraft inspections/monitoring at lake access sites to promote prevention.	Education and Outreach	Watershed-Wide	Local	SWCD, CROW, County	DNR, WD	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Streams and Rivers
108	Promote natural shorelands and shoreland revegetation by providing education, technical, and financial assistance to landowners for shoreland restoration	Education and Outreach	Watershed-Wide	Local	SWCD, County	DNR, NRCS	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Lakes
109	Provide technical and financial assistance to lake associations and other stakeholders for the implementation of in-lake management efforts to improve the quality of water resources, when appropriate.	Education and Outreach	Watershed-Wide	Local	CROW, WD	DNR / SWCD	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Lakes
110	Perform education and outreach initiatives targeted to general public / lake shore owners about impacts of recreational boating motors on the resuspension of lake sediment.	Education and Outreach	Watershed-Wide	Local	DNR, County	N/A	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Lakes
111	Use various programs to provide land owners with economically viable alternatives for use of land in flood prone areas.	Education and Outreach	Watershed-Wide	Local	SWCD	NRCS	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Surface Runoff
112	Provide educational and technical assistance to landowners regarding State and Federal programs to preserve and restore wetlands, including the State wetland-banking program.	Education and Outreach	Watershed-Wide	Local	SWCD	DNR, County, U of MN, NRCS, USFWS	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Surface Water	Wetlands
113	Provide educational materials, consultations, demonstration projects, and workshops to landowners, agricultural producers, and lake shore owners about compensation and incentive programs to promote riparian BMPs and shoreland BMPs (including shoreland restoration and shoreland revegetation).	Education and Outreach	Watershed-Wide	Local	SWCD / WD / CROW	NRCS, U of M, BWSR	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Fish and Wildlife and Unique Habitat Features	Lake Shoreland and Stream Riparian Corridors
											Local Knowledge Base and Technical Capacity	Landowner, Producer, and Lake Shore Owner Engagement
114	Provide school presentations and other educational efforts tailored to youth.	Education and Outreach	Watershed-Wide	Local	SWCD / WD / CROW	Extension, County, School Districts	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Local Knowledge Base and Technical Capacity	Public Knowledge
115	Provide and distribute educational materials through various multi-media methods about local water management, the impacts of decisions, and actions the public can take to make a difference.	Education and Outreach	Watershed-Wide	Local	SWCD / WD / CROW	Extension, County, City	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Local Knowledge Base and Technical Capacity	Public Knowledge
116	Host meetings for the public regarding monitoring results and assessments from North Fork Crow River Watershed 1W1P monitoring activities.	Education and Outreach	Watershed-Wide	Local	SWCD / CROW / WD	Watershed Districts, County, MPCA	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Local Knowledge Base and Technical Capacity	Public Knowledge

Table 4-1: The North Fork Crow River One Watershed, One Plan Targeted Implementation Schedule. Actions are not listed in order of importance. Structural BMPs and management practices (shaded light blue) are further described in implementation profiles.

Action No.	Action Description	Implementation Component	Location	Lead	Lead Entity	Partners	Funded By	Cost	Start	End	Benefits to…	
											Resource Category	Priority Concerns
117	Host annual meetings for local government officials about the condition of water resources, progress made, and results and assessments from North Fork Crow River Watershed 1W1P monitoring activities.	Education and Outreach	Watershed-Wide	Local	NFCRWPP	MPCA, DNR, Cities	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Local Knowledge Base and Technical Capacity	Public Knowledge
118	Provide cooperative education efforts and demonstration projects to promote agricultural BMP's including, but not limited to: nutrient management, conservation tillage, buffers, soil testing, pesticide application, etc.	Education and Outreach	Watershed-Wide	Local	NFCRWPP	NRCS, MDA, MPCA, Extension	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Local Knowledge Base and Technical Capacity	Landowner, Producer, and Lake Shore Owner Engagement
119	Develop new techniques to promote conservation efforts, such as administering a local certification training program or partnering with agribusiness retailers to recommend appropriate BMPs.	Education and Outreach	Watershed-Wide	Local	NFCRWPP	Cities, DNR, MDA	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Local Knowledge Base and Technical Capacity	Landowner, Producer, and Lake Shore Owner Engagement
120	Support and encourage citizen-led initiatives, such as Farmer Led Councils, lake associations, farmer mentor lists, and local advisory committees, that promote conservation through peer-based outreach and performance-based incentives.	Education and Outreach	Watershed-Wide	Local	NFCRWPP	NRCS, MDA, MPCA, Extension	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Local Knowledge Base and Technical Capacity	Landowner, Producer, and Lake Shore Owner Engagement
121	Develop a comprehensive civic engagement plan.	Education and Outreach	Watershed-Wide	Local	NFCRWPP	SWCD, County, WD, MPCA	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Local Knowledge Base and Technical Capacity	Landowner, Producer, and Lake Shore Owner Engagement
122	Promote education for solid and hazardous waste disposal and awareness of existing regulations, rules, and ordinances pertaining to proper waste disposal to reduce chemical and nutrient contamination of water.	Education and Outreach	Watershed-Wide	Local	County	SWCD, CROW	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Local Development and Sustainability	Rural Development and Sustainability
123	Promote the natural meandering of streams to decrease stream velocity for reducing flood impacts and enhance recreational and fish and wildlife habitat value.	Education and Outreach	Watershed-Wide	State	DNR, WD	SWCD, WD, BWSR, CROW	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Water Resources Infrastructure	Urban Stormwater
124	Provide educational materials, consultations, and workshops to landowners and agricultural producers about public drainage and public water statutes, including MS 103E.015 subd 1a.	Education and Outreach	Watershed-Wide	Local	WD, County	SWCD, County, BWSR	Education and Outreach Initiative	See 4.8	Ongoing or As Determined in Annual Work Plan		Water Resources Infrastructure	Agricultural Drainage Systems
125	Provide technical and financial assistance, as available, for the reconstruction and repair of dams to ensure adequate water levels are maintained.	Capital Improvement	Watershed-Wide	Local	WD	DNR, US Corps of Engineers	Capital Improvements	See 5.2	See 5.2		Water Resources Infrastructure	Urban Stormwater; Agricultural Drainage Systems
126	Stabilize and/or restore degraded sections of stream and river reaches to provide multiple benefits, such as enhanced hydrologic function and reduced bank failure and sediment deposition into waterbodies, while also providing connectivity benefits for aquatic and terrestrial habitats.	Capital Improvement	Watershed-Wide	Local	SWCD / County / WD	DNR, CROW	Capital Improvements	See 5.2	See 5.2		Surface Water	Streams and Rivers; Lakes; Surface Runoff; Wetlands
127	Assist as needed with outlet structure reconstruction and improvements on degraded or failing structures.	Capital Improvement	Watershed-Wide	Local	SWCD / County / WD	DNR, MPCA, CROW	Capital Improvements	See 5.2	See 5.2		Surface Water	Lakes
128	Maintain public infrastructure to provide drainage at the anticipated level of service to minimize flood damage to land both upland and downstream of the managed systems.	Capital Improvement	Watershed-Wide	Local	SWCD / County / WD	DNR, MPCA, CROW	Capital Improvements	See 5.2	See 5.2		Surface Water	Surface Runoff
129	Evaluate the need for, develop, and implement capital improvement projects to address areas currently subject to damage.	Capital Improvement	Watershed-Wide	Local	SWCD / County / WD	DNR, CROW	Capital Improvements	See 5.2	See 5.2		Surface Water	Surface Runoff
130	Protect the natural meandering of streams and promote the restoration of straightened streams to decrease stream velocity for reducing flood impacts and enhance recreational and fish and wildlife habitat value.	Capital Improvement	Watershed-Wide	Local	SWCD / County / WD	DNR, CROW	Capital Improvements	See 5.2	See 5.2		Local Development and Sustainability	Rural Development and Sustainability
131	Identify where maintenance is needed on County ditch systems, and complete repairs in accordance with multi-purpose drainage goals as stated in MS 103E.015.	Capital Improvement	Watershed-Wide	Local	SWCD / County / WD	BWSR, SWCD, CROW	Capital Improvements	See 5.2	See 5.2		Water Resources Infrastructure	Agricultural Drainage Systems

4.3 IMPORTANCE OF WORK COMPLETED BY OTHERS

Success in addressing the priority concerns within the plan area cannot be achieved solely by local government and requires the participation of state agencies, federal agencies, NGOs, private entities, and those residing within and beyond the plan boundary. A great deal of work has been done by NGOs, state agencies, federal agencies, and others within the plan area. Much of this work has been used in developing this plan.

There are considerable similarities between the priority concerns established by this plan and the priorities, goals, and objectives of NGOs, state agencies and federal agencies. This plan represents an opportunity to clarify roles and facilitate the cooperation and the streamlining of implementation efforts to get work done by multiple organizations within the plan area. Although this plan largely reflects local priorities, in no way is the plan intended to supplant or replace the importance of efforts of other organizations with somewhat differing but complementary goals and objectives. The work of other organizations is expected to continue during plan implementation and into the future, and is reflected within the targeted implementation schedule. The NFCRWPP will continue to foster an environment that enhances cooperation and coordination with other organizations to the maximum extent possible throughout the implementation of the plan (**Section 5.5.2**).

The state has invested in the completion of multiple studies, reports, and strategies which are pertinent to the plan area. This investment has generated valuable information, which has been heavily leveraged in the development of this plan. **Table 4-2** summarizes the resulting state documents and how they have been considered and incorporated into the plan.

Table 4-2: **State documents and relation to the North Fork Crow River Watershed 1W1P**.

State Agency	Document Name	Use in the Plan
Minnesota Department of Agriculture	Minnesota Nitrogen Fertilizer Management Plan	▪ Actions for nutrient management and reduction
Minnesota Department of Health	Volunteer Nitrate Monitoring Network Study	▪ Nitrate groundwater levels
Minnesota Department of Health	North Fork Crow River Watershed Groundwater Restoration and Protection Strategies (GRAPS) (Draft)	▪ Actions for protection and restoration of groundwater quality and supplies
Minnesota Department of Natural Resources	Bonanza Valley Groundwater Management Area Plan	▪ Actions and goals for groundwater supplies
Minnesota Pollution Control Agency	Groundwater Report: North Fork Crow River Watershed	▪ Condition of groundwater quality and supplies ▪ Actions for groundwater quality and supplies
Minnesota Pollution Control Agency	The Minnesota Nutrient Reduction Strategy	▪ Actions for nutrient reduction ▪ Benchmarks used as surrogate for assessing progress at a planning region scale towards statewide nutrient reduction goals
Minnesota Pollution Control Agency	North Fork Crow River Watershed Monitoring and Assessment Report	▪ Monitoring data ▪ Condition of surface waters
Minnesota Pollution Control Agency	North Fork Crow River Watershed Biotic Stressor ID Report	▪ Biotic community and diversity
Minnesota Pollution Control Agency	North Fork Crow River TMDL, Bacteria, Nutrients and Turbidity	▪ Targets for impaired surface waters
Minnesota Pollution Control Agency	North Fork Crow River Watershed Restoration and Protection Strategy (WRAPS)	▪ Issues impacting water quality potential and priority concerns ▪ Actions within targeted implementation schedule

State water policy officials envisioned a synergy between a plan developed through the One Watershed, One Plan effort and the outcomes and strategies described by a completed Watershed Restoration and Protection Strategy (WRAPS). Both the WRAPS and this plan identify issues impacting water quality potential and priority concerns. The WRAPS describe general strategies to improve water quality within each of the planning regions. This plan incorporates the strategies identified within the WRAPS, but also:

- adds detail about the sources of pollutants;
- sets measurable goals;
- identifies potential locations for prioritized implementation;
- establishes new and consistent programs for funding field walkovers and the implementation of management practices and structural BMPs;
- describes the anticipated load reduction benefits arising from implementation of practices; and
- estimates the fiscal resources needed for implementation.

However, this refinement is still not perfect. Long-term resolution of the relationship between the One Watershed, One Plan and the WRAPS will determine most efficient use of fiscal and staff resources. Additionally, further technological information and advances will continue to refine the actions identified in the plan.

4.4 PRIORITIZE, TARGET, AND MEASURE APPLICATION: PLANNING SCALE PRODUCTS

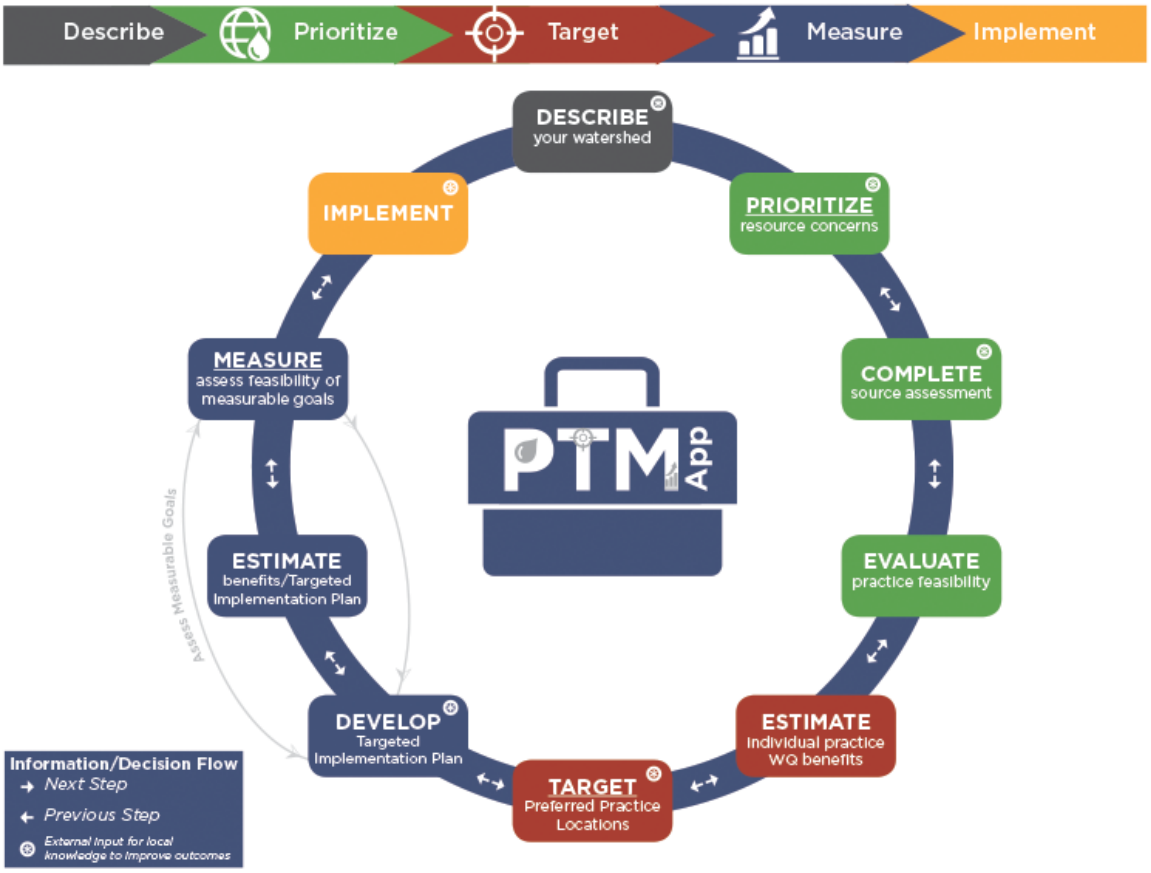
The NFCRWPP elected to use the Prioritize, Target, and Measure Application (PTMApp) to prioritize and target the implementation of management practices and structural BMPs identified within planning region implementation profiles.

The underlying theory, algorithms, and application of PTMApp is documented on the PTMApp website (http://ptmapp.rrbdin.org/User/Documentation). PTMApp requires several data inputs, including a hydro-conditioned Digital Elevation Model (DEM). The hydroconditioning process was completed by the MnDNR, utilizing the Minnesota's published GEN1 3-meter DEM.

The output products from PTMApp can be used in many business workflows **(Figure 4-2)**. Each of these business workflows were evaluated by a panel of local governmental units (LGUs) during the development of PTMApp. The business workflows are tasks that NFCRWPP staff might undertake as part of daily work to prioritize and target locations of projects and practices that provide measurable water quality benefits. These workflows, or subset of the workflows, might be completed for creating an implementation strategy for an annual work plan, refining the WRAPS implementation approach, and assembling grant funding requests (i.e., accelerated implementation grants).

This section provides examples of these products for the Lake Koronis-North Fork Crow River planning region. The data developed through this project can be used continuously to develop numerous management practice and structural BMP implementation scenarios, some of which are shown in the planning region implementation profiles (**Section 4.6**). As such, the purpose of showing results from Lake Koronis- North Fork Crow River is to illustrate business workflows, so that they can be repeated as needed during plan implementation.

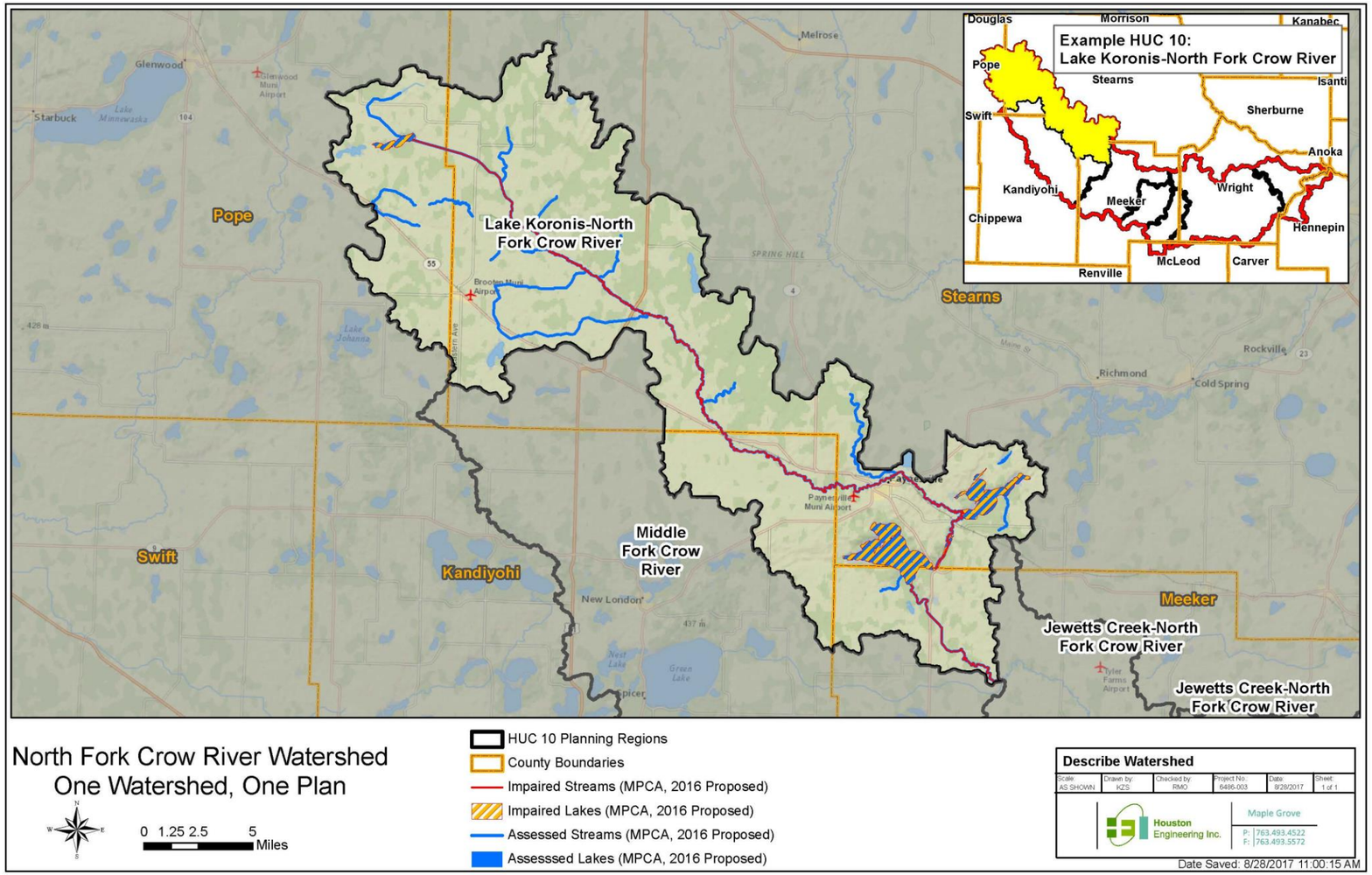
Figure 4-2: Business workflows addressed and guided by PTMApp Desktop.

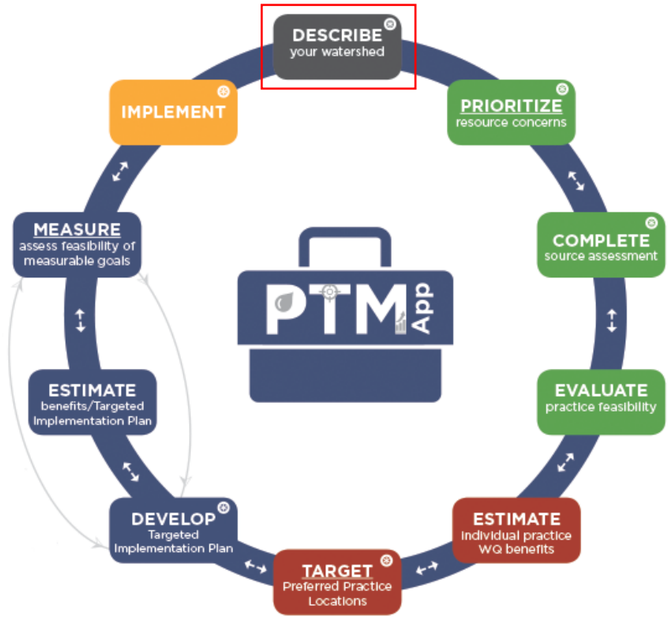


4.4.1 DESCRIBE YOUR WATERSHED

Describing your watershed is the process of identifying and describing important resources, features, and factors (e.g. socioeconomics) associated with your watershed. PTMApp provides base outputs of publicly available statewide data that are set to the extent of your watershed, such as watershed boundaries of different scales, assessed streams and lakes, impaired streams and lakes, ecological regions, and monitoring locations. This information is intended to simplify the process of gathering and summarizing some of the common information needs associated with watershed management. **Figure 4-3** below is an example for the Lake Koronis-North Fork Crow River planning region, where assessed and impaired lakes and streams are displayed based on current geospatial data from the Minnesota Pollution Control Agency. This data can help to visualize and summarize the number of impaired waters and assessed waters within the project area.

Figure 4-3: Assessed and impaired streams and lakes in the Lake Koronis-North Fork Crow River planning region

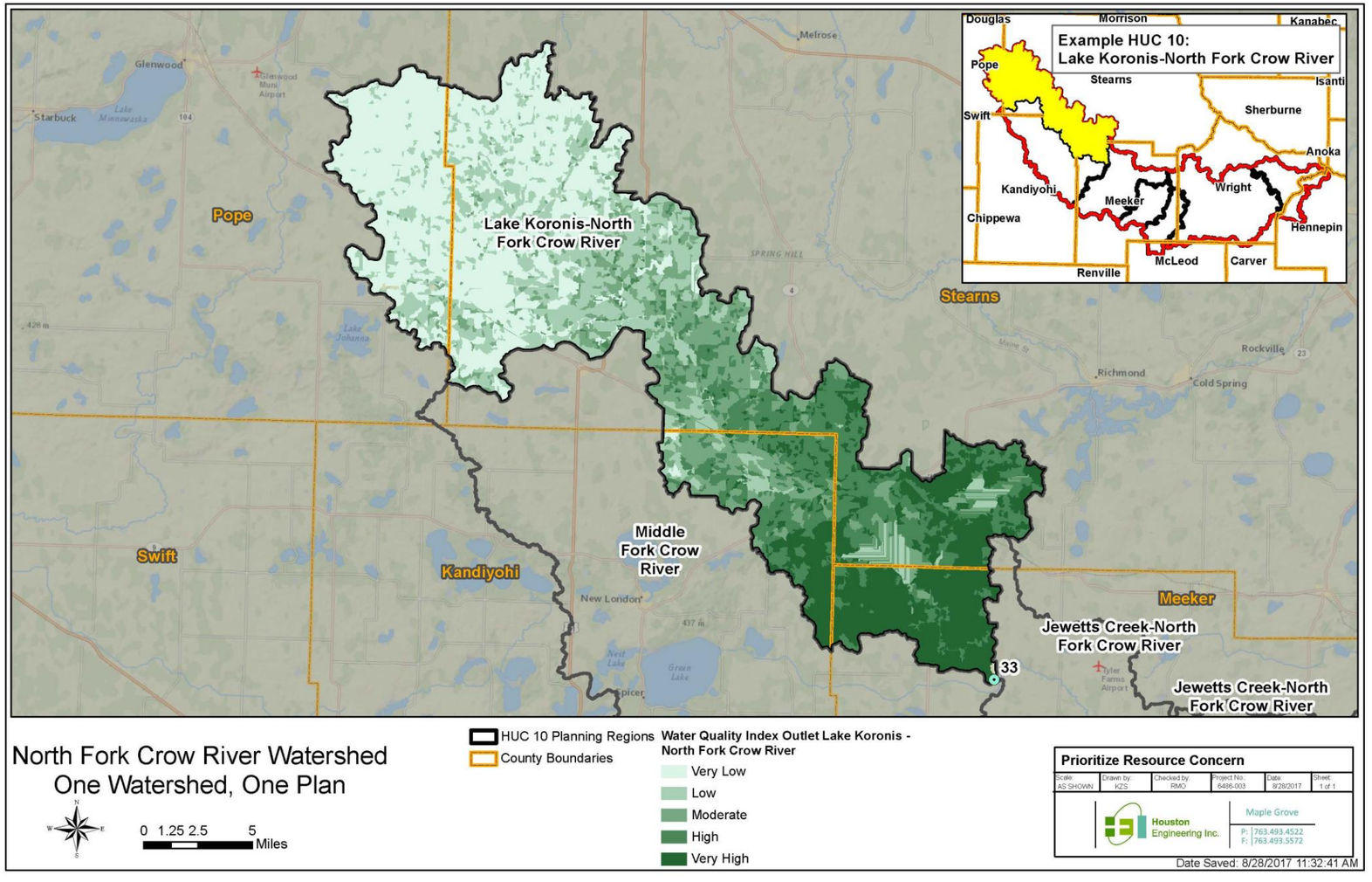


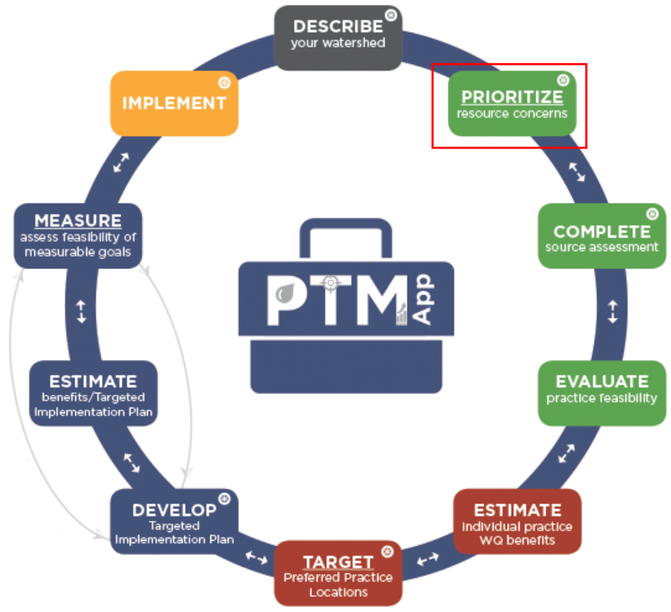


4.4.2 PRIORITIZE RESOURCE CONCERNS

Prioritizing resource concerns is the process by which practitioners establish the relative importance of resources within their area of management. Frequently in Minnesota, water quality is a potential resource concern included in prioritization processes. Products from PTMApp can be used in conjunction with other information, such as Hydrologic Simulation-Fortran Program (HSPF) models and Zonation, to aid in the process of prioritizing resource concerns. For example, PTMApp outputs can be used to show the ranks of field scale catchments based on their delivery of sediment and nutrients, called a water quality index (50% sediment and 50% nutrients), to areas of channelized flow (**Figure 4-4**). These ranks can help the prioritization in types of resources that are selected as priorities and locations in which management actions are undertaken.

Figure 4-4: Water quality index (50% sediment and 50% nutrients) for sediment, total nitrogen, and total phosphorus delivered to the outlet of the Lake Koronis-North Fork Crow River planning region

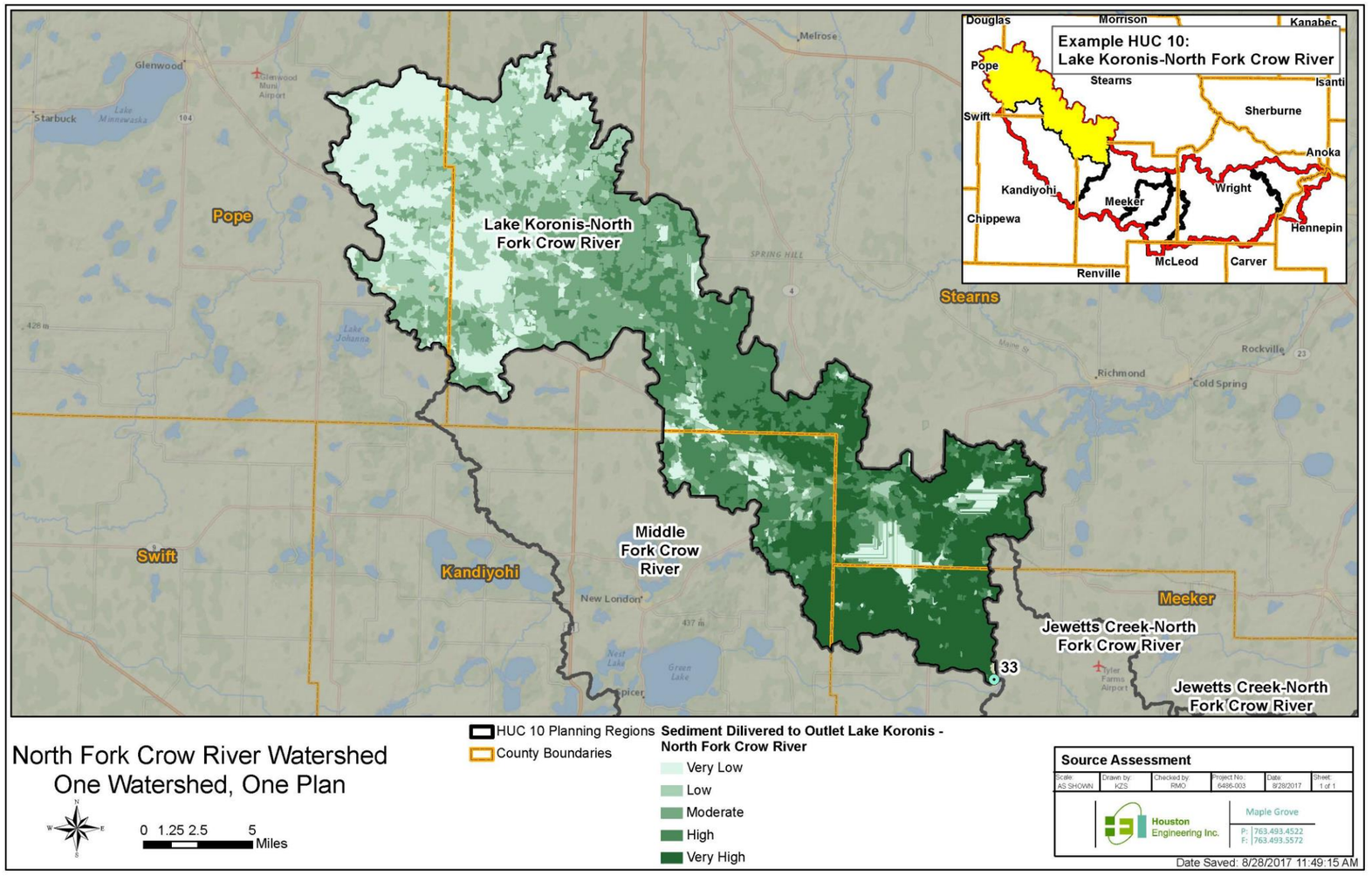


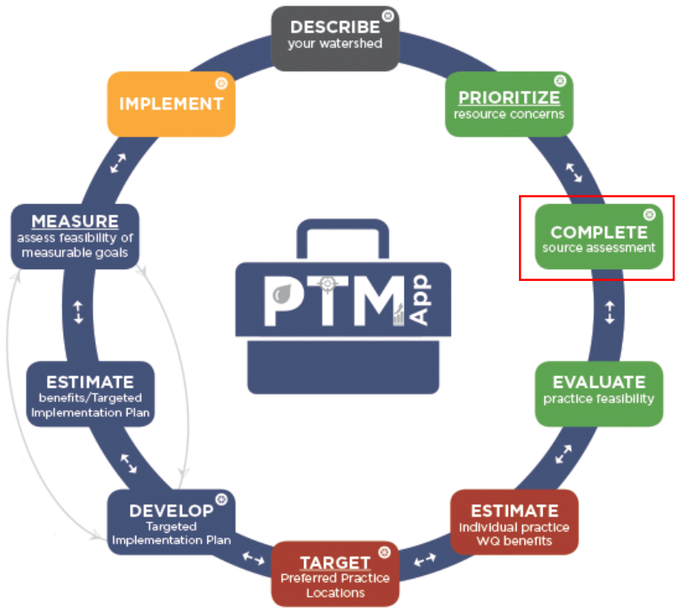


4.4.3 COMPLETE SOURCE ASSESSMENT

The source assessment identifies the magnitude and spatial distribution of potential pollution sources across the landscape. PTMApp creates three source assessment products: (1) load and yields leaving the landscape, (2) loads delivered to a waterway, and (3) loads delivered to a downstream resource of interest (such as a lake or river reach). The source assessment provides an understanding of how various parts of the watershed affect a resource while identifying problem locations. The sediment yield (tons/acre/year) delivered to the Lake Koronis-North Fork Crow River planning region outlet is shown in **Figure 4-5**. Similar products can be developed for total nitrogen (TN) and total phosphorus (TP) for any priority resource point. For strategies aimed at reducing sediment delivered to the Lake Koronis-North Fork Crow River planning region outlet, the **"High"** sediment yield areas would provide ideal locations to target practices. However, the Planning Partnership must first evaluate the feasibility of implementing management practices and structural BMPs in those areas. In other words, the highest loading (sediment, TN, or TP) areas on the landscape might have limited opportunities for implementing a practice to address the issue.

Figure 4-5: Lake Koronis-North Fork Crow River planning region source assessment for sediment yield delivered to the planning region outlet. Total nitrogen and total phosphorus were also assessed (not shown in map).





4.4.4 EVALUATE PRACTICE FEASIBLITY

The feasibility of placing a management practice or structural BMP on the landscape depends on several factors. These factors include the size of the contributing drainage area, the land slope, the type of flow regime, and local topography. Practice feasibility is based solely on technical factors largely based on field office technical guides developed by the Natural Resource Conservation Service (NRCS), and excludes social factors like landowner willingness. Locations shown as "feasible" are candidates for implementing practices and require further technical evaluation to confirm feasibility. The potential opportunities for structural BMPs in the Lake Koronis-North Fork Crow River planning region are shown in **Figure 4-6**, and the opportunities for management practices are shown in **Figure 4-7**. The opportunities are displayed by PTMApp treatment group types included in this plan. It's important to note that that these are only **potential locations** at this point in the business workflow. Local knowledge is still needed to refine the locations to identify a realistic set of targeted practices (see **Section 4.2.5**). These management practices and structural BMP opportunities can be combined with the source assessment data in PTMApp to estimate the "measurable" water quality benefits for implementing the practices.

Figure 4-6: Feasible structural BMPs within the Lake Koronis-North Fork Crow River planning region

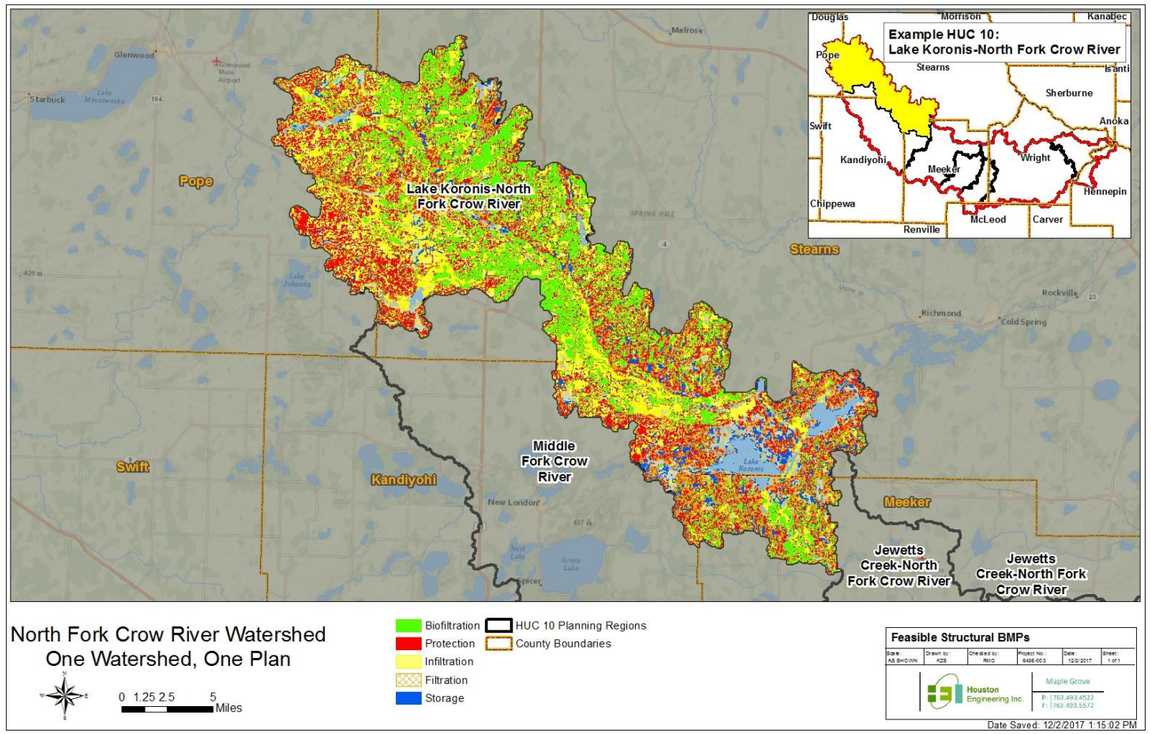
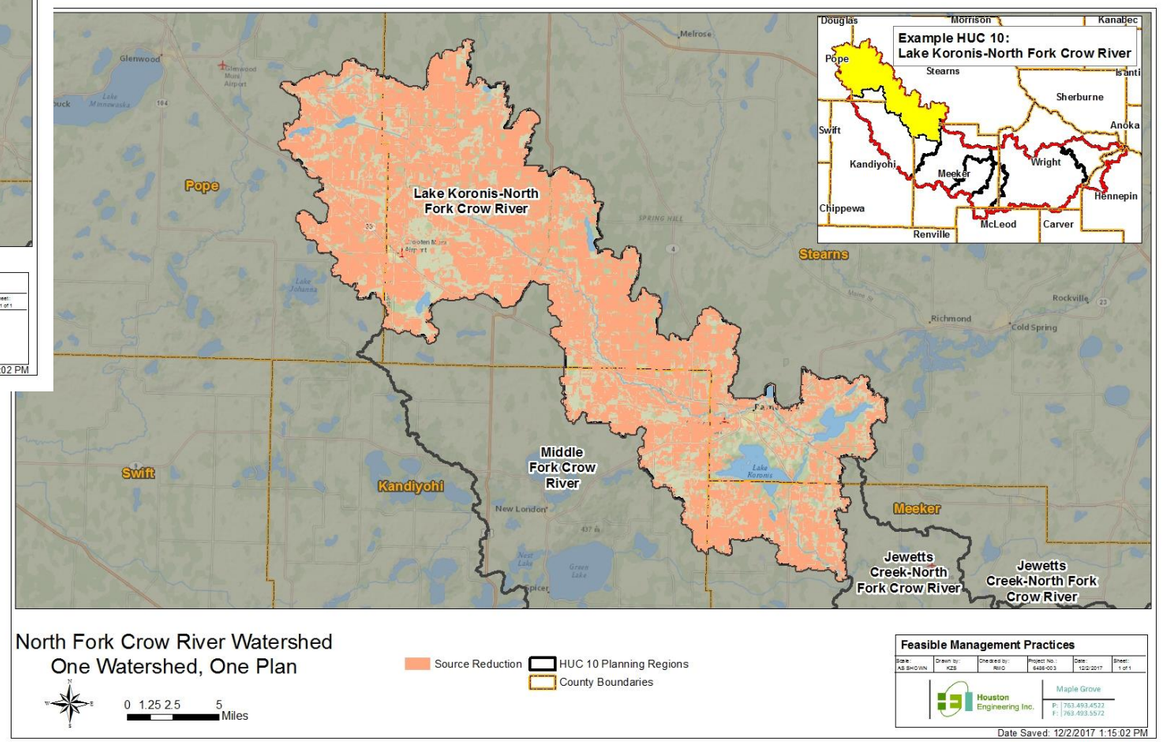


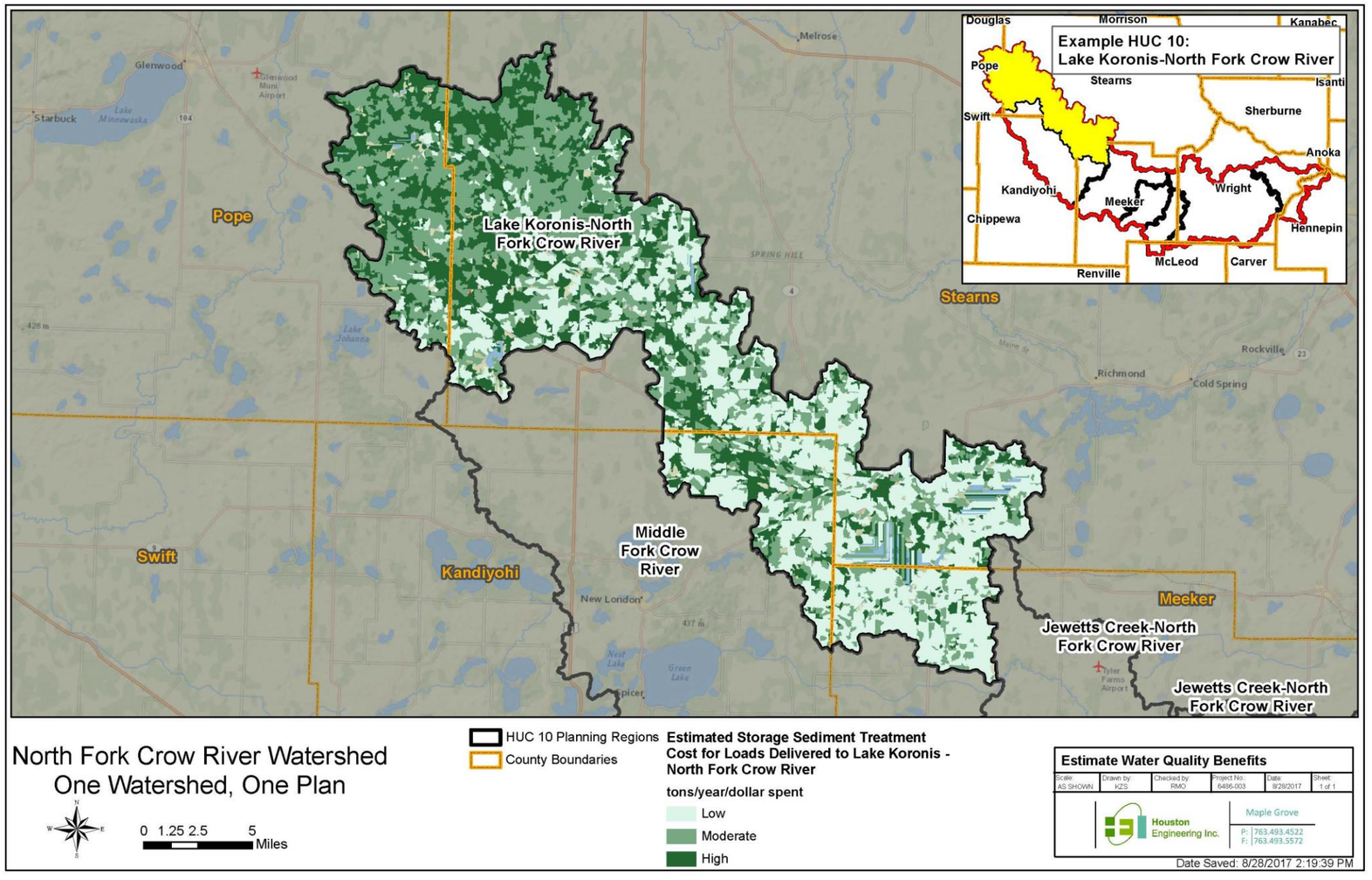
Figure 4-7: Feasible management practices within the Lake Koronis-North Fork Crow River planning region



4.4.5 ESTIMATE WATER QUALITY BENEFITS

One of the ways to select specific practices for implementation is based on their probable benefits. The probable benefits of a practice can be described by either the amount of a parameter (like sediment or phosphorus) removed, or the cost to remove one unit of the parameter (e.g., dollars per pound of phosphorus annually reduced). Practice benefits can be estimated at the location of the practice or the resource. The estimated benefits at a lake or river are more valuable from a decision-making perspective. **Figure 4-8** show the treatment cost (in tons/year/dollar spent) of reducing sediment to the outlet of the Lake Koronis-North Fork Crow River planning region, using storage practices shown. The areas providing the largest "bang for the buck" are in the "Low" category, while areas that are cost ineffective based on benefits to the planning region outlet are in the "High" category. The most cost-effective areas for sediment reductions do not correspond exactly to the highest source load areas (see **Figure 4-5**). These results can be used to target practice locations to implement management practices and structural BMPs that provide the most cost-effective avenue to make progress towards local, state, and regional water quality management goals.

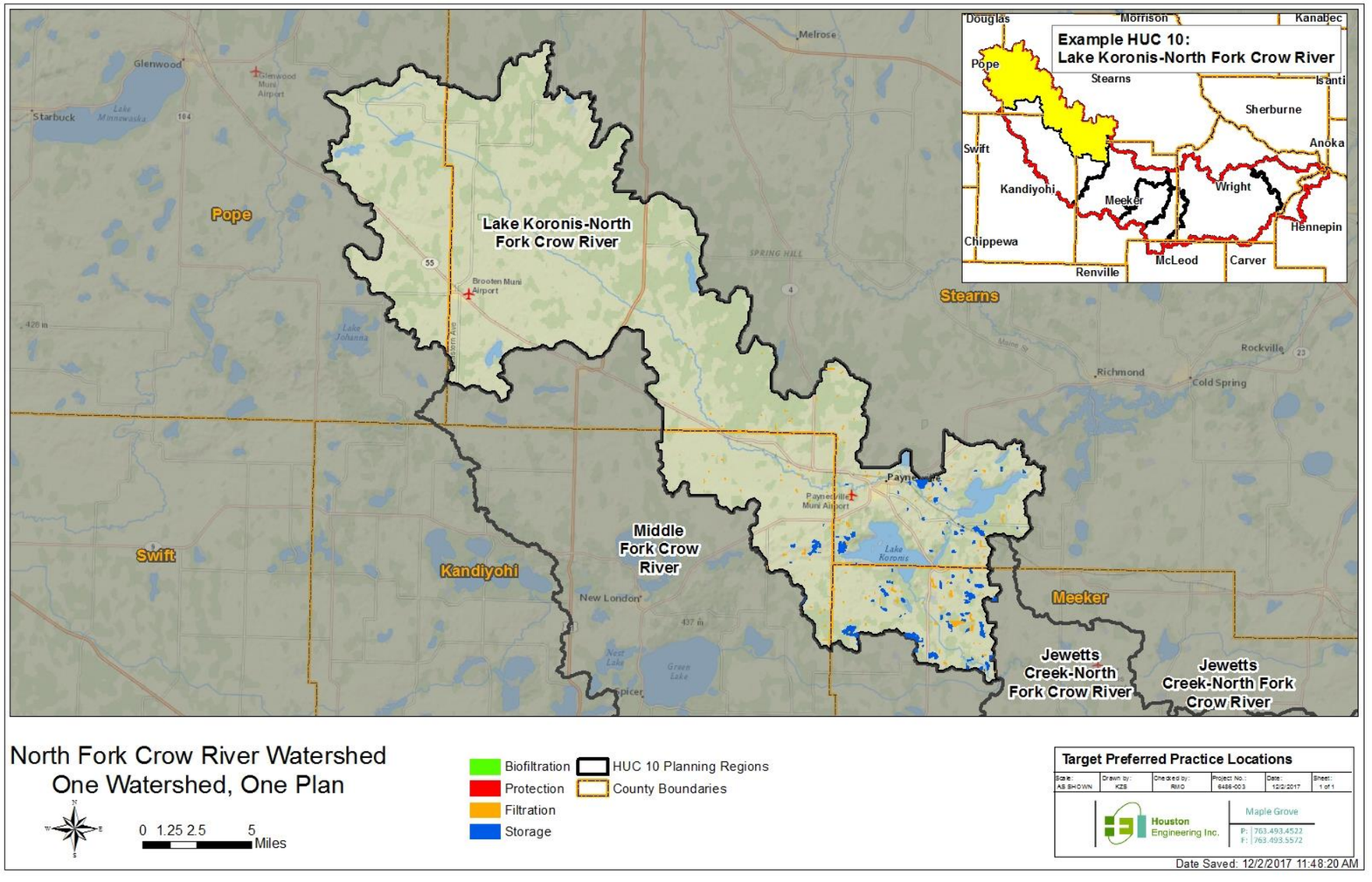
Figure 4-8: The treatment cost (tons/year/dollar spent) of reducing sediment delivered to the Lake Koronis-North Fork Crow River planning region outlet using storage practices. Similar products can be developed for total nitrogen and total phosphorus.

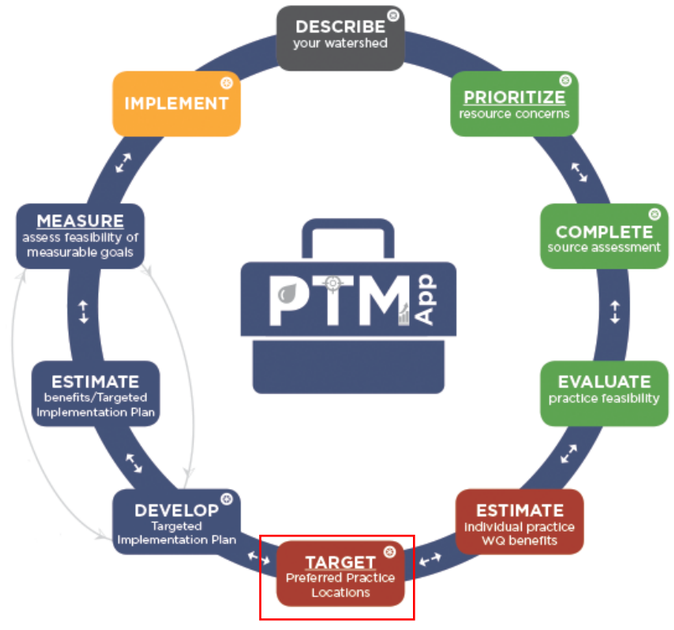


4.4.6 TARGET PREFERRED PRACTICE LOCATIONS

Once possible management practice and structural BMP locations are identified based on technical feasibility, the potential locations need to be assembled into an implementation approach to evaluate effectiveness. The range of management practice and structural BMP locations based solely on technical feasibility is reduced, by applying conditions like a minimum size requirement, minimum treatment effectiveness, or minimum cost-effectiveness. The best structural BMPs targeted for implementation in the Lake Koronis-North Fork Crow River planning region are shown in **Figure 4-9**. This targeted implementation approach is focused on targeting the 250 best structural BMPs that provided the most cost-effective reductions of total phosphorus and total nitrogen to the planning region outlet, while considering local sediment benefits. This step in the business workflow is based on queries of the data generated by PTMApp. It is intended to provide feasible locations for implementing practices that will provide measurable water quality improvements for local priority resources. However, there are a number of factors that might influence the practices that end up being implemented. These include existing practices already in place or willingness of the landowner to participate. The inclusion of such factors is discussed in the next business workflow section, Develop Targeted Implementation Plan.

Figure 4-9: **Structural BMPs targeted for implementation based on local sediment benefits locally, and nutrient load reduction benefits to the outlet of the Lake Koronis-North Fork Crow River planning region outlet**





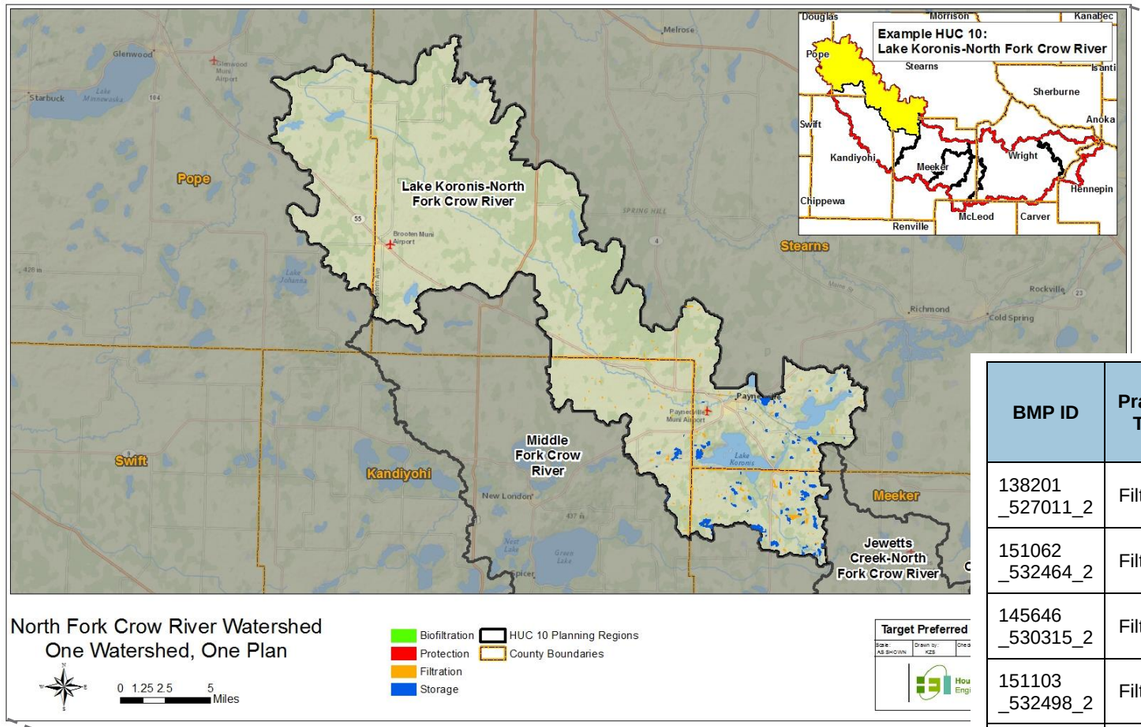
4.4.7 DEVELOP TARGETED IMPLEMENTATION PLAN

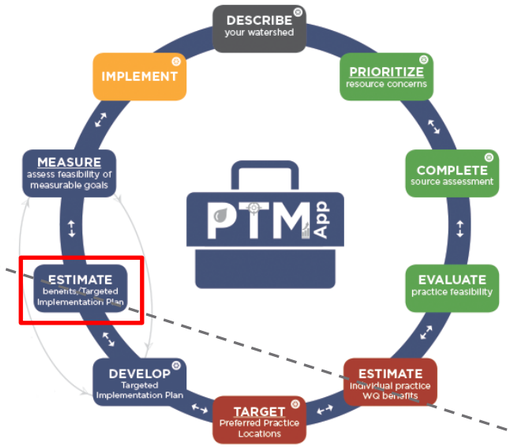
Specific locations to place practices need to be targeted based on other factors, including practical and social factors. Practical factors include landowner acceptance of specific types of practices and landowner willingness to place a practice on a field. Additional information can be incorporated to refine the practices targeted based on PTMApp data (see example in **Section 4.4.4**). It's likely that many areas in watersheds might already have numerous management practices or structural BMPs implemented, lack landowners who are willing to participate in additional management practices or structural BMPs, or have benefits outside of water quality (such as water quantity, wildlife habitat, and aquatic habitat) that adjust the targeted locations for practices.

4.4.8 BENEFITS OF TARGETED IMPLEMENTATION PLAN

The structural BMP benefits expressed as the amount of load reduction at the resource location being restored or protected can be compared to a goal. The goal may be the load reduction necessary to reach the loading capacity for an impaired surface water or the existing load. The annual sediment and total phosphorus load reduction estimates based on implementation of the top 10 "best", most cost-effective practices within the Lake Koronis-North Fork Crow River planning region are shown in **Figure 4-10.** The load reductions are calculated at the outlet of Lake Koronis-North Fork Crow River planning region for total phosphorus, and locally for sediment, and can be used to assess progress towards and feasibility of a measurable water quality goal, in this case the Sediment Reduction Strategy target for sediment and the Minnesota Nutrient Reduction Strategy target for total phosphorus.

Figure 4-10: Estimated sediment and total phosphorus load reductions based upon implementation of the 10 "best" structural practices within the Lake Koronis-North Fork Crow River planning region



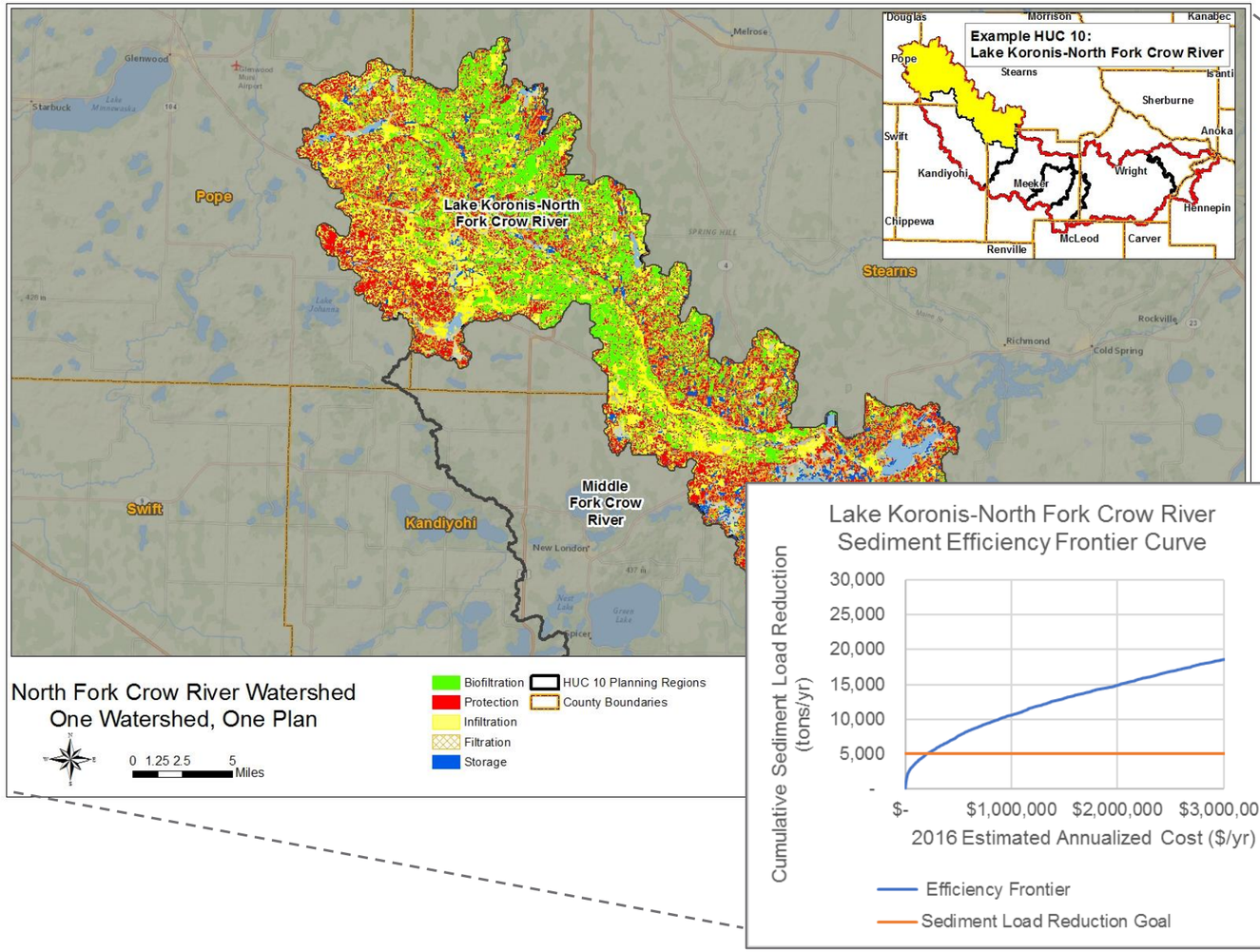


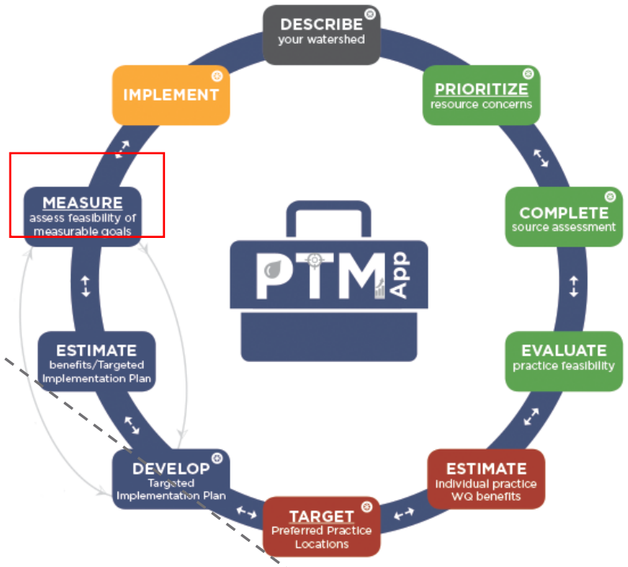
BMP ID	Practice Type	Drainage Area Treated (Sq. Feet)	Parameter	Annual Est. Load at BMP	Est. Annual Load Reduction	Cumulative Load Reduction	Progress towards State Goal (%)	Est. Annualized Cost	Cumulative Annualized Cost
138201_527011_2	Filtration	4,276,648	Sed (tons)	149.6	74.8	75	1.5	$ 95	$ 95
			TP (lbs.)	22.7	1.3	1	0.3		
151062_532464_2	Filtration	4,980,930	Sed (tons)	149.3	74.6	149	3.0	$ 130	$ 225
			TP (lbs.)	40.1	1.6	3	0.7		
145646_530315_2	Filtration	3,415,235	Sed (tons)	101.6	50.8	200	4.0	$ 124	$ 349
			TP (lbs.)	28.0	1.3	4	1.0		
151103_532498_2	Filtration	1,768,164	Sed (tons)	31.0	15.5	216	4.3	$ 80	$ 429
			TP (lbs.)	10.6	1.1	5	1.2		
131508_525300_2	Filtration	4,145,382	Sed (tons)	93.8	46.9	263	5.2	$ 171	$ 600
			TP (lbs.)	30.8	0.7	6	1.4		
147153_531166_2	Filtration	2,601,581	Sed (tons)	49.5	24.8	287	5.7	$ 115	$ 715
			TP (lbs.)	15.9	0.6	7	1.5		
150573_532320_2	Filtration	3,771,154	Sed (tons)	61.8	30.9	318	6.3	$ 186	$ 900
			TP (lbs.)	28.5	2.8	9	2.2		
91742_515914_2	Filtration	5,386,352	Sed (tons)	154.8	75.5	394	7.8	$ 150	$ 1,050
			TP (lbs.)	39.0	0.2	10	2.2		
151530_532591_2	Filtration	2,533,865	Sed (tons)	85.7	42.8	437	8.6	$ 249	$ 1,299
			TP (lbs.)	19.4	0.5	10	2.3		
122255_522418_2	Filtration	4,953,224	Sed (tons)	29.1	14.5	451	8.9	$ 129	$ 1,428
			TP (lbs.)	47.8	0.8	11	2.5		

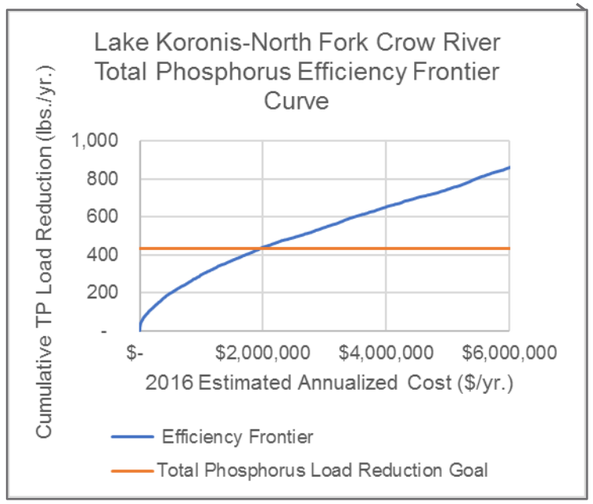
4.4.9 ASSESS FEASIBILTY OF MEASURABLE GOALS

A measurable goal may be the load reduction needed to restore a lake or river reach or a maximum load to protect a resource. The benefits of the implementation plan can be compared to the stated measurable goals. The estimated benefits of the targeted implementation plan can be compared to water quality goals from watershed, state, or regional strategies, such as those found in the States Nutrient Reduction Strategy or a local WRAPS. For example, **Figure 4-11** shows the anticipated sediment load reduction benefit from implementation of technically feasible structural BMPs within the Lake Koronis-North Fork Crow River planning region drainage area in relation to cost and the target sediment goal (red horizontal line in Efficiency Frontier Curves), based on the Sediment Reduction Strategy target. **Figure 4-11** also shows the anticipated total phosphorus load reduction benefit from implementation of structural BMPs within the Lake Koronis-North Fork Crow River planning region drainage area in relation to cost and the target total phosphorus goal (shown in red), based on the Minnesota Nutrient Reduction Strategy target for total phosphorus.

Figure 4-11: Anticipated total phosphorus load reduction benefit from implementation of technically feasible structural BMPs, relative to stated goals







4.5 PRIORITIZE, TARGET, AND MEASURE APPLICATION: PLANNING REGION IMPLEMENTATION PROFILES

Locations within the NFCR Watershed that are technically feasible for management practices and structural BMPs are identified by PTMApp. Practices within PTMApp are placed into one of six "treatment groups," including: (1) storage; (2) filtration; (3) biofiltration; (4) infiltration; (5) protection; and (6) source reduction.

Within this plan, structural BMPs include storage, filtration, biofiltration, infiltration, and protection practices. The source reduction treatment group represents "management practices" (e.g., following fertilization application recommendations, residue management, or the use of cover crops).

More practices than can reasonably be implemented are identified by PTMApp. The NFCRWPP elected to initially "screen" or remove unrealistic management practices and structural BMPs based on ineffectual mass load reduction benefits and impractical sizing (**Table 4-3**). Removing these management practices and structural BMPs is intended to reflect the fact that some practices are small with minimal benefit, and are not practical for implementation.

Table 4-3: Criteria used in the Prioritize, Target and Measure Application to initially screen practices for inclusion in the final geospatial products.

Treatment Group	Practice Percent Removal Efficiency	Estimated Mass Load Reduction by Practices (must be ≥ stated load reduction)			Size Restrictions	
		Sediment (tons)	Total Phosphorus (lbs.)	Total Nitrogen (lbs.)	Drainage Area	Surface Area
Storage	20%	1	1	1	N/A	Minimum 0.5 acres
Filtration	60%	0.25	0	0	Minimum = 1.23 acres; Maximum = 125 acres	Minimum = 0.33 acres
Biofiltration	60%	0.25	0.25	0.5	Minimum = 5 acres; Maximum = 100 acres	N/A
Infiltration	60%	0.25	0.25	0.5	N/A	Minimum = 100 sq. feet
Protection	25%	0.25	0.25	0.5	N/A	N/A
Source Reduction	N/A	0.25	0.25	1	N/A	N/A

The best practices to meet goals are highlighted in a targeted implementation approach. Many different factors can be used to select the best or most effective management practices and structural BMPs within each planning region. The NFCRWPP used the feasible practice locations generated within PTMApp to develop a prioritized and targeted implementation approach aimed at implementing the most cost-effective practices for improving priority concerns within each planning region.

Due to the differing nature of the NFCR Watershed, the importance of priority concerns can shift between planning regions, based on geology and prominence of resources. For example, agricultural drainage systems may be more important in the Lake Koronis-North Fork Crow River planning region than it is in the Crow River planning region, as the land use in the former is more predominately agricultural than the land use in the latter. The NFCRWPP identified regional priority concerns within each planning region (**Table 4.4**), to create a prioritized and targeted implementation approach aimed at improving the most important or prominent issues within each planning region.

Assigning regional priorities allows planning partners to preferentially select what structural BMPs are best to address the issues most prevalent in their planning region. For example, if a planning region has a lot of lakes that are impaired for nutrients or merit substantial protection from nutrients, practices that do the most cost-efficient job of reducing total phosphorus could be preferentially selected over practices that do a cost-efficient job of reducing sediment. This "preferential selection" is accomplished by assigning weighted ranks to structural BMPs identified through PTMApp.

Sediment, total phosphorus, and total nitrogen are the three most prominent issues that PTMApp analyzes that affect priority concerns. To create the list of structural BMPs in the targeted implementation approach, structural BMPs in each planning region were ranked from most cost effective to least cost-effective, with the greatest reductions in the annual nutrient (nitrogen and phosphorus) load delivered to the planning region outlet (regional scale) and the greatest sediment load reduction reaching the catchment outlet (i.e., local scale). The final ranking of “best” structural BMPs was weighted to favor either sediment, nitrogen, and total phosphorus load reduction benefits, based on a planning region’s regional priorities (**Table 4-4**). Using this approach resulted in selecting practices within each planning region that make the greatest, most cost-effective progress toward regional priorities within each planning region.

Management practices were analyzed separately from structural BMPs as part of rural land stewardship within the targeted implementation approach.

Table 4-4: Regional priorities by planning region, and its parameter ranking to identify the “best” structural BMPs for the targeted implementation approach

Planning Region	Regional Priorities	Ranking for Sediment, Total Phosphorus, and Total Nitrogen
Lake Koronis-North Fork Crow River	1) Groundwater Supplies 2) Agricultural Drainage Systems 3) Drinking Water 4) Lakes 5) Rural Sustainability	Total Phosphorus (33%) Total Nitrogen (33%) Sediment (33%)
Middle Fork Crow River	1) Lakes 2) Drinking Water 3) Agricultural Drainage Systems 4) Rural Sustainability 5) Groundwater Supplies	Total Phosphorus (50%) Total Nitrogen (30%) Sediment (20%)
Jewetts Creek-North Fork Crow River	1) Lakes 2) Drinking Water 3) Rural Sustainability 4) Urban Stormwater 5) Agricultural Drainage Systems	Total Phosphorus (50%) Total Nitrogen (30%) Sediment (20%)
Washington Creek	1) Lakes 2) Drinking Water 3) Agricultural Drainage Systems 4) Surface Runoff 5) Lake Shoreland and Stream Riparian Corridors	Total Phosphorus (50%) Total Nitrogen (30%) Sediment (20%)
Big Swan Lake	1) Lakes 2) Streams and Rivers 3) Lake Shoreland and Stream Riparian Corridors 4) Surface Runoff 5) Agricultural Drainage Systems	Total Phosphorus (50%) Sediment (30%) Total Nitrogen (20%)
North Fork Crow River	1) Surface Runoff 2) Lakes	Total Phosphorus (50%) Total Nitrogen (25%)

Planning Region	Regional Priorities	Ranking for Sediment, Total Phosphorus, and Total Nitrogen
	3) Urban Stormwater 4) Drinking Water 5) Streams and Rivers	Sediment (25%)
Crow River	1) Urban Stormwater 2) Lakes 3) Drinking Water 4) Streams and Rivers 5) Surface Runoff	Total Phosphorus (50%) Total Nitrogen (25%) Sediment (25%)

The NFCRWPP reduced the total number of structural BMPs identified by PTMApp to the 250 "best" practices within each planning region. The locations of these practices are shown within the planning region implementation profiles. The sediment and nutrient annual load reduction benefits were evaluated as if they were all implemented within each planning region (see **Table 4-5**). This plan therefore provides a best estimate of the numbers, types, and approximate locations for structural BMPs on the landscape, and how much progress toward goals is possible from implementation of those practices.

It is important to note that improvements in surface and groundwater quality will require time. Typically, the amount of time required to see improvements is long, and can take decades.

4.5.1 PTMAPP LIMITATIONS

While the best available data and information have been used to develop this plan, no plan is perfect. There are limitations with this plan and recognizing these limitations is important because they influence the targeted implementation approach. For example, PTMApp was not programmed to analyze bacterial issues impacting surface and groundwater priority resource concerns. For this reason, bacteria was not included in PTMApp assessment.

Another important limitation is that PTMApp only analyzes sediment and nutrient sources from the surface of the land, and does not consider near channel sediment sources, shoreland erosion, point sources, or contributions from individual septic treatment systems. Many of the action items within the targeted implementation schedule are focused on implementing management practices and structural BMPs to reduce the amount of sediment and nutrients leaving the landscape, and entering drainage systems, streams and rivers. Action items focused on mitigating surface runoff are also expected to provide benefits in reducing the amount of near channel sediment, although the amount is not quantified within the plan.

Additional information about bacteria, sources of sediment, and nutrient impacts (individual septic treatment systems, point sources, shoreland erosion, etc.), can be found within the North Fork Crow River WRAPS, North Fork Crow River TMDL Bacteria, Nutrients and Turbidity, and North Fork Crow River Watershed Monitoring and Assessment Report, available at https://www.pca.state.mn.us/water/watersheds/north-fork-crow-river.

4.5.2 ADDRESSING PTMAPP LIMITATIONS: NITROGEN INFILTRATION RISK MAPS

PTMApp creates geospatial water quality products specific to surface water hydrology, but does not model or analyze groundwater. Drinking water (groundwater) quality and groundwater supplies are priority concerns as identified by the Policy Committee. To guide implementation aimed at these priority concerns, the NFCRWPP identified the need for an implementation aide to inform the placement of management practices and structural BMPs which accomplished two goals: (1) promoting groundwater

supplies by encouraging recharge of clean water; and (2) protecting groundwater quality by treating nitrogen-rich waters before the contaminated water could reach drinking water (groundwater) supplies.

To meet this need, a Nitrogen Infiltration Risk Map (**Appendix M)** was developed for this plan to target practices aimed at managing water supply and quality, and is presented in each implementation profile. The analysis performed to create this map considers the estimated nitrogen input on the landscape based on land use and the potential for denitrification as water infiltrating from the surface travels through surficial materials. Nitrogen Infiltration Risk Maps show relative risk of areas on the landscape regarding the amount of nitrogen potentially reaching groundwater. Maps can be used during plan implementation to manage the protection of groundwater quality and supplies. Specifically, the management and structural BMP practice location products created through PTMApp can be overlaid with the Nitrogen Infiltration Risk Map to provide a relative sense of where practices should go to protect both groundwater quality and supplies. For example, infiltration structural BMPs can be targeted to those areas with low nitrogen infiltration risk to encourage groundwater recharge, and their use minimized on areas with high nitrogen infiltration risk.

4.6 PLANNING REGION IMPLEMENTATION PROFILES

4.6.1 CONTENT OF IMPLEMENTATION PROFILES

This plan presents an implementation profile for each planning region to target the implementation of management practices and structural BMPs. Each implementation profile summarizes the following:

- The condition of surface and groundwater resources within each planning region;
- The locations of technically feasible practices;
- The estimated cost for the technically feasible practices relative to the measurable goals;
- The types and probable locations of "best" (i.e., most cost-effective) structural BMPs that comprise the targeted implementation approach;
- The location of the "best" management practices, aimed at the most critical areas on the landscape; and
- The anticipated benefits arising from implementation, relative to goals.

Sediment, total phosphorus, and total nitrogen are the three most prominent issues that PTMApp analyzes that affect priority concerns. To select the best 250 practices for the targeted implementation approach within each planning region, some target or goal was needed to compare practice benefits against. Using goals that pertain only to a specific priority concern—such as TMDL load allocations for streams and rivers—presents a challenge as it becomes difficult to optimize all practices in a planning region to multiple goals. For this reason, the Planning Work Group elected to use one target load reduction goal for sediment and total phosphorus evaluated at the outlet of each planning region, for selecting practices and evaluating practice benefits within the targeted implementation approach.

The planning region load reduction goal for total phosphorus is based on the statewide Minnesota Nutrient Reduction Strategy (MPCA 2014b), which calls for **a 12% reduction in total phosphorus from existing conditions** by 2025. The planning region load reduction goal for sediment uses milestones within the Sediment Reduction Strategy for the Minnesota River Basin and South Metro Mississippi River (MPCA 2015) as a surrogate, which calls for a 25% reduction in sediment loads by 2020. The cost for implementing structural BMPs are shown relative to progress made toward state load reduction goals. Presenting information in this way demonstrates whether state load reduction goals are attainable or realistic within each planning region, compared to dollars available for implementation.

Based on direction received by the Planning Work Group, the management practice and structural BMP costs calculated within PTMApp were based on estimated 2016 lifecycle costs representative of each PTMApp treatment group (Tyndall, J., and T. Bowman, 2016). Presented costs are annualized lifecycle costs, inclusive of design, construction (earthwork, piping, etc.), installation, operation and maintenance, land cost, and lost crop opportunity costs from crops removed from production. The cost estimations provided herein should not solely be utilized for distribution of funds that may become available because of this plan.

Benefits from implementation of structural BMPs is estimated through PTMApp. Benefits are expressed as the mass load reduction of sediment, total phosphorus, or total nitrogen arising from implementation. Load reduction benefits are summarized in the implementation profiles at the outlet of each planning region. However, load reduction benefits can be evaluated from any of the 182 PTMApp priority resource points within the NFCR Watershed planning boundary (**Appendix O**).

Lastly, the benefits from implementation of management practices are estimated within each implementation profile. The implementation of management practices is directly related to rural stewardship measurable goals established in **Section 3,** with benefits gained from improving soil health

by increasing Soil Organic Matter (SOM) for the rural stewardship acres categorized as “Probability Low” or “Probability Depends on Practice Effectiveness.”

The science surrounding the benefits of improving soil health and SOM continues to emerge. Research shows the relationship between yield and SOM can vary depending on a variety of field conditions, including:

- soil texture
- field slope
- drainage condition.

Other factors within the soil (rather than carbon as a source for mineralization) may limit yields. Similarly, research suggests that the proportion of dissolved phosphorus in surface water runoff can increase with an increase in SOM, but total phosphorus will decline. The relationship between the water holding capacity of soil is also related to several factors including soil texture and drainage condition.

Rural stewardship helps keep soil on the field

For the purposes of this plan, the environmental benefits of rural stewardship are assumed to be a reduction in sediment and nutrient (i.e. total phosphorus) loss from fields. This plan assumes the use of management practices (such as annual cover crops, conservation tillage, or permanent vegetative cover) reduces sediment loss from a field through detachment and transport by 40%. This plan assumes the reduction in total phosphorus loss is 20%. These were selected because they tend to be on the low end of the anticipated load reduction benefit.

The potential estimated annual load reductions for sediment and total phosphorus are presented at the outlet of each planning region. The results suggest increasing the SOM for stewardship acres categorized as “Probability Low” or “Probability Depends on Practice Effectiveness” has considerable environmental benefit and in some cases achieving the state load reduction goals in a planning region.

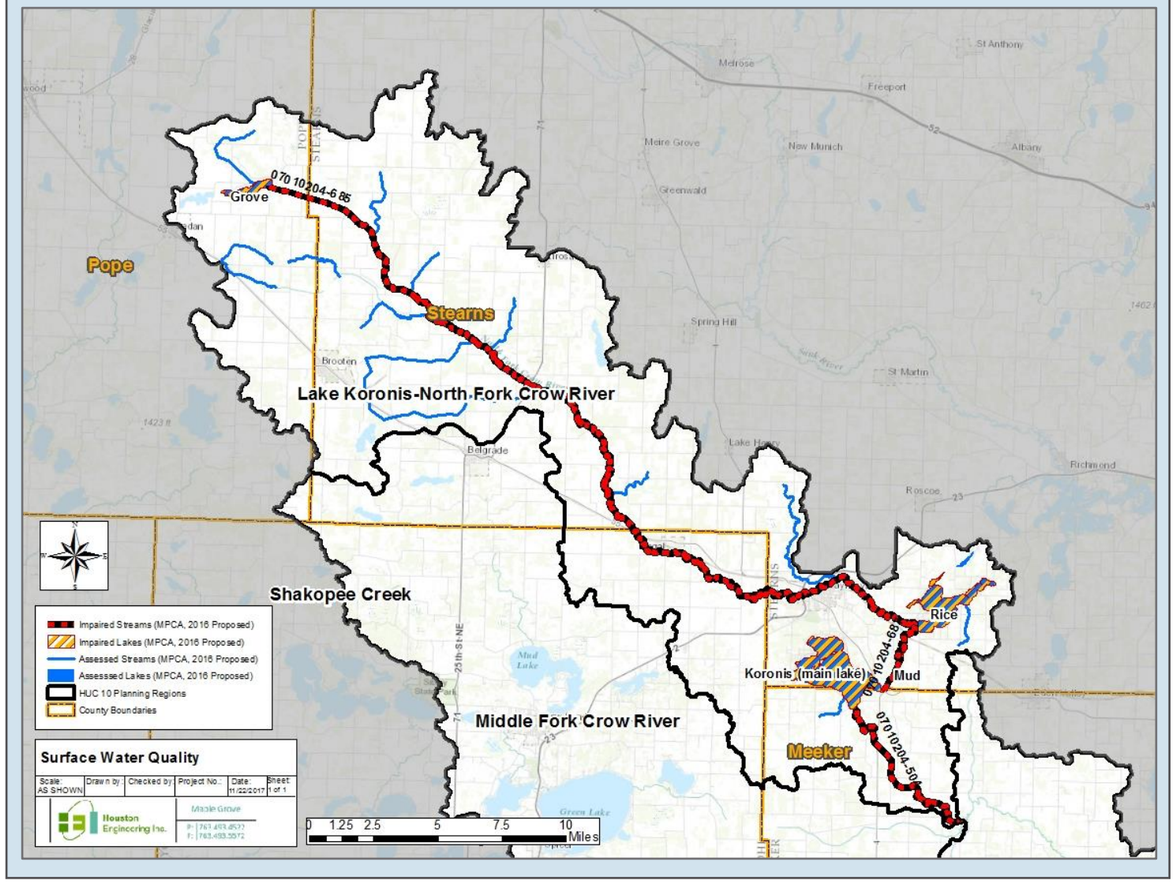
In addition to sediment and nutrient benefits, this plan also presents volume reduction benefits arising from implementation of management practices. Based on literature from the NRCS, a 1% increase in SOM (i.e., from 2% to 3%) reduces runoff volume by ¼-inch to ½-inch. Therefore, the estimated volume reduction benefits from meeting the rural stewardship measurable goal can be estimated.

The rural stewardship framework is not intended to represent a scientific analysis of the benefits of soil health and improving stewardship. Rather the rural stewardship framework is presented as concept for one portion of a possible solution to improving water quality, founded in the value proposition of the agricultural producer and positive environmental outcomes. Achieving watershed-wide and priority concern measurable goals will require the use of both management practices and structural practices.

LAKE KORONIS-NORTH FORK CROW RIVER IMPLEMENTATION PROFILE: SUMMARY OF WATER RESOURCE CURRENT CONDITIONS (SHEET 1 OF 4)

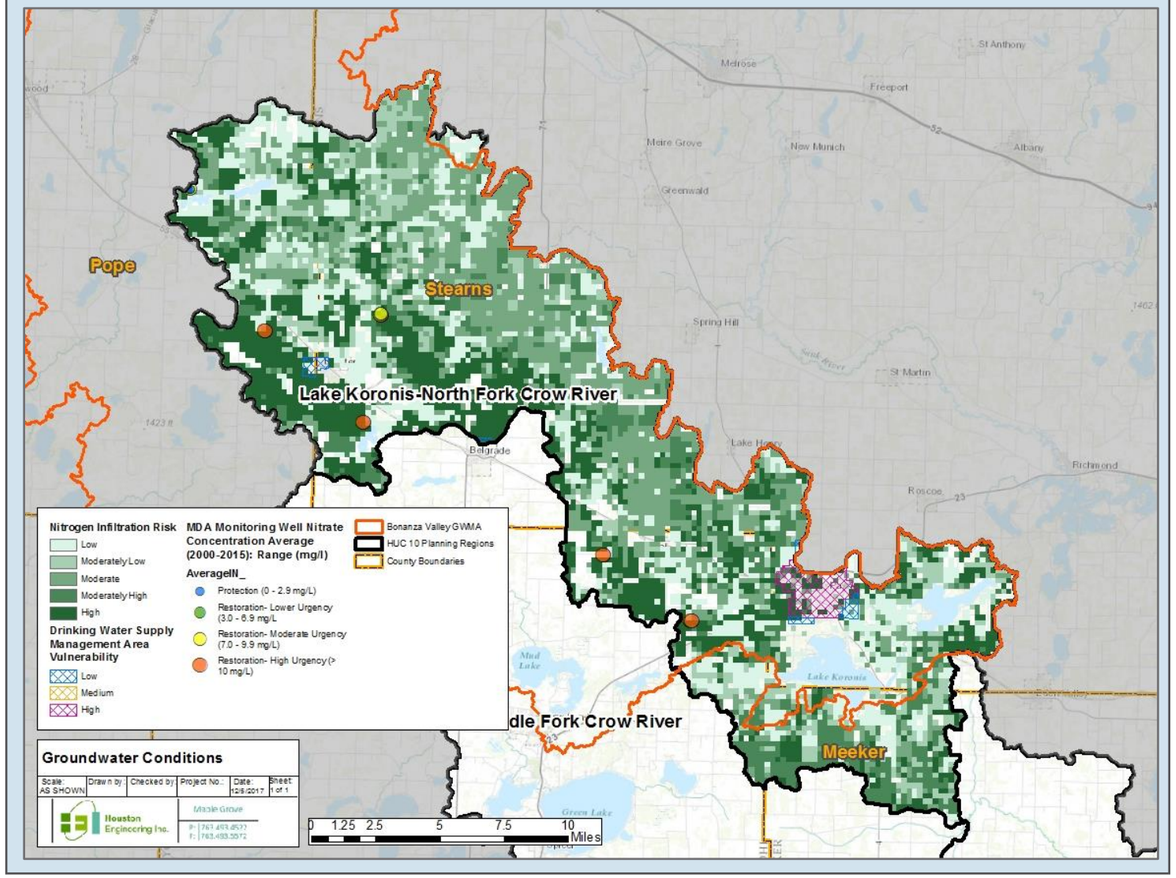
CURRENT CONDITIONS: SURFACE WATER QUALITY

Within the Lake Koronis- North Fork Crow River planning region, there are three stream reaches (07010204-504; 685; 687) and three lakes (Grove, Rice, and Koronis) that do not meet state water quality standards, and are listed as impaired. Other streams in the planning region have been assessed by parameter, based on available water quality monitoring data. Those streams have been categorized as meriting protection or restoration management efforts, and are summarized in the **Figures 3-3** through **3-7.** For more information about impaired and assessed streams and lakes within this planning region, please see the NFCR Watershed Restoration and Protection Strategy Report (https://www.pca.state.mn.us/sites/default/files/wq-ws4-06a.pdf).



CURRENT CONDITIONS: GROUNDWATER

The Lake Koronis-North Fork Crow River planning region overlays a significant portion of the Bonanza Valley Groundwater Management Area (GWMA), a regionally important resource. Within the Bonanza Valley GWMA, there is growing concern about the sustainability of groundwater supplies and vulnerability of supplies to elevated nitrate levels. To address these concerns, recharge structural practices should be encouraged in areas of “low” nitrogen infiltration risk to promote recharge of cleaner water. Storage and filtration practices should be encouraged in “high” nitrogen infiltration risk areas, to promote trapping and filtering of nitrogen rich surface waters to minimize the likelihood of further groundwater contamination, especially in Drinking Water Supply Management Areas (DWSMAS).

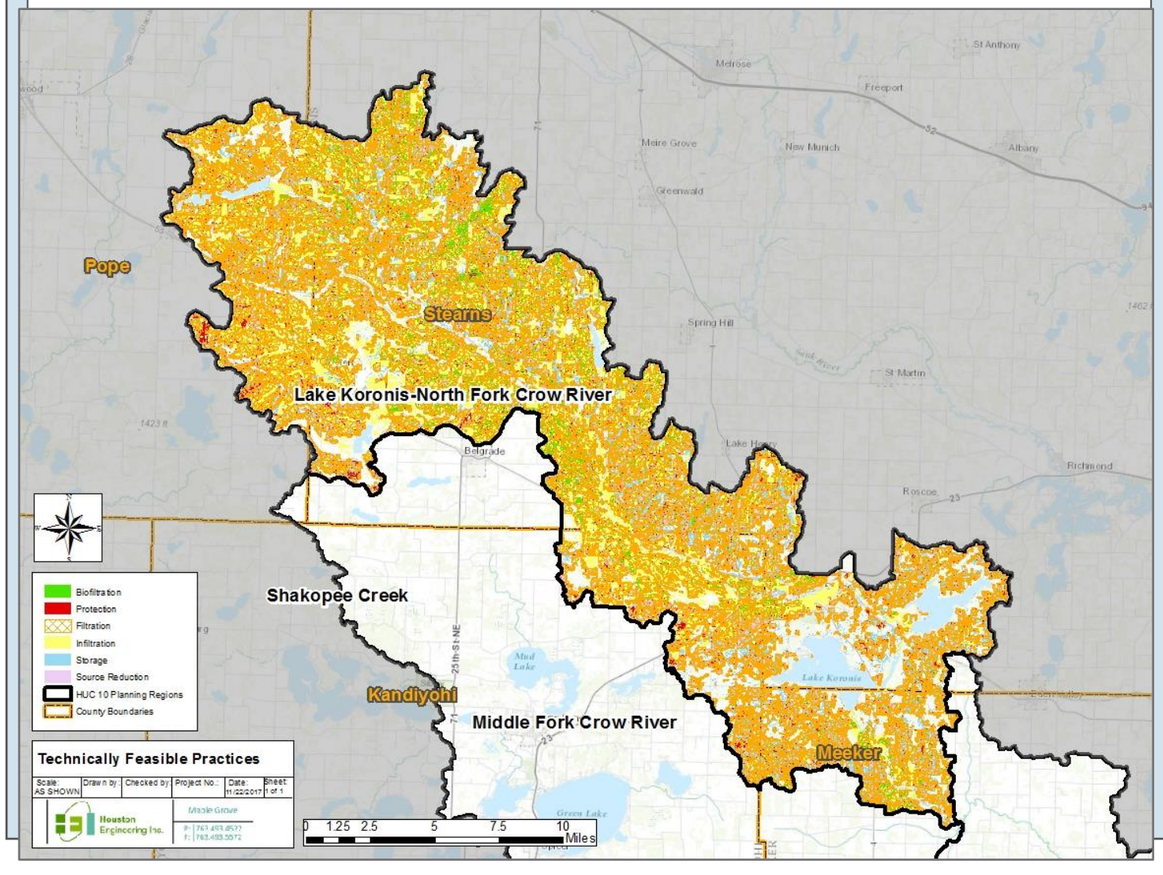


LAKE KORONIS-NORTH FORK CROW RIVER IMPLEMENTATION PROFILE: TECHNICALLY FEASIBLE MANAGEMENT PRACTICES AND STRUCTURAL BMPS (SHEET 2 OF 4)

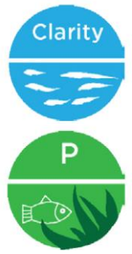
TECHNICALLY FEASIBLE MANAGEMENT PRACTICES AND STRUCTURAL BMPS

Implementation of management practices and structural BMPs make progress toward watershed-wide and priority concern measurable goals. There are many locations feasible for implementation of these practices within the Lake Koronis-North Fork Crow planning region. Locations technically feasible for management practices and structural BMPs are summarized and shown in the table and map below.

PTMApp Treatment Group	Practice Type		Number Impacting Planning Region Outlet
	Structural BMP	Management Practice	
Biofiltration	X		2,286
Protection	X		4,758
Filtration	X		6,236
Infiltration	X		4,062
Storage	X		5,793
Source Reduction		X	6,769



ARE STATE LOAD REDUCTION GOALS REALISTIC THROUGH STRUCTURAL PRACTICES ALONE?



Sediment 25% Reduction
Existing Loads

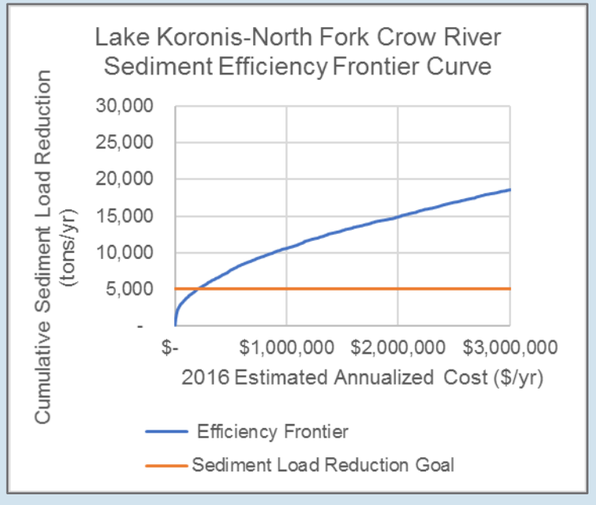
Goal Source: Sediment Reduction Strategy
Existing Load at Planning Region Outlet: 20,245 tons/yr.
Target Load Reduction at Outlet: 5,061 tons/yr.
Estimated # of Structural BMPs to Meet Goal*: 372
Estimated Annualized Cost: $323,500

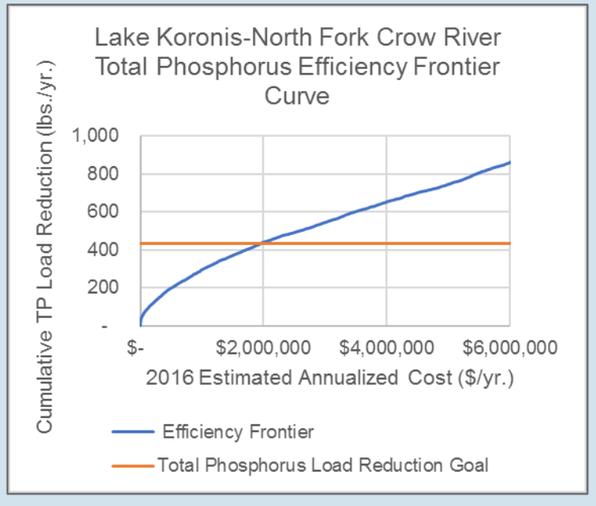
Total Phosphorus 12% Reduction
Existing Loads

Goal Source: Nutrient Reduction Strategy
Existing Load at Planning Region Outlet: 3,608 lbs./yr.
Target Load Reduction at Outlet: 433 lbs./yr.
Estimated # of Structural BMPs to Meet Goal*: 1,227
Estimated Annualized Cost: $2,804,800

Efficiency frontier curves were developed to evaluate whether or not state load reduction goals for sediment and total phosphorus are realistic by treating solely surface runoff with technically feasible structural BMPs. Shown in the charts below with horizontal lines are the total sediment and total phosphorus load reduction goal regardless of source. Total cost of implementation is shown on the x-axis. Progress towards goals is evaluated locally for sediment, and at the planning region outlet for total phosphorus.

** 120% of load reduction goal used to estimate # of practices and annualized cost, in recognition that not all practices function*



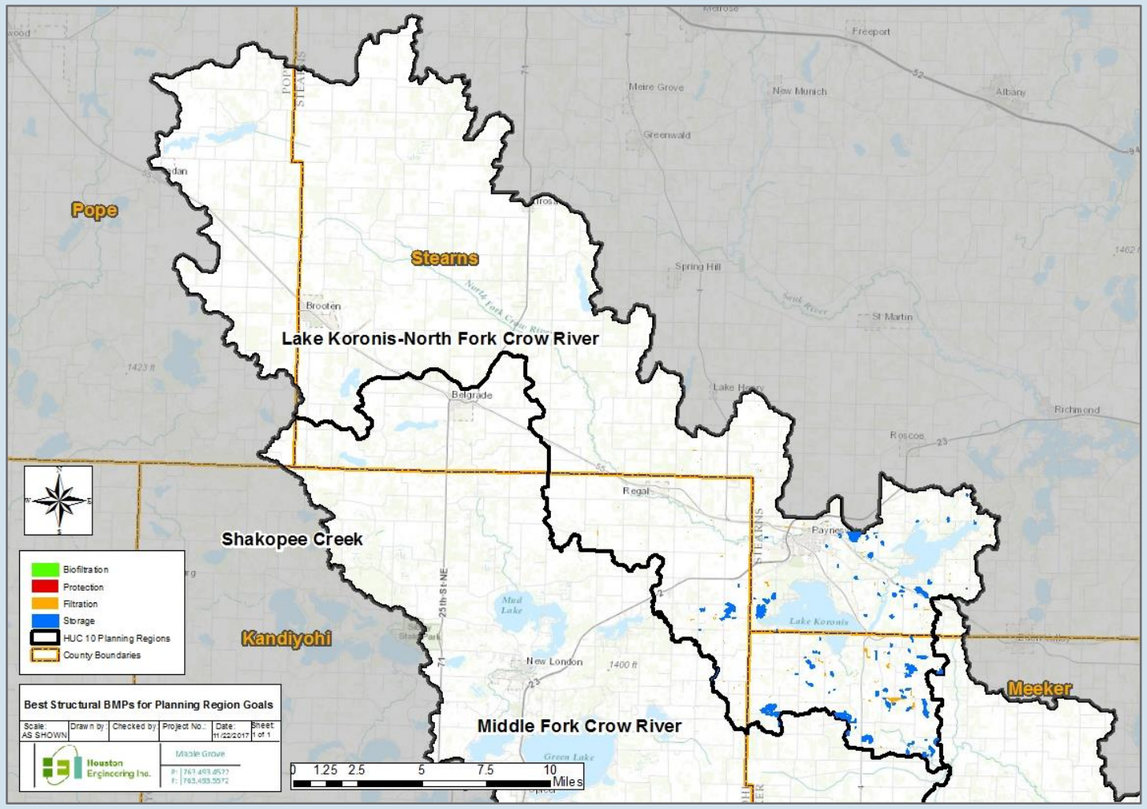


LAKE KORONIS-NORTH FORK CROW RIVER IMPLEMENTATION PROFILE: TARGETED IMPLEMENTATION APPROACH- BEST STRUCTURAL PRACTICES (SHEET 3 OF 4)

BEST STRUCTURAL BMPS

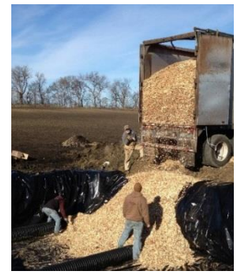
Shown in the image below are the 250 “best” structural BMPs (biofiltration, protection, filtration, infiltration, and storage treatment groups) which make up the targeted implementation approach for the Lake Koronis-North Fork Crow River planning region. These structural BMPs are the most cost effective based upon the estimated annualized dollars per unit of total phosphorus and total nitrogen reduced for the practice at the planning region outlet, and local water quality benefits from reducing sediment.

PTMApp Treatment Group	Number Impacting Planning Region Outlet
Biofiltration	0
Protection	0
Filtration	151
Infiltration	0
Storage	99



10 BEST STRUCTURAL PRACTICES WITH ANTICIPATED WATER QUALITY BENEFITS

The table below summarizes the top 10 “best” or most cost-effective structural practices within the Lake Koronis-North Fork Crow River planning region. Shown in the table are the anticipated cumulative annualized cost of implementation and cumulative progress implementation makes toward state load reduction goals at the planning region outlet. These practices could be targeted first for potential implementation efforts. A complete list is provided in **Table 4-5**.



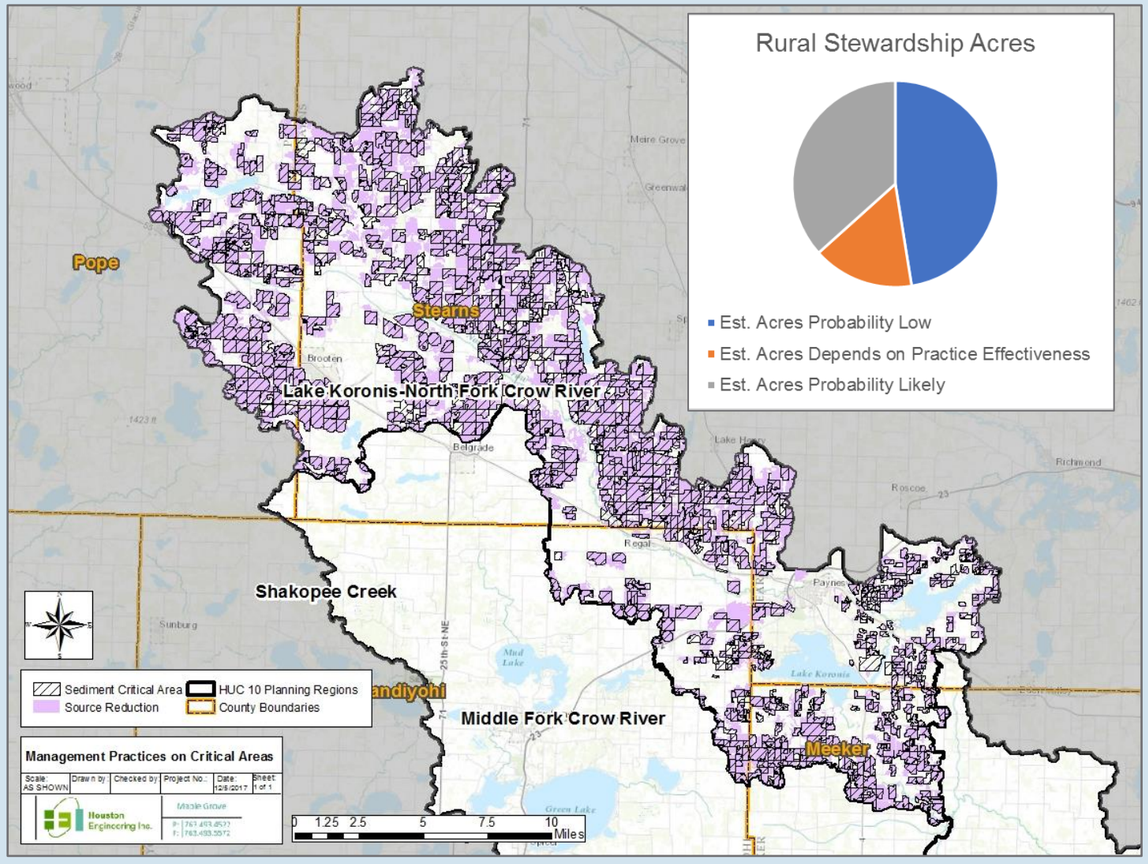
BMP ID	Practice Type	Drainage Area Treated (Sq. Ft)	Parameter	Annual Est. Load at BMP	Est. Annual Load Reduction	Cumulative Load Reduction	Progress towards State Goal (%)	Est. Annual Cost	Cumulative Annual Cost
138201 _527011_2	Filtration	4,276,648	Sed (tons)	149.6	74.8	75	1.5	$95	$95
			TP (lbs.)	22.7	1.3	1	0.3		
151062 _532464_2	Filtration	4,980,930	Sed (tons)	149.3	74.6	149	3.0	$130	$225
			TP (lbs.)	40.1	1.6	3	0.7		
145646 _530315_2	Filtration	3,415,235	Sed (tons)	101.6	50.8	200	4.0	$124	$349
			TP (lbs.)	28.0	1.3	4	1.0		
151103 _532498_2	Filtration	1,768,164	Sed (tons)	31.0	15.5	216	4.3	$80	$429
			TP (lbs.)	10.6	1.1	5	1.2		
131508 _525300_2	Filtration	4,145,382	Sed (tons)	93.8	46.9	263	5.2	$171	$600
			TP (lbs.)	30.8	0.7	6	1.4		
147153 _531166_2	Filtration	2,601,581	Sed (tons)	49.5	24.8	287	5.7	$115	$ 715
			TP (lbs.)	15.9	0.6	7	1.5		
150573 _532320_2	Filtration	3,771,154	Sed (tons)	61.8	30.9	318	6.3	$186	$900
			TP (lbs.)	28.5	2.8	9	2.2		
91742 _515914_2	Filtration	5,386,352	Sed (tons)	154.8	75.5	394	7.8	$150	$1,050
			TP (lbs.)	39.0	0.2	10	2.2		
151530 _532591_2	Filtration	2,533,865	Sed (tons)	85.7	42.8	437	8.6	$249	$1,299
			TP (lbs.)	19.4	0.5	10	2.3		
122255 _522418_2	Filtration	4,953,224	Sed (tons)	29.1	14.5	451	8.9	$129	$1,428
			TP (lbs.)	47.8	0.8	11	2.5		

LAKE KORONIS-NORTH FORK CROW RIVER IMPLEMENTATION PROFILE: TARGETED IMPLEMENTATION APPROACH- BEST MANAGEMENT PRACTICES (SHEET 4 OF 4)

BEST MANAGEMENT PRACTICES

Cropland fields (defined by Common Land Units) within the Lake Koronis-North Fork Crow River planning region were assessed based on their ability to meet principles of rural land stewardship. There are approximately 203,700 acres of cropland in the planning region, of which 47% are in “Probability Low”, 16% are in “Probability Depends on Practice Effectiveness,” and 37% are in “Probability Likely.”

One of the primary factors in determining stewardship is identifying areas that have disproportionately high sediment and total phosphorus loss, defined as critical source areas. Critical source areas for sediment within the Lake Koronis- North Fork Crow River planning region are shown on the map below. These areas could be targeted first for implementation of management practices (like cover crops, tillage management), to increase organic matter content. Areas where technically feasible management practices intersect these sediment critical source areas are shown below.



ANTICIPATED WATER QUALITY BENEFITS OF ATTAINING STEWARDSHIP GOAL

The watershed-wide measurable goal for rural stewardship is to implement management practices (i.e. cover crops, conservation tillage to increase residue, permanent cover) in 40% of all cropland areas in the watershed to increase Soil Organic Matter (SOM) content 1%. Areas to be managed are cropland areas categorized as rural stewardship “Probability Low” and “Probability Depends on Practice Effectiveness” which have SOM content between 1% and 4%. Below is a summary of the water quality benefits of attaining the rural stewardship measurable goal within the Lake Koronis-North Fork Crow River planning region.

Clarity — 25% — **Sediment 25% Reduction** Existing Loads

Goal attainable through stewardship alone: No
Anticipated % reduction at planning region outlet: 17.7%

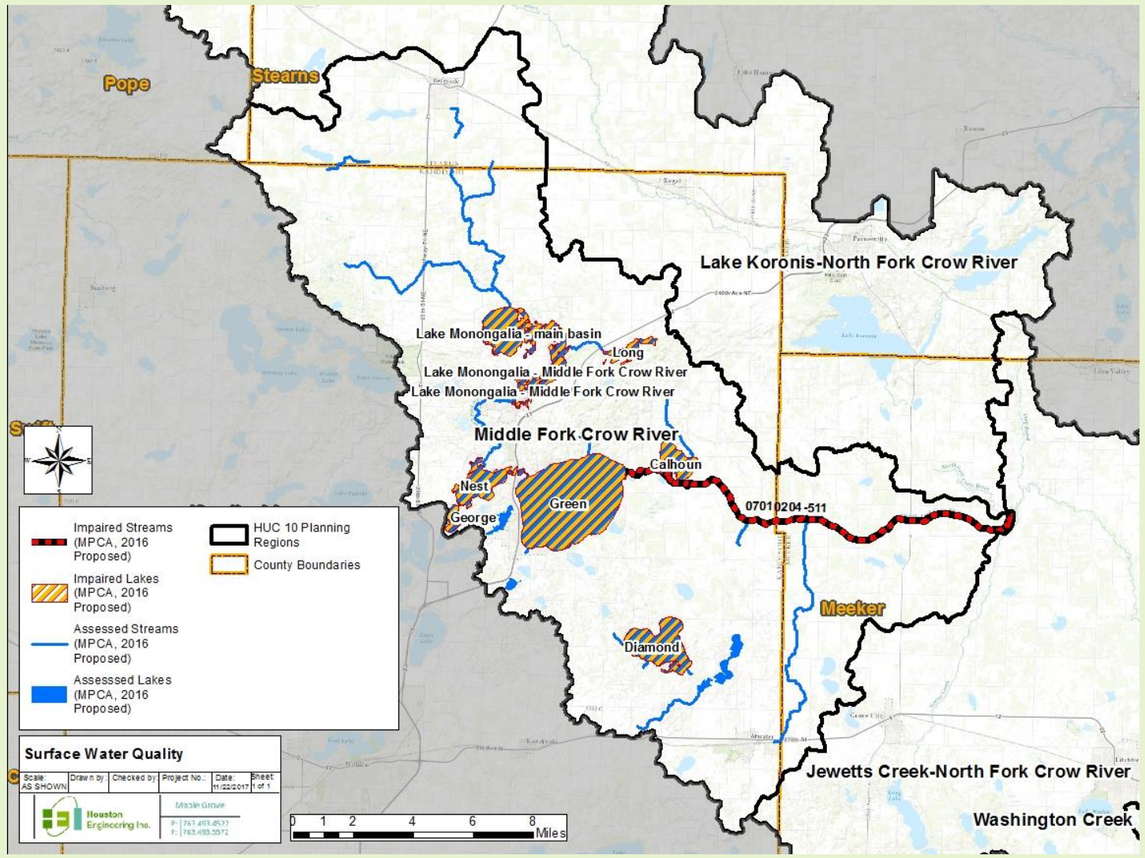
P — 12% — **Total Phosphorus 12% Reduction** Existing Loads

Goal attainable through stewardship alone: No
Anticipated % reduction at planning region outlet: 7.2%

MIDDLE FORK CROW RIVER IMPLEMENTATION PROFILE: SUMMARY OF WATER RESOURCE CURRENT CONDITIONS (SHEET 1 OF 4)

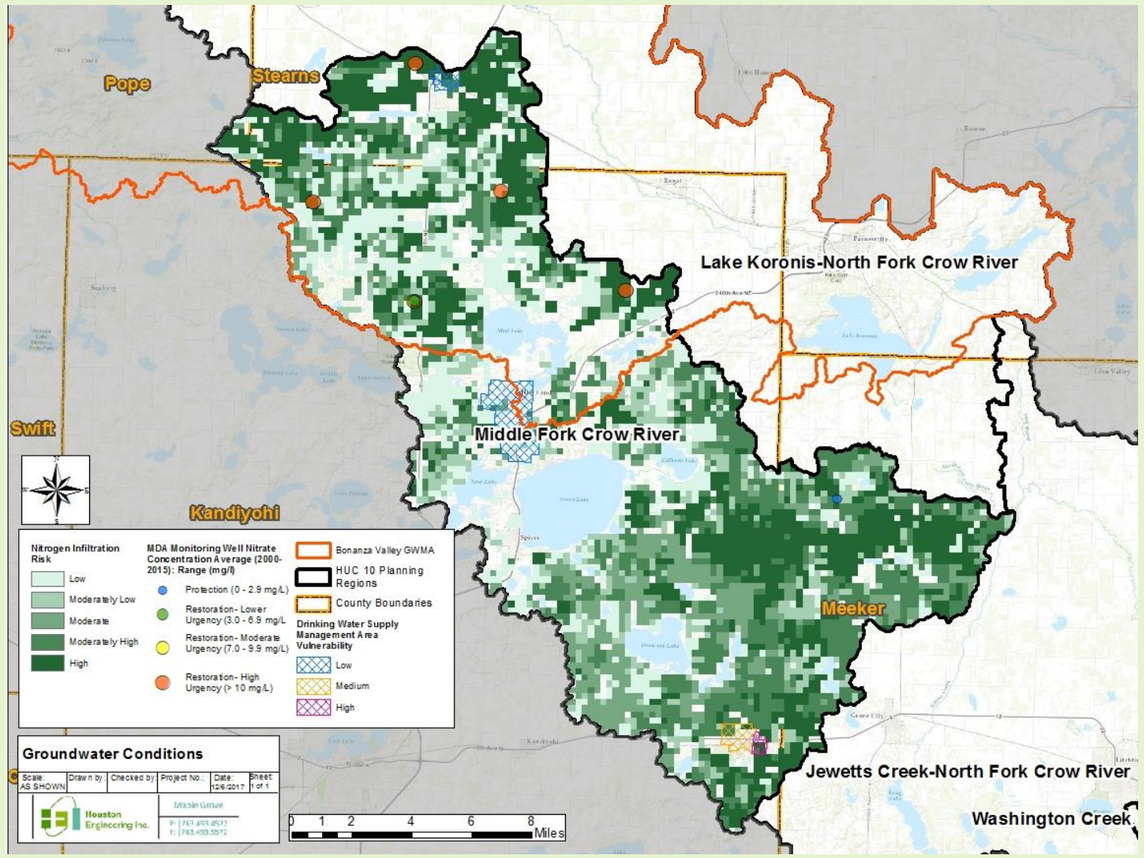
CURRENT CONDITIONS: SURFACE WATER QUALITY

Within the Middle Fork Crow River planning region, there is one stream reach (07010204-511) and seven lakes (Diamond, George, Nest, Green, Calhoun, Lake Monongalia, Long) which do not meet state water quality standards, and are listed as impaired. Other streams in the planning region have been assessed by parameter, based on available water quality monitoring data. Those streams have been categorized as needing protection or restoration management efforts, and are summarized in the **Figures 3-3** through **3-7**. For more information about impaired and assessed streams and lakes within this planning region, please see the NFCR Watershed Restoration and Protection Strategy Report (https://www.pca.state.mn.us/sites/default/files/wq-ws4-06a.pdf).



CURRENT CONDITIONS: GROUNDWATER

The Middle Fork Crow River planning region overlays a significant portion of the Bonanza Valley Groundwater Management Area (GWMA), a regionally important resource. Within the Bonanza Valley GWMA, there is growing concern about the sustainability of groundwater supplies and elevated nitrate levels. To address these concerns, recharge structural practices should be encouraged in areas of "low" nitrogen infiltration risk to promote recharge of cleaner water. Storage and filtration practices should be encouraged in "high" nitrogen infiltration risk areas, to promote trapping and filtering of nitrogen rich surface waters to minimize the likelihood of further groundwater contamination, especially in Drinking Water Supply Management Areas (DWSMAS).

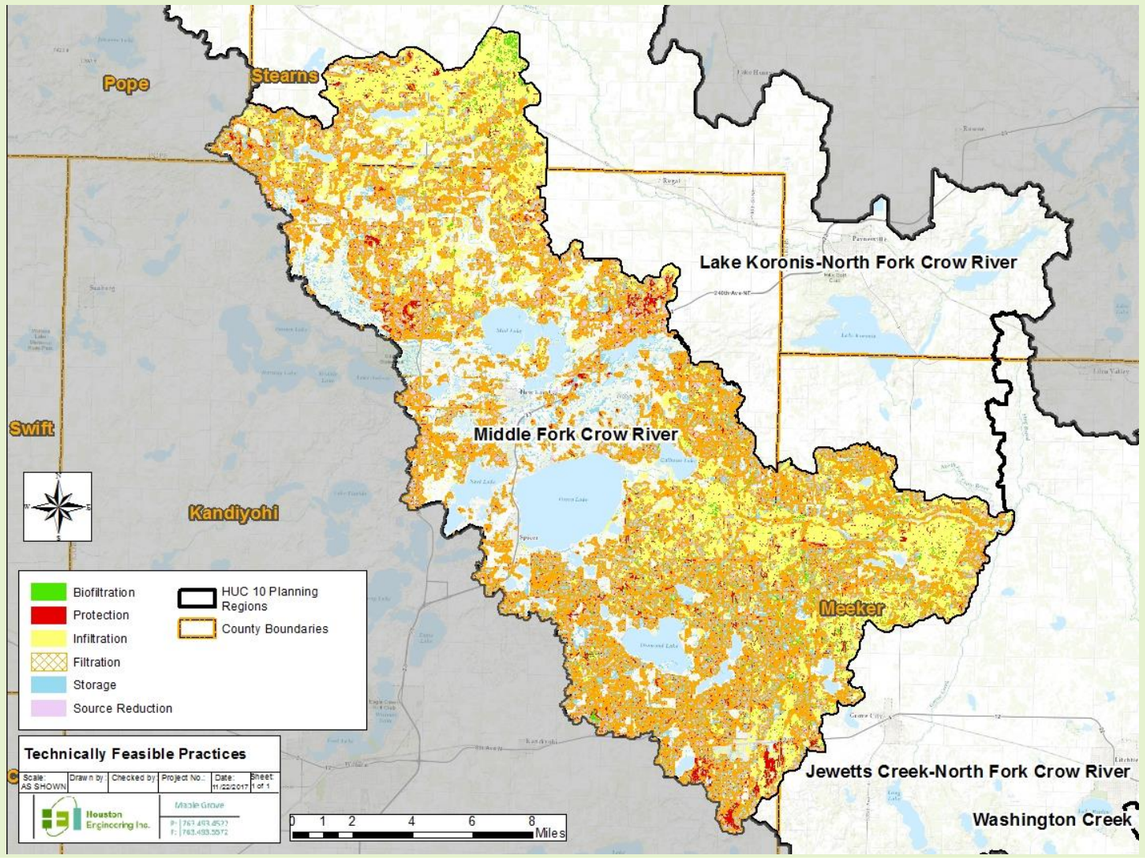


MIDDLE FORK CROW RIVER IMPLEMENTATION PROFILE: TECHNICALLY FEASIBLE MANAGEMENT PRACTICES AND STRUCTURAL BMPS (SHEET 2 OF 4)

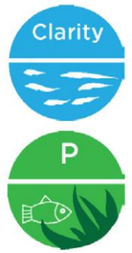
TECHNICALLY FEASIBLE MANAGEMENT PRACTICES AND STRUCTURAL BMPS

Implementation of management practices and structural BMPs make progress toward watershed-wide and priority concern measurable goals. There are many locations feasible for implementation of these practices within the Middle Fork Crow River planning region. Locations technically feasible for management practices and structural BMPs are summarized and shown in the table and map below.

PTMApp Treatment Group	Practice Type		Number Impacting Planning Region Outlet
	Structural BMP	Management Practice	
Biofiltration	X		76
Protection	X		4,538
Filtration	X		4,108
Infiltration	X		2,396
Storage	X		4,717
Source Reduction		X	4,622



ARE STATE LOAD REDUCTION GOALS REALISTIC THROUGH STRUCTURAL PRACTICES ALONE?



Sediment 25% Reduction
Existing Loads

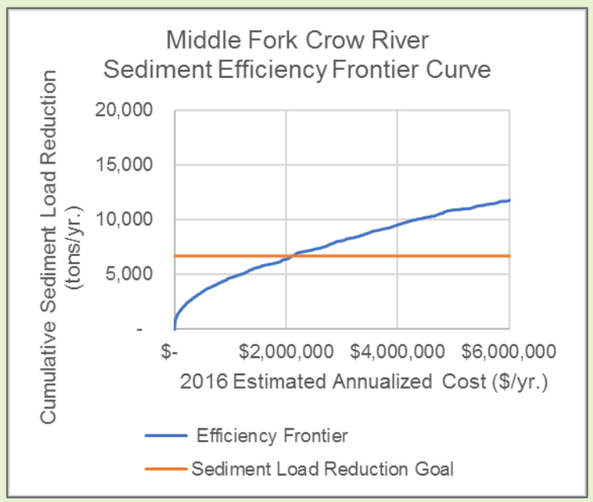
Goal Source: Sediment Reduction Strategy
Existing Load at Planning Region Outlet: 26,855 tons/yr.
Target Load Reduction at Outlet: 6,714 tons
Estimated # of Structural BMPs to Meet Goal*: 801
Estimated Annualized Cost: $2,961,000

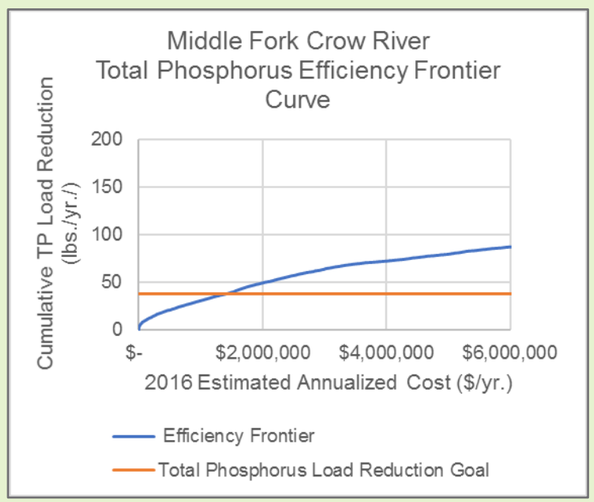
Total Phosphorus 12% Reduction
Existing Loads

Goal Source: Nutrient Reduction Strategy
Existing Load at Planning Region Outlet: 315 lbs./yr.
Target Load Reduction at Outlet: 38 lbs./yr.
Estimated # of Structural BMPs to Meet Goal*: 567
Estimated Annualized Cost: $1,798,000

Efficiency frontier curves were developed to evaluate if state load reduction goals for sediment and total phosphorus are realistic by treating solely surface runoff with technically feasible structural BMPs. Shown in the charts below with horizontal lines are the total sediment and total phosphorus load reduction goal regardless of source. Total cost of implementation is shown on the x-axis. Progress towards goals is evaluated locally for sediment, and at the planning region outlet for total phosphorus.

** 120% of load reduction goal used to estimate # of practices and annualized cost, in recognition that not all practices function perfectly upon implementation*



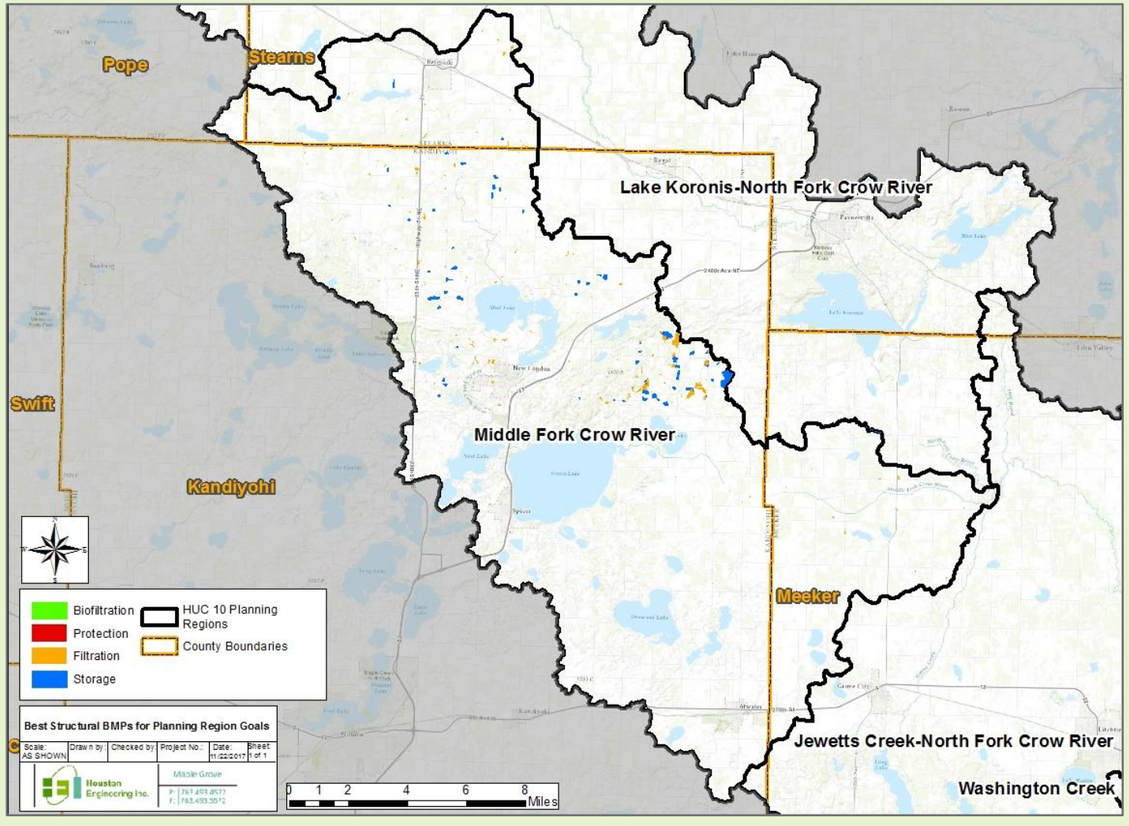


MIDDLE FORK CROW RIVER IMPLEMENTATION PROFILE: TARGETED IMPLEMENTATION APPROACH- BEST STRUCTURAL PRACTICES (SHEET 3 OF 4)

BEST STRUCTURAL BMPS

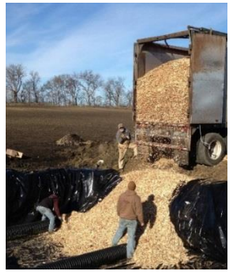
Shown in the image below are the 250 “best” structural BMPs (biofiltration, protection, filtration, infiltration, and storage treatment groups) which make up the targeted implementation approach for the Middle Fork Crow River planning region. These structural BMPs are the most cost effective based upon the estimated annualized dollars per unit of total phosphorus and total nitrogen reduced for the practice at the planning region outlet, and local water quality benefits from reducing sediment.

PTMApp Treatment Group	Number Impacting Planning Region Outlet
Biofiltration	0
Protection	0
Filtration	190
Infiltration	0
Storage	60



BEST STRUCTURAL PRACTICES WITH ANTICIPATED WATER QUALITY BENEFITS

The table below summarize the top 10 “best” or most cost-effective structural practices within the Middle Fork Crow River planning region. Shown in the table are the anticipated cumulative annualized cost of implementation and cumulative progress implementation makes towards state load reduction goals at the planning region outlet. These practices could be targeted first for potential implementation efforts. A complete list is provided in **Table 4-5**.



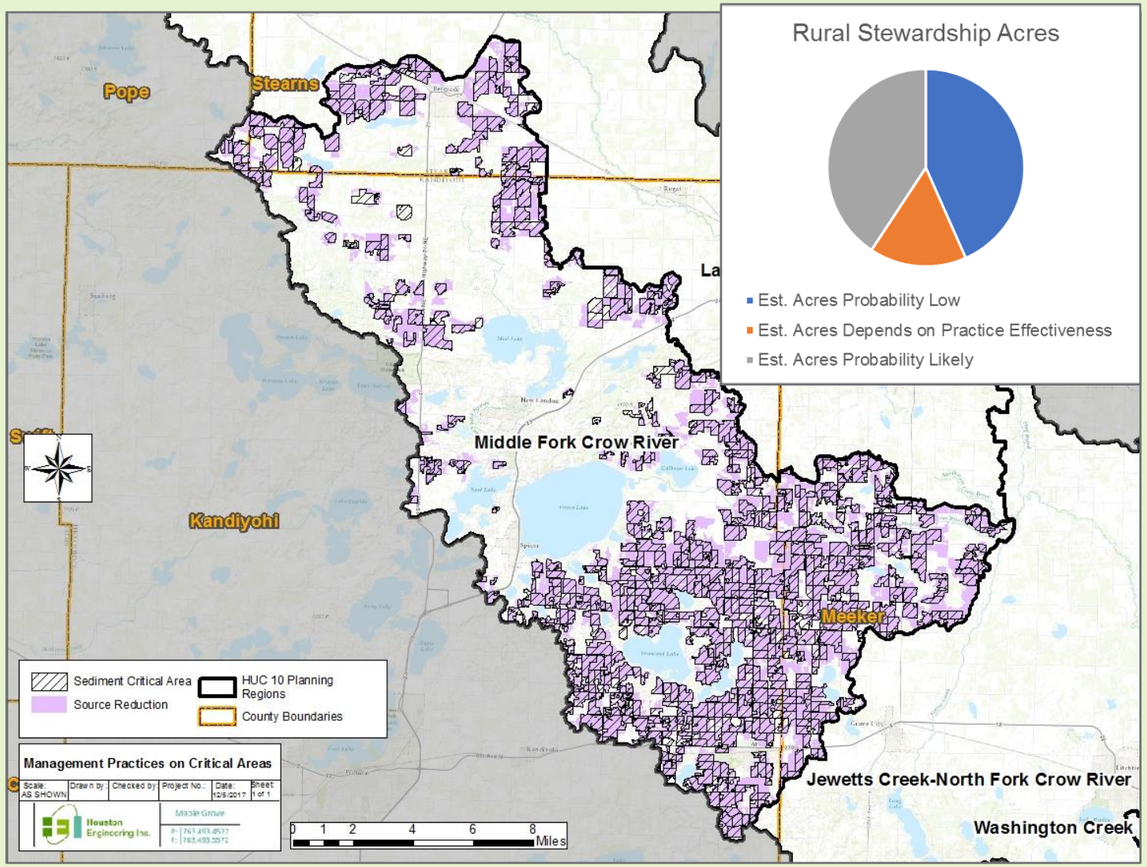
BMP ID	Practice Type	Drainage Area Treated (Sq. Ft)	Parameter	Annual Est. Load at BMP	Est. Annual Load Reduction	Cumulative Load Reduction	Progress toward State Goal (%)	Est. Annual Cost	Cumulative Annual Cost
142531 _528910_2	Filtration	5,015,127	Sed (tons)	145.4	72.7	72.7	1.1	$145	$ 145
			TP (lbs.)	19.7	0.3	0.3	0.7		
146545 _530893_2	Filtration	2,353,968	Sed (tons)	51.3	25.6	98.3	1.5	$274	$ 419
			TP (lbs.)	17.7	0.3	0.5	1.4		
144994 _530874_2	Filtration	1,594,564	Sed (tons)	20.2	10.1	108.4	1.6	$103	$ 521
			TP (lbs.)	5.1	0.1	0.6	1.5		
146870 _531024_2	Filtration	2,382,546	Sed (tons)	24.6	12.3	120.8	1.8	$227	$748
			TP (lbs.)	14.2	0.2	0.7	2.0		
135530 _526442_2	Filtration	3,043,234	Sed (tons)	56.9	28.5	149.2	2.2	$167	$915
			TP (lbs.)	25.7	0.1	0.8	2.2		
107740 _519369_2	Filtration	4,505,855	Sed (tons)	93.1	46.5	195.8	2.9	$145	$1,060
			TP (lbs.)	31.5	0.1	0.9	2.3		
142303 _528822_2	Filtration	4,606,799	Sed (tons)	21.8	10.9	206.6	3.1	$179	$1,239
			TP (lbs.)	34.4	0.1	1.0	2.5		
138842 _527223_2	Filtration	1,461,845	Sed (tons)	8.2	4.1	210.7	3.1	$104	$1,343
			TP (lbs.)	11.3	0.1	1.0	2.7		
146492 _530858_2	Filtration	948,117	Sed (tons)	26.1	13.0	223.8	3.3	$249	$1,591
			TP (lbs.)	5.9	0.1	1.1	2.9		
144990 _530063_2	Filtration	1,093,720	Sed (tons)	24.7	12.3	236.1	3.5	$268	$1,860
			TP (lbs.)	7.0	0.1	1.2	3.2		

MIDDLE FORK CROW RIVER IMPLEMENTATION PROFILE: TARGETED IMPLEMENTATION APPROACH- BEST MANAGEMENT PRACTICES (SHEET 4 OF 4)

BEST MANAGEMENT PRACTICES

Cropland fields (defined by Common Land Units) within the Middle Fork Crow River planning region were assessed based on their ability to meet principles of rural land stewardship. There are approximately 143,300 acres of cropland in the planning region, of which 43% are in “Probability Low”, 16% are in “Probability Depends on Practice Effectiveness,” and 41% are in “Probability Likely.”

One of the primary factors in determining stewardship is identifying areas that have disproportionately high sediment and total phosphorus loss, defined as critical source areas. Critical source areas for sediment within the Middle Fork Crow River planning region are shown on the map below. These areas could be targeted first for implementation of management practices (like cover crops, tillage management), to increase organic matter content. Areas where technically feasible management practices intersect these sediment critical source areas are shown below.



ANTICIPATED WATER QUALITY BENEFITS OF ATTAINING STEWARDSHIP GOAL

The watershed-wide measurable goal for rural stewardship is to implement management practices (i.e. cover crops, conservation tillage to increase residue, permanent cover) in 40% of all cropland areas in the watershed to increase Soil Organic Matter (SOM) content 1%. Areas to be managed are cropland areas categorized as rural stewardship “Probability Low” and “Probability Depends on Practice Effectiveness” which have SOM content between 1% and 4%. Below is a summary of the water quality benefits of attaining the rural stewardship measurable goal within the Middle Fork Crow River planning region.

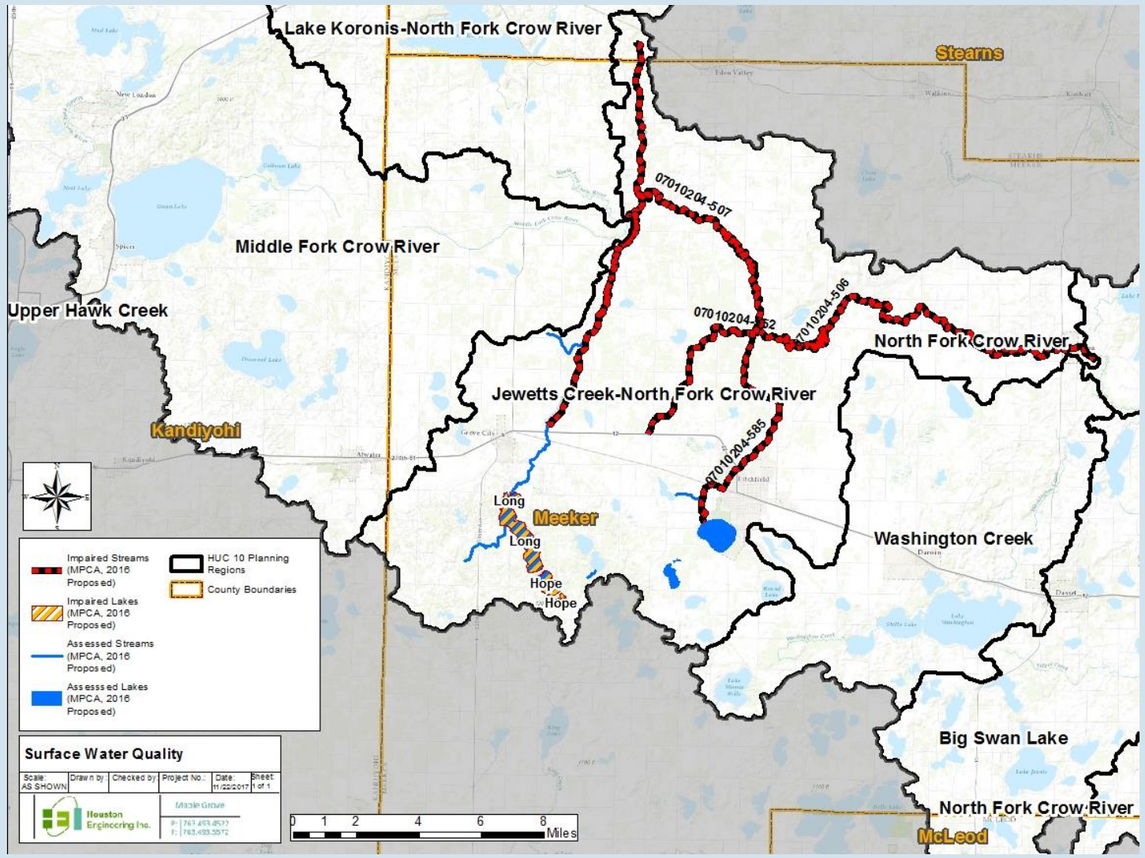
Clarity — 25% — **Sediment 25% Reduction** Existing Loads
Goal attainable through stewardship alone: No
Anticipated % reduction at planning region outlet: 16.8%

P — 12% — **Total Phosphorus 12% Reduction** Existing Loads
Goal attainable through stewardship alone: No
Anticipated % reduction at planning region outlet: 8.8%

JEWETTS CREEK-NORTH FORK CROW RIVER IMPLEMENTATION PROFILE: SUMMARY OF WATER RESOURCE CURRENT CONDITIONS (SHEET 1 OF 4)

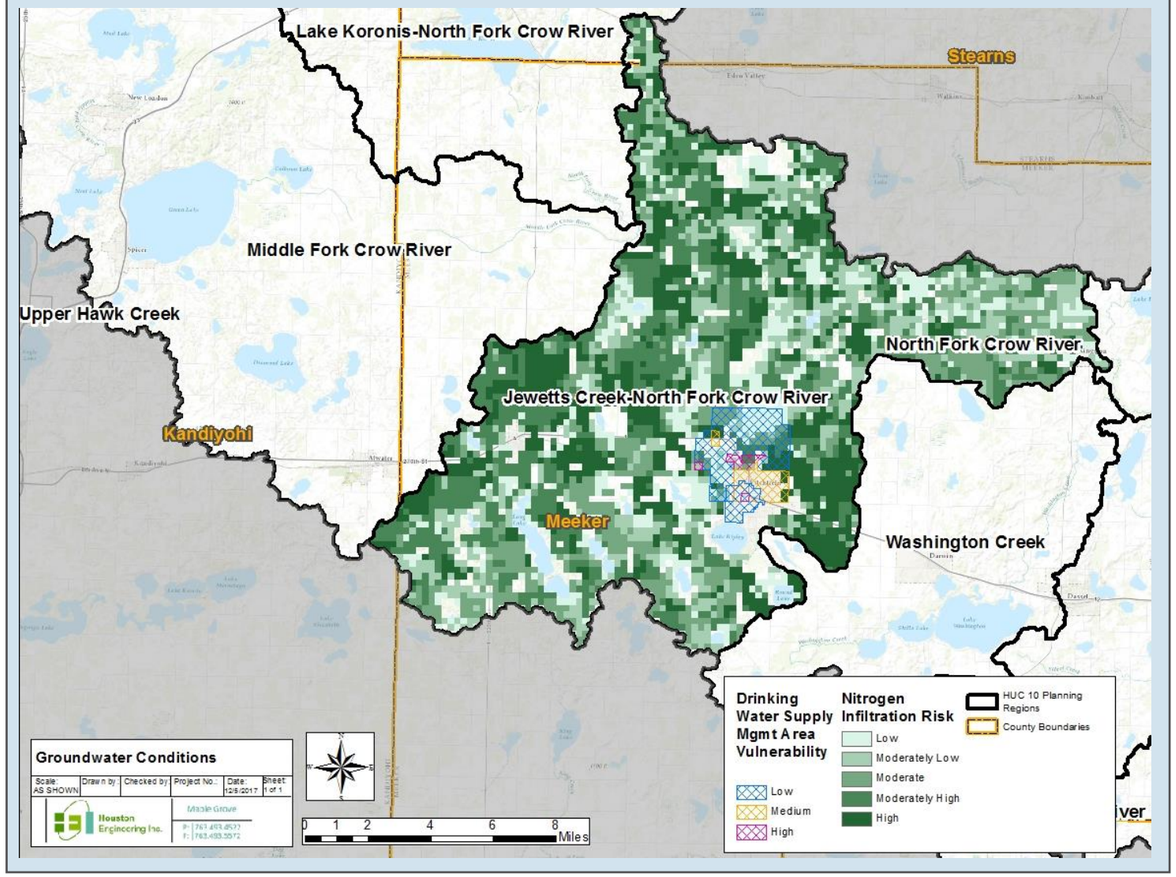
CURRENT CONDITIONS: SURFACE WATER QUALITY

Within the Jewetts Creek-North Fork Crow River planning region, there are six stream reaches (07010204-572; 514; 507; 552; 506; and 585) and two lakes (Long and Hope) which do not meet state water quality standards, and are listed as impaired. Other streams in the planning region have been assessed by parameter, based on available water quality monitoring data. Those streams have been categorized as needing protection or restoration management efforts, and are summarized in **Figures 3-3** through **3-7**. For more information about impaired and assessed streams and lakes within this planning region, please see the NFCR Watershed Restoration and Protection Strategy Report (https://www.pca.state.mn.us/sites/default/files/wq-ws4-06a.pdf).



CURRENT CONDITIONS: GROUNDWATER

The Jewetts Creek-North Fork Crow River planning region contains multiple Drinking Water Supply Management Areas (DWSMAs), where protection of groundwater used for drinking water purposes from nitrogen contamination is both a priority concern and plan measurable goal. To protect groundwater quality yet promote groundwater supplies, recharge structural practices should be encouraged in areas of "low" nitrogen infiltration risk to promote recharge of cleaner water. Storage and filtration practices should be encouraged in "high" nitrogen infiltration risk areas, to promote trapping and filtering of nitrogen rich surface waters to minimize the likelihood of further groundwater contamination, especially in DWSMAs.

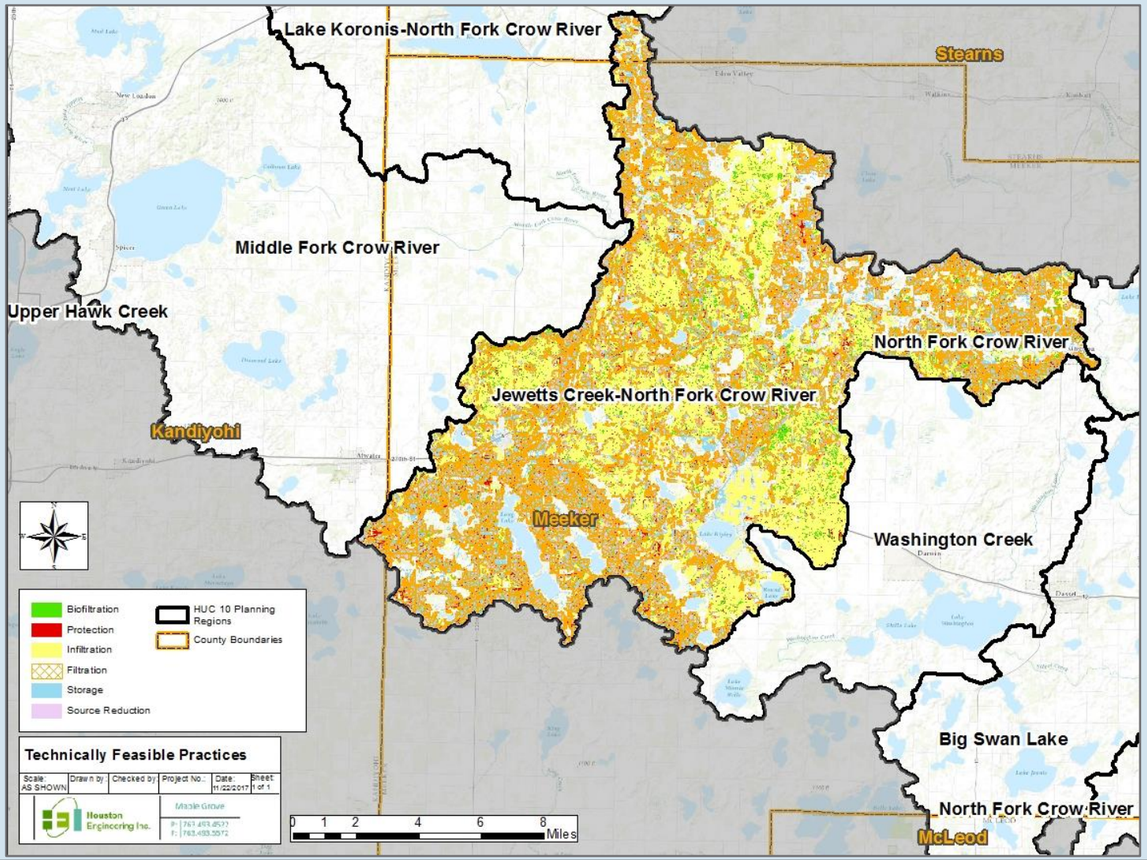


JEWETTS CREEK-NORTH FORK CROW RIVER IMPLEMENTATION PROFILE: TECHNICALLY FEASIBLE MANAGEMENT PRACTICES AND STRUCTURAL BMPS (SHEET 2 OF 4)

TECHNICALLY FEASIBLE MANAGEMENT PRACTICES AND STRUCTURAL BMPS

Implementation of management practices and structural BMPs make progress towards watershed-wide and priority concern measurable goals. There are many locations feasible for implementation of these practices within the Jewetts Creek-North Fork Crow planning region. Locations technically feasible for management practices and structural BMPs are summarized and shown in the table and map below.

PTMApp Treatment Group	Practice Type		Number Impacting Planning Region Outlet
	Structural BMP	Management Practice	
Biofiltration	X		3,660
Protection	X		12,678
Filtration	X		13,668
Infiltration	X		8,383
Storage	X		13,427
Source Reduction		X	15,148



ARE STATE LOAD REDUCTION GOALS REALISTIC THROUGH STRUCTURAL PRACTICES ALONE?

Sediment 25% Reduction
Existing Loads

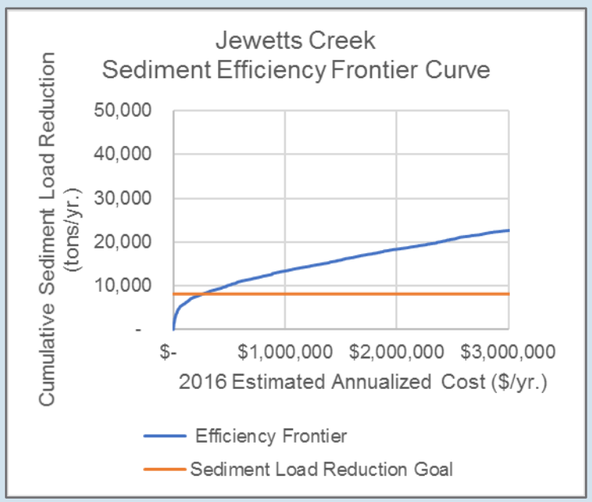
Goal Source: Sediment Reduction Strategy
Existing Load at Planning Region Outlet: 32,688 tons/yr.
Target Load Reduction at Outlet: 8,172 tons/yr.
Estimated # of Structural BMPs to Meet Goal*: 418
Estimated Annualized Cost: $467,700

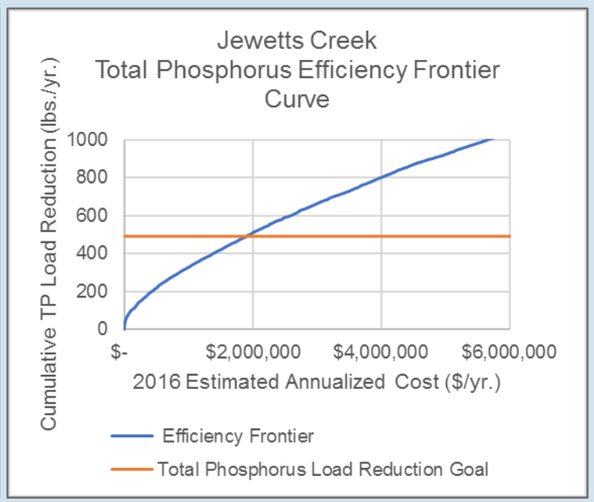
Total Phosphorus 12% Reduction
Existing Loads

Goal Source: Nutrient Reduction Strategy
Existing Load at Planning Region Outlet: 4,102 lbs./yr.
Target Load Reduction at Outlet: 492 lbs./yr.
Estimated # of Structural BMPs to Meet Goal*: 1,098
Estimated Annualized Cost: $2,503,500

Efficiency frontier curves were developed to evaluate if state load reduction goals for sediment and total phosphorus are realistic by treating solely surface runoff with technically feasible structural BMPs. Shown in the charts below with horizontal lines are the total sediment and total phosphorus load reduction goal regardless of source. Total cost of implementation is shown on the x-axis. Progress towards goals is evaluated locally for sediment, and at the planning region outlet for total phosphorus.

** 120% of load reduction goal used to estimate # of practices and annualized cost, in recognition that not all practices function perfectly upon implementation*



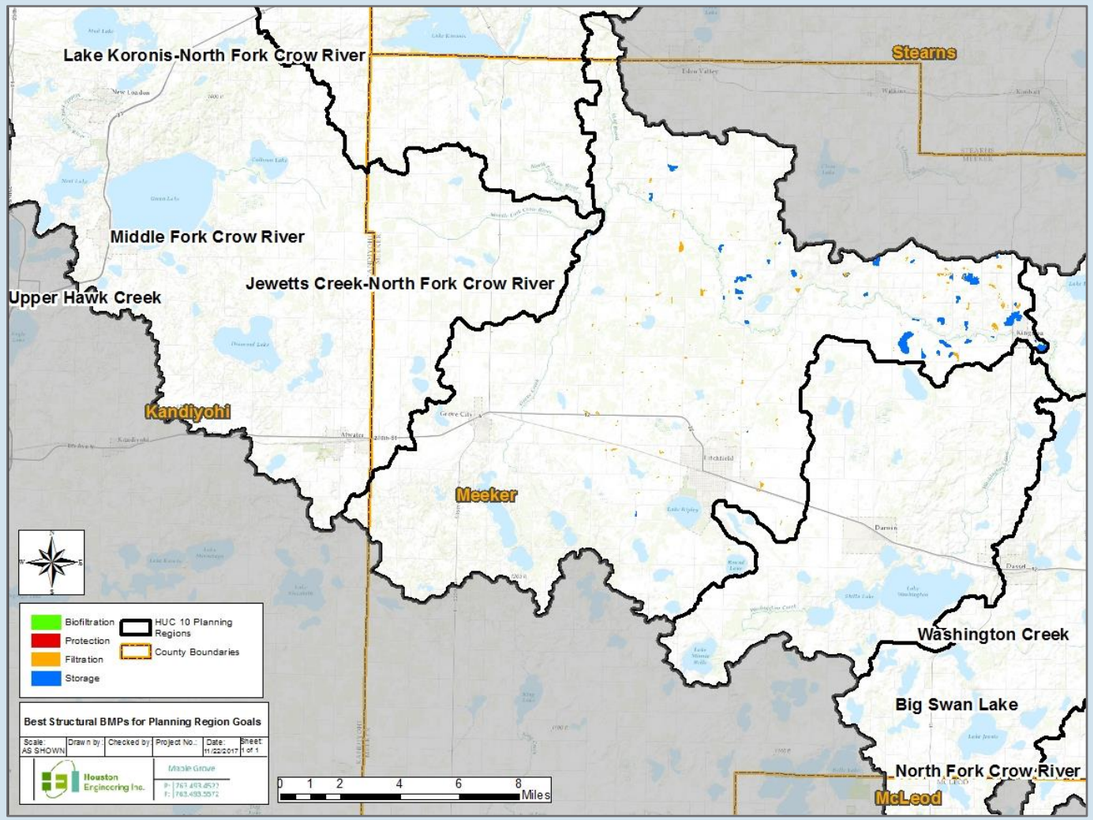


JEWETTS CREEK-NORTH FORK CROW RIVER IMPLEMENTATION PROFILE: TARGETED IMPLEMENTATION APPROACH- BEST STRUCTURAL PRACTICES (SHEET 3 OF 4)

BEST STRUCTURAL BMPS

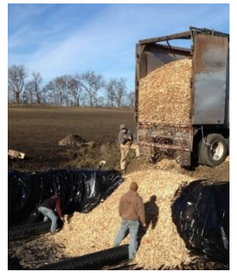
Shown in the image below are the 250 “best” structural BMPs (biofiltration, protection, filtration, infiltration, and storage treatment groups) which make up the targeted implementation approach for the Jewetts Creek-North Fork Crow River planning region. These structural BMPs are the most cost effective based upon the estimated annualized dollars per unit of total phosphorus and total nitrogen reduced for the practice at the planning region outlet, and local water quality benefits from reducing sediment.

PTMApp Treatment Group	Number Impacting Planning Region Outlet
Biofiltration	0
Protection	0
Filtration	205
Infiltration	0
Storage	45



BEST STRUCTURAL PRACTICES WITH ANTICIPATED WATER QUALITY BENEFITS

The table below summarize the top 10 “best” or most cost-effective structural practices within the Jewetts Creek-North Fork Crow River planning region. Shown in the table are the anticipated cumulative annualized cost of implementation and cumulative progress implementation makes towards state load reduction goals at the planning region outlet. These practices could be targeted first for potential implementation efforts. A complete list is provided in **Table 4-5**.



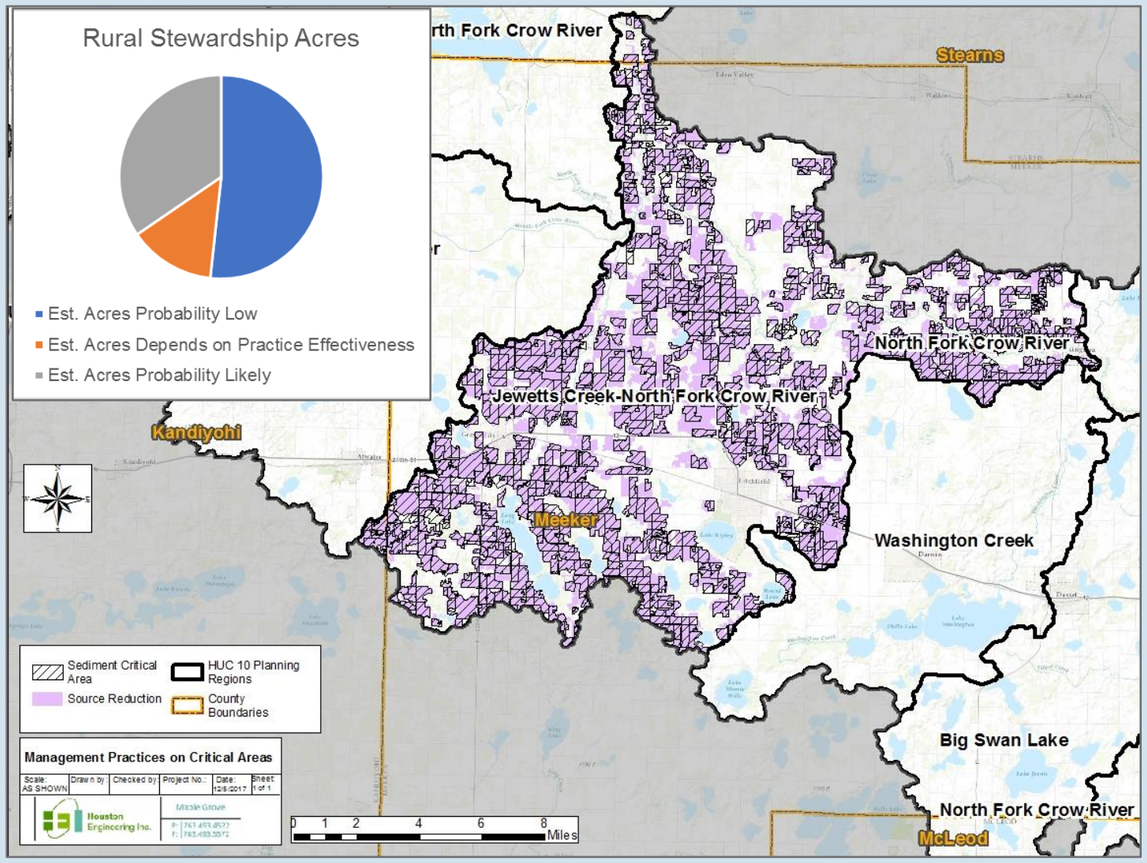
BMP ID	Practice Type	Drainage Area Treated (Sq. Ft)	Parameter	Annual Est. Load at BMP	Est. Annual Load Reduction	Cumulative Load Reduction	Progress toward State Goal (%)	Est. Annual Cost	Cumulative Annual Cost
198635_47429_2	Filtration	5,437,018	Sed (tons)	129.2	63.8	63.8	0.8	$ 95	$ 95
			TP (lbs.)	32.8	2.8	2.8	0.6		
218878_554362_2	Filtration	4,892,096	Sed (tons)	164.7	82.4	146.2	1.8	$121	$216
			TP (lbs.)	38.6	1.0	3.7	0.8		
185641_542904_2	Filtration	2,969,900	Sed (tons)	99.7	47.8	194.0	2.4	$ 118	$334
			TP (lbs.)	21.0	1.3	5.1	1.0		
259840_570498_2	Filtration	4,652,427	Sed (tons)	85.4	42.7	236.8	2.9	$ 80	$415
			TP (lbs.)	39.1	0.6	5.7	1.1		
210331_551734_2	Filtration	3,325,335	Sed (tons)	100.1	50.0	286.8	3.5	$177	$591
			TP (lbs.)	20.8	2.1	7.8	1.6		
191958_545030_2	Filtration	4,376,623	Sed (tons)	117.5	58.8	345.6	4.2	$225	$817
			TP (lbs.)	31.6	2.4	10.2	2.1		
280450_579674_2	Filtration	5,400,206	Sed (tons)	116.2	58.1	403.7	4.9	$118	$935
			TP (lbs.)	42.7	0.4	10.6	2.1		
200455_548253_2	Filtration	3,592,322	Sed (tons)	77.1	38.6	442.2	5.4	$177	$1,112
			TP (lbs.)	17.8	2.2	12.8	2.6		
262953_571719_2	Filtration	4,458,870	Sed (tons)	117.9	58.9	501.2	6.1	$89	$1,201
			TP (lbs.)	32.6	0.2	13.0	2.6		
212856_552539_2	Filtration	2,046,680	Sed (tons)	47.7	23.9	525.0	6.4	$87	$ 1,288
			TP (lbs.)	18.9	0.4	13.4	2.7		

JEWETTS CREEK-NORTH FORK CROW RIVER IMPLEMENTATION PROFILE: TARGETED IMPLEMENTATION APPROACH- BEST MANAGEMENT PRACTICES (SHEET 4 OF 4)

BEST MANAGEMENT PRACTICES

Cropland fields (defined by Common Land Units) within the Jewetts Creek-North Fork Crow River planning region were assessed based on their ability to meet principles of rural land stewardship. There are approximately 120,300 acres of cropland in the planning region, of which 52% are in “Probability Low”, 14% are in “Probability Depends on Practice Effectiveness,” and 35% are in “Probability Likely.”

One of the primary factors in determining stewardship is identifying areas that have disproportionately high sediment and total phosphorus loss, defined as critical source areas. Critical source areas for sediment within the Jewetts Creek- North Fork Crow River planning region are shown on the map below. These areas could be targeted first for implementation of management practices (like cover crops, tillage management), to increase organic matter content. Areas where technically feasible management practices intersect these sediment critical source areas are shown below.



ANTICIPATED WATER QUALITY BENEFITS OF ATTAINING STEWARDSHIP GOAL

The watershed-wide measurable goal for rural stewardship is to implement management practices (i.e. cover crops, conservation tillage to increase residue, permanent cover) in 40% of all cropland areas in the watershed to increase Soil Organic Matter (SOM) content 1%. Areas to be managed are cropland areas categorized as rural stewardship “Probability Low” and “Probability Depends on Practice Effectiveness” which have SOM content between 1% and 4%. Below is a summary of the water quality benefits of attaining the rural stewardship measurable goal within the Jewetts Creek-North Fork Crow River planning region.

25%

Sediment 25% Reduction
Existing Loads

Goal attainable through stewardship alone: No
Anticipated % reduction at planning region outlet: 16.4%

12%

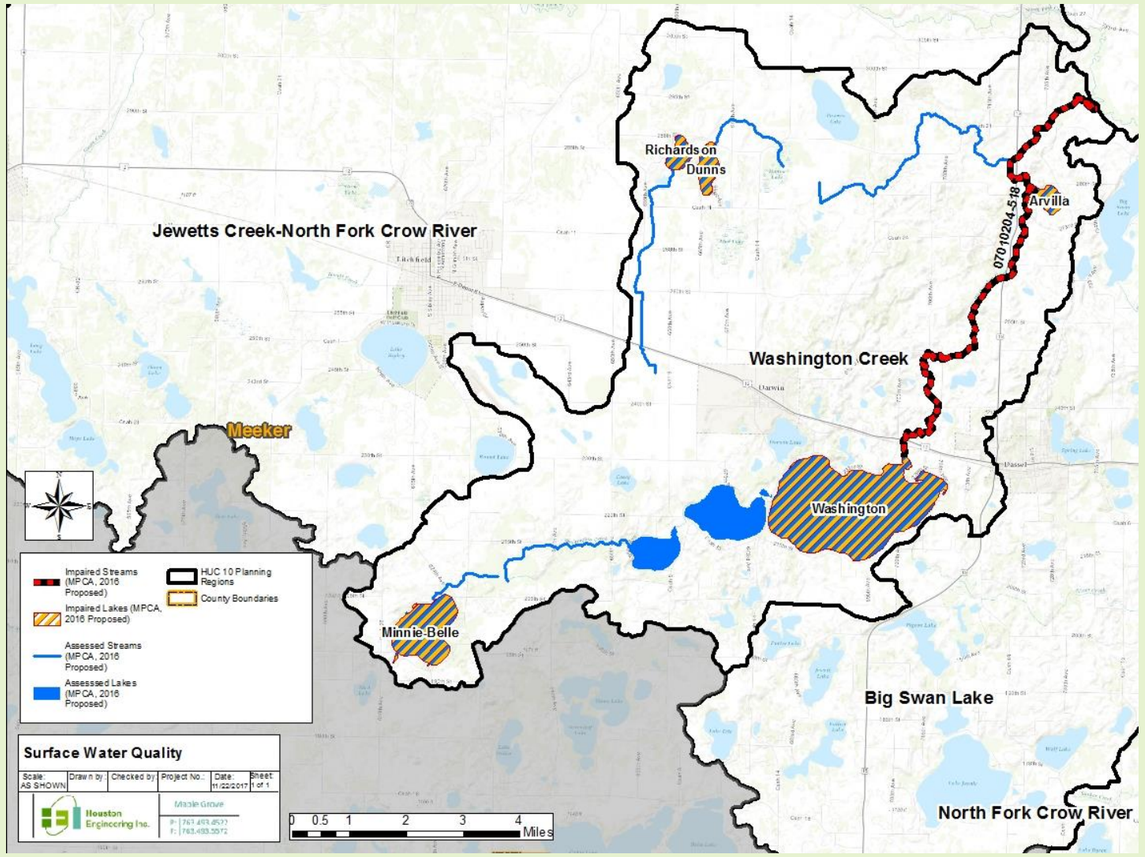
Total Phosphorus 12% Reduction
Existing Loads

Goal attainable through stewardship alone: No
Anticipated % reduction at planning region outlet: 7.1%

WASHINGTON CREEK IMPLEMENTATION PROFILE: SUMMARY OF WATER RESOURCE CURRENT CONDITIONS (SHEET 1 OF 4)

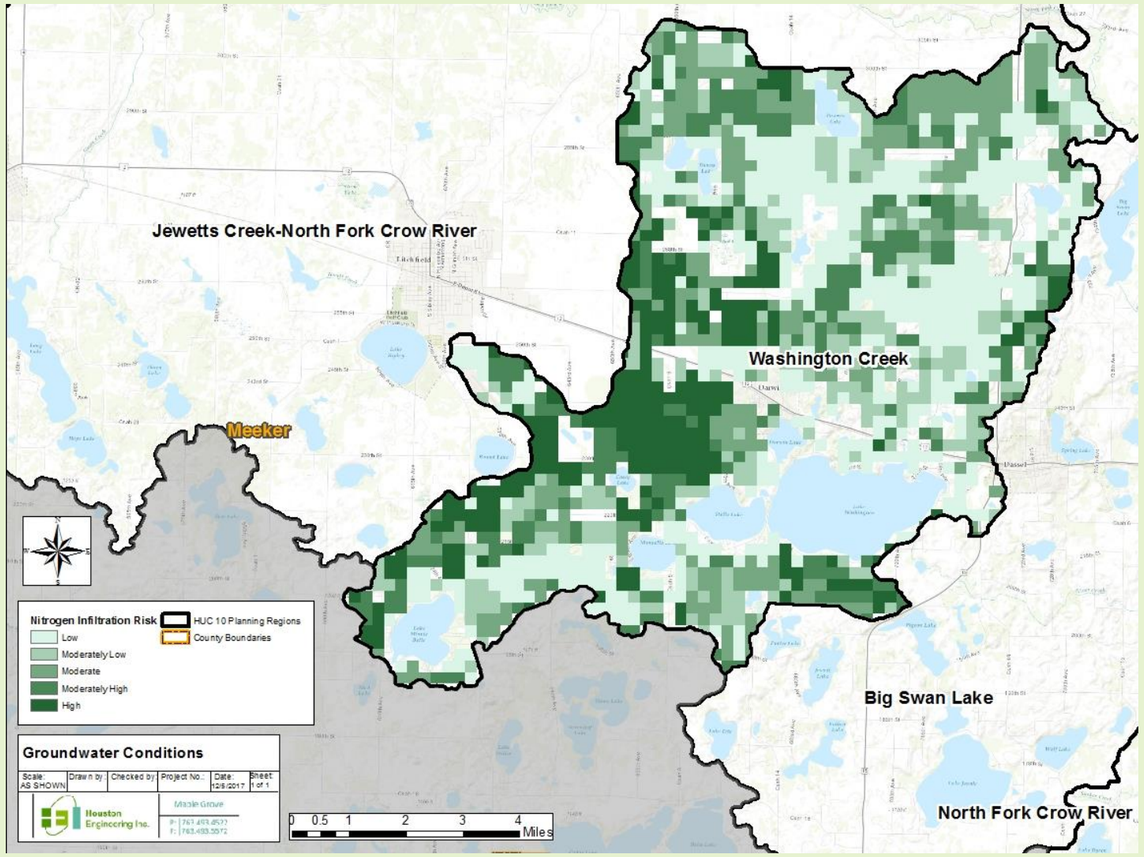
CURRENT CONDITIONS: SURFACE WATER QUALITY

Within the Washington Creek planning region, there is one stream reach (07010204-518) and five lakes (Minnie-Belle, Washington, Arvilla, Richardson, and Dunns) which do not meet state water quality standards, and are listed as impaired. Other streams in the planning region have been assessed by parameter, based on available water quality monitoring data. Those streams have been categorized as needing protection or restoration management efforts, and are summarized in the **Figures 3-3** through **3-7.** For more information about impaired and assessed streams and lakes within this planning region, please see the NFCR Watershed Restoration and Protection Strategy Report (https://www.pca.state.mn.us/sites/default/files/wq-ws4-06a.pdf).



CURRENT CONDITIONS: GROUNDWATER

The Washington Creek planning region does not contain any Drinking Water Supply Management Areas (DWSMAs). However, the protection of groundwater used for drinking water purposes and groundwater supplies are both plan priority concerns. To protect groundwater quality yet promote groundwater supplies, recharge structural practices should be encouraged in areas of “low” nitrogen infiltration risk to promote recharge of cleaner water. Storage and filtration practices should be encouraged in “high” nitrogen infiltration risk areas, to promote trapping and filtering of nitrogen rich surface waters to minimize the likelihood of further groundwater contamination.

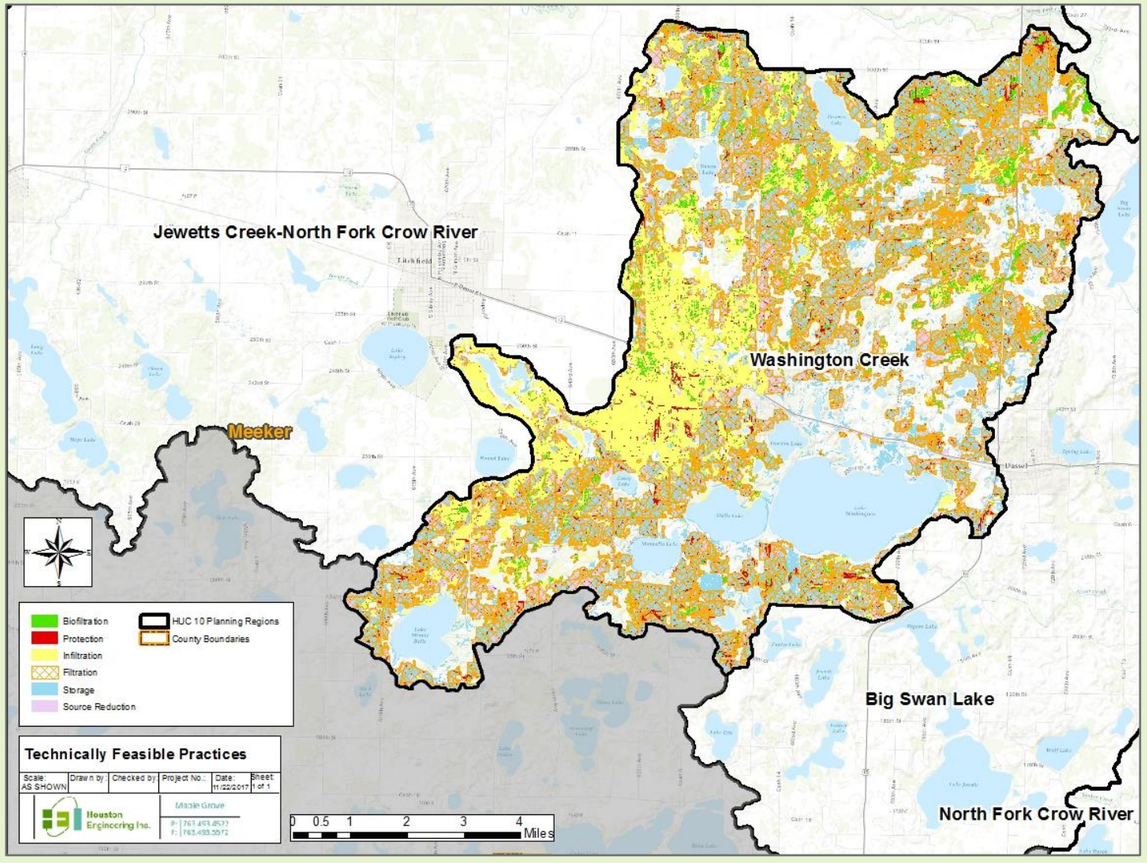


WASHINGTON CREEK IMPLEMENTATION PROFILE: TECHNICALLY FEASIBLE MANAGEMENT PRACTICES AND STRUCTURAL BMPS (SHEET 2 OF 4)

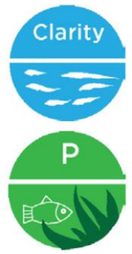
TECHNICALLY FEASIBLE MANAGEMENT PRACTICES AND STRUCTURAL BMPS

Implementation of management practices and structural BMPs make progress towards watershed-wide and priority concern measurable goals. There are many locations feasible for implementation of these practices within the Washington Creek planning region. Locations technically feasible for management practices and structural BMPs are summarized and shown in the table and map below.

PTMApp Treatment Group	Practice Type		Number Impacting Planning Region Outlet
	Structural BMP	Management Practice	
Biofiltration	X		2,475
Protection	X		1,837
Filtration	X		1,230
Infiltration	X		541
Storage	X		1,783
Source Reduction		X	1,526



ARE STATE LOAD REDUCTION GOALS REALISTIC THROUGH STRUCTURAL PRACTICES ALONE?



Sediment 25% Reduction
Existing Loads

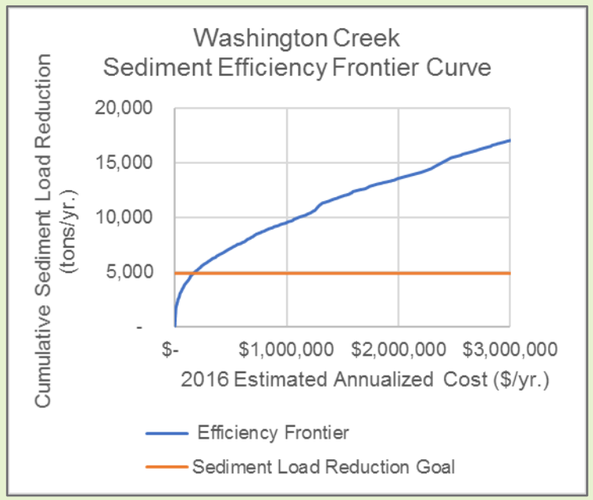
Goal Source: Sediment Reduction Strategy
Existing Load at Planning Region Outlet: 19,689 tons/yr.
Target Load Reduction at Outlet: 4,922 tons/yr.
Estimated # of Structural BMPs to Meet Goal*: 183
Estimated Annualized Cost: $292,000

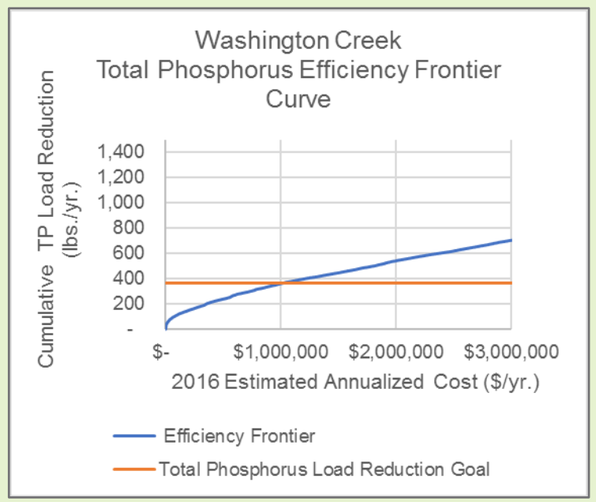
Total Phosphorus 12% Reduction
Existing Loads

Goal Source: Nutrient Reduction Strategy
Existing Load at Planning Region Outlet: 3070 lbs./yr.
Target Load Reduction at Outlet: 368 lbs./yr.
Estimated # of Structural BMPs to Meet Goal*: 386
Estimated Annualized Cost: $1,455,000

Efficiency frontier curves were developed to evaluate if state load reduction goals for sediment and total phosphorus are realistic by treating solely surface runoff with technically feasible structural BMPs. Shown in the charts below with horizontal lines are the total sediment and total phosphorus load reduction goal regardless of source. Total cost of implementation is shown on the x-axis. Progress towards goals is evaluated locally for sediment, and at the planning region outlet for total phosphorus.

** 120% of load reduction goal used to estimate # of practices and annualized cost, in recognition that not all practices function perfectly upon implementation*



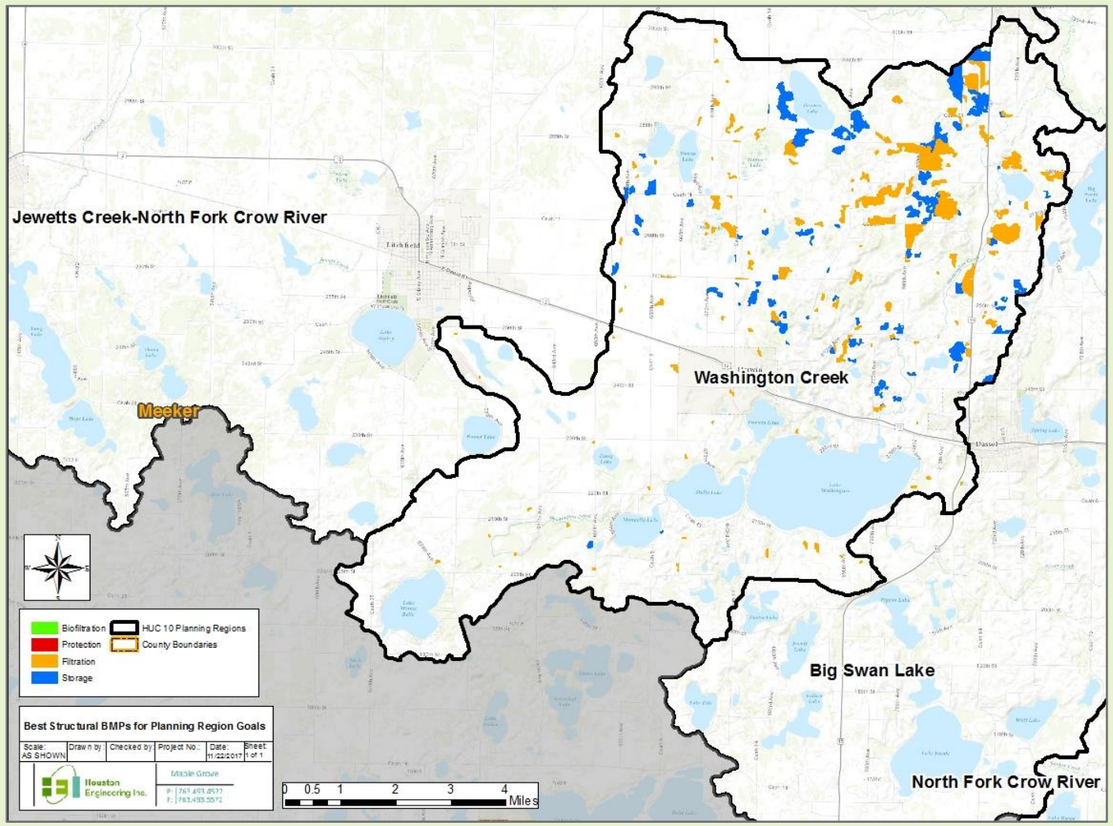


WASHINGTON CREEK IMPLEMENTATION PROFILE: TARGETED IMPLEMENTATION APPROACH- BEST STRUCTURAL PRACTICES (SHEET 3 OF 4)

BEST STRUCTURAL BMPS

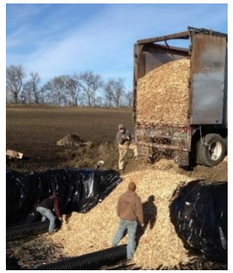
Shown in the image below are the 250 “best” structural BMPs (biofiltration, protection, filtration, infiltration, and storage treatment groups) which make up the targeted implementation approach for the Washington Creek planning region. These structural BMPs are the most cost effective based upon the estimated annualized dollars per unit of total phosphorus and total nitrogen reduced for the practice at the planning region outlet, and local water quality benefits from reducing sediment.

PTMApp Treatment Group	Number Impacting Planning Region Outlet
Biofiltration	0
Protection	0
Filtration	150
Infiltration	0
Storage	100



BEST STRUCTURAL PRACTICES WITH ANTICIPATED WATER QUALITY BENEFITS

The table below summarize the top 10 “best” or most cost-effective structural practices within the Washington Creek planning region. Shown in the table are the anticipated cumulative annualized cost of implementation and cumulative progress implementation makes towards state load reduction goals at the planning region outlet. These practices could be targeted first for potential implementation efforts. A complete list is provided in **Table 4-5**.



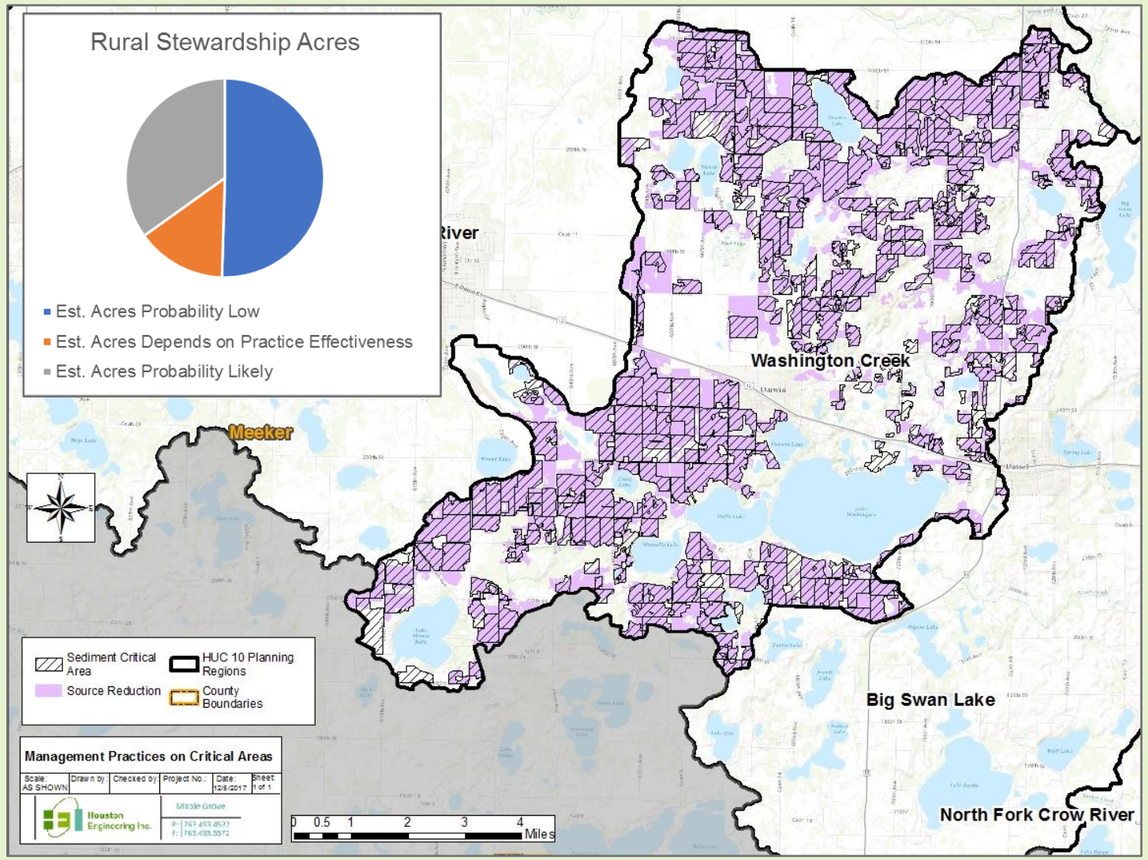
BMP ID	Practice Type	Drainage Area Treated (Sq. Ft)	Parameter	Annual Est. Load at BMP	Est. Annual Load Reduction	Cumulative Load Reduction	Progress toward State Goal (%)	Est. Annual Cost	Cumulative Annual Cost
275702_577138_2	Filtration	5,322,899	Sed (tons)	235.6	117.8	117.8	2.4	$ 137	$ 137
			TP (lbs.)	42.4	4.1	4.1	1.1		
241379_563280_2	Filtration	3,903,970	Sed (tons)	176.0	88.0	205.8	4.2	$108	$ 245
			TP (lbs.)	32.4	1.7	5.7	1.6		
257805_568842_2	Filtration	2,594,703	Sed (tons)	85.7	42.8	248.6	5.1	$ 83	$ 329
			TP (lbs.)	19.8	0.9	6.7	1.8		
265753_572880_2	Filtration	2,975,034	Sed (tons)	117.4	58.7	307.3	6.2	$ 241	$ 569
			TP (lbs.)	21.1	2.4	9.1	2.5		
232169_558486_2	Filtration	2,131,737	Sed (tons)	76.8	38.4	345.7	7.0	$ 85	$ 655
			TP (lbs.)	15.8	0.7	9.8	2.7		
235494_561157_2	Filtration	3,661,588	Sed (tons)	194.5	97.3	443.0	9.0	$ 489	$ 1,144
			TP (lbs.)	29.8	3.9	13.6	3.7		
241419_563474_2	Filtration	1,748,789	Sed (tons)	62.8	29.4	472.4	9.6	$ 127	$ 1,272
			TP (lbs.)	15.0	0.7	14.3	3.9		
279178_579083_2	Filtration	4,924,452	Sed (tons)	102.4	51.2	523.6	10.6	$ 104	$ 1,376
			TP (lbs.)	36.6	0.5	14.8	4.0		
242787_563850_2	Filtration	1,617,814	Sed (tons)	75.4	37.7	561.3	11.4	$ 355	$ 1,731
			TP (lbs.)	14.5	2.7	17.5	4.7		
252068_567745_2	Filtration	1,928,396	Sed (tons)	100.5	50.3	611.5	12.4	$ 185	$ 1,916
			TP (lbs.)	12.2	1.0	18.4	5.0		

WASHINGTON CREEK IMPLEMENTATION PROFILE: TARGETED IMPLEMENTATION APPROACH- BEST MANAGEMENT PRACTICES (SHEET 4 OF 4)

BEST MANAGEMENT PRACTICES

Cropland fields (defined by Common Land Units) within the Washington Creek planning region were assessed based on their ability to meet principles of rural land stewardship. There are approximately 48,200 acres of cropland in the planning region, of which 50% are in “Probability Low”, 15% are in “Probability Depends on Practice Effectiveness,” and 35% are in “Probability Likely.”

One of the primary factors in determining stewardship is identifying areas that have disproportionately high sediment and total phosphorus loss, defined as critical source areas. Critical source areas for sediment within the Washington Creek planning region are shown on the map below. These areas could be targeted first for implementation of management practices (like cover crops, tillage management), to increase organic matter content. Areas where technically feasible management practices intersect these sediment critical source areas are shown below.



ANTICIPATED WATER QUALITY BENEFITS OF ATTAINING STEWARDSHIP GOAL

The watershed-wide measurable goal for rural stewardship is to implement management practices (i.e. cover crops, conservation tillage to increase residue, permanent cover) in 40% of all cropland areas in the watershed to increase Soil Organic Matter (SOM) content 1%. Areas to be managed are cropland areas categorized as rural stewardship “Probability Low” and “Probability Depends on Practice Effectiveness” which have SOM content between 1% and 4%. Below is a summary of the water quality benefits of attaining the rural stewardship measurable goal within the Washington Creek planning region.

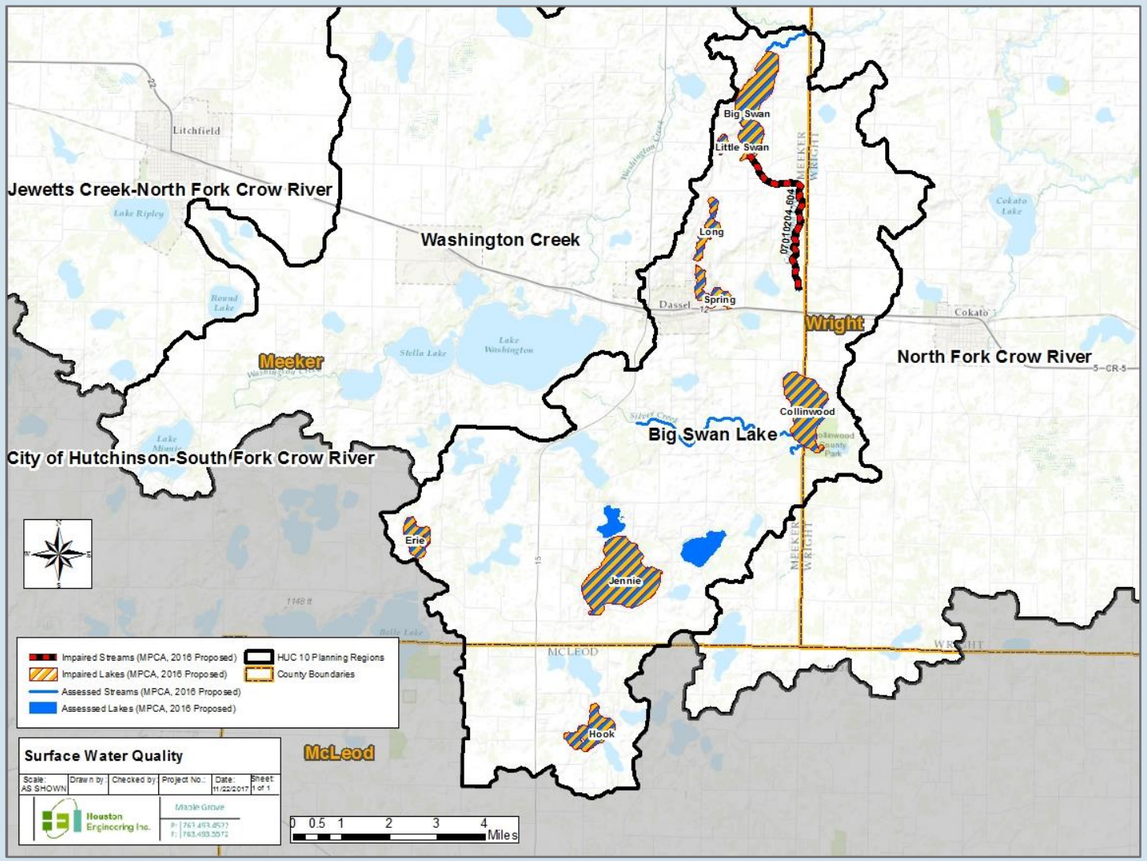
Clarity — 25% — **Sediment 25% Reduction** Existing Loads
Goal attainable through stewardship alone: No
Anticipated % reduction at planning region outlet: 14.2%

P — 12% — **Total Phosphorus 12% Reduction** Existing Loads
Goal attainable through stewardship alone: No
Anticipated % reduction at planning region outlet: 5.1%

BIG SWAN LAKE IMPLEMENTATION PROFILE: SUMMARY OF WATER RESOURCE CURRENT CONDITIONS (SHEET 1 OF 4)

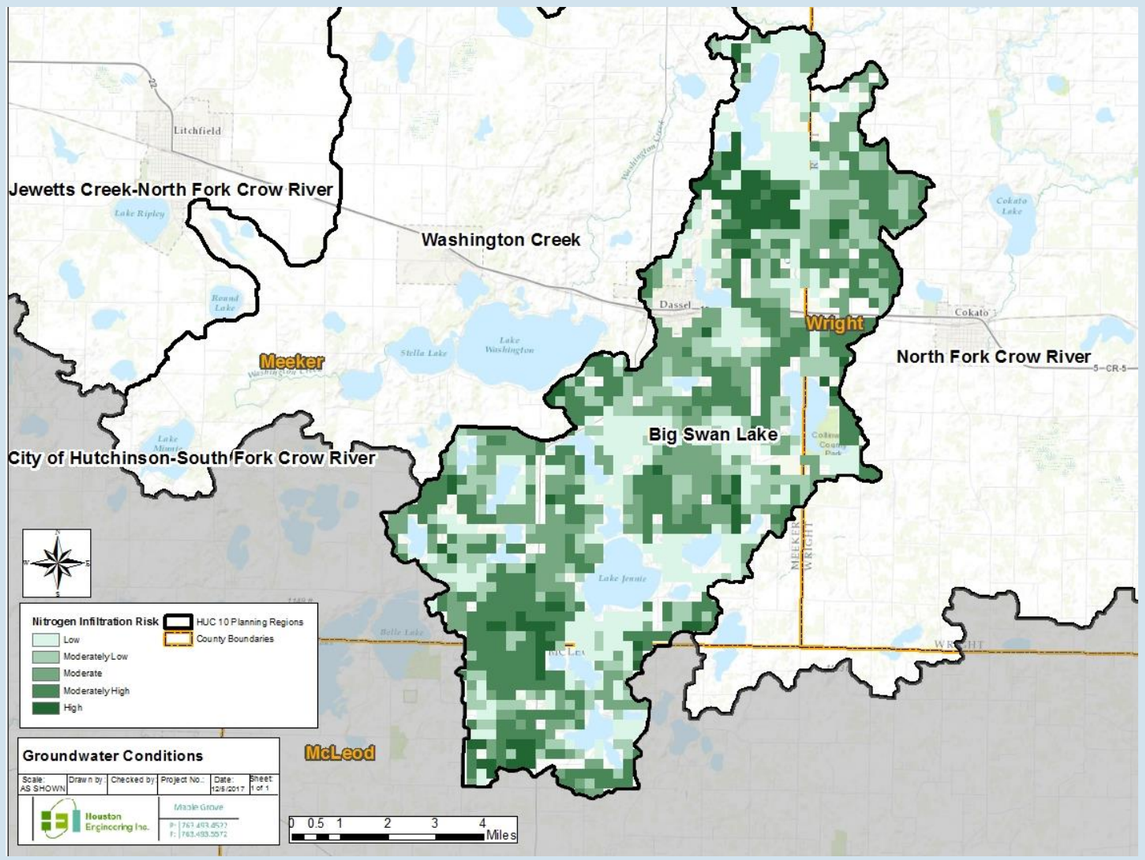
CURRENT CONDITIONS: SURFACE WATER QUALITY

Within the Big Swan Lake planning region, there is one stream reach (07010204-604) and eight lakes (Erie, Hook, Jennie, Collinwood, Spring, Long, Little Swan, and Big Swan) that do not meet state water quality standards, and are listed as impaired. Other streams in the planning region have been assessed by parameter, based on available water quality monitoring data. Those streams have been categorized as needing protection or restoration management efforts, and are summarized in the **Figures 3-3** through **3-7**. For more information about impaired and assessed streams and lakes within this planning region, please see the NFCR Watershed Restoration and Protection Strategy Report (https://www.pca.state.mn.us/sites/default/files/wq-ws4-06a.pdf).



CURRENT CONDITIONS: GROUNDWATER

The Big Swan Lake planning region does not contain any Drinking Water Supply Management Areas (DWSMAs). However, the protection of groundwater used for drinking water purposes and groundwater supplies are both plan priority concerns. To protect groundwater quality yet promote groundwater supplies, recharge structural practices should be encouraged in areas of “low” nitrogen infiltration risk to promote recharge of cleaner water. Storage and filtration practices should be encouraged in “high” nitrogen infiltration risk areas, to promote trapping and filtering of nitrogen rich surface waters to minimize the likelihood of further groundwater contamination.

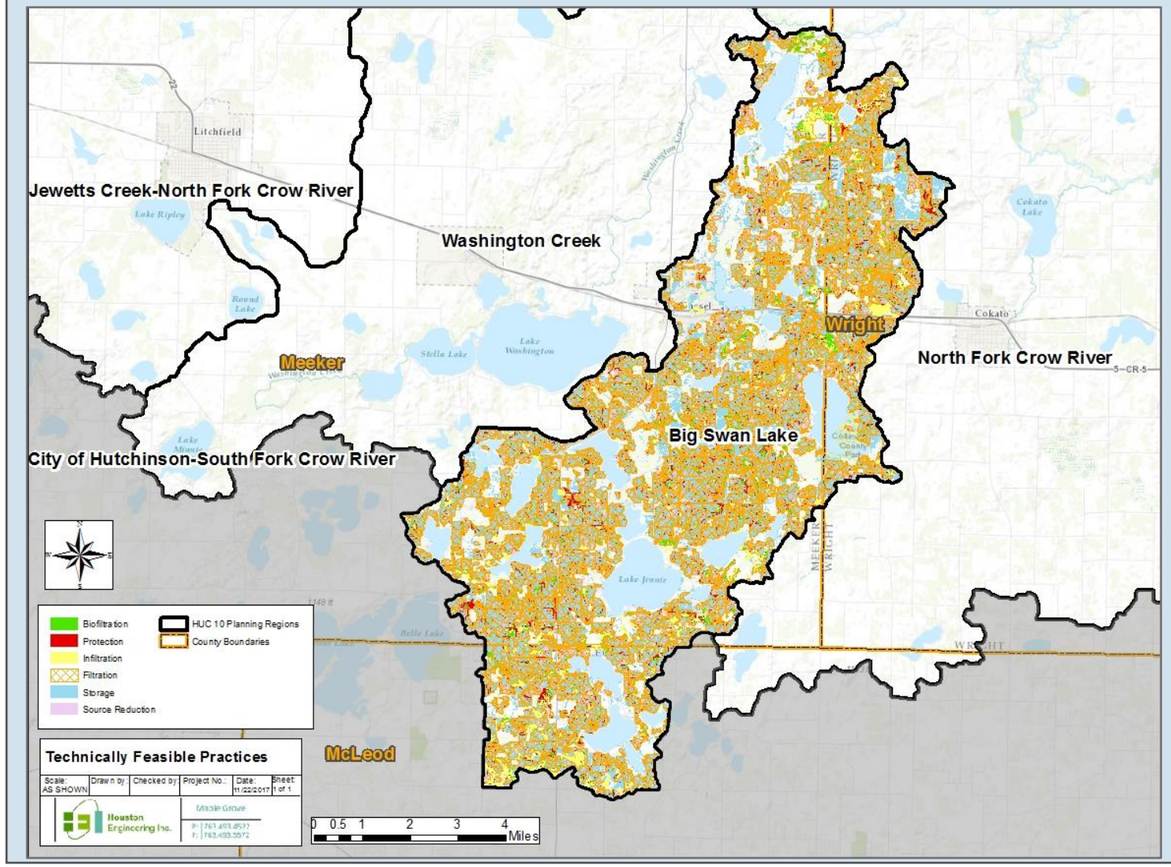


BIG SWAN LAKE IMPLEMENTATION PROFILE: TECHNICALLY FEASIBLE MANAGEMENT PRACTICES AND STRUCTURAL BMPS (SHEET 2 OF 4)

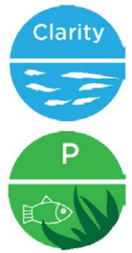
TECHNICALLY FEASIBLE MANAGEMENT PRACTICES AND STRUCTURAL BMPS

Implementation of management practices and structural BMPs make progress towards watershed-wide and priority concern measurable goals. There are many locations feasible for implementation of these practices within the Big Swan Lake planning region. Locations technically feasible for management practices and structural BMPs are summarized and shown in the table and map below.

PTMApp Treatment Group	Practice Type		Number Impacting Planning Region Outlet
	Structural BMP	Management Practice	
Biofiltration	X		1,702
Protection	X		2,590
Filtration	X		1,287
Infiltration	X		312
Storage	X		1,661
Source Reduction		X	1,723



ARE STATE LOAD REDUCTION GOALS REALISTIC THROUGH STRUCTURAL PRACTICES ALONE?



Sediment 25% Reduction
Existing Loads

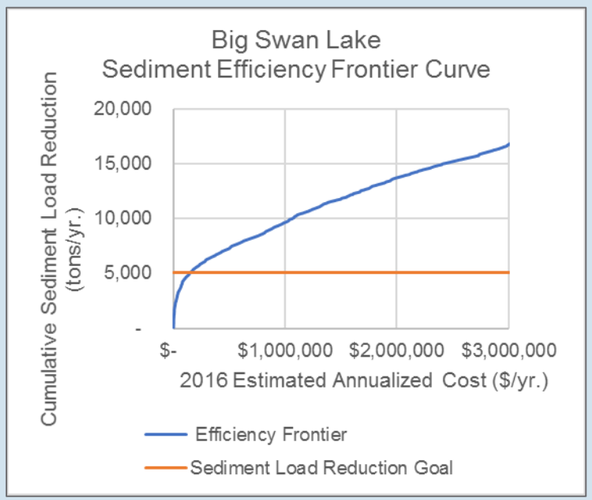
Goal Source: Sediment Reduction Strategy
Existing Load at Planning Region Outlet: 20,404 tons/yr.
Target Load Reduction at Outlet: 5,101 tons/yr.
Estimated # of Structural BMPs to Meet Goal*: 198
Estimated Annualized Cost: $284,500

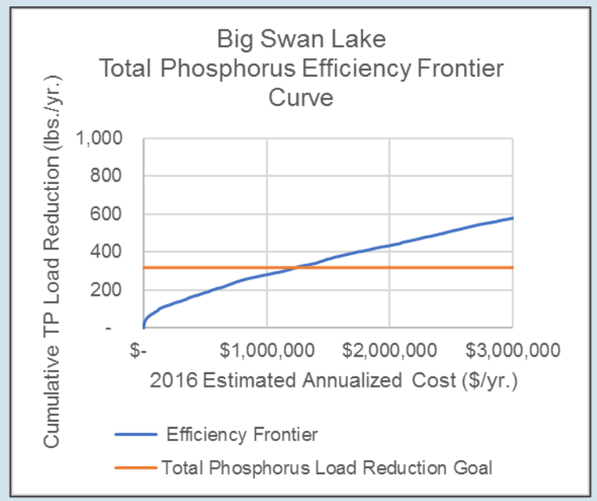
Total Phosphorus 12% Reduction
Existing Loads

Goal Source: Nutrient Reduction Strategy
Existing Load at Planning Region Outlet: 2,655 lbs./yr.
Target Load Reduction at Outlet: 319 lbs./yr.
Estimated # of Structural BMPs to Meet Goal*: 447
Estimated Annualized Cost: $1,618,000

Efficiency frontier curves were developed to evaluate if state load reduction goals for sediment and total phosphorus are realistic by treating solely surface runoff with technically feasible structural BMPs. Shown in the charts below with horizontal lines are the total sediment and total phosphorus load reduction goal regardless of source. Total cost of implementation is shown on the x-axis. Progress towards goals is evaluated locally for sediment, and at the planning region outlet for total phosphorus.

** 120% of load reduction goal used to estimate # of practices and annualized cost, in recognition that not all practices function perfectly upon implementation*



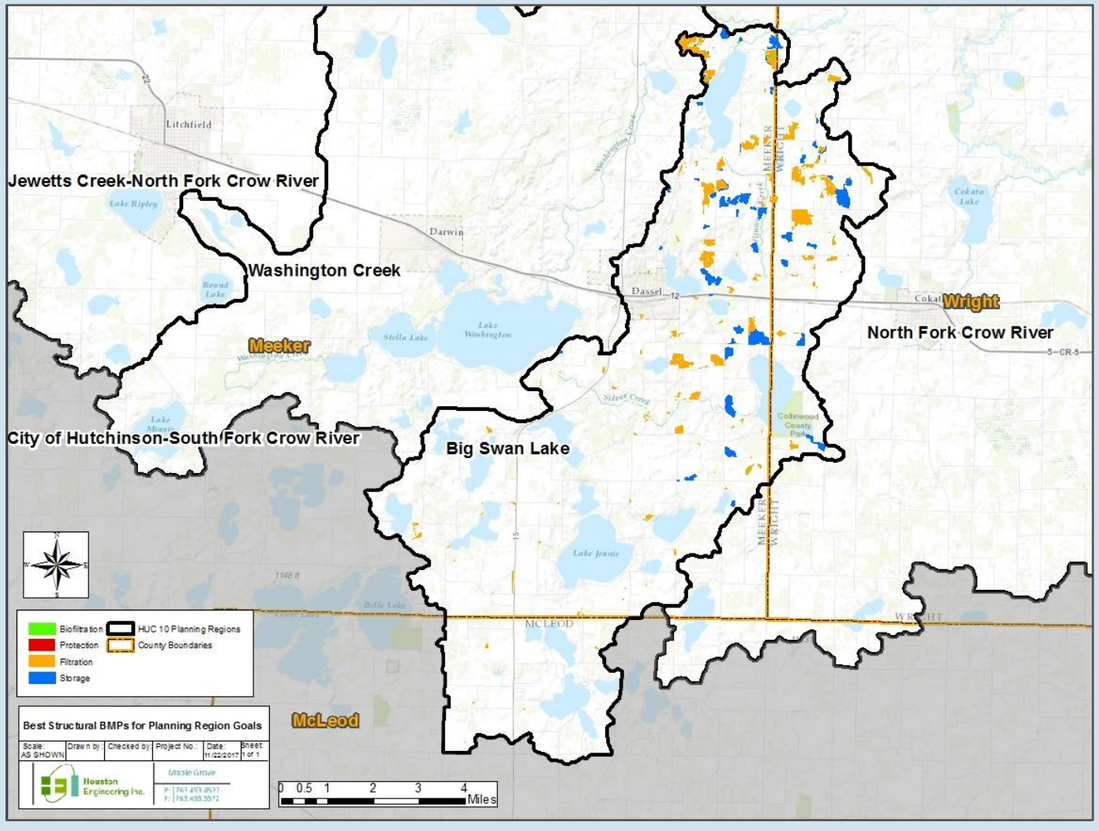


BIG SWAN LAKE IMPLEMENTATION PROFILE: TARGETED IMPLEMENTATION APPROACH- BEST STRUCTURAL PRACTICES (SHEET 3 OF 4)

BEST STRUCTURAL BMPS

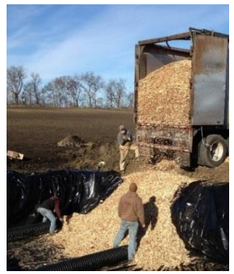
Shown in the image below are the 250 “best” structural BMPs (biofiltration, protection, filtration, infiltration, and storage treatment groups) which make up the targeted implementation approach for the Big Swan Lake planning region. These structural BMPs are the most cost-effective based on the estimated annualized dollars per unit of total phosphorus and total nitrogen reduced for the practice at the planning region outlet, and local water quality benefits from reducing sediment.

PTMApp Treatment Group	Number Impacting Planning Region Outlet
Biofiltration	11
Protection	10
Filtration	169
Infiltration	0
Storage	60



BEST STRUCTURAL PRACTICES WITH ANTICIPATED WATER QUALITY BENEFITS

The table below summarize the top 10 “best” or most cost-effective structural practices within the Big Swan Lake planning region. Shown in the table are the anticipated cumulative annualized cost of implementation and cumulative progress implementation makes toward state load reduction goals at the planning region outlet. These practices could be targeted first for potential implementation efforts. A complete list is provided in **Table 4-5**.



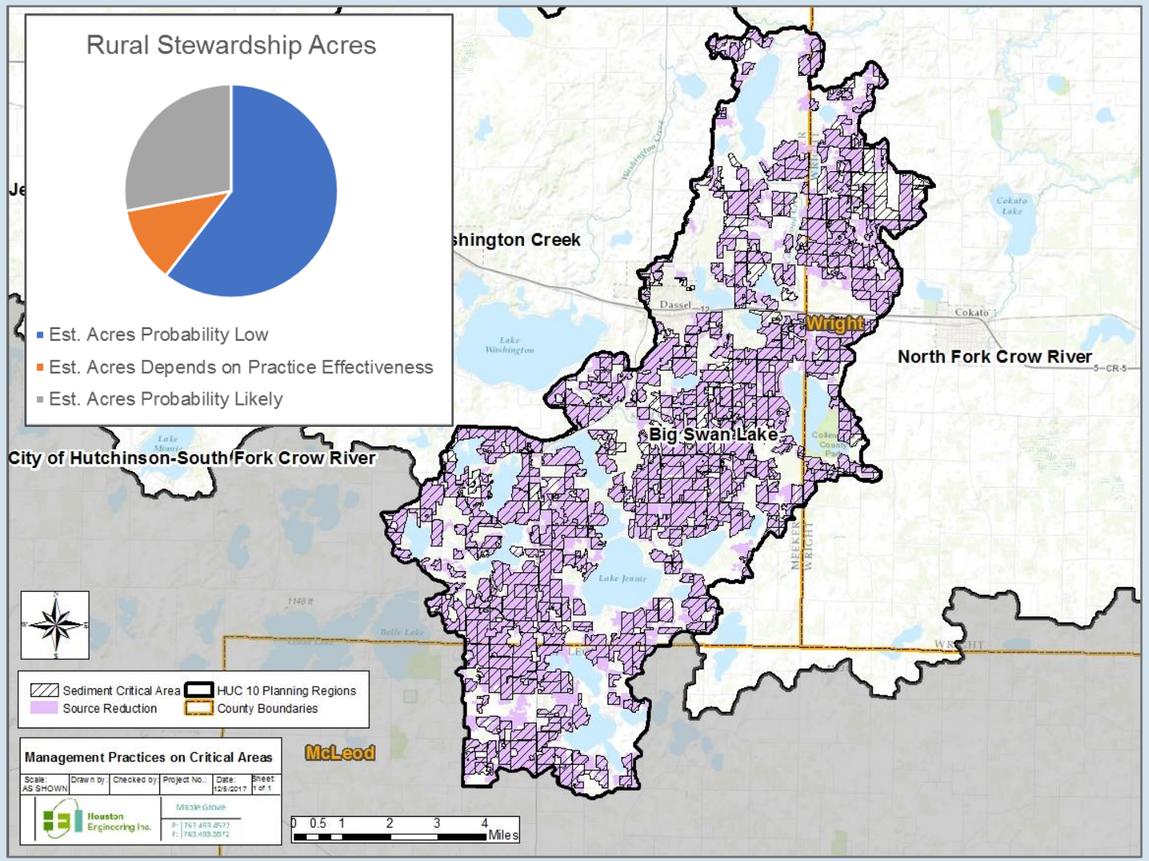
BMP ID	Practice Type	Drainage Area Treated (Sq. Ft)	Parameter	Annual Est. Load at BMP	Est. Annual Load Reduction	Cumulative Load Reduction	Progress toward State Goal (%)	Est. Annual Cost	Cumulative Annual Cost
289568_584385_2	Filtration	3,660,232	Sed (tons)	167.5	83.7	83.7	1.6	$ 100	$ 100
			TP (lbs.)	27.4	1.5	1.5	0.5		
271509_575518_2	Filtration	5,383,931	Sed (tons)	241.1	120.6	204.3	4.0	$ 233	$ 333
			TP (lbs.)	37.1	2.4	3.9	1.2		
283367_580629_2	Filtration	3,322,041	Sed (tons)	69.0	34.5	238.8	4.7	$ 90	$ 423
			TP (lbs.)	23.6	1.1	4.9	1.5		
269197_566106_2	Filtration	2,320,837	Sed (tons)	57.3	28.7	267.5	5.2	$ 104	$ 527
			TP (lbs.)	17.5	2.7	7.7	2.4		
274093_576632_2	Filtration	4,649,908	Sed (tons)	257.0	128.5	396.0	7.8	$ 302	$ 829
			TP (lbs.)	27.6	2.2	9.9	3.1		
308940_592816_2	Filtration	4,702,802	Sed (tons)	369.3	184.6	580.6	11.4	$ 202	$1,031
			TP (lbs.)	34.1	1.1	11.0	3.5		
286960_582537_2	Filtration	1,499,433	Sed (tons)	80.0	40.0	620.6	12.2	$ 84	$1,115
			TP (lbs.)	11.7	0.6	11.6	3.6		
271229_575388_2	Filtration	1,822,608	Sed (tons)	127.9	64.0	684.6	13.4	$ 124	$1,239
			TP (lbs.)	11.7	0.7	12.4	3.9		
299820_588912_2	Filtration	1,802,942	Sed (tons)	75.1	37.6	722.1	14.2	$ 151	$1,390
			TP (lbs.)	15.4	0.8	13.1	4.1		
311546_594003_2	Filtration	1,562,983	Sed (tons)	132.4	66.2	788.3	15.5	$ 90	$1,480
			TP (lbs.)	9.7	0.3	13.4	4.2		

BIG SWAN LAKE IMPLEMENTATION PROFILE: TARGETED IMPLEMENTATION APPROACH- BEST MANAGEMENT PRACTICES (SHEET 4 OF 4)

BEST MANAGEMENT PRACTICES

Cropland fields (defined by Common Land Units) within the Big Swan Lake planning region were assessed based on their ability to meet principles of rural land stewardship. There are approximately 45,900 acres of cropland in the planning region, of which 60% are in “Probability Low”, 12% are in “Probability Depends on Practice Effectiveness,” and 28% are in “Probability Likely.”

One of the primary factors in determining stewardship is identifying areas that have disproportionately high sediment and total phosphorus loss, defined as critical source areas. Critical source areas for sediment within the Big Swan Lake planning region are shown on the map below. These areas could be targeted first for implementation of management practices (like cover crops, tillage management), to increase organic matter content. Areas where technically feasible management practices intersect these sediment critical source areas are shown below.



ANTICIPATED WATER QUALITY BENEFITS OF ATTAINING STEWARDSHIP GOAL

The watershed-wide measurable goal for rural stewardship is to implement management practices (i.e. cover crops, conservation tillage to increase residue, permanent cover) in 40% of all cropland areas in the watershed to increase Soil Organic Matter (SOM) content 1%. Areas to be managed are cropland areas categorized as rural stewardship “Probability Low” and “Probability Depends on Practice Effectiveness” which have SOM content between 1% and 4%. Below is a summary of the water quality benefits of attaining the rural stewardship measurable goal within the Big Swan Lake planning region.

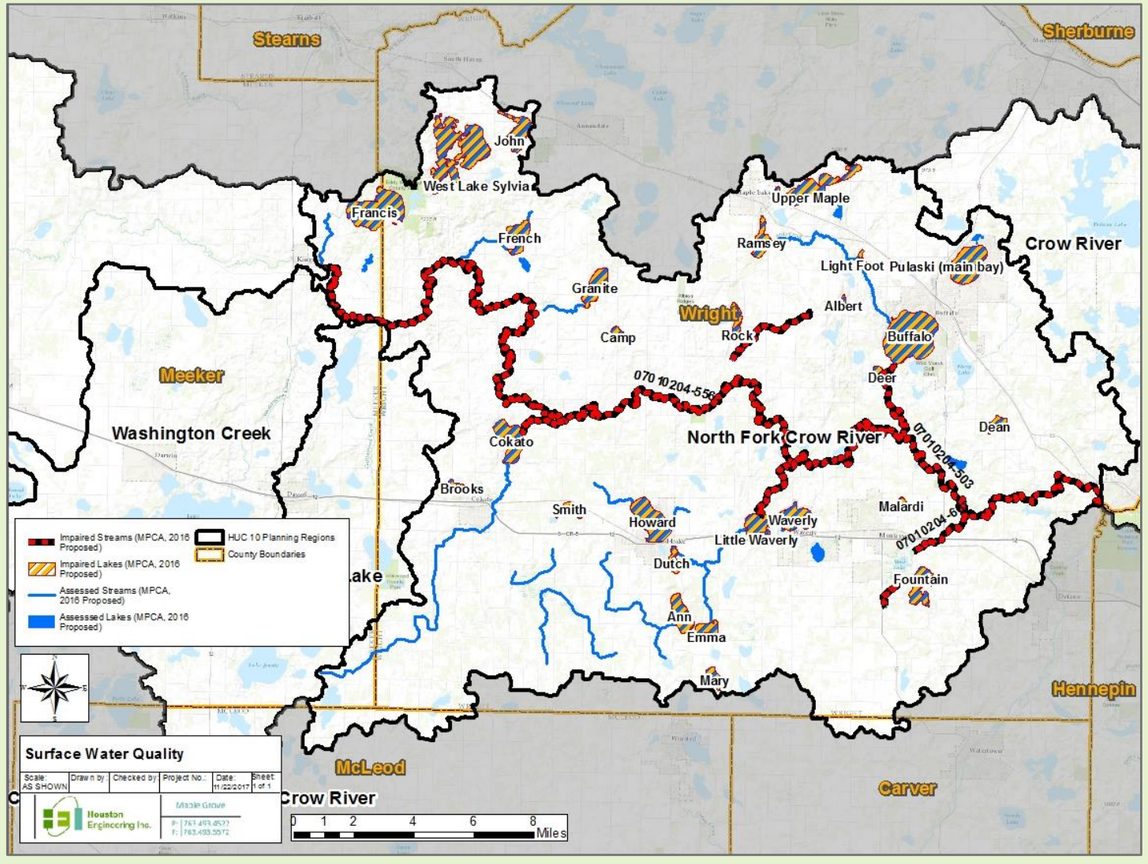
Clarity — 25% — **Sediment 25% Reduction** Existing Loads
Goal attainable through stewardship alone: No
Anticipated % reduction at planning region outlet: 16.6%

P — 12% — **Total Phosphorus 12% Reduction** Existing Loads
Goal attainable through stewardship alone: No
Anticipated % reduction at planning region outlet: 7.2%

NORTH FORK CROW RIVER IMPLEMENTATION PROFILE: SUMMARY OF WATER RESOURCE CURRENT CONDITIONS (SHEET 1 OF 4)

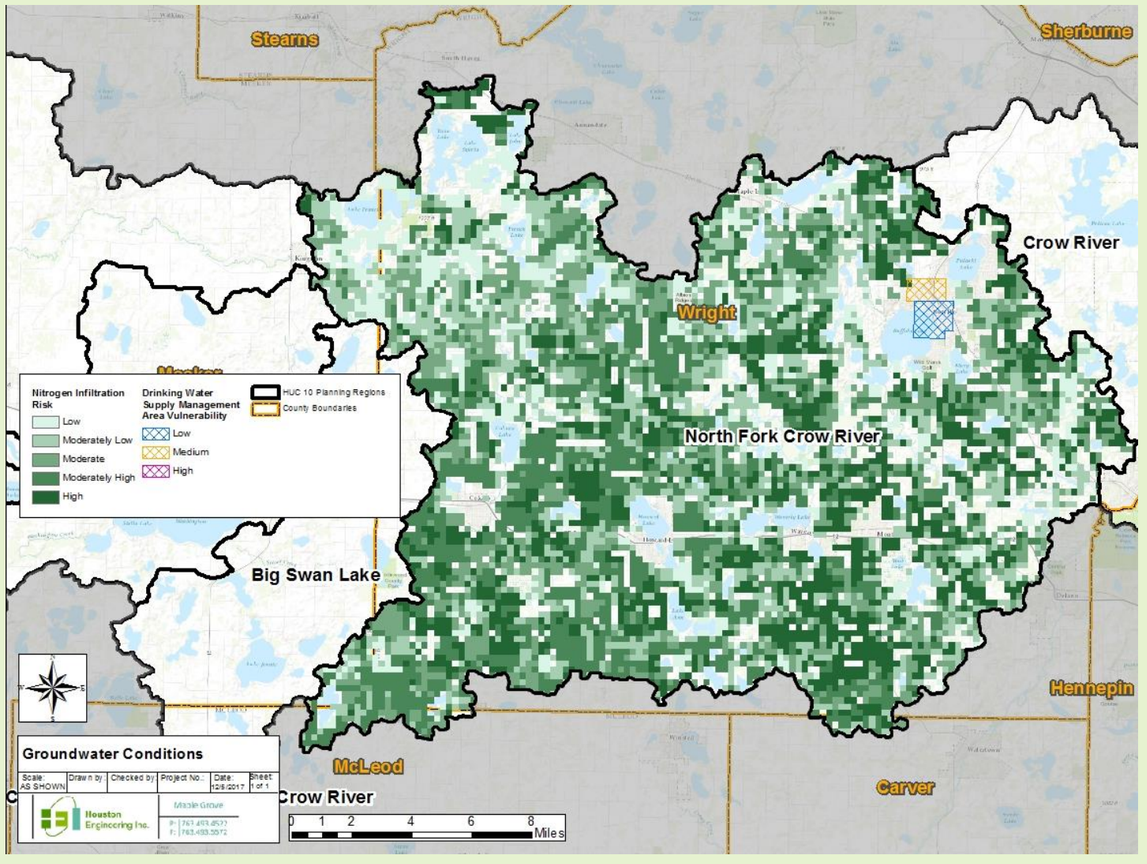
CURRENT CONDITIONS: SURFACE WATER QUALITY

Within the North Fork Crow River planning region, there are eight stream reaches (07010204-555; 556; 681; 515; 543; 503; 667; and 668) and 28 lakes (Brooks, Cokato, Francis, West Lake Sylvia, East Lake Sylvia, John, French, Granite, Camp, Smith, Howard, Dutch, Ann, Emma, Mary, Little Waverly, Waverly, Rock, Ramsey, Upper Maple, Albert, Light Foot, Pulaski, Buffalo, Deer, Malardi, Fountain, and Dean) which do not meet state water quality standards, and are listed as impaired. Other streams in the planning region have been assessed by parameter, based on available water quality monitoring data. Those streams have been categorized as needing protection or restoration management efforts, and are summarized in the **Figures 3-3** through **3-7**. For more information about impaired and assessed streams and lakes within this planning region, please see the NFCR Watershed Restoration and Protection Strategy Report (https://www.pca.state.mn.us/sites/default/files/wq-ws4-06a.pdf).



CURRENT CONDITIONS: GROUNDWATER

The North Fork Crow River planning region contains multiple Drinking Water Supply Management Areas (DWSMAs), where protection of groundwater used for drinking water purposes from nitrogen contamination is both a priority concern and plan measurable goal. To protect groundwater quality yet promote groundwater supplies, recharge structural practices should be encouraged in areas of “low” nitrogen infiltration risk to promote recharge of cleaner water. Storage and filtration practices should be encouraged in “high” nitrogen infiltration risk areas, to promote trapping and filtering of nitrogen rich surface waters to minimize the likelihood of further groundwater contamination, especially in DWSMAs.

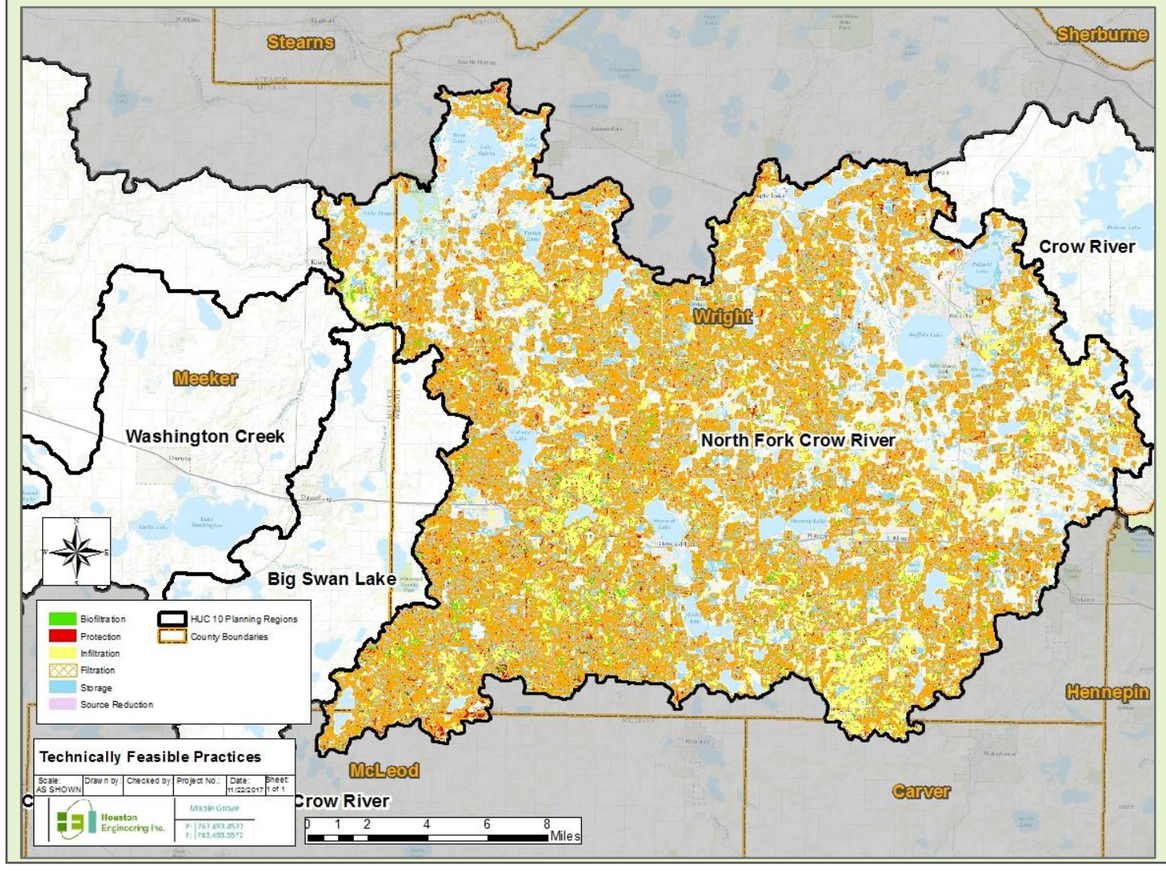


NORTH FORK CROW RIVER IMPLEMENTATION PROFILE: TECHNICALLY FEASIBLE MANAGEMENT PRACTICES AND STRUCTURAL BMPS (SHEET 2 OF 4)

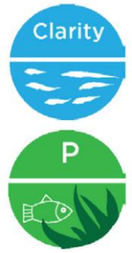
TECHNICALLY FEASIBLE MANAGEMENT PRACTICES AND STRUCTURAL BMPS

Implementation of management practices and structural BMPs make progress towards watershed-wide and priority concern measurable goals. There are many locations feasible for implementation of these practices within the North Fork Crow River planning region. Locations technically feasible for management practices and structural BMPs are summarized and shown in the table and map below.

PTMApp Treatment Group	Practice Type		Number Impacting Planning Region Outlet
	Structural BMP	Management Practice	
Biofiltration	X		3,752
Protection	X		25,711
Filtration	X		22,873
Infiltration	X		24,509
Storage	X		23,526
Source Reduction		X	26,203



ARE STATE LOAD REDUCTION GOALS REALISTIC THROUGH STRUCTURAL PRACTICES ALONE?



Sediment 25% Reduction
Existing Loads

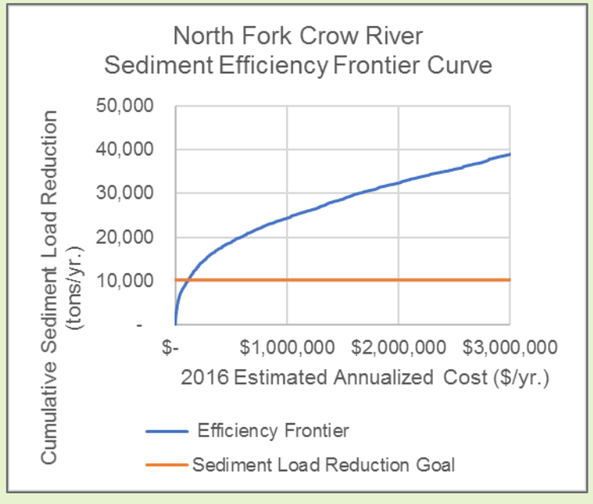
Goal Source: Sediment Reduction Strategy
Existing Load at Planning Region Outlet: 41,097 tons/yr.
Target Load Reduction at Outlet: 10,274 tons/yr.
Estimated # of Structural BMPs to Meet Goal*: 368
Estimated Annualized Cost: $170,500

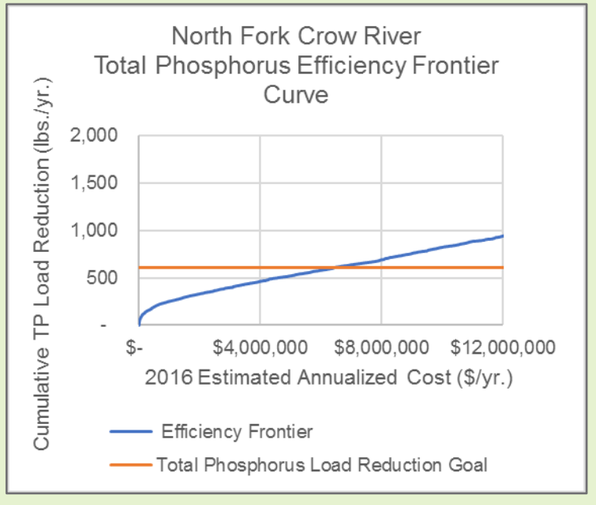
Total Phosphorus 12% Reduction
Existing Loads

Goal Source: Nutrient Reduction Strategy
Existing Load at Planning Region Outlet: 5,071 lbs./yr.
Target Load Reduction at Outlet: 609 lbs./yr.
Estimated # of Structural BMPs to Meet Goal*: 3,403
Estimated Annualized Cost: $8,633,000

Efficiency frontier curves were developed to evaluate if state load reduction goals for sediment and total phosphorus are realistic by treating solely surface runoff with technically feasible structural BMPs. Shown in the charts below with horizontal lines are the total sediment and total phosphorus load reduction goal regardless of source. Total cost of implementation is shown on the x-axis. Progress towards goals is evaluated locally for sediment, and at the planning region outlet for total phosphorus.

** 120% of load reduction goal used to estimate # of practices and annualized cost, in recognition that not all practices function perfectly upon implementation*



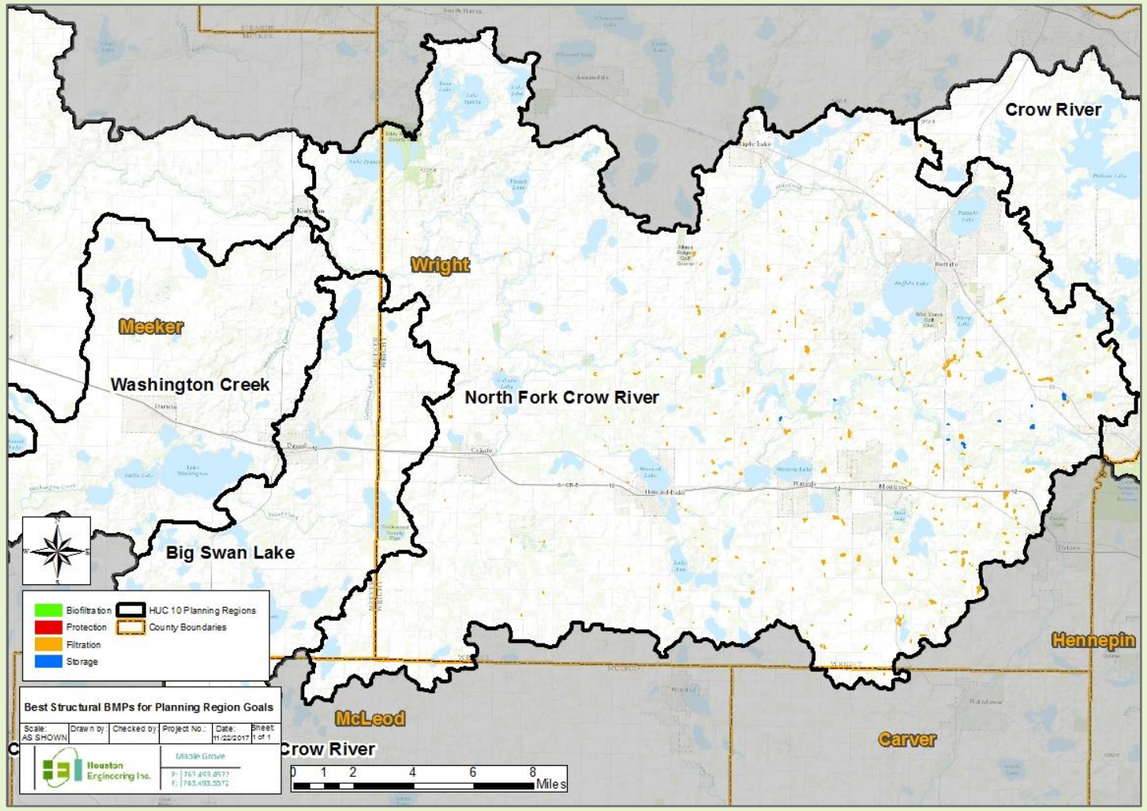


NORTH FORK CROW RIVER IMPLEMENTATION PROFILE: TARGETED IMPLEMENTATION APPROACH- BEST STRUCTURAL PRACTICES (SHEET 3 OF 4)

BEST STRUCTURAL BMPS

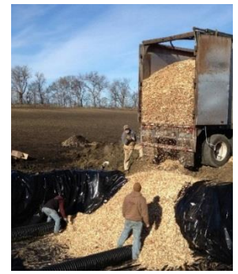
Shown in the image below are the 250 “best” structural BMPs (biofiltration, protection, filtration, infiltration, and storage treatment groups) which make up the targeted implementation approach for the North Fork Crow River planning region. These structural BMPs are the most cost effective based upon the estimated annualized dollars per unit of total phosphorus and total nitrogen reduced for the practice at the planning region outlet, and local water quality benefits from reducing sediment.

PTMApp Treatment Group	Number Impacting Planning Region Outlet
Biofiltration	0
Protection	0
Filtration	244
Infiltration	0
Storage	6



BEST STRUCTURAL PRACTICES WITH ANTICIPATED WATER QUALITY BENEFITS

The table below summarize the top 10 “best” or most cost-effective structural practices within the North Fork Crow River planning region. Shown in the table are the anticipated cumulative annualized cost of implementation and cumulative progress implementation makes towards state load reduction goals at the planning region outlet. These practices could be targeted first for potential implementation efforts. A complete list is provided in **Table 4-5**.



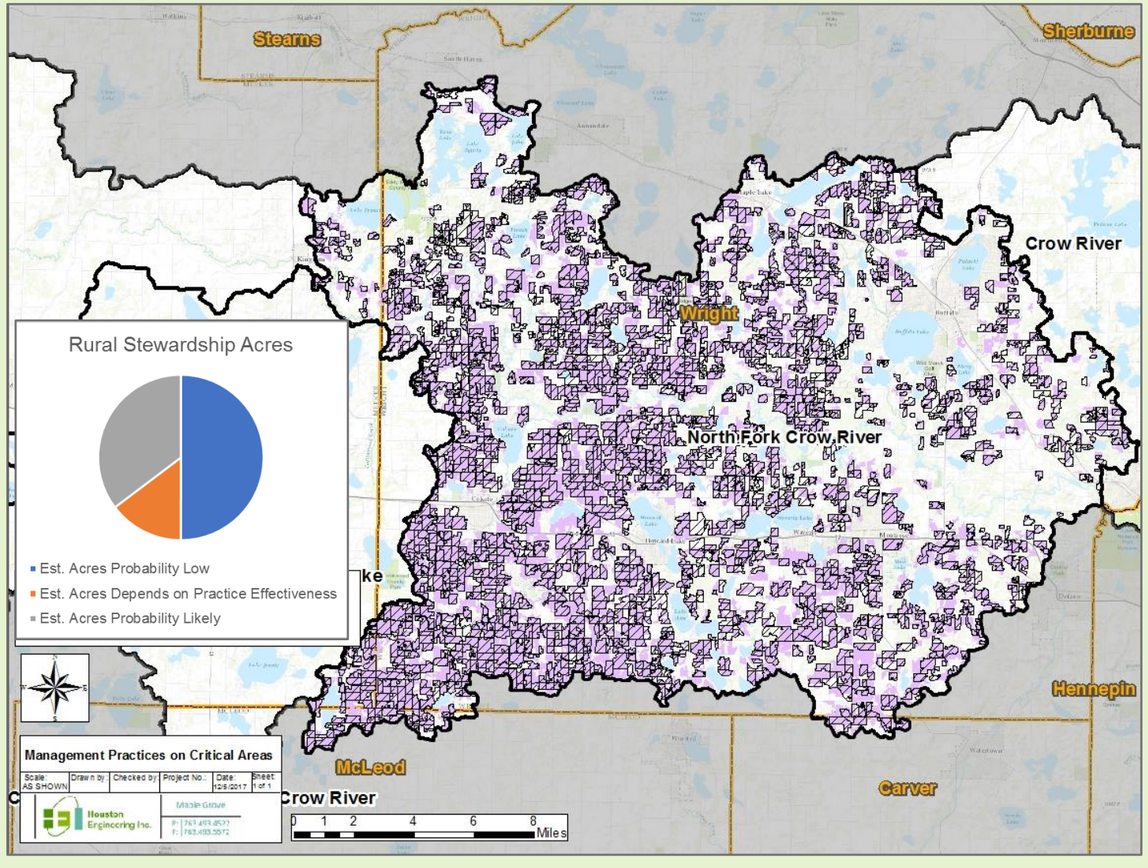
BMP ID	Practice Type	Drainage Area Treated (Sq. Ft)	Parameter	Annual Est. Load at BMP	Est. Annual Load Reduction	Cumulative Load Reduction	Progress toward State Goal (%)	Est. Annual Cost	Cumulative Annual Cost
314549 _595697_2	Filtration	3,581,182	Sed (tons)	110.9	55.4	55.4	0.5	$98	$98
			TP (lbs.)	23.6	1.0	1.0	0.2		
274691 _10009_2	Filtration	5,435,565	Sed (tons)	118.4	59.2	114.6	1.1	$122	$220
			TP (lbs.)	21.7	1.3	2.3	0.4		
306996 _592132_2	Filtration	4,346,204	Sed (tons)	82.5	41.2	155.9	1.5	$90	$310
			TP (lbs.)	30.4	1.4	3.7	0.6		
312490 _594483_2	Filtration	3,392,566	Sed (tons)	136.3	68.2	224.0	2.2	$135	$445
			TP (lbs.)	19.8	1.0	4.7	0.8		
309178 _593324_2	Filtration	2,286,349	Sed (tons)	90.2	45.1	269.1	2.6	$95	$540
			TP (lbs.)	14.6	0.8	5.5	0.9		
298051 _588298_2	Filtration	5,209,362	Sed (tons)	57.7	28.9	298.0	2.9	$84	$625
			TP (lbs.)	31.9	3.9	9.5	1.6		
281888 _580451_2	Filtration	5,260,027	Sed (tons)	300.6	139.4	437.4	4.3	$429	$1,053
			TP (lbs.)	31.7	3.7	13.1	2.2		
229922 _558356_2	Filtration	4,654,267	Sed (tons)	96.1	48.0	485.4	4.7	$91	$1,144
			TP (lbs.)	29.2	0.2	13.4	2.2		
285712 _582444_2	Filtration	4,930,361	Sed (tons)	132.5	66.3	551.7	5.4	$181	$1,326
			TP (lbs.)	26.0	0.7	14.1	2.3		
286839 _583066_2	Filtration	5,314,471	Sed (tons)	148.3	74.2	625.9	6.1	$96	$1,422
			TP (lbs.)	36.6	0.2	14.3	2.3		

NORTH FORK CROW RIVER IMPLEMENTATION PROFILE: TARGETED IMPLEMENTATION APPROACH- BEST MANAGEMENT PRACTICES (SHEET 4 OF 4)

BEST MANAGEMENT PRACTICES

Cropland fields (defined by Common Land Units) within the North Fork Crow River planning region were assessed based on their ability to meet principles of rural land stewardship. There are approximately 194,000 acres of cropland in the planning region, of which 50% are in “Probability Low”, 15% are in “Probability Depends on Practice Effectiveness,” and 35% are in “Probability Likely.”

One of the primary factors in determining stewardship is identifying areas that have disproportionately high sediment and total phosphorus loss, defined as critical source areas. Critical source areas for sediment within the North Fork Crow River planning region are shown on the map below. These areas could be targeted first for implementation of management practices (like cover crops, tillage management), to increase organic matter content. Areas where technically feasible management practices intersect these sediment critical source areas are shown below.



ANTICIPATED WATER QUALITY BENEFITS OF ATTAINING STEWARDSHIP GOAL

The watershed-wide measurable goal for rural stewardship is to implement management practices (i.e. cover crops, conservation tillage to increase residue, permanent cover) in 40% of all cropland areas in the watershed to increase Soil Organic Matter (SOM) content 1%. Areas to be managed are cropland areas categorized as rural stewardship “Probability Low” and “Probability Depends on Practice Effectiveness” which have SOM content between 1% and 4%. Below is a summary of the water quality benefits of attaining the rural stewardship measurable goal within the North Fork Crow River planning region.

Clarity — 25%

Sediment 25% Reduction
Existing Loads

Goal attainable through stewardship alone: No
Anticipated % reduction at planning region outlet: 21.7%

P — 12%

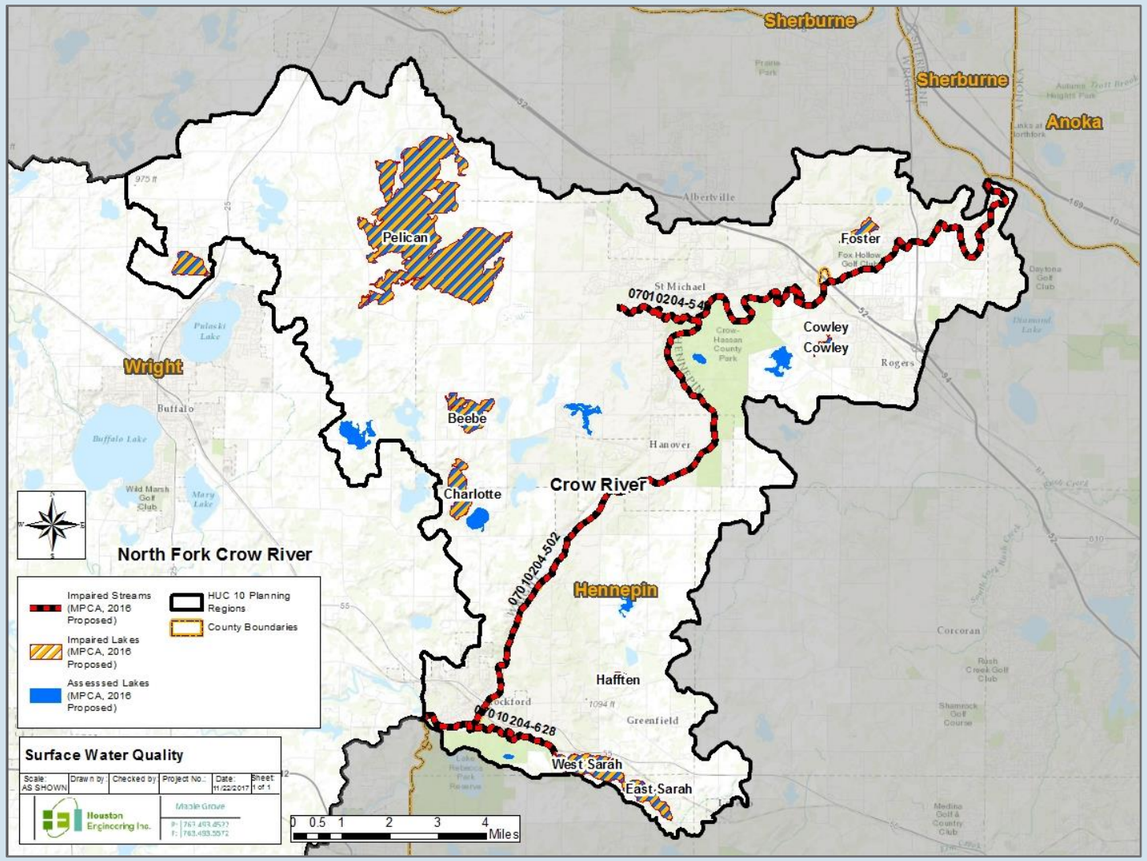
Total Phosphorus 12% Reduction
Existing Loads

Goal attainable through stewardship alone: No
Anticipated % reduction at planning region outlet: 8.4%

CROW RIVER IMPLEMENTATION PROFILE: SUMMARY OF WATER RESOURCE CURRENT CONDITIONS (SHEET 1 OF 4)

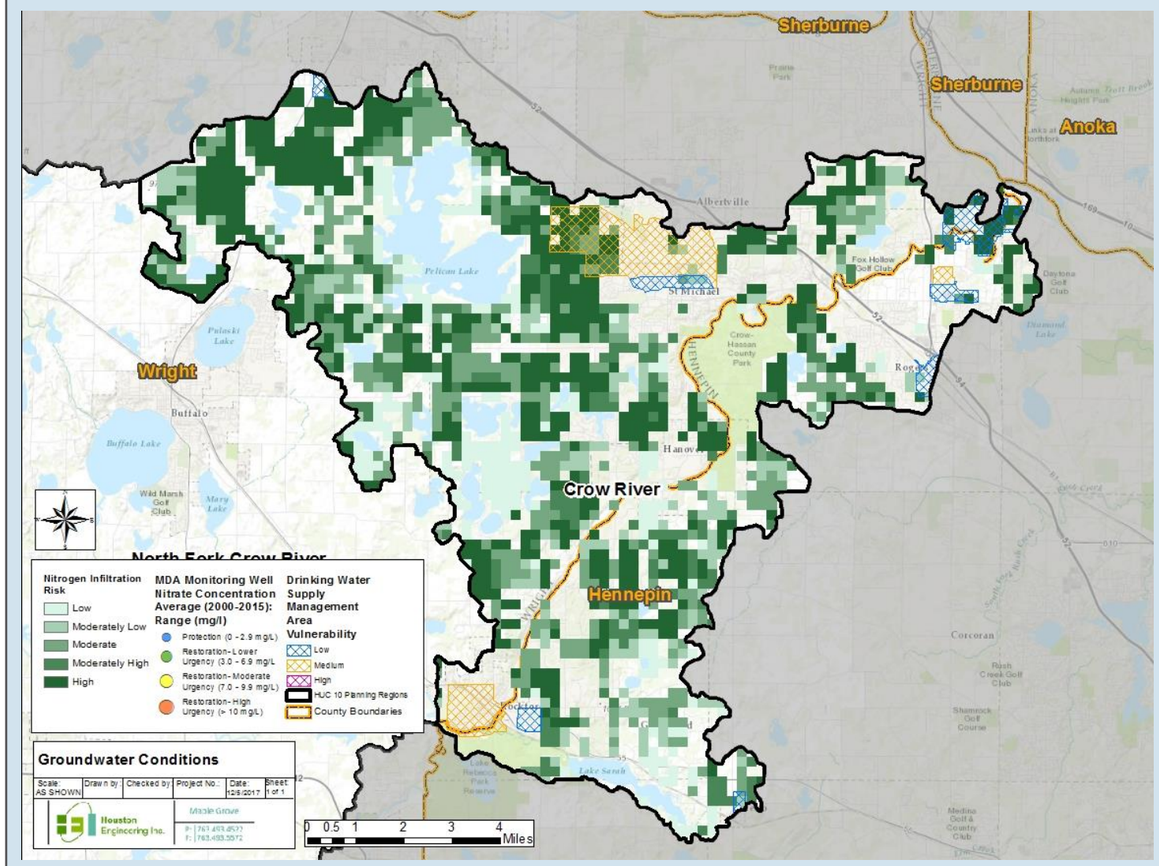
CURRENT CONDITIONS: SURFACE WATER QUALITY

Within the Crow River planning region, there are three stream reaches (07010204-628; 502; 542) and eight lakes (East Sarah, West Sarah, Charlotte, Beebe, Constance, Pelican, Cowley, Foster) which do not meet state water quality standards, and are listed as impaired. Other streams in the planning region have been assessed by parameter, based on available water quality monitoring data. Those streams have been categorized as needing protection or restoration management efforts, and are summarized in the **Figures 3-3** through **3-7**. For more information about impaired and assessed streams and lakes within this planning region, please see the NFCR Watershed Restoration and Protection Strategy Report (https://www.pca.state.mn.us/sites/default/files/wq-ws4-06a.pdf).



CURRENT CONDITIONS: GROUNDWATER

The Crow River planning region contains multiple Drinking Water Supply Management Areas (DWSMAs), where protection of groundwater used for drinking water purposes from nitrogen contamination is both a priority concern and plan measurable goal. To protect groundwater quality yet promote groundwater supplies, recharge structural practices should be encouraged in areas of "low" nitrogen infiltration risk to promote recharge of cleaner water. Storage and filtration practices should be encouraged in "high" nitrogen infiltration risk areas, to promote trapping and filtering of nitrogen rich surface waters to minimize the likelihood of further groundwater contamination, especially in DWSMAs.

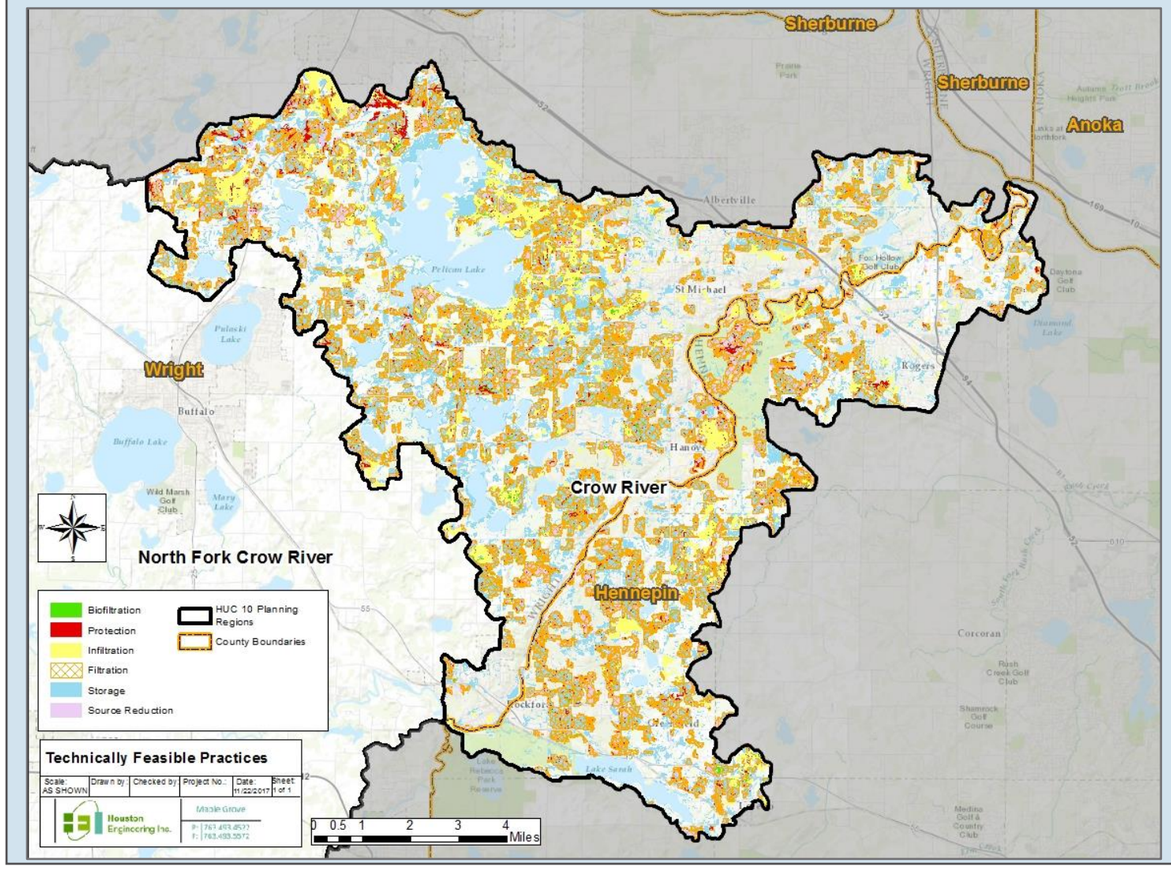


CROW RIVER IMPLEMENTATION PROFILE: TECHNICALLY FEASIBLE MANAGEMENT PRACTICES AND STRUCTURAL BMPS (SHEET 2 OF 4)

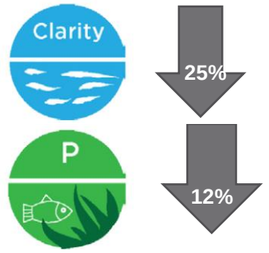
TECHNICALLY FEASIBLE MANAGEMENT PRACTICES AND STRUCTURAL BMPS

Implementation of management practices and structural BMPs make progress towards watershed-wide and priority concern measurable goals. There are many locations feasible for implementation of these practices within the Crow River planning region. Locations technically feasible for management practices and structural BMPs are summarized and shown in the table and map below.

PTMApp Treatment Group	Practice Type		Number Impacting Planning Region Outlet
	Structural BMP	Management Practice	
Biofiltration	X		1,228
Protection	X		27,636
Filtration	X		24,518
Infiltration	X		11,811
Storage	X		25,667
Source Reduction		X	28,228



ARE STATE LOAD REDUCTION GOALS REALISTIC THROUGH STRUCTURAL PRACTICES ALONE?



Sediment 25% Reduction
Existing Loads

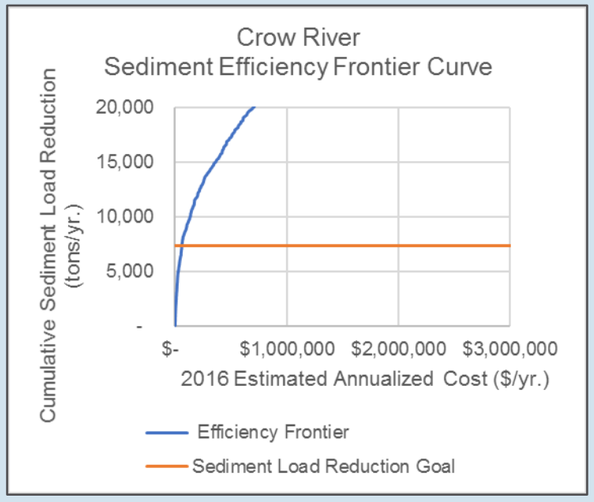
Goal Source: Sediment Reduction Strategy
Existing Load at Planning Region Outlet: 29,597 tons/yr.
Target Load Reduction at Outlet: 7,399 tons/yr.
Estimated # of Structural BMPs to Meet Goal*: 264
Estimated Annualized Cost: $100,000

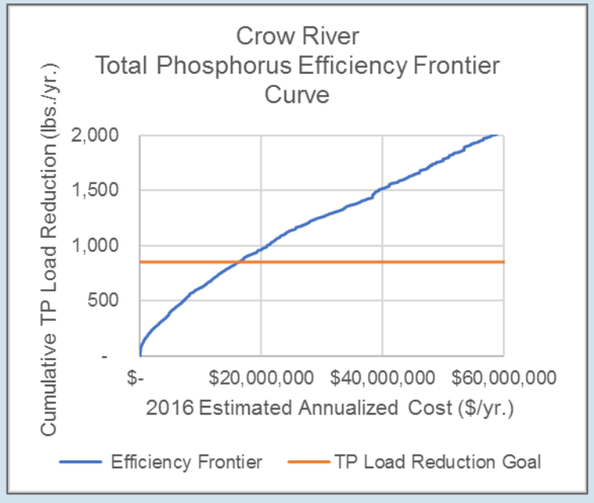
Total Phosphorus 12% Reduction
Existing Loads

Goal Source: Nutrient Reduction Strategy
Existing Load at Planning Region Outlet: 7,088 lbs./yr.
Target Load Reduction at Outlet: 851 lbs./yr.
Estimated # of Structural BMPs to Meet Goal*: 6,854
Estimated Annualized Cost: $21,490,000

Efficiency frontier curves were developed to evaluate if state load reduction goals for sediment and total phosphorus are realistic by treating solely surface runoff with technically feasible structural BMPs. Shown in the charts below with horizontal lines are the total sediment and total phosphorus load reduction goal regardless of source. Total cost of implementation is shown on the x-axis. Progress towards goals is evaluated locally for sediment, and at the planning region outlet for total phosphorus.

** 120% of load reduction goal used to estimate # of practices and annualized cost, in recognition that not all practices function perfectly upon implementation*



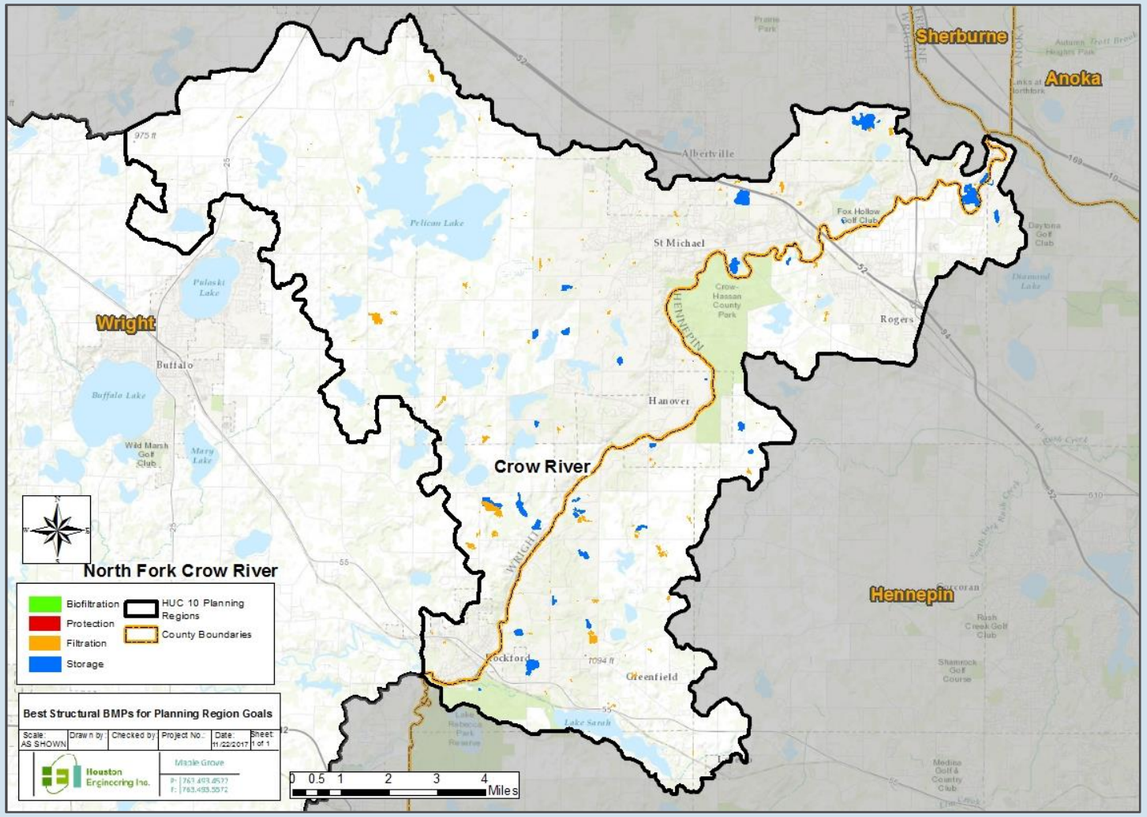


CROW RIVER IMPLEMENTATION PROFILE: TARGETED IMPLEMENTATION APPROACH- BEST STRUCTURAL PRACTICES (SHEET 3 OF 4)

BEST STRUCTURAL BMPS

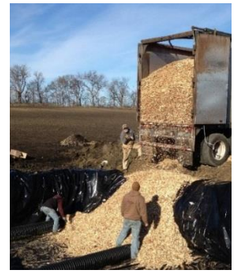
Shown in the image below are the 250 “best” structural BMPs (biofiltration, protection, filtration, infiltration, and storage treatment groups) which make up the targeted implementation approach for the Crow River planning region. These structural BMPs are the most cost effective based upon the estimated annualized dollars per unit of total phosphorus and total nitrogen reduced for the practice at the planning region outlet, and local water quality benefits from reducing sediment.

PTMApp Treatment Group	Number Impacting Planning Region Outlet
Biofiltration	0
Protection	24
Filtration	187
Infiltration	0
Storage	39



BEST STRUCTURAL PRACTICES WITH ANTICIPATED WATER QUALITY BENEFITS

The table below summarize the top 10 “best” or most cost-effective structural practices within the Crow River planning region. Shown in the table are the anticipated cumulative annualized cost of implementation and cumulative progress implementation makes toward state load reduction goals at the planning region outlet. These practices could be targeted first for potential implementation efforts. A complete list is provided in **Table 4-5**.



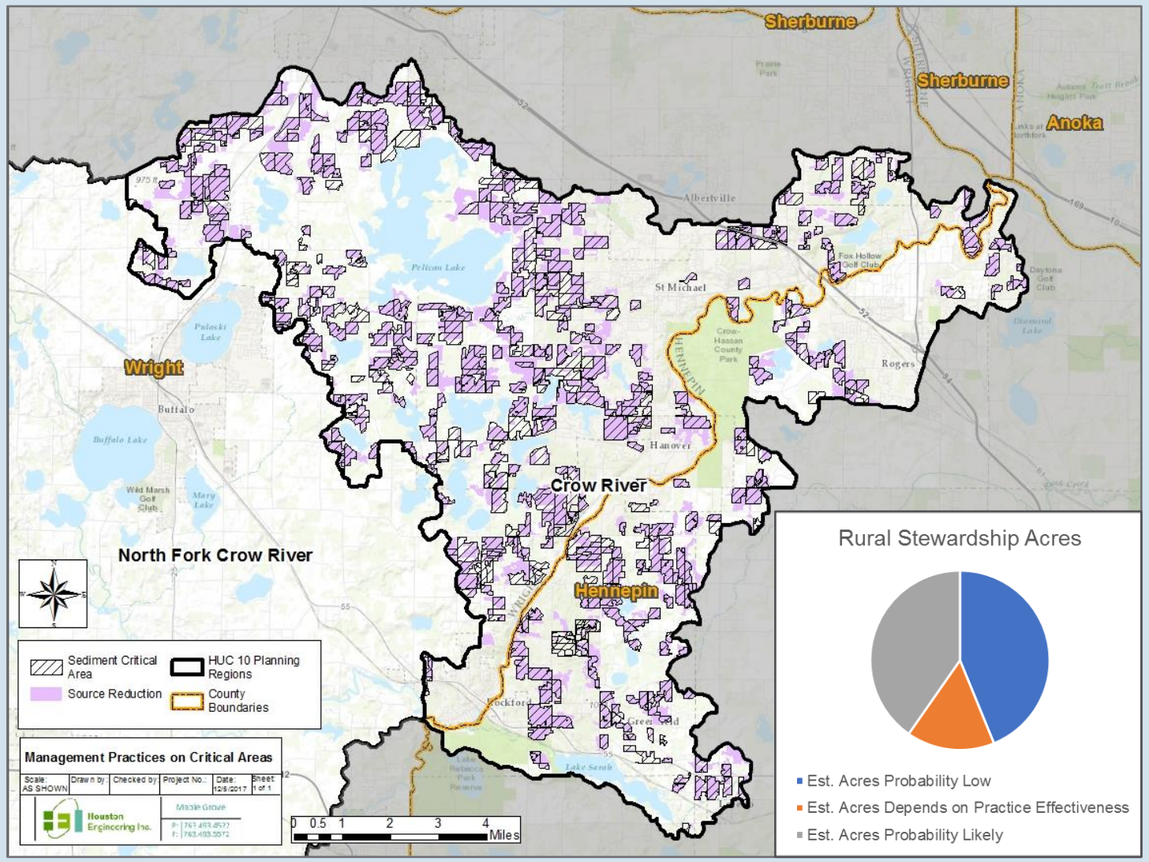
BMP ID	Practice Type	Drainage Area Treated (Sq. Ft)	Parameter	Annual Est. Load at BMP	Est. Annual Load Reduction	Cumulative Load Reduction	Progress toward State Goal (%)	Est. Annual Cost	Cumulative Annual Cost
191495 _545207_2	Filtration	1,988,943	Sed (tons)	203.3	101.7	101.7	1.4	$89	$89
			TP (lbs.)	15.3	1.0	1.0	0.1		
229227 _558128_2	Filtration	3,867,932	Sed (tons)	99.8	49.9	151.5	2.0	$83	$172
			TP (lbs.)	17.9	0.9	1.9	0.2		
251233 _566932_2	Filtration	2,960,794	Sed (tons)	76.3	38.2	189.7	2.6	$78	$250
			TP (lbs.)	12.7	0.6	2.5	0.3		
184196 _542667_2	Filtration	4,840,267	Sed (tons)	133.3	66.7	256.4	3.5	$132	$382
			TP (lbs.)	35.9	0.5	2.9	0.3		
218468 _554131_2	Filtration	3,445,072	Sed (tons)	97.5	48.7	305.1	4.1	$89	$471
			TP (lbs.)	19.2	0.3	3.2	0.4		
201177 _548667_2	Filtration	1,863,489	Sed (tons)	97.2	48.6	353.7	4.8	$145	$616
			TP (lbs.)	14.1	1.9	5.1	0.6		
163806 _536378_2	Filtration	5,011,155	Sed (tons)	191.8	95.9	449.6	6.1	$101	$717
			TP (lbs.)	39.8	0.2	5.3	0.6		
298051 _588298_2	Filtration	5,209,362	Sed (tons)	57.7	28.9	478.4	6.5	$84	$801
			TP (lbs.)	31.9	0.6	5.9	0.7		
306996 _592132_2	Filtration	4,346,204	Sed (tons)	82.5	41.2	519.7	7.0	$90	$891
			TP (lbs.)	30.4	0.2	6.1	0.7		
283209 _581147_2	Filtration	2,622,796	Sed (tons)	155.1	77.6	597.2	8.1	$211	$1,102
			TP (lbs.)	15.2	0.6	6.7	0.8		

CROW RIVER IMPLEMENTATION PROFILE: TARGETED IMPLEMENTATION APPROACH- BEST MANAGEMENT PRACTICES (SHEET 4 OF 4)

BEST MANAGEMENT PRACTICES

Cropland fields (defined by Common Land Units) within the Crow River planning region were assessed based on their ability to meet principles of rural land stewardship. There are approximately 48,900 acres of cropland in the planning region, of which 44 are in “Probability Low,” 16% are in “Probability Depends on Practice Effectiveness,” and 40% are in “Probability Likely.”

One of the primary factors in determining stewardship is identifying areas that have disproportionately high sediment and total phosphorus loss, defined as critical source areas. Critical source areas for sediment within the Crow River planning region are shown on the map below. These areas could be targeted first for implementation of management practices (like cover crops, tillage management), to increase organic matter content. Areas where technically feasible management practices intersect these sediment critical source areas are shown below.



ANTICIPATED WATER QUALITY BENEFITS OF ATTAINING STEWARDSHIP GOAL

The watershed-wide measurable goal for rural stewardship is to implement management practices (i.e. cover crops, conservation tillage to increase residue, permanent cover) in 40% of all cropland areas in the watershed to increase Soil Organic Matter (SOM) content 1%. Areas to be managed are cropland areas categorized as rural stewardship “Probability Low” and “Probability Depends on Practice Effectiveness” which have SOM content between 1% and 4%. Below is a summary of the water quality benefits of attaining the rural stewardship measurable goal within the Crow River planning region.

Sediment
25% Reduction
Existing Loads

Goal attainable through stewardship alone: Yes
Anticipated % reduction at planning region outlet: 25.4%

Total Phosphorus
12% Reduction
Existing Loads

Goal attainable through stewardship alone: No
Anticipated % reduction at planning region outlet: 10.1%

4.7 SUMMARY OF IMPLEMENTATION APPROACH FOR STRUCTURAL BMPS

The targeted implementation approach for structural BMPs is summarized in **Table 4-5**. Included in this table are the costs and cumulative anticipated benefits of the 250 best structural BMPs within each planning region. The "best" structural BMPs in each planning region were chosen as the most cost-effective practices with the greatest reductions in the annual nutrient (nitrogen and phosphorus) load delivered to the planning region outlet (regional scale) and the greatest sediment load reduction reaching the catchment outlet (i.e., local scale). During implementation, the locations of specific practices will differ because of several factors including landowner willingness to participate in a conservation practice.

The benefits of implementing structural BMPs in the targeted implementation approach are expressed in **Table 4-5** relative to state load reduction goals for sediment and nutrients. The anticipated reduction at the planning region outlet is cumulative and is inclusive of the listed structural BMPs implemented upstream, and are not inclusive of load reduction benefits from attaining stewardship goals through management practices (see **Section 4.8**).

The types, numbers, and locations of structural BMPs in the targeted implementation approach are not final, and will inevitably shift during plan implementation. Factors that may cause the types, locations, and numbers of structural BMPs for implementation to change include, but are not limited to:

- Potential for voluntary participation by landowners and residents;
- Amount of funding available for implementation;
- New data on resource conditions;
- Proximity to streams that are nearly or barely impaired;
- Practices/projects ready to implement (overlay these with management practices and structural BMPs identified by PTMApp); and
- Effectiveness of education and outreach and research initiatives.

Table 4-5: The 250 "best" (most cost-effective) structural practices in each planning region, with estimated cumulative load reduction progress towards State load reduction goals as estimated by the Prioritize, Target, and Measure Application.

Planning Region	Treatment Group Type & Number of Structural BMPs	Estimated Annualized Cost	Parameter	Unit	Existing Condition at Planning Region Outlet	State Load Reduction Goal			Load Reduction Expected from Implementation	Load Reduction Expected from Implementation (%)	5 year Reduction Goal	10 year Reduction Goal	Progress towards 10 yr. Goal (%)	Start	End
						Metric	Amount (%)	Target Load Reduction							
Lake Koronis-North Fork Crow River	Storage (99) Filtration (151)	$157,377	Sediment	tons/yr.	20,245	Annual Load	25	5,061	4,461	22%	2,531	5,061	88%	Year 1	Year 10
			Total Nitrogen	lbs./yr.	68,489	Annual Load	45	30,820	2,927	4%	15,410	30,820	9%		
			Total Phosphorus	lbs./yr.	3,608	Annual Load	12	433	105	3%	217	433	24%		
Middle Fork Crow River	Storage (60) Filtration (190)	$202,448	Sediment	tons/yr.	26,855	Annual Load	25	6,714	2,285	9%	3,357	6,714	34%	Year 1	Year 10
			Total Nitrogen	lbs./yr.	93,922	Annual Load	45	42,265	392	0.4%	21,132	42,265	1%		
			Total Phosphorus	lbs./yr.	315	Annual Load	12	38	13	4%	19	38	35%		
Jewetts Creek-North Fork Crow River	Storage (45) Filtration (205)	$141,078	Sediment	tons/yr.	32,688	Annual Load	25	8,172	6,243	19%	4,086	8,172	76%	Year 1	Year 10
			Total Nitrogen	lbs./yr.	75,566	Annual Load	45	34,005	3,011	4%	17,002	34,005	9%		
			Total Phosphorus	lbs./yr.	4,102	Annual Load	12	492	111	3%	246	492	22%		
Washington Creek	Storage (100) Filtration (150)	$541,859	Sediment	tons/yr.	19,689	Annual Load	25	4,922	7,437	38%	2,461	4,922	151%	Year 1	Year 10
			Total Nitrogen	lbs./yr.	60,708	Annual Load	45	27,319	6,776	11%	13,659	27,319	25%		
			Total Phosphorus	lbs./yr.	3,070	Annual Load	12	368	252	8%	184	368	68%		
Big Swan Lake	Storage (60) Filtration (169) Protection (10) Biofiltration (11)	$508,824	Sediment	tons/yr.	20,404	Annual Load	25	5,101	7,430	36%	2,551	5,101	146%	Year 1	Year 10
			Total Nitrogen	lbs./yr.	54,112	Annual Load	45	24,355	5,249	10%	12,177	24,355	22%		
			Total Phosphorus	lbs./yr.	2,655	Annual Load	12	319	188	7%	160	319	59%		
North Fork Crow River	Storage (6) Filtration (244)	$93,659	Sediment	tons/yr.	41,097	Annual Load	25	10,274	9,470	23%	5,137	10,274	92%	Year 1	Year 10
			Total Nitrogen	lbs./yr.	90,397	Annual Load	45	40,679	2,544	3%	20,339	40,679	6%		
			Total Phosphorus	lbs./yr.	5,071	Annual Load	12	609	98	2%	305	609	16%		
Crow River	Storage (39) Filtration (187) Protection (24)	$173,925	Sediment	tons/yr.	29,597	Annual Load	25	7,399	4,694	16%	3,700	7,399	63%	Year 1	Year 10
			Total Nitrogen	lbs./yr.	85,265	Annual Load	45	38,369	1,779	2%	19,185	38,369	5%		
			Total Phosphorus	lbs./yr.	7,088	Annual Load	12	851	81	1%	426	851	10%		

Green cells indicate achievement of the state load reduction goal through implementation of all 250 best structural practices

Estimated number of practices, annualized cost, and progress toward achieving state load reduction by planning region, based on implementing the "best", most cost-effective structural practices with the greatest reductions in the annual nutrient (nitrogen and phosphorus) load delivered to the planning region outlet (regional scale) and the greatest sediment load reduction reaching the catchment outlet (i.e., local scale). Estimates developed using the Prioritize, Target and Measure Application (PTMApp). Load reduction benefits from practice implementation are cumulative and do not consider implementation of upstream practices, and therefore are likely high. Benefits arising from implementation of management practices are not evaluated in this table. For combined benefits from implementation of all 250 best structural practices at all the 182 priority resource points within the NFCR Watershed, see **Appendix O**.

Table Interpretation (top row): In the Lake Koronis-North Fork Crow River planning region, 99 storage practices and 151 filtration practices will cost an estimated $157,377 annually to implement and maintain. Upon implementation of those 250 structural practices, PTMApp estimates that the sediment load at the outlet of the Lake Koronis-North Fork Crow River planning region will be reduced by 4,461 tons/yr., or 22% from existing conditions. This sediment load reduction corresponds to 88% of the state target load reduction goal of 5,061 tons/yr. or a 25% load reduction goal, based on the Sediment Reduction Strategy.

4.8 IMPLEMENTATION FUNDING TO ACHIEVE MEASURABLE GOALS

The ability to achieve the measurable goals is largely dependent on the amount of funding available. Increased funding is expected to increase implementation of management practices aimed at attaining stewardship in urban, rural, and shoreland areas, increase the number of structural BMPs cost-shared, and provide additional capital improvement projects. Increasing the level of funds available also will increase the need for local capacity.

Although local funds are committed to implementation, the largest funding sources are expected to be State and Federal sources. This plan also creates an avenue for investment by NGOs and perhaps private agribusinesses interested in supporting sourcing sustainability claims. Three implementation levels representing incremental increases in the implementation effort and funding amounts needed are described and evaluated within this plan.

The implementation levels reflect increasing the rate of progress toward achieving the measurable goals for the priority concerns established by the Policy Committee. Implementation is preferentially focused on completing the actions intended to address the issues affecting A- and B-level priority concerns (**Section 2.3**), as established by the Policy Committee. As funding and implementation efforts increase, the actions intended to address the issues affecting C-level priority concerns are added.

4.8.1 BASELINE IMPLEMENTATION LEVEL

The baseline implementation level is specifically focused on executing the actions within the targeted implementation schedule that address A- and B-priority concerns. For the baseline implementation level, local funding committed to plan implementation is at or near the estimated current (2015) local funding level, recognizing that annual funding may fluctuate greatly between years.

The baseline implementation level is inclusive of costs needed to develop a consistent education and outreach program for the watershed area, and implement education and outreach actions at or near their current level. Dollars are also included to fund research to close data gaps. The baseline implementation level assumes local fiscal support of statutory obligation and ordinance implementation remains unchanged, and includes funding for plan administration costs (see **Section 5.4**). Costs also include the construction of three large capital improvement projects, which may or may not be located within a watershed district.

Table 4-6: Annualized and total plan cost for implementation actions within the baseline implementation level

Item	Estimated Annualized Cost	Total Plan Cost (Over 10 Years)
Targeted Implementation Schedule		
Structural BMP	$2,182,800 [1]	$21,828,000
Management Practice	$2,430,825 [2]	$24,308,250
Education and Outreach	$150,000 [3]	$1,500,000
Data Gaps and Research	$100,000 [4]	$1,000,000
Regulatory	$495,000 [5]	$4,950,000
Capital Improvement	$750,000 [6]	$7,500,000
Additional Expenses		
Plan Administration	$233,000	$2,330,000
Total Estimated Funding Needs		
	$6,341,625	**$63,416,250**

[1] Includes total cost of targeted implementation approach plus 20% for technical assistance
[2] Assumes 10% of rural stewardship measurable goal is met and additional cost of $10/acre for field walkovers
[3] Estimated $150,000 per year for watershed wide activities, inclusive of upfront cost to develop uniform education and outreach program
[4] Assumes one study per year of $100,000

[5] Assumes local fiscal support of statutory obligation and ordinance implementation remains unchanged.
[6] Assumes three large investment projects

Successful delivery of the actions comprising the baseline implementation level would result in the implementation and anticipated load reduction benefits from all structural BMPs within the targeted implementation approach (**Table 4-5**). This baseline implementation level would also achieve 10% of the rural stewardship measurable goal, implementing management practices in 32,400 cropland acres categorized as "Probability Low" or "Probability Depends on Practice Effectiveness." Anticipated load reduction benefits arising from education and outreach, data gaps and research, regulatory, and capital improvement are not estimated.

Table 4-7: Load reduction benefits and progress towards state load reduction goals at the outlet of each planning region arising from implementation of structural BMPs and management practices comprising the baseline implementation level.

Planning Region	Implementation Component	Sediment			Total Phosphorus		
		State Load Reduction Goal	Est. Load Reduction Benefit (%)	Progress Toward Goal (%)	State Load Reduction Goal	Est. Load Reduction Benefit (%)	Progress Toward Goal (%)
Lake Koronis - North Fork Crow	Structural BMPs	25%	22%	88%	12%	3%	24%
	Management Practs.		2%	7%		1%	6%
	Combined*		***24%***	***95%***		***4%***	***30%***
Middle Fork Crow River	Structural BMPs	25%	9%	34%	12%	4%	35%
	Management Practs.		2%	7%		1%	7%
	Combined		***11%***	***41%***		***5%***	***42%***
Jewetts Creek-North Fork Crow River	Structural BMPs	25%	19%	76%	12%	3%	22%
	Management Practs.		2%	7%		1%	6%
	Combined		***21%***	***83%***		***4%***	***28%***
Washington Creek	Structural BMPs	25%	38%	151%	12%	8%	68%
	Management Practs.		1%	6%		1%	4%
	Combined		***39%***	***157%***		***9%***	***72%***
Big Swan Lake	Structural BMPs	25%	36%	146%	12%	7%	59%
	Management Practs.		2%	7%		1%	6%
	Combined		***38%***	***153%***		***8%***	***65%***
North Fork Crow River	Structural BMPs	25%	23%	92%	12%	2%	16%
	Management Practs.		2%	9%		1%	7%
	Combined		***25%***	***101%***		***3%***	***23%***
Crow River	Structural BMPs	25%	16%	63%	12%	1%	10%
	Management Practs.		3%	10%		1%	8%
	Combined		***19%***	***73%***		***2%***	***18%***

*Combined load reduction benefit from structural BMP and management practice implementation were not analyzed together within PTMApp, and are additive.

4.8.2 MODERATE FUNDING IMPLEMENTATION LEVEL

The moderate funding implementation level is specifically focused on executing actions within the targeted implementation schedule that address A-, B- and C-priority concerns. Three components differ compared to the baseline implementation level (**Table 4-8**):

1. Number of acres covered by management practices increases from 32,400 acres (10% of rural stewardship measurable goal) to 162,000 acres (50% of rural stewardship measurable goal);

2. The construction of one additional capital improvement compared to the baseline implementation level, which may or may not be located within a watershed district; and

3. Corresponding increases in plan administration costs, relative to the increases in management practices and capital improvements.

Table 4-8: Annualized and total plan cost for implementation actions within the moderate funding implementation level

Item	Estimated Annualized Cost	Total Plan Cost (Over 10 Years)
Targeted Implementation Schedule		
Structural BMP	$2,182,800 [1]	$21,828,000
Management Practice	**$12,150,000** [2]	**$121,500,000**
Education and Outreach	$150,000 [3]	$1,500,000
Data Gaps and Research	$100,000 [4]	$1,000,000
Regulatory	$495,000 [5]	$4,950,000
Capital Improvement	**$1,000,000** [6]	**$10,000,000**
Additional Expenses		
Plan Administration	**$611,000**	**$6,110,000**
Total Estimated Funding Needs		
	$16,688,800	**$166,888,000**

[1] Includes total cost of targeted implementation approach plus 20% for technical assistance
[2] Assumes 50% of rural stewardship measurable goal is met and additional cost of $10/acre for field walkovers
[3] Estimated $150,000 per year for watershed wide activities, inclusive of upfront cost to develop uniform education and outreach program
[4] Assumes one study per year of $100,000
[5] Assumes local fiscal support of statutory obligation and ordinance implementation remains unchanged.
[6] Assumes four large investment projects

Successful delivery of the actions comprising the moderate funding implementation level would result in the implementation and anticipated load reduction benefits from all structural BMPs within the targeted implementation approach (**Table 4-5**). This baseline implementation level would also achieve 50% of the rural stewardship measurable goal. Anticipated load reduction benefits arising from education and outreach, data gaps and research, regulatory, and capital improvement are not estimated.

Table 4-9: Load reduction benefits and progress towards state load reduction goals at the outlet of each planning region arising from implementation of structural BMPs and management practices comprising the moderate funding implementation level.

Planning Region	Implementation Component	Sediment			Total Phosphorus		
		State Load Reduction Goal	Est. Load Reduction Benefit (%)	Progress Towards Goal (%)	State Load Reduction Goal	Est. Load Reduction Benefit (%)	Progress Toward Goal (%)
Lake Koronis - North Fork Crow	Structural BMPs	25%	22%	88%	12%	3%	24%
	Management Practs.		9%	35%		4%	30%
	Combined*		***31%***	***123%***		***7%***	***54%***
Middle Fork Crow River	Structural BMPs	25%	9%	34%	12%	4%	35%
	Management Practs.		8%	34%		4%	37%
	Combined		***17%***	***68%***		***8%***	***72%***
Jewetts Creek-North Fork Crow River	Structural BMPs	25%	19%	76%	12%	3%	22%
	Management Practs.		8%	33%		4%	30%
	Combined		***27%***	***109%***		***7%***	***52%***
Washington Creek	Structural BMPs	25%	38%	151%	12%	8%	68%
	Management Practs.		7%	28%		3%	21%
	Combined		***45%***	***179%***		***11%***	***89%***
Big Swan Lake	Structural BMPs	25%	36%	146%	12%	7%	59%
	Management Practs.		8%	33%		4%	30%
	Combined		***44%***	***179%***		***11%***	***89%***
North Fork Crow River	Structural BMPs	25%	23%	92%	12%	2%	16%
	Management Practs.		11%	43%		4%	35%
	Combined		***34%***	***135%***		***6%***	***51%***
Crow River	Structural BMPs	25%	16%	63%	12%	1%	10%
	Management Practs.		13%	51%		5%	42%
	Combined		***29%***	***114%***		***6%***	***52%***

*Combined load reduction benefit from structural BMP and management practice implementation were not analyzed together within PTMApp, and are additive.

4.8.3 HIGH FUNDING IMPLEMENTATION LEVEL

Lastly, the high funding implementation level is specifically focused on executing the actions within the targeted implementation schedule that address A-, B-, and C-priority concerns. Four components differ compared to the baseline implementation level (**Table 4-10**):

1. An increase in funding for the structural BMP implementation program component (BMP Cost-Share Initiative) up to the projected cost of attaining 120% of both sediment and total phosphorus state load reduction goals within each planning region (defined by efficiency frontier curves in planning region implementation profiles) (**Table 4-11**) with a corresponding increase in the number of structural BMPs implemented;

2. Number of acres covered by management practices increases from 32,400 acres (10% of rural stewardship measurable goal) to 324,110 acres (100% of rural stewardship measurable goal) (**Table 4-11**);

3. The construction of two additional capital improvement compared to the baseline implementation level, which may or may not be located within a watershed district; and

4. Corresponding increases in plan administration costs, relative to the increases in management practices and capital improvements.

Anticipated load reduction benefits arising from education and outreach, data gaps and research, regulatory, and capital improvement are not estimated (**Table 4-11**).

Table 4-10: Annualized and total plan cost for implementation actions within the high funding implementation level

Item	Estimated Annualized Cost	Total Plan Cost (Over 10 Years)
Targeted Implementation Schedule		
Structural BMP	**$49,754,920** [1]	**$497,549,200**
Management Practice	**$24,308,000** [2]	**$243,080,000**
Education and Outreach	$150,000 [3]	$1,500,000
Data Gaps and Research	$100,000 [4]	$1,000,000
Regulatory	$495,000 [5]	$4,950,000
Capital Improvement	**$1,250,000** [6]	**$12,500,000**
Additional Expenses		
Plan Administration	**$2,890,200**	**$28,902,000**
Total Estimated Funding Needs		
	$78,948,120	**$789,481,200**

[1] Includes total cost of all structural BMPs needed to meet 120% of both sediment and total phosphorus state load reduction goals as estimated by efficiency frontier curves. 20% added to total cost for technical assistance.
[2] Assumes 100% of rural stewardship measurable goal is met and additional cost of $10/acre for field walkovers
[3] Estimated $150,000 per year for watershed wide activities, inclusive of upfront cost to develop uniform education and outreach program
[4] Assumes one study per year of $100,000
[5] Assumes local fiscal support of statutory obligation and ordinance implementation remains unchanged.
[6] Assumes five large investment projects

Table 4-11: Load reduction benefits and progress towards state load reduction goals at the outlet of each planning region arising from implementation of structural BMPs and management practices comprising the high funding implementation level.

Planning Region	Implementation Component	Sediment			Total Phosphorus		
		State Load Reduction Goal	Est. Load Reduction Benefit (%)	Progress Toward Goal (%)	State Load Reduction Goal	Est. Load Reduction Benefit (%)	Progress Toward Goal (%)
Lake Koronis - North Fork Crow	Structural BMPs	25%	89%	355%	12%	14%	121%
	Management Practs.		18%	71%		7%	60%
	Combined*		***107%***	***426%***		***22%***	***181%***
Middle Fork Crow River	Structural BMPs	25%	30%	120%	12%	20%	168%
	Management Practs.		17%	67%		9%	73%
	Combined		***47%***	***187%***		***29%***	***241%***
Jewetts Creek-North Fork Crow River	Structural BMPs	25%	63%	253%	12%	14%	120%
	Management Practs.		16%	66%		7%	59%
	Combined		***80%***	***319%***		***22%***	***179%***
Washington Creek	Structural BMPs	25%	60%	239%	12%	14%	120%
	Management Practs.		14%	57%		5%	43%
	Combined		***74%***	***296%***		***19%***	***162%***
Big Swan Lake	Structural BMPs	25%	60%	242%	12%	14%	120%
	Management Practs.		17%	66%		7%	60%
	Combined		***77%***	***308%***		***22%***	***180%***
North Fork Crow River	Structural BMPs	25%	152%	609%	12%	14%	120%
	Management Practs.		22%	87%		8%	70%
	Combined		***174%***	***696%***		***23%***	***190%***
Crow River	Structural BMPs	25%	345%	1380%	12%	14%	120%
	Management Practs.		25%	102%		10%	84%
	Combined		***370%***	***1482%***		***25%***	***204%***

*Combined load reduction benefit from structural BMP and management practice implementation were not analyzed together within PTMApp, and are additive.

Implementation Programs

5 IMPLEMENTATION PROGRAMS

5.1 INCENTIVE-BASED INITIATIVES

Incentive-based initiatives can get projects on the ground in the watershed

Implementation programs (i.e. incentive-based initiatives) are a key component of the targeted implementation schedule presented in **Section 4**. Incentive-based initiatives are used as the funding mechanism to implement actions and make progress toward achieving plan measurable goals. Previously, incentive-based initiatives were used by plan participants across the NFCR Watershed, but lacked commonality. This plan establishes common incentive-based initiatives within the plan area[1]. The incentive-based initiatives are described conceptually in this section. Specific details for execution may be needed before program use.

Each action in the targeted implementation schedule is categorized as an implementation component (i.e. structural BMP, management practice, education and outreach, data gaps and research, regulatory, and capital improvement. Implementation components relate to the implementation program, or incentive-based initiative, which will be used to fund the action. These initiatives and programs are defined and discussed in this plan section.

As local approvals and ordinances are already a component of local government budgets, actions in the "regulatory" implementation component are not assigned a specific initiative, and are instead discussed in **Section 5.3**. Likewise, "capital improvements" represent larger projects not associated with general local funding, and are also not associated with a specific initiative. These projects are discussed in **Section 5.2**.

5.1.1 BMP COST SHARE INITIATIVE

To achieve the measurable goals, funding is needed to plan, design, and implement management practices and structural BMPs within urban, rural, and shoreland areas. Within the targeted implementation schedule, actions assigned as "management practice" or "structural BMP" use the planning, design, and implementation of management practices and structural BMPs on the landscape to make progress toward watershed-wide and priority concern measurable goals. These actions are funded through the BMP Cost Share Initiative.

Examples of activities that are eligible for funding through the BMP Cost Share Initiative include:

- Soil testing and grid sampling (e.g., for organic matter content and to guide fertilizer recommendations);
- Field scale cash flow/profitability analysis to identify low profitability locations and the intersection with opportunities for management practices and structural BMPs;
- Field walkovers and consultations with rural, urban, and shoreland property owners interested in implementing management practices or structural BMPs;
- Structural BMP design within urban, rural, or shoreland properties;

[1] Plan participants will still no doubt continue to use financial incentives through their own programs to meet their own individualized needs within their jurisdiction.

- The construction of structural BMPs, including the cost associated with construction observation, construction materials, and actual construction on urban, rural, or shoreland properties;
- The administrative, engineering, and legal costs specific to implementing management practices or structural BMPs; and
- Documentation costs for complying with grant or funding requirements.

The BMP Cost Share Initiative can be used to plan, design, and implement management practices (e.g. nutrient management, conservation tillage) or structural BMPs (e.g. grassed waterways, controlled drainage) (see **Table 5.1** for a list of eligible practices). Projects and practices funded by the BMP Cost Share Initiative are typically much smaller in size than a capital improvement project (see **Section 5.2**). Funding by this initiative is intended reduce the amount of sediment and nutrients leaving the landscape and delivered downstream, thereby treating runoff[2] near the pollutant source. This cost share is also used to fund projects and practices that create live storage on the landscape. Any type of assistance (financial incentive, technical assistance, tax exemption, conservation easement, land acquisition) can be used to provide the BMP Cost Share Initiative, up to 75% of the total project or practice cost.

To be suitable for funding under the BMP Cost Share Initiative, practices and projects must be planned and implemented to a recognized standard, such as the NRCS design standard or guidance found within an urban BMP stormwater manual. A lesser design standard can be used to fund a project or practice, but the total allotted cost share amount will be reduced. If a lesser design standard is used to plan and implement a management practice or structural BMP, the burden for replacement is shifted to landowner.

The BMP Cost Share Initiative is expected be funded through Clean Water Fund dollars and potentially dollars from federal and foundation grants[3], to pay for eligible activities. Grant applications to fund the BMP Cost Share Initiative will be prepared jointly as the NFCRWPP.

Prior to any grant application, each partnering entity will identify the number and locations of management and structural BMPs they wish to implement within a two-year period, consistent with the plan, and according to technical capacity. Funding for BMP Cost Share Initiative dollars is preferentially given to projects and practices that adhere to the prioritized numbers, types, and locations of projects and practices identified within each planning region implementation profile (see **Section 4.6**).

Section 5.5 of the plan identifies responsibility for receiving, managing, and disbursing money to plan participants. Grant dollars received by the NFCRWPP will be distributed to plan participants planning, designing, or implementing the prioritized and funded management practices and structural BMPs. Decisions about practices considered but not funded (perhaps a landowner is unwilling to participate) should be maintained in central location for BWSR reporting. Each plan participant that receives funding is responsible for reporting results and estimated benefits arising from dollars received.

Within rural, urban, and shoreland areas, field walkovers and consultations to identify critical source areas will be completed free of charge to the landowner using the BMP Cost Share Initiative, up to a maximum amount of $4,000 per walkover or consultation, or the maximum amount as determined by the Planning Work Group. The purpose of the walkover or consultation is to evaluate how to best plan to fix a problem. BMP Cost Share Initiative dollars can then be used to design and implement solutions to problems once identified. Walkovers or consultations funded through the BMP Cost Share Initiative can be performed by any qualified entity that undergoes sufficient training (SWCD or watershed district staff, agronomic advisor, consultant, etc.). The results from field walkover and consultations funded by Clean Water Fund dollars must be reported to CROW, for reporting to BWSR.

[2] For example, the intent is to minimize the likelihood of funding in-lake treatment projects.
[3] Private funding from private agribusinesses may be possible, provided the efforts support a sustainability claim.

Progress toward measurable goals arising from walkovers and consultations can be reported as:

- **Rural stewardship:** the number of field walkovers completed and number of acres reviewed, reported at the 12-digit HUC scale (not individual farms);
- **Urban stewardship:** the number of city and cities where consultations have been completed;
- **Shoreland stewardship:** number of shoreland owners visited, reported by stream reach or lake name.

Information gained during walkovers and consultations is expected to be used to periodically (i.e., approximately every 2-3 years) to update and report about attainment of the rural, urban and shoreland stewardship metrics.

The Fiscal / Administrative Agent is responsible for managing process, paper work, and funds (including payment requests) of the BMP Cost Share Initiative. The initiative will be coordinated through local units of government. Additional staff are likely to be needed because the amount of money available and number of practices constructed will increase, especially if implementation funding levels increase from the baseline implementation level to the moderate or high funding implementation level. Implementing the program will require one or more qualified engineering technicians capable of designing the practices and working with landowners and city engineers.

Table 5-1: Probable list of management practices or structural BMPs eligible for funding under the BMP Cost Share Initiative. List is not all inclusive. Management practices and structural BMPs are grouped by their Prioritize, Target, and Measure Application (PTMApp) treatment group.

Management Practice or Structural BMP	NRCS Code	PTMApp Treatment Group Category						
		Storage	Filtration	Biofiltration	Infiltration	Protection	Source Reduction	User Defined
Alternative Tile Intake - Dense Pattern Tiling	606				x			
Alternative Tile Intake - Gravel Inlet	606		x					
Alternative Tile Intake - Other Blind Intake	606		x					
Alternative Tile Intake - Perforated Riser Intake	606	x						
Anaerobic Digester	366							x
Bioretention Basin	N/A			x				
Conservation Cover	327		x					
Conservation Crop Rotation	328		x					
Conservation Tillage	329						x	
Constructed Wetlands	N/A	x						
Contour Buffer Strips	332		x					
Contour Farming	330						x	
Cover Crop	340		x					
Critical Area Planting	342					x		
Culvert Sizing	N/A	x						

Management Practice or Structural BMP	NRCS Code	PTMApp Treatment Group Category						
		Storage	Filtration	Biofiltration	Infiltration	Protection	Source Reduction	User Defined
Dam	402	x						
Drainage Water Management	554	x						
Filter Strips	393		x					
Forage and Biomass Planting	512						x	
Grade Stabilization Structure	410					x		
Grassed Waterways and Swales	412		x					
Infiltration Trench	N/A				x			
Irrigation Water Management	442						x	
Lined Waterway or Outlet	468				x			
Multi-stage Ditch	N/A				x			
Nutrient Management	590						x	
Pest management	595							x
Pond for Water Use	378	x						
Prescribed Burning	338							x
Prescribed Grazing	556						x	
Riparian Forest Buffer	391		x					
Riparian herbaceous Cover	322		x					
Roof Runoff Management	558							x
Rotational Grazing	N/A						x	
Sediment Basin	350	x						
Saturated Buffer	N/A			x				
Septic System Improvement	N/A							x
Storm Water Retention Basins	N/A	x						
Stream Channel Stabilization	584					x		
Streambank and Shoreline Protection	580					x		
Stripcropping	585				x			
Structure for Water Control	587	x						
Terrace	600		x					
Tree/Shrub Establishment	612					x		
Water and Sediment Control Basin	638	x						

Management Practice or Structural BMP	NRCS Code	PTMApp Treatment Group Category						
		Storage	Filtration	Biofiltration	Infiltration	Protection	Source Reduction	User Defined
Water Reuse	636							x
Wetland Creation	658	x						
Wetland Restoration	657	x						

5.1.2 EDUCATION AND OUTREACH INITIATIVE

Actions assigned as an "education and outreach" implementation component use education and outreach methods to address issues impacting a priority concern and make progress toward a measurable goal. The Education and Outreach Initiative funds the implementation of these actions. These actions are primarily targeted at two stakeholder groups: (1) the general public; and (2) landowners, producers, and lakeshore owners.

Two campaigns comprise the Education and Outreach Initiative:

- Public Knowledge and Behavior Campaign; and
- Landowner, Producer and Lakeshore Owner Campaign.

Education and Outreach Initiative campaigns are operated through NFCR Watershed 1W1P sharing of services. Expectations are that a common set of (template) education and outreach materials will be developed for use across the watershed, but delivered by the staff within each county. The campaigns will be locally administered or administered by entities covering a larger plan area. The campaigns will be implemented with individual local entities operating as their own respective fiscal agent.

5.1.2.1 PUBLIC KNOWLEDGE AND BEHAVIOR CAMPAIGN

Outreach programs can help improve the engagement with watershed issues

The primary purpose of the Public Knowledge and Behavior Campaign is to create positive and impactful education and outreach experiences for members of the public, to encourage behavioral changes that support progress toward watershed-wide and priority concern measurable goals.

There are numerous public education and outreach activities currently occurring in NFCR Watershed. Many of these activities are tailored to youth, including presentations about water quality, in-school environmental days, annual Envirothons, annual Earth Day, outreach events (through the Prairie Woods Environmental Learning Center, Crow River Clean-Up Day with 4H Boy Scout, Cub Scout, and Girl Scout Troops), and more.

Plan partners collaborate with others to increase education and outreach and community engagement within the plan area. Organizations that have collaborated with plan partners for education and outreach purposes include, but are not limited to Trail Guards, the Prairie Woods Environmental Learning Center, Minnesota Agricultural Water Resource Center, Pheasants Forever, Ducks Unlimited, and American

Farmland Trust. Lake associations and coalitions of lake associations (COLAs) also provide education and outreach and project implementation assistance. Collaboration with other entities is discussed more in **Section 5.5.2**.

Several activities are included as part the Public Knowledge and Behavior Campaign, such as the development of educational materials, newsletters, coordination of volunteer activities, school presentations, and public meetings to raise awareness and gain a better understanding of the consequences of individual decisions on water management. Also included are general media campaigns, citizen and local government unit surveys, and municipal training.

5.1.2.2 LANDOWNER, PRODUCER AND LAKESHORE OWNER ENGAGEMENT CAMPAIGN

The Landowner, Producer, and Lakeshore Owner Engagement Campaign is tailored to agricultural landowners and operators, cities staff, and lakeshore owners within the plan area. The purpose of the Landowner, Producer, and Lakeshore Owner Engagement Campaign is to understand, engage, and communicate with local landowners, cities, agricultural producers, and lakeshore owners to increase understanding of resource issues and the benefits of management practice and structural BMP implementation, ultimately leading to increased adoption of voluntary practices.

There are many education and outreach activities already occurring in the area tailored to landowners, producers, and lakeshore owners. Examples include field steward programs, and Discovery Farms through the Minnesota Agricultural Water Resource Center, and the Minnesota Agricultural Water Quality Certification Program. For lakeshore owners, there are many lake associations and coalitions of lake associations (COLAs) within the plan area, which are actively involved in education and outreach and project implementation.

Several activities are eligible as part the Landowner, Producer, and Lakeshore Owner Engagement Campaign. Eligible activities include production of educational materials, demonstration projects, and workshops tailored to landowners, agricultural producers, and lakeshore owners about compensation and incentive programs to promote management practices and structural BMPs. Other activities may include outreach initiatives to prevent invasive species and the development of citizen-led initiatives, such as Farmer Led Councils, lake associations, farmer mentor lists, and local advisory committees, that promote conservation through peer-based outreach and performance-based incentives.

5.1.3 DATA GAPS AND RESEARCH INITIATIVE

Actions categorized as “data gaps and research” use research to close information and data gaps, and are funded by the Data Gaps and Research Initiative. Closing data gaps allows for the conceptualization of tailored, science-based implementation strategies aimed to develop information to better address priority concerns.

Plan participants have and will continue to invest in the development and assembly of data and information. A large portion of these data and information are water quality monitoring data. The Data Gaps and Research Initiative is dedicated to enhancing and maintaining the monitoring network in the NFCR Watershed to capture and document measurable water quality changes resulting from watershed implementation activities. Plan partners have a robust surface and groundwater monitoring network in place that continues to be refined.

There are many local plan participants that conduct monitoring in the NFCR Watershed, including but not limited to the Crow River Organization of Water (CROW), the North Fork Crow River Watershed District (NFCRWD), the Middle Fork Crow River Watershed District (MFCRWD), and local soil and water conservation districts (SWCDs). Both the NFCRWD and the MFCRWD work under watershed management plans where monitoring activities are specified. Local entities continue to pursue funding to assess and monitor water quality in the NFCR Watershed to fill identified data gaps, measure progress

toward implementation goals for both protection and restoration and provide the basis for future planning and adaptive management (CROW, 2014). Periodic analysis of data to meet BWSR requirements for achieving measurable actions and goals will be completed by local and partnering entities. Met Council is doing data analysis within the NFCR Watershed for the watershed outlet monitoring program (WOMP).

There are several surface monitoring sites in the NFCR Watershed that are operated by the MPCA as part of the watershed monitoring approach. The watershed approach is a 10-year rotation for assessing waters of the state on the level of Minnesota's 80 major watersheds (MPCA, 2012). There are 98 total biological monitoring sites within streams and rivers in the NFCR Watershed that have been monitored from 1999-2017. In 2007, 60 biological stations and 16 water chemistry stations were sampled. These assessments identified 17 streams that cannot support aquatic life and 15 that do not support bodily contact (MPCA, 2011). Further monitoring was conducted in 2017, sampling 43 biological stations, 10 water chemistry stations, and numerous lakes.

The NFCR Watershed Pollutant Load Monitoring Network (WPLMN) provides year-round monitoring data from four monitoring sites located on the main stem and main tributaries of the North Fork Crow River. These sites located on the North Fork Crow River are located (from upstream to downstream) in Paynesville, Cokato, and Rockford. Monitoring data collected by the WPLMN sites consists of stream flow data collected by USGS and the MnDNR, and water quality data collected by the MPCA. The MPCA also coordinates two programs as part of the watershed monitoring programs that are aimed at encouraging citizen surface water monitoring: (1) the Citizen Lake Monitoring Program and (2) the Citizen Stream Monitoring Program. The programs gain valuable long-term data, which can be used to evaluate trends.

The MPCA awarded Surface Water Assessment Grants (SWAG) to local entities in the plan area for monitoring lake and stream water quality. The goals of these SWAG grants have been to expand the local entities' training programs and outreach efforts enabling organizations to recruit and retain additional citizen volunteers for both lake and stream monitoring in the NFCR Watershed and enhance and complete datasets for streams and lakes throughout the watershed to evaluate overall water quality. Other existing surface water monitoring sites in the plan area are operated by the MnDNR and the USGS.

Monitoring efforts also support tracking groundwater supply trends in the NFCR Watershed. The upper portion of the NFCR Watershed coincides with the southeastern extent of the Bonanza Valley Aquifer system, a regionally important groundwater resource which is highly used by area landowners for high capacity use, the majority of which is for crop irrigation. There are currently a number of observation wells in place within the Bonanza Valley area; however, additional wells may be necessary to accurately gauge the water level variations within these aquifers (CROW, 2014).

In addition to groundwater levels, groundwater quality is also being monitored in the NFCR Watershed. The Minnesota Department of Agriculture (MDA) provides an assessment of nitrate-nitrogen concentrations in private wells at the township scale. MDA has identified townships throughout the state that are vulnerable to groundwater contamination and have significant row crop production, several of which are located within the NFCR Watershed area. Results from these well tests provide practitioners with knowledge about the current nitrate conditions in their county to enable more informed local planning and decision-making.

During implementation, the Data Gaps and Research Initiative will build on the data and information processes already established by plan participants. This initiative will also be used to fund implementation of actions aimed to build and maintain technical capacity to fully utilize new technology and tools for water resource management. The Data Gaps and Research Initiative will be operated through the sharing of services. However, activities will be locally-administered and implemented, with individual local entities operating as the fiscal agent.

5.2 CAPITAL IMPROVEMENTS

A capital improvement is defined as a major non-recurring expenditure for the construction, repair, retrofit, or increased utility or function of physical facilities, infrastructure, or environmental features. Capital improvements are beyond the "normal" financial means of the NFCRWPP and therefore require external funding.

Table 5-2 shows proposed capital improvements within the NFCR Watershed. Additional discussions are needed among plan participants to develop the specific process for implementing capital improvements. Specifically, members of the Policy Committee or the Planning Work Group's individual and representative Boards are expected to discuss the means and methods for funding new capital improvements, with potential funding partners, before an implementation timeline can be established.

Capital improvement projects completed through this plan will be operated and maintained by the sponsoring organization.

Table 5-2: Potential capital improvement projects in the North Fork Crow River Watershed One Watershed, One Plan Planning Area. Projects listed in no particular order.

Capital Improvement Project	Description	Lead Entity	Information Source	Years (Start & End)	Status	Estimated Cost*
North Fork Crow River Altered Hydrology Mitigation Projects	Develop, design and construct storage areas as mitigation for altered hydrology.	North Fork Crow River Watershed District	NFCRWD Comprehensive Management Plan	1 project every 5 years (i.e. 2020; 2025)	Concept	$2,500,000
City of Brooten Urban Wastewater/Stormwater Treatment Practices	Water quality analysis required to identify areas where pollution and flooding is a problem within the city limits of Brooten, MN	North Fork Crow River Watershed District	NFCRWD Comprehensive Management Plan	2019-2021	Concept	$300,000
Lake Koronis Ravine Stabilization and Stormwater Treatment	Development and installation of various BMPs identified to reduce erosion	North Fork Crow River Watershed District	NFCRWD Comprehensive Management Plan	1 Project every 2 years	Concept	$670,000
Mud Lake Sediment Removal	Removal of sediment from Mud Lake to remove phosphorus source to Lake Koronis and provide sediment capture	North Fork Crow River Watershed District	NFCRWD Comprehensive Management Plan	2025-2028	Concept	$20,000,000
Nest Lake TMDL Projects	Construct a wetland restoration project east of Nest Lake on land owned by the MnDNR: Upstream lake as nonpoint contributing source	Middle Fork Crow Watershed District	North Fork Crow Watershed WRAPS	2025-2028	Concept	$200,000
Green Belt and Stream Bank Stabilization - Middle Fork Crow River	Develop and create a greenbelt for a portion of the Middle Fork of the Crow River, upstream of Nest Lake. Conceptual designs for the erosion locations with moderately-high to severe erosion features	Middle Fork Crow Watershed District	MFCRWD 10-Year Comprehensive Plan; Clean Water Fund: Accelerated Implementation Subwatershed Assessment Study	2023-2026	Planning Level Analysis	$674,200
New London and Spicer Priority Stormwater BMP	Stormwater water quality analysis was completed to identify areas where runoff pollution is the worst within the city limits of New London and Spicer, MN	Cities: New London and Spicer	Clean Water Fund: Accelerated Implementation Water Quality Subwatershed Assessment - Stormwater Modeling	2020-2023	Planning Level Analysis	$1,142,090

Capital Improvement Project	Description	Lead Entity	Information Source	Years (Start & End)	Status	Estimated Cost*
City of Paynesville Stormwater Treatment Practices	Improvement of 4 major outfalls to the NFCR by installation of catch basins. Installation of wet retention basins (2) for storage and stormwater treatment.	City: Paynesville	City of Paynesville Surface Water Management Plan – Bolton & Menk, Inc (2011)	2023-2026	Planning Level Analysis	$800,000
Ann Lake Water Quality & Flood Control	A limestone filter near grass lake to help improve water quality and water quantity management to prevent flooding of homeowner property on Ann Lake	County: Wright	Wright SWCD	2021-2023	Concept	>$500,000

5.3 REGULATORY ADMINISTRATION

Many of the issues affecting priority concerns can be addressed in part through the administration of statutory responsibilities and ordinances. **Table 5-3** shows the relationship between statutory obligations and ordinances administered by the counties and watershed districts within the NFCR Watershed. Additional descriptions of the administration of many of these statutory responsibilities and local ordinances is described within this section of the plan.

5.3.1 ADMINISTRATION OF STATUTORY RESPONSIBILITIES

The State Statutes administered by the counties and watershed districts involved in this plan are described below. In many cases, local regulations and ordinances have been adopted to conform to the standards and requirements of the state statutes (**Table 5-3**). The responsibility for implementing these programs will remain with the respective counties.

5.3.1.1 WETLAND CONSERVATION ACT (WCA)

The Minnesota Legislature passed the Wetland Conservation Act of 1991, which is intended to result in "no net loss" of wetlands through filling, draining, excavating, or converting wetlands to other uses. Local government units are responsible for administering, regulating, and educating landowners on WCA.

5.3.1.2 BUFFER AND SOIL LOSS LEGISLATION

During the 2015 legislative session, the State of Minnesota passed the Buffer and Soil Loss Legislation (Minnesota Statue 2014, section 103B.101), commonly referred to as the Minnesota Buffer Law. The legislation requires a 50-foot average continuous buffer of perennial vegetation with a 30-foot minimum width around all public waters and a 16.5-foot minimum width continuous buffer of perennial vegetation along all public drainage systems. The SWCDs will be relied upon for implementation and assessing compliance of the buffer legislation. SWCDs are also likely to provide technical assistance and provide guidance about financial assistance options. Landowners also have the option of working with their SWCD to determine if other alternative practices aimed at protecting water quality can be used, rather than a buffer.

5.3.1.3 SHORELAND MANAGEMENT

The Minnesota Legislature has delegated responsibility to local government units to regulate the subdivision, use, and development of shorelands along public waters to preserve and enhance the quality of surface waters, conserve the economic and natural environmental values of shorelands, and provide for the wise use of waters and related land resources. This statute is administered and enforced as a zoning ordinance requiring a 50-foot buffer around public waters, with applicable height limits, impervious surface limits, lot requirements, vegetation removal and land alteration requirements.

5.3.1.4 FLOODPLAIN MANAGEMENT

Floodplain zoning regulations are intended to guide development in the flood plain consistent with the magnitude of the flood threat, in order to minimize loss of life and property, disruption of commerce and governmental services, extraordinary public expenditure for public protection and relief, and interruption of transportation and communication, all of which adversely affect the public health, safety, and general welfare.

5.3.1.5 INDIVIDUAL SUBSURFACE SEWAGE TREATMENT SYSTEMS (SSTS)

Counties participating in the 1W1P administer Minnesota Rules Chapter 7080 through 7083 for individual SSTSs. The program provides technical assistance, education, plan review, and inspections to protect water quality, prevent and control water borne diseases, and prevent or eliminate nuisance conditions.

5.3.1.6 MUNICIPAL WASTEWATER TREATMENT FACILITIES

Municipal wastewater treatment facilities are found throughout the NFCR Watershed. The Minnesota Pollution Control Agency regulates and monitors municipal wastewater treatment facilities.

5.3.1.7 SOLID WASTE MANAGEMENT

Counties participating in the NFCR Watershed 1W1P operate solid waste management systems as direct by Minnesota Statues Chapters 115A and 400. These programs may include:

- Waste reduction and waste education programs;
- Curbside recycling and publicly-owned and operated recycling center;
- Yard waste composting sites; and
- Regional hazardous waste management facility.

5.3.1.8 WELL MANAGEMENT

The Minnesota Department of Health (MDH) administers the state wellhead protection rule, Minnesota Rules, Chapter 4720.5100 – 4720.5590, that sets standards for wellhead protection planning. Cities within the NFCR Watershed have completed or will be completing wellhead protection plans. The most recent listing of completed wellhead protection plans can be obtained from MDH.

5.3.1.9 HAZARD MANAGEMENT

Section 104 of the Disaster Mitigation Act of 2000 (DMA 2000), Public Law 106-390, codified at 42 USC Sections 5121 et seq. Hazard Mitigation Planning, 44 CFR Part 201, established criteria for state and local hazard mitigation planning. Counties participating in the 1W1P have developed hazard mitigation plans as a result of DMA 2000.

5.3.1.10 FEEDLOTS

Feedlot rules, regulations, and programs were established under MN Rules 7020 and is administered through the Minnesota Pollution Control Agency. Counties participating in the 1W1P provide feedlot regulatory oversight and technical assistance programs, and maintain a feedlot inventory.

5.3.2 LOCAL ORDINANCES

Local ordinances are used by all of the counties in the NFCR Watershed to address issues specific to their county. **Table 5-3** shows the counties that have ordinances related to managing water and resources. The responsibility for implementing these ordinances will remain with the respective counties.

5.3.2.1 AGGREGATE MANAGEMENT

Individual counties manage the development of and extraction of aggregate resources through local zoning and ordinances. County government will remain responsible for this process.

5.3.2.2 EROSION CONTROL (AGRICULTURAL AND CONSTRUCTION)

Some counties participating in this plan have erosion control regulations within their zoning ordinances that address agricultural erosion, construction and storm water plans. The State of Minnesota also

requires permits through the National Pollutant Discharge Elimination System (NPDES) for all construction on development sites of one acre or more in size.

5.3.2.3 BLUFFLAND PROTECTION

Counties in plan area have policies within their zoning ordinances to control certain land uses, define structure and feedlot setback distances, and/or restrict vegetative alterations within bluff areas. These policies are in place to control soil erosion, protect water quality, and preserve the aesthetic and natural value of bluffs.

5.3.2.4 FORESTLAND MANAGEMENT

Some counties in the plan area have ordinances to manage trees and woodland. This includes restrictions for structures being built in a wooded area to preserve trees, and standards for the harvesting of timber and associated reforestation or conversion of forested use to a non-forested use.

5.3.2.5 PRESERVATION OF NATURAL DRAINAGE WAYS

Wright County has a zoning ordinance to retain the natural drainage systems in the county through performance standards for lakes, rivers, and streams.

5.3.2.6 LAND USE

Counties within the NFCR Watershed are responsible for land use planning, which is administered through local zoning ordinances.

5.3.3 RULES

There are two watershed districts within the NFCR Watershed: the North Fork Crow River Watershed District (NFCRWD) and the Middle Fork Crow River Watershed District (MFCRWD). Both the NFCRWD and MFCRWD have a system of rules and regulations for the management of water within their respective watershed districts. No new rules or regulations specific to water management will be implemented by the watershed districts within the NFCR Watershed. Rather the need for new and implementation of existing rules and regulations will continue through the NFCRWD and MFCRWD. **Table 5-3** shows existing rules and regulations within the NFCRWD and MFCRWD, as they relate to statutory responsibilities and local county ordinances. Existing rules and regulations for the NFCRWD and MFCRWD are also shown in **Appendix N**.

5.3.3.1 PUBLIC DRAINAGE SYSTEMS: ESTABLISHMENT, IMPROVEMENT, REROUTING, REPAIRS, IMPOUNDMENTS, BUFFER COMPLIANCE

Actions impacting public drainage systems are subject to Minnesota Statutes 103E. They are also regulated by rules within the NFCRWD and MFCRWD. The following actions require a permit from the NFCRWD to proceed:

- Work in any water course or water basin, whether or not open water is present at the time of the work--including but not limited to excavation, filling, dredging, and the placement of structures. In the case of agriculture drainage, a permit is required for: a. Surface or open ditch drainage of a drainage area greater than 160 A.'s b. Tile drainage of a drainage area greater than 320 A.'s (NFCRWD Rules 3.1A);
- Work in the right of way of any legal drainage system within the jurisdiction of the District (NFCRWD Rules 3.1C);
- Diversion of water into a public drainage system from land not assessed for the public system (NFCRWD Rules 3.1D);

- Cultivating any area that is closer than one rod from the top edge of any water course that is part of a public drainage system (NFCRWD Rules 3.1F).

5.3.3.2 PRESERVATION OF NATURAL DRAINAGEWAYS

The NFCRWD has a rule in place requiring a permit for any work to restrict the normal or natural drainage of land or to enlarge wetlands that will cause flooding of adjacent land or public or private roadways. This rule is in place to help ensure wise development and conservation of the NFCRWD's water resources.

5.3.3.3 TILE DRAINAGE

Tile drainage is regulated by rules within the NFCRWD and MFCRWD to preserve drainage capacity, prevent flooding, and improve water quality. Within these rules, permits are required for certain new or expanded tile drainage systems. Permits may also be required for the repair or preplacement of existing private drainage facilities.

5.3.3.4 STORMWATER RUNOFF

Through District rules, the MFCRWD manages storm water runoff within the watershed to protect surface water and groundwater resources, promote infiltration, encourage pretreatment, and minimize peak flows after storm events and spring snow melt. Included in this rule are permit requirements for certain development and redevelopment and standards for stormwater permit applications.

Table 5-3: Statutory responsibilities and regulations, rules, and ordinances administered by the counties and watersheds districts participating in the North Fork Crow River One Watershed, One Plan. List is not intended to be all-inclusive.

	Rule, Ordinance or Statute Name	Kandiyohi	McLeod	Meeker	Pope	Stearns	Wright	MFCRWD	NFCRWD
Statutory Responsibilities	**Shoreland management**	Managed through Zoning Ordinance	McLeod County Zoning Ordinance Section 13	Article 19A	Administered through Co Land Use Ordinance Sec. 4	Land Use and Zoning Ordinance #439, Section 10.2	WCZO Sec.155.057	MFCRWD Rules Sec 6 Erosion Control	NFCRWD Rules Sec 4.3
	Floodplain management	Managed through Floodplain Ordinance	McLeod County Zoning Ordinance Section 12	Meeker County Floodplain Ordinance	NFIP Administered through County Ordinance No 5	Land Use and Zoning Ordinance #439, Section 10.1	WCZO Sec.155.056	N/A	NFCRWD Rules Sec 4.3
	Individual Sewage Treatment Systems (ISTS)	Managed through SSTS Zoning Ordinance	McLeod County Subsurface Sewage Treatment Systems Ordinance	Article 22.13	Administered through Co Land Use Ordinance Sec 10.20	Sewage System Treatment Ordinance #422	WCZO Sec.155.090	N/A	NFCRWD Rule 4.5.C
	Solid Waste Management	Managed through Solid Waste Ordinance	McLeod County Solid Waste Management Ordinance	Meeker County Waste Ordinance	Administered through Co Land Ordinance Sec 10.26 Solid waste Ordinance #4	Public Solid Waste Ordinance #193; Solid Waste Collection #194; Solid Waste Management #431	WCZO Ch.156	N/A	NFCRWD Rule 4.5.C
	Hazard Management	NA	McLeod County Solid Waste Management Ordinance	Meeker County Emergency Management Administered by Sheriff's Dept	Pope County Hazard Mitigation Plan 2016 Administered by Sheriff's Dept	Stearns County Emergency Operations Plan and All-Hazard Mitigation Plan	WC Multi-Hazard Mitigation Plan	N/A	Adopt Stearns County Haz Mit. Plan Resolution 2017-06
	Feedlots	Delegated County	McLeod County Feedlot Management Ordinance	Article 22.10 of the Zoning Ordinance	Administered through Co Land Use Ordinance Sec 10.3	Land Use and Zoning Ordinance #439, Section 6.7	WC Feedlot Ordinance Chapter 152	N/A	N/A
Local Regulations, Rules, and Ordinances	**Aggregate Management**	Managed through Zoning Ordinance	McLeod County Zoning Ordinance Section 16	Article 22.15 of the Zoning Ordinance	Administered through Co Land Use Ordinance1 Sec 10.15	Land Use and Zoning Ordinance #439, Section 7.17	WCZO Sec.155.100	N/A	N/A
	Agricultural Soil Erosion	Managed through Zoning Subdivision Ordinances	Minnesota Soil Erosion Law (Minnesota State Statute - Chapter 103F.401-.455)	Article 22.24	General Permit	Land Use and Zoning Ordinance #439, Section 7.10	WCZO Sec.155.084	N/A	NFCRWD Rules Sec 4.2, 4.4
	Construction Erosion Control	Building Permit Standards	McLeod County Zoning Ordinance Section 13	Building Permit Standards	Section 4.6.10 Shoreland Land Use Ordinance Section 10.4	Land Use and Zoning Ordinance #439, Section 7.10	Building Permit Standards	MFCRW D Rules Sec 6. Erosion Control	NFCRWD Rules Sec 4.2, 4.4
	Bluffland Protection	Managed through Zoning Ordinance	McLeod County Zoning Ordinance Section 13	Article 19A	Managed through Pope County Land Use Ordinance	Managed through Landuse and Zoning Ordinance	WCZO Sec.155.057	N/A	N/A
	Forestland Management	N/A	McLeod County Zoning Ordinance Section 13	Managed through Zoning Ordinance	Managed through Pope County Land Use Ordinance Shoreland Zoning Ordinance	N/A	WCZO Sec.155.083	N/A	N/A
	Preservation of Natural Drainage Ways	N/A	N/A	Article 22.25 of the Zoning Ordinance	N/A	N/A	WCZO Sec.155.057 & 155.058	N/A	NFCRWD Rules Sec 3.1.E.
	Tile Drainage	N/A	N/A	N/A	N/A	N/A	N/A	MFCRW D Rules Sec 7. Drainage	NFCRWD Rules Sec 3.1.A.b.
	Land Use	Managed through Zoning Ordinance	McLeod County Zoning Ordinance Section 13	Article 11- A-1 Agricultural Preservation District; Article 20 – Recreational River Management Overlay; Wild and Scenic Ordinance	Administered through County Land Use Ordinance	Land Use and Zoning Ordinance #439	WCZO & Land Use Plans	N/A	N/A
	Public Drainage Systems: Establishment, Improvement, Rerouting, Repairs, Impoundments, Buffer Compliance	MS 103E	MS 103E	MS 103E and Drainage Repair Policy	Ditches managed with Drainage Manual under MS 103E; Highway Department Buffer compliance managed by Riparian Buffer Enforcement Ordinance through Co Land & Resource Management	MS 103E	MS 103E	MFCRW D Rules Sec 7. Drainage	M.S. 103E: NFCRWD Rule 3.1.A & 3.1.C. & 3.1.D & F
	Stormwater Runoff	Managed through Subdivision Ordinance Platting Procedure	McLeod County Zoning Ordinance Section 13	Article 22.25 of the Zoning Ordinance	Land Use Ordinance Section 10.24 and Shoreland Management Controls Section	Land Use and Zoning Ordinance #439, Section 7.25	Wright County Zoning Ordinance	MFCRW D Rules Sec 5. Stormwater	N/A

5.3.4 DRAINAGE AUTHORITY

Below is a list of the entities with the NFCR Watershed, with identification of the drainage authority for the county ditch systems within its area.

Table 5-4: Drainage authority by North Fork Crow River Water Planning Partnership entity

NFCRWPP Entity	Drainage Authority (Y/N)
Wright County	Yes
Meeker County	Yes
Pope County	Yes
Stearns County	Yes
McLeod County	Yes
Kandiyohi County	Yes
NFCRWD	Yes
MFCRWD	No

5.4 FUNDING

Plan participants will pursue grant opportunities to fund implementation

This section describes how the plan will be funded. ***Plan participants expect to pursue grant opportunities collaboratively to fund implementation of the targeted implementation schedule.*** Within the targeted implementation schedule, actions are assigned to implementation programs. **Table 5-5** shows the sources of funding that will be used to implement and administer the programs. The Baseline Implementation Level (see **Section 4.8**) is shown for demonstration purposes.

This plan sets an ambitious implementation schedule. Local, state, federal, and other funding sources will not be sufficient to meet the targeted implementation schedule. As such, the success of implementing the plan will depend on collaboratively sought competitive state, federal, and private grant dollars. As an alternative to reliance on competitive grants, this plan envisions successful legislation to allow for block grant dollars for plan implementation.

Table 5-6 shows the most commonly used programs and grants for implementing the incentive-based initiatives described by this plan and used within the targeted implementation schedule. These funding grants and programs are cross-referenced to this plan's initiatives, thereby showing potential sources of revenue for implementation.

Table 5-5: Budget for the baseline implementation level for the North Fork Crow River Watershed One Watershed, One Plan

Implementation Program	Local		State Cost Share		State Collaborative Grants[4]		Federal		NGOs		All Sources	
	Annual	Total	Annual	Total	Annual	Total	Annual	Total	Annual	Total	Annual	Total
BMP Cost Share (Baseline)[1]	$461,363	$4,613,625			$4,152,263	$41,522,625	TBD	TBD	TBD	TBD	$4,613,625	$46,136,250
Regulatory[2]	$297,000	$2,970,000	$198,000	$1,980,000	-	-					$495,000	$4,950,000
Data Gaps and Research	$10,000	$100,000			$90,000	$900,000					$100,000	$1,000,000
Education & Outreach	$15,000	$150,000			$135,000	$1,350,000					$150,000	$1,500,000
Plan Administration (Baseline)	$23,300	$233,000			$209,700	$2,097,000					$233,000	$2,330,000
Capital Improvements (Baseline)	$75,000	$750,000			$675,000	$6,750,000					$750,000	$7,500,000
TOTAL	**$881,663**	**$8,816,625**	**$198,000**	**$1,980,000**	**$5,261,963**	**$52,619,625**	**-**	**-**	**-**	**-**	**$6,341,625**	**$63,416,250**

[1] Baseline BMP Cost Share amount based on current amount for all counties, and includes baseline costs for management practices and structural BMPs
[2] Assumes local fiscal support of local implementation of statutory obligations and ordinances remains unchanged.
[3] Baseline plan administration budgets like current local expenditures by individual counties. Total estimated cost assumes approximately 10% of total dollar amount of funds administered.
[4] Collaborative grants assumed to be provided to the NFCR Watershed 1W1P as one or more non-competitive implementation block grants

Table 5-6: Incentive based initiatives and related funding sources. Note: This table is not intended to contain all funding sources, but instead, examples of funding opportunities and their primary relation to incentive based initiatives.

Source	Organization	Program/Grant Name	Primary Assistance Type	BMP Cost Share Initiative	Data Gaps and Research Initiative	Education and Outreach Initiative
Federal	NRCS	**Conservation Innovation Grant (CIG)**	Financial	x		
		Conservation Stewardship Program (CSP)	Financial/Technical	x		
		Environmental Quality Incentives Program (EQIP)	Financial/Technical	x		
		Agricultural Conservation Easement Program (ACEP)	Easement	x		
	FSA	**Conservation Reserve Program (CRP)**	Easement	x		
		Conservation Reserve Enhancement Program (CREP)	Easement	x		
		Farmable Wetlands Program (FWP)	Easement	x		
		Grasslands Reserve Program (GRP)	Easement	x		
	FSA/ USDA / NRWA	**Source Water Protection Program (SWPP)**	Technical			x
	USFWS	**Partners for Fish and Wildlife Program (PFW)**	Financial/Technical	x		
	PCA	**Federal Clean Water Act Section 319 Grants**	Financial	x		
	FEMA	**Hazard Mitigation Grant Program (HMGP)**	Financial	x		
		Pre-Disaster Mitigation (PDM)	Financial	x		
		Flood Mitigation Assistance (FMA)	Financial	x		
		Risk Mapping, Assessment, and Planning	Technical	x		
	EPA	**Water Pollution Control Program Grants (Section 106)**	Financial			x
		Federal Clean Water Act Section 319 Grant Funds	Financial	x		
		State Revolving Fund (SRF)	Loan	x		
		Drinking Water State Revolving Fund (DWSRF)	Loan	x		
State	MnDNR	**Aquatic Invasive Species Control Grant Program**	Financial/Technical	x		
		Conservation Partners Legacy Grant Program	Financial	x		
		Pheasant Habitat Improvement Program (PHIP)	Financial	x		
		Flood Hazard Mitigation Grant Assistance	Financial	x		x
		Forest Stewardship Program	Technical	x		

Source	Organization	Program/Grant Name	Primary Assistance Type	BMP Cost Share Initiative	Data Gaps and Research Initiative	Education and Outreach Initiative
		Reinvest in Minnesota (RIM)	Financial/Easement	x		
		Aquatic Management Area Program	Easement	x		
		Wetland Tax Exemption Program	Financial	x		
	BWSR	**Clean Water Fund Grants**	Financial	x	x	
		Erosion Control and Management Program	Financial	x		
		SWCD Local Capacity Services	Financial	x	x	x
		Natural Resources Block Grant	Financial	x		
		Reinvest in Minnesota (RIM) Reserve Services	Financial	x		
	MPCA	**Surface Water Assessment Grants (SWAG)**	Financial	x		x
		Clean Water Partnership	Financial	x		
	MDH	**Source Water Protection Grant Program**	Financial	x		x
	MDA	**Agriculture Best Management Practices (BMP) Loan Program**	Financial	x		
		Minnesota Agricultural Water Quality Certification Program	Technical/Financial	x	x	x
Other	Trout Unlimited	**Trout Unlimited: Embrace-A-Stream**	Financial	x		
	Pheasants Forever	**Pheasants Forever (Stearns Co. Chp. #9; Wright Co. Chp. #95; Meeker Co. Chp. #123; Kandiyohi Co. Chpt. #2; McLeod Co. Chpt. #7)**	Financial/Easement	x		x
	Ducks Unlimited	**Ducks Unlimited**	Financial/Easement	x	x	x
	Initiatives Foundation	**Initiatives Fund**	Financial	x	x	x
	McKnight Foundation	**McKnight Foundation: Mississippi River Initiative**	Financial	x		x
	Fishers & Farmers Partnership	**Fishers and Farmers Program**	Financial	x		x

*Disclaimer: This is not an all-inclusive list of funding opportunities, but instead, provides examples of funding opportunities and their primary relation to NFCR Watershed 1W1P Financial Incentive Programs.

5.4.1 LOCAL FUNDING

The annual amount of funding needed to implement the Baseline Implementation Level from local sources is an estimated **$881,700 annually** and **$8,817,000 for the ten-year plan life cycle**. Local revenue is defined as money derived from either the local property tax base or in-kind services of any personnel funded from the local tax base. Local funding excludes general operating funds obtained from BWSR, counties, fees for service and grants or partnership agreements with the federal government or other conservation organizations.

These funds will be used for locally focused initiatives where opportunities for state and federal funding are lacking because of misalignment of an initiatives purpose with state or federal objectives. These funds will also be used for matching grants.

5.4.2 STATE FUNDING

The annual amount of funding needed to implement the Baseline Implementation Level from state sources is **$198,000 annually** and **$1,980,000 for the ten-year plan life cycle.** State funding includes all funds derived from the State tax base for state cost share regulatory purposes. State funding excludes general operating funds obtained from BWSR, counties, fees for service and grants or partnership agreements with the federal government or other conservation organizations.

5.4.3 STATE COLLABORATIVE GRANTS

The annual amount of funding needed to implement the Baseline Implementation Level from collaborative grants is **$5,262,000** annually and **$52,620,000 for the ten-year plan life cycle.** The NFCR Watershed 1W1P will apply as an entity for collaborative grants, which may be competitive or non-competitive. The assumption is that future base support for implementation will be provided to the NFCR Watershed 1W1P as one or more non-competetive implementation block grants. Where the purpose of an intitiative aligns with the objectives of various state, local, non-profit, or private programs, these dollars will be used to help fund the initiatives described by this plan.

5.4.4 FEDERAL FUNDING SOURCES

Federal funding includes all funds derived from the Federal tax base. For example, this includes programs such as the Environmental Quality Incentives Program (EQIP), Conservation Reserve Program (CRP), and Conservation Innovation Grants (CIG). The Environmental Protection Agency also has Section 319 funds, which traditionally have been used for implementation to improve water quality. Federal funding excludes general operating funds obtained from BWSR, counties, fees for service and grants or partnership agreements with state government or other conservation organizations.

Federal agencies need to be more effectively engaged following the approval of this plan and prior to implementation, to create an avenue to access federal resources for implementation. An opportunity may exist to leverage state dollar through some form of federal cost share program. Where the purpose of an intitiative or campaign aligns with the objectives of various federal agencies, federal dollars will be used to help fund the initiatives and campaigns described by this plan.

Currently, the NFCR Watershed 1W1P has no funding from federal sources for plan implementation, however, funds from federal sources will be sought during implementation of the plan.

5.4.5 OTHER: NON-GOVERNMENTAL ORGANIZATIONS AND PRIVATE ENTITIES

This category of funding excludes general operating funds obtained from BWSR, counties, fees for service, local funding sources, and grants or partnership agreements with the state or federal government or other conservation organizations.

Several non-governmental funding sources may provide technical assistance and fiscal resources to implement the NFCR Watershed 1W1P targeted implementation schedule. For example, Trout Unlimited's Embrace-A-Stream grant program, Pheasants Forever, Ducks Unlimited Chapter, the Initiatives Foundation, the McKnight Foundation, or the Fishers & Farmers Partnership would be potential funding sources that differ from the other categories. This plan and specifically the planning region implementation profiles should be provided to all NGOs as a means of exploring opportunities to fund specific aspects of the targeted implementation schedule.

Private sector companies, including those specifically engaged in agribusiness are often overlooked as a potential source of funding for implementation. Many agribusiness companies are working to improve water quality. Some of the agribusiness companies are providing technical or financial support for the implementation of management and structural BMPs because they are interested in agricultural sustainability. Most often this is through Field to Market (https://calculator.fieldtomarket.org/fieldprint-calculator/). This plan could be used to explore with private sector companies whether the estimated water quality benefits have monetary value and therefore, may provide access to funding from the private sector.

5.5 PLAN ADMINISTRATION AND COORDINATION

5.5.1 DECISION-MAKING AND STAFFING

The CROW, on behalf of the Planning Work Group and the Policy Committee, will become responsible for completing the annual work planning process and completing and submitting annual reports. The CROW will also serve as the central fiscal agent on behalf of the NFCR Watershed 1W1P. Responsibilities for annual work planning and serving as the central fiscal agent will be revisited by the Planning Work Group on an annual basis. Expectations are that the roles of the Policy Committee, Planning Work Group, and Advisory Committee will shift and change focus. **Table 5-7** shows the probable roles and functions related to plan implementation.

Table 5-7: Anticipated roles for NFCR Watershed 1W1P implementation

Local Committee Name	Primary Implementation Role/Functions
Local Organization Board/ Policy Committee	▪ Local funding commitments for implementation ▪ Approving the annual work plan ▪ Approving annual fiscal reports ▪ Approving annual reports submitted to Minnesota Board of Water and Soil Resources (BWSR) ▪ Annual review and confirmation of Planning Work Group priority resource concerns recommendations ▪ Direction to Planning Work Group on addressing emerging issues ▪ Approve plan amendments ▪ Implement county ordinances and state statutory responsibilities separately from plan implementation ▪ Approve grant applications ▪ Approve annual assessment

Local Committee Name	Primary Implementation Role/Functions
Advisory Committee	▪ Review of and input on annual work plan ▪ Identification of collaborative funding opportunities ▪ Recommendations to Planning Work Group on program adjustments ▪ Assist with execution of the targeted implementation schedule
Planning Work Group	▪ Identify local funding needs for implementation ▪ Review annual work plan ▪ Review annual fiscal reports ▪ Prepare annual reports submitted to BWSR ▪ Annual review and confirmation of priority resource concerns ▪ Evaluate and recommend response to emerging issues ▪ Prepare plan amendments ▪ Implement the targeted implementation schedule
Fiscal / Administrative Agent	▪ Convene committee meetings ▪ Prepare the annual work plan ▪ Prepare annual fiscal reports ▪ Prepare and submit grant applications/funding requests ▪ Compile annual results for annual assessment

5.5.2 COLLABORATION

5.5.2.1 COLLABORATION WITH OTHER UNITS OF GOVERNMENT

The NFCRWPP will continue coordination and cooperation with other governmental units at all levels. This cooperation and coordination is both horizontal and vertical. Vertical coordination between the NFCRWPP and agencies such as BWSR, US Army Corps of Engineers, MnDNR, and the MPCA are mandated through legislative and permit requirements. Horizontal cooperation between NFCRWPP and comparable units of government such as municipalities, township boards, county boards, watershed district boards, joint powers boards, and other water management authorities are a practical necessity to facilitate watershed wide activities.

The NFCRWPP will exercise intergovernmental coordination and cooperation as an absolute necessity for it to perform its required functions. The NFCRWPP will continue to foster an environment that enhances coordination and cooperation to the maximum extent possible throughout the implementation of this plan.

A variety of plans, goals, objectives, directions, and strategies have been developed by other agencies for resource management within the plan area. Local, state, and federal state agency input has been utilized and/or considered throughout the development of this plan. The priority concerns table (see **Table 2-1)** used as a compilation, organizational, and prioritization tool, was initially drafted incorporating local and state plans and reports for the plan area. In addition, BWSR, Minnesota Department of Health, MnDNR, and Metropolitan Council submitted comment letters for the NFCR Watershed 1W1P (provided as **Appendix H**). These comments and themes in agency letters were assessed and considered to the extent possible, while recognizing that the 1W1P is to be driven by the participating local governments.

The NFCRWPP has identified that agency goals, objectives, directions, and strategies are generally compatible with the content of this plan. The implementation strategies and goals were predominantly defined through a collaborative effort. However, some agency goals, objectives, directions, and strategies for resource management within the plan area have not been selected as a priority concern. The

responsibility for achieving the goals associated with those potential concerns considered D- or E-level potential concerns remains with the respective agency or organization.

The NFCRWPP will act as the lead for the implementation of this plan's identified priority concerns. Due to local funding, technological, and other capacities, the lower ranked potential concerns that were not prioritized are encouraged to be implemented with agency-led efforts, including but not limited to funding. The NFCRWPP will continue to cooperate and collaborate with other governmental units, at all levels, but may retain a cooperator or facilitator role with implementation of addressing potential concerns that were not prioritized by the NFCRWPP as A-, B-, or C-level priorities.

5.5.2.2 COLLABORATION WITH OTHERS

Plan partners expect to continue and build on existing collaboration with others, including non-governmental organizations, while implementing this plan. Many of these existing collaborations are aimed to increase habitat and hunting opportunities within the plan area, while providing education and outreach opportunities. Partners for these collaborations include, but are not limited to Pheasants Forever, Ducks Unlimited, National Wild Turkey Federation, Minnesota Waterfowl Association, and the Minnesota Deer Hunters Association.

Plan partners currently collaborate with others to increase education and outreach and community engagement within the plan area. Organizations which have collaborated with plan partners include, but are not limited to Trail Guards, the Prairie Woods Environmental Learning Center, Minnesota Agricultural Water Resource Center, and American Farmland Trust.

Lastly, there are many lake associations and coalitions of lake associations (COLAs) within the plan area. Planning partners collaborate frequently with lake associations and COLA's for education and outreach and project implementation.

5.5.3 WORK PLANNING

This plan envisions collaborative implementation. Therefore, annual work planning is envisioned to align the priority concern addressed, the availability of funds, and the roles and responsibilities for implementation.

5.5.3.1 LOCAL PURPOSE

An annual work plan will be developed by the Planning Work Group based on the targeted implementation schedule and any adjustments made through self-assessments (see **Section 5.5.4**). The annual work plan will then be presented to the Planning Work Group's individual and representative Boards and/or Policy Committee, who will ultimately be responsible for approval, while recognizing the existing authorities of the local government units. The intent of these annual work plans will be to maintain collaborative progress toward completing the targeted implementation schedule.

5.5.3.2 STATE PURPOSE

The Planning Work Group will collaboratively develop, review, and submit a Biennial Budget Request (BBR) from this plan to BWSR. The BBR is intended to utilize local water management priorities to drive state appropriation requests. The NFCRWPP intends to pursue block grant requests and other funding based on the BBR to meet goals and plan implementation schedules.

This BBR will be submitted to and ultimately approved by the Planning Work Group's individual and representative Boards and/or Policy Committee, prior to submittal to BWSR. The BBR will be developed based on the targeted implementation schedule and any adjustments made through self-assessments (see **Section 5.5.4**).

5.5.4 ASSESSMENT AND EVALUATION

5.5.4.1 ANNUAL EVALUATION

Each year the Planning Work Group will provide their individual and representative Boards and/or the Policy Committee with an annual update on the progress of the plan's implementation in accordance with BWSR's Level 1 performance standards. During this annual review process, feedback will be solicited from the Boards, Policy Committee, and the Advisory Committee. This feedback will be presented to each Board and/or the Policy Committee to set the coming year's priorities for achieving the plan's goals and to decide on the direction for grant submittals. In addition, this feedback will be documented and incorporated into Five Year Evaluations.

5.5.4.2 FIVE-YEAR EVALUATION

This plan has a ten-year life cycle beginning in 2018. Over the course of the plan life cycle, progress towards reaching goals and completing the implementation schedule may vary. In addition, new issues may emerge and/or new monitoring data, models, or research may become available. As such, in 2023 a five-year evaluation will be undertaken to determine if the current course of actions is sufficient to reach the goals of the plan, or if a change in the course of actions is necessary.

5.5.4.3 REPORTING

Local governmental units have a number of annual reporting requirements. A number of these reporting requirements will remain a responsibility of the local government units (LGUs) (**Table 5-8).** LGU's reporting responsibilities will be conducted per state agency requirements. However, reporting related to grants and programs developed collaboratively and administered under this plan will be reported by the Planning Work Group. In addition to annual reports, the Planning Working Group will also develop an annual State of the Watershed Report. This report will document progress toward reaching goals and completing the targeted implementation schedule, and will describe any new emerging issues or priorities. The information needed to annually update the State of the Watershed Report will be developed through the annual evaluation process.

Table 5-8: Examples of annual LGU reporting responsibilities.

Report	Local Governmental Unit Responsibility
Annual Report	CROW
Ditch Buffer Strip Annual Report	Drainage Authority
Farm Bill Assistance Report	SWCD
Financial Reports	CROW
Technical Approval Authority (TAA)	SWCD
Website Compliance: (Checklist)	All Grantees
WCA Annual Report	All WCA LGUs
Feedlot Report	All Feedlot LGUs

5.5.5 PLAN AMENDMENT PROCESS

This plan extends through 2028. Revision of the plan may be needed through an amendment prior to the plan update if significant changes emerge in the priorities, goals, policies, administrative procedures, or plan implementation programs. Revision may also be needed if issues emerge that are not addressed in the plan.

An amendment can be categorized as either a minor or general. All amendments to this plan will follow the procedures set forth in this section. This plan will remain in full effect until a revision is approved by BWSR. Plan amendments may be proposed by any agency, person, city, county, or Watershed District to the Policy Committee, but only the Policy Committee can initiate the amendment process. All recommended plan amendments must be submitted to the Policy Committee along with a statement of the problem and need, the rationale for the amendment, and an estimate of the cost to complete the amendment. However, the existing authorities of each local government unit within the NFCR Watershed is still maintained. Prior to implementation by a local Board, CIPs need only be approved by the local Board. CIPs approved by a local Board are considered amended to the Plan. The local Board shall notify the Policy Committee of an approved CIP.

Preparers of this plan recognize it may need to be periodically amended to remain useful as a long-term planning tool. However, the structure and intent of this plan is to provide flexibility to respond to short-term emerging issues and opportunities. The Policy Committee or Planning Work Group's individual and representative Boards will review and revise its long-range work plan and/or implementation programs through the annual budget and Annual and Short-Range Work Plan.

Technical information (especially water quality data) will require frequent updating, such as when new, site-specific data is generated by state, federal, and regional agencies, counties, cities, or individuals. Generally, these technical updates and studies are considered part of the normal course of operations consistent with the intent of this plan and not a trigger for a plan amendment. However, when the technical information results in a policy that is a significant change of direction from the plan, or the implementation of a projects or implementation programs, a plan amendment may be required.

5.5.5.1 CRITERIA AND FORMAT FOR AN AMENDMENT

Plan participants recognize the large work effort required to manage water-related issues. The plan provides the framework to implement this work by identifying priority concerns, issues impacting priority concerns, measurable goals, strategies and action items. Neither a minor nor a general plan amendment will be required for the following situations:

- Any activity implemented through the "normal" statutory authorities of a local unit of government, unless the activity is deemed contrary to the intent and purpose of this plan. This plan does not affect any of the normal statutory authorities of a local unit of government;
- The estimated cost of a non-capital improvement project action item is different than the cost shown in the long-range work plan or within this plan;
- The addition or deletion of action items, programs, initiatives or projects, as long as these are generally consistent with the goals this plan, are not capital improvement projects as defined by this plan (nor is contemplated by an initiative), and will be proposed, discussed and adopted as part of the annual budgeting process which involves public input.

Plan amendments (both minor and general) will be prepared in a format consistent with Rule 8410.0140 (as revised). The rule requires that unless the entire plan is re-printed, all adopted amendments must be printed in the form of replacement pages for the plan, each page of which must:

- Show deleted text as stricken and new text as underlined for draft amendments being considered;
- Be renumbered as appropriate; and
- Include the effective date of the amendment.

The Policy Committee will maintain a distribution list for copies of the plan and within 30 days of adopting an amendment distribute copies of the amendment to the distribution list. Generally, electronic copies of the amendment will be provided, or documents made available for public access on the CROW website (www.crowriver.org). Printed copies will be made available upon written request, and printed at the cost of the requester.

5.5.5.2 GENERAL PLAN AMENDMENTS

If the Policy Committee or BWSR decide that a general plan amendment is needed, the Planning Work Group will follow the general plan amendment process described in Minnesota rules and laws (Rule 8410.0140, Subp. 2 and MS 103B.231, Subd. 11). The general plan amendment, which is the same as the plan review process, is as follows:

- Submit the amendment to the all cities, counties, and conservation districts within the plan boundary, the state review agencies (the MnDNR, MPCA, Minnesota Department of Agriculture, and MDH), and BWSR for a 60-day review;
- Respond in writing to any concerns raised by the reviewers;
- Hold a public hearing on the proposed amendment;
- Submit the revised amendment to the state review agencies and BWSR for a 45-day review; and
- The 1W1P must submit the final revised amendment to BWSR for approval.

At the discretion of the Policy Committee, drafts of proposed general plan amendments may be sent to all plan review authorities for input before beginning the formal review process. Examples of situations where a general plan amendment may be required include:

- Addition of a capital improvement project that is not described by the plan;
- Establishment of a water management district(s) to collect revenues and pay for projects initiated through MS 103B.231, MS 103D. To use this funding method, MS 103D.729 requires that the (Planning Work Group equivalent) prepare an amendment to its plan;
- Addition of new programs or other initiatives that have the potential to create significant financial impacts or controversy, when inconsistent with the issues, goals and policies.

5.5.5.3 MINOR PLAN AMENDMENTS

The minor plan amendment process is more streamlined than the general plan amendment process. Although no comprehensive criteria are set forth for what constitutes a minor amendment, the definition in Rule 8410.0020, Subpart 10 is as follows:

> *"Minor plan amendments" means items such as recodification of the plan, revision of a procedure meant to streamline administration of the plan, clarification of the intent of a policy, the inclusion of additional data not requiring interpretation, or any other action that will not adversely affect a local unit of government or diminish a water management organization's ability to achieve its plan's goals or implementation program".*

A minor plan amendment will be required for changes to the goals or policies that directly affect the programs or budgets of other local units of government within the plan boundary.

5.5.6 FORMAL AGREEMENTS

The NFCRWPP is a coalition of Counties, Soil and Water Conservation Districts, watershed districts, and a joint powers board within southeast Minnesota. The NFCRWPP previously entered into a formal agreement through a Memorandum of Agreement for planning the 1W1P for the NFCR Watershed (**Appendix A**). The parties are drafting a revised Memorandum of Agreement for purposes of implementing this plan. The legal name for the entity is the NFCRWPP.

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