UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SEP 29 2017

REPLY TO THE ATTENTION OF
WW-16J

Glenn Skuta, Division Director
Water Division
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155-4194

Dear Mr. Skuta:

The U.S. Environmental Protection Agency has conducted a complete review of the final Total Maximum Daily Loads (TMDLs) and supporting documentation for the Pioneer-Sarah Creek Subwatershed of the North Fork Crow River (HUC 07010204) and South Fork Crow River Watershed (HUC 07010205) in the Upper Mississippi River Basin. The watershed is located in the northwest portion of the Minneapolis-St. Paul metropolitan area in Carver, Hennepin and Wright Counties. The TMDLs address six nutrient impairments in Lake Ardmore, Peter Lake, Spurzem Lake, Half Moon Lake, North Whaletail Lake, and South Whaletail Lake, and four *Escherichia coli* (*E. coli*) bacteria impairments in Sarah Creek, Pioneer Creek, Unnamed Creek, and Deer Creek.

These TMDLs meet the requirements of Section 303(d) of the Clean Water Act and EPA's implementing regulations at 40 C.F.R. Part 130. Therefore, EPA hereby approves Minnesota's TMDLs. The statutory and regulatory requirements, and EPA's review of Minnesota's compliance with each requirement, are described in the enclosed decision document.

We wish to acknowledge Minnesota's effort in submitting these TMDLs, and look forward to future TMDL submissions by the State of Minnesota. If you have any questions, please contact Mr. Peter Swenson, Chief of the Watersheds and Wetlands Branch, at 312-886-0236.

Sincerely,

Christopher Korleski
Director, Water Division

wq-iw8-55g

Enclosure

cc: Celine Lyman, MPCA
Rachel Olmanson, MPCA

TMDL: Pioneer-Sarah Creek Subwatershed, Minnesota TMDL
Date: September 2017

DECISION DOCUMENT FOR THE APPROVAL OF THE PIONEER-SARAH CREEK SUBWATERSHED MINNESOTA TMDL

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 C.F.R. Part 130 describe the statutory and regulatory requirements for approvable TMDLs. Additional information is generally necessary for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation. Use of the term "should" below denotes information that is generally necessary for EPA to determine if a submitted TMDL is approvable. These TMDL review guidelines are not themselves regulations. They are an attempt to summarize and provide guidance regarding currently effective statutory and regulatory requirements relating to TMDLs. Any differences between these guidelines and EPA's TMDL regulations should be resolved in favor of the regulations themselves.

1. Identification of Waterbody, Pollutant of Concern, Pollutant Sources, and Priority Ranking

The TMDL submittal should identify the waterbody as it appears on the State's/Tribe's 303(d) list. The waterbody should be identified/georeferenced using the National Hydrography Dataset (NHD), and the TMDL should clearly identify the pollutant for which the TMDL is being established. In addition, the TMDL should identify the priority ranking of the waterbody and specify the link between the pollutant of concern and the water quality standard (see section 2 below).

The TMDL submittal should include an identification of the point and nonpoint sources of the pollutant of concern, including location of the source(s) and the quantity of the loading, e.g., lbs/per day. The TMDL should provide the identification numbers of the NPDES permits within the waterbody. Where it is possible to separate natural background from nonpoint sources, the TMDL should include a description of the natural background. This information is necessary for EPA's review of the load and wasteload allocations, which are required by regulation.

The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as:

(1) the spatial extent of the watershed in which the impaired waterbody is located;
(2) the assumed distribution of land use in the watershed (e.g., urban, forested, agriculture);

(3) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources;
(4) present and future growth trends, if taken into consideration in preparing the TMDL (e.g., the TMDL could include the design capacity of a wastewater treatment facility); and
(5) an explanation and analytical basis for expressing the TMDL through *surrogate measures*, if applicable. *Surrogate measures* are parameters such as percent fines and turbidity for sediment impairments; chlorophyll-a and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

Comment:
Location Description/Spatial Extent: The Pioneer-Sarah Creek Watershed TMDL document was submitted by the Minnesota Pollution Control Agency (MPCA). These TMDLs address 10 impairments in the Pioneer-Sarah Creek Watershed of the North Fork Crow River (HUC 07010204) and South Fork Crow River Watershed (HUC 07010205), located in the Upper Mississippi River Basin in the northwest portion of the Minneapolis-St. Paul metropolitan area in Carver, Hennepin and Wright Counties. All of the subwatershed is location in the North Central Hardwood Forest Ecoregion. All or portions of the cities of Minnetrista, Independence, Maple Plain, Medina, Greenfield, Loretto and a small portion of Corcoran are included in the watershed. The TMDLs address six nutrient impairments in Lake Ardmore, Peter Lake, Spurzem Lake, Half Moon Lake, North Whaletail Lake, and South Whaletail Lake and four *Escherichia coli* (*E. coli*) bacteria impairments in Sarah Creek, Pioneer Creek, Unnamed Creek, and Deer Creek (Table 1.1 below from the TMDL). Note several of the locations are proposed to be listed in the current draft 2016 integrated report, and the TMDLs are completed for these waters in anticipation of approval of their listing. This document calculates loads for a total of 10 TMDLs.

It should be noted (Section 1.3 of the TMDL) that there are several other TMDLs completed in the past in this area that have direct hydrological connection to some of the lakes and streams in this study. Peter, Spurzem, and Half Moon Lakes will have reduced phosphorus load allocations as a result of this TMDL, discharging water that reaches Lake Independence, which was addressed in a past TMDL. The past TMDL calculations include those at:

- Lake Independence Phosphorus TMDL (2007);
- Lake Sarah Nutrient TMDL (2011); and,
- Hafften Lake Phosphorus TMDL (2015) as a portion of the North Fork Crow River TMDL for Bacteria, Nutrients, and Turbidity.

Table 1.1 - Impairments addressed in this TMDL report

Stream (Reach Description) or Lake Name	Assessment Unit ID	Affected Use	Pollutant	Designated Use Class	Year Listed	TMDL Target Start/Completion
Sarah Creek	07010204-628	Aquatic recreation	*E. coli*	2B, 3C	2012	2014/2019
Pioneer Creek	07010205-653			2C	Proposed 2016*	2012/2017
Unnamed Creek	07010205-593			2B, 3C		
Deer Creek	07010205-594					
Peter Lake – North Bay	27-0147-02	Aquatic Recreation	Nutrients	2B, 3C	Proposed 2016*	2012/2017
Spurzem Lake	27-0149				2008	2013/2018
Half Moon Lake	27-0152				Proposed 2016*	2012/2017
Lake Ardmore	27-0153				Proposed 2016*	2012/2017
South Whaletail Lake	27-0184-02				2006	2013/2018
North Whaletail Lake	27-0184-01				2008	2013/2018

* Listed on the 2016 Draft 303(d) Impaired Waters List.

Land Use: Section 1.3 of the TMDL states that the land use of the entire Pioneer-Sarah Creek Watershed is 38% agricultural, 36% undeveloped, and less than 10% developed, with some variation of use within each creek subwatershed. Five of the six lakes in the TMDL area are deep lakes, and Whaletail Lake is classified as shallow. Categories by Minnesota are shallow (15 feet or less) or deep, with the categories used in water quality standard development.

Problem Identification in Lakes: Section 3.7.1 of the TMDL states that all six of the lakes have excess nitrogen and phosphorus. There has been a resultant increase in algal blooms and decrease in water clarity, impairing the aquatic recreation use. The sources are from human activity and include, in general terms, external watershed loading, internal lake loading, and atmospheric deposition.

Problem Identification in Streams: Section 3.7.2.3 of the TMDL states that each of the four creeks exceeded the chronic *E. coli* standards. There are varied sources depending on the location of the creeks within the watershed; the most prevalent categories of bacteria production are:

- Sarah Creek – 58% wildlife; 30% human sources via failing septic systems and Wastewater Treatment Plant (WWTP) effluent; and 12% domestic animal sources
- Pioneer Creek, Unnamed Creek, Deer Creek – 99% - 96% livestock, i.e., surface applied manure; 3% to < 1% domestic animals, wildlife, and human sources.

Section 1.3 of the TMDL identifies further problems in that the creeks are also listed as impaired due to low Dissolved Oxygen (DO), which occurs as the Biological Oxygen Demand (BOD) increases with algal growth due to greater loading of phosphorus into upstream lakes (Lake Independence, Whaletail Lake and Mud Lake); the lakes then contribute BOD loading to the streams. Further, there is Sediment Oxygen Demand (SOD) from the in-channel sediments in the reaches that flow through wetlands, as part of the natural background condition of the wetlands. DO TMDLs are not developed in this project but the causes are addressed in the Watershed Restoration and Protections Strategy (WRAPS) Report that plans to reduce loadings into both streams and the upstream lakes.

Pollutant of Concern: The pollutant of concern for the streams is *E. coli*, and excess nutrients in the lakes (phosphorus), along with chlorophyll-a and Secchi depths not meeting standards. Minnesota standards for nutrients require that both chlorophyll-a and Secchi depth values must be met along with phosphorus values to achieve standards.

Source Identification of Phosphorus in Lakes – Six lakes are impaired by nutrients and are addressed in the TMDL. Section 3.7.1.1 of the TMDL describes details of the point source contributions.

- Municipal Separate Storm Sewer Systems (MS4s) – all of the communities in the watershed are served by MS4 permits (except Greenfield which has a very limited area). The conveyance systems include the mechanism to transport grass clippings and leaves, dust and dirt, car wash wastewater, improper disposal of pet waste, and other phosphorus-containing material.
- Feedlots with NPDES permits - There are no large feedlots that would be permitted in the watershed.
- Municipal/Industrial Wastewater – the only pollutant source in this category is the Loretto WWTF (MN0023990).
- Construction/Industrial Stormwater – the construction stormwater permits are applicable on an as-needed basis, when there is disturbance due to construction on more than one acre of soil or, on less than one acre but part of a larger common plan of development, or less than one acre but MPCA has determined that there is a risk to water resources. Industrial stormwater permits are applicable as needed for industrial activity in certain industrial categories and include any material handled, used, processed, or generated in industry that stormwater may cause to leak, leach, or decompose and be transported off-site.

Section 3.7.1.2 of the TMDL describes the nonpoint source contribution of phosphorus to the lakes.

- Livestock at animal smaller feeding operations can add nutrients to the lakes via runoff from these facilities, manure storage, and cropland with improperly applied manure. There are several smaller feedlots throughout the watershed, not required to meet the zero discharge standard, but they must comply with Minnesota Rules Chapters 7020, 7050, and 7060 for feedlots, standards, and underground waters, respectively.

- Land application of manure also adds nutrients to the lakes, with transportation and delivery to the waterways via surface runoff and drain tiles.
- Livestock grazing can add to the contaminants in the lakes due to runoff, but pastures are not registered with the state.
- Bottom sediments in a lake contain phosphorus, which can accumulate and later be released. The internal loading of phosphorus can be a major contributing factor to the phosphorus load, and there are many conditions which affect the release: the magnitude of past loading, the type and degree of enrichment of the sediments, the lake's bathymetry, and the exposure of bottom sediments to low or no oxygen conditions.
- Atmospheric deposition of phosphorus comes into the water by precipitation and dust particles in the wind that fall directly to the lake surface.
- Subsurface sewage treatment systems (SSTS) in non-compliance near the lake shore properties can contribute nutrients to the lakes as well as bacteria.

Source Identification of Bacteria in Streams – Four creeks are impaired by bacteria and are addressed in the TMDL. Section 3.7.2 of the TMDL describes details of the potential point source contributions.

- MS4s – There are two MS4s in this study area, located only in the Pioneer Creek watershed, in the cities of Independence and Maple Plain. The contaminants are primarily from pet waste and wildlife that drain directly to impervious surface and waterbodies. Though these are the primary point source inputs of contaminants, they cover only 2.7% of the watershed.
- There are no municipal/industrial wastewater sites discharging into the creeks.
- There are no large feedlots that are permitted in the watershed, but there are smaller ones that do not fall under the state permitting process. Contributions from these feedlots include livestock grazing and land application of manure, and are considered to be the primary contributors of loading to the streams.

Section 3.7.2.2 of the TMDL describes the nonpoint source contribution of bacteria to the streams.

- Septic systems – Data were collected and reviewed to determine generally failing septic systems and those systems that are an imminent threat to public health and safety (ITPHS). Generally failing systems do not provide adequate treatment and may affect groundwater. They may have a functioning tank and absorption system, but do not protect groundwater because they provide an insufficient amount of unsaturated soil between sewage and groundwater or bedrock. ITPHS are severely failing or not designed to provide adequate treatment, and may discharge directly to surface water bodies such as ditches, streams or lakes. To assess the impacts of failing septic systems, MPCA used data estimating the total number of SSTSs in the watershed using rural population estimates, and county inspection failure rates from 2011. The two failure categories by county are shown below, taken from Section 3.7.2.2 of the TMDL.

Table 3.7. SSTS failure rates by county.

County	Generally Failing SSTSs	ITPHS SSTSs
Carver	26%	14%
Hennepin	29%	1%
Wright	30%	2%

Source: MPCA 2011.

- Livestock is considered to be the largest contributing source in three of the four stream watersheds (all but Sarah Creek) with 96 - 99% coming from horses, cattle, and chickens/ turkeys. Sarah Creek has the greatest percent of contaminant coming from wildlife at 58%, followed by human (failing septics and WWTP effluent at 30%) and domestic animals at 12%; the other watersheds have only 3 to <1% from those sources.

Priority Ranking: Section 1.4 of the TMDL states that the TMDLs are prioritized with the watershed approach and the state's 10-year cycle for completing Watershed Restoration and Protection Strategy (WRAPS). MPCA developed the priority framework for TMDL development to meet the EPA's national measure WQ-27 under EPA's Long-Term Vision for assessment, restoration, and protection, and developed a corresponding state plan for a priority framework.

Future growth: In Section 4.2.3.3 the TMDL states that MPCA set aside 1.0% percent of the total watershed load for both industrial and construction stormwater to account for future growth. Section 4.3.2 states that the city of Greenfield may grow to be a permitted MS4 based on population growth estimates; Greenfield was calculated separately within the load allocation category for any transfer of its current load to a future permitted wasteload.

EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this first element.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy. (40 C.F.R. §130.7(c)(1)). EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

The TMDL submittal must identify a numeric water quality target(s) – a quantitative value used to measure whether or not the applicable water quality standard is attained. Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. The TMDL expresses the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target. Occasionally, the pollutant of concern is different from the pollutant that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as Dissolved Oxygen (DO) criteria). In such cases, the TMDL submittal should explain the linkage between the pollutant of concern and the chosen numeric water quality target.

Comment:
Designated Use: Section 1.2 of the TMDL states the creeks are classified as 2B, 2C, and 3C, and the lakes are classified as 2B and 3C; 2B is intended to protect cool and warm water fisheries, and 3C protects water for industrial use and cooling. Minnesota Rules Chapter 7050.0140, Water Use Classification for Waters of the State for Class 2 waters, aquatic life and recreation, states: "Aquatic life and recreation includes all waters of the state that support or may support fish, other aquatic life, bathing, boating, or other recreational purposes and for which quality control is or may be necessary to protect aquatic or terrestrial life or their habitats or the public health, safety, or welfare."

Standards for nutrients: Section 2.2.1 of the TMDL states that the standards for nutrients in all Class 2 waters of the state *"...There shall be no material increase in undesirable slime growths or aquatic plants including algae."* (Minn. R. 7050.0150(3)). Standards for the lakes are found under Minn. R. chs. 7050.0150 and 7050.0222 subp. 4. Minnesota uses both the size of the waterbody (shallow or deep) and its ecoregional location, located in the North Central Hardwood Forest ecoregion, to determine standards for a waterbody. Three criteria are included in the nutrient standards: total phosphorus (TP), chlorophyll-a, and Secchi disc depth because of the clear relationships amongst the causal factor of phosphorus and the response variables of chlorophyll-a and Secchi depth. The numeric criteria are shown below in Table 2.1, taken from the TMDL. Of the six lakes, only Whaletail Lake is classified as shallow.

Table 2.1 - Numeric eutrophication standards for shallow and deep Lakes within the NCHF Ecoregion.

Parameters	Shallow[1]	Deep[1]
Total Phosphorus (μg/L)	<60	<40
Chlorophyll-*a* (μg/L)	<20	<14
Secchi disk (meters)	>1.0	>1.4

[1] Numeric standards are June 1 – September 30 mean values

Standards for bacteria: The narrative standard is described in Section 2.2.2 of the TMDL as it relates to Class 2B and 2C waters, defined in Minn. R. 7050.0222. *The quality of Class 2B surface waters shall be such as to permit the propagation and maintenance of a healthy community of cool or warm water sport or commercial fish and associated aquatic life, and their* *habitats. These waters shall be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable.*

The numeric standard for Class 2B and 2C waters for *E. coli* – ***Not to exceed 126 organisms per 100 milliliters (cfu/100ml) as a geometric mean*** *of not less than five samples representative of conditions within any given calendar month,* ***nor shall more than ten percent of all samples taken during any calendar month individually exceed 1,260 cfu/100 ml****. The standard applies only between April 1 and October 31.*

EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this second element.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a waterbody for the applicable pollutant. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).

The pollutant loadings may be expressed as either mass-per-time, toxicity or other appropriate measure (40 C.F.R. §130.2(i)). If the TMDL is expressed in terms other than a daily load, e.g., an annual load, the submittal should explain why it is appropriate to express the TMDL in the unit of measurement chosen. The TMDL submittal should describe the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model.

The TMDL submittal should contain documentation supporting the TMDL analysis, including the basis for any assumptions; a discussion of strengths and weaknesses in the analytical process; and results from any water quality modeling. EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation. TMDLs must take into account *critical conditions* for stream flow, loading, and water quality parameters as part of the analysis of loading capacity. (40 C.F.R. §130.7(c)(1)). TMDLs should define applicable *critical conditions* and describe their approach to estimating both point and nonpoint source loadings under such *critical conditions*. In particular, the TMDL should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

Comment:
TMDL = Loading Capacity (LC) = WLA + LA + MOS
Tables 4.2 – 4.7 below show the loading capacity for Total Phosphorus for the six lakes. Section 7.0 in Appendix C describes the nutrient loading capacity: "The impaired lakes within the Pioneer and Sarah Creek Watershed are extremely eutrophic due to the past excessive amounts of nutrient

loading. The internal load seems to have a significant influence on water quality conditions and has accounted for a significant portion of the nutrient balance for all of the impaired lakes."

Tables 4.9 – 4.12 below on the following pages show the loading capacity for phosphorus, and for *E. coli* by flow regime. Note unallocated load in Figures 4.9 – 4.12 are defined as the difference between the existing and allowable load as described in Section 4.3.6 of the TMDL.

Table 4.2 - Peter Lake Phosphorus TMDL and Allocations.

Load Category	Load Component	Existing Load (lbs/yr)	Allowable Load (lbs/yr)	Estimated Load Reduction[1] (lbs/yr)	Estimated Load Reduction[1] %	TMDL (lbs/day)
TOTAL LOAD		**472.7**	**396.9**	**95.6**	**20%**	**1.087**
Wasteload Allocation	**Total WLA**	**34.6**	**34.6**	**0.0**	**0%**	**0.095**
	Construction/Industrial Stormwater	**4.0**	**4.0**	**0.0**	**0%**	0.011
	Corcoran MS4	**21.0**	**21.0**	**0.0**	**0%**	0.057
	Medina MS4	**9.6**	**9.6**	**0.0**	**0%**	0.027
Load Allocation	**Total LA**	**438.1**	**342.4**	**95.6**	**22%**	**0.938**
	Non-MS4 Runoff	**131.1**	**131.1**	**0.0**	**0%**	0.359
	Atmospheric deposition	**15.2**	**15.2**	**0.0**	**0%**	0.042
	Internal load	**291.7**	**196.1**	**95.5**	**33%**	0.537
	SSTS	**0.1**	**0.0**	**0.1**	**100%**	0.000
Margin of Safety		**0.0**	**19.8**	--	--	**0.054**

[1] Existing TP load is an average for the years 2009-2015

Table 4.3 - Spurzem Lake Phosphorus TMDL and Allocations.

Load Category	Load Component	Existing Load (lbs/yr)	Allowable Load (lbs/yr)	Estimated Load Reduction[1] (lbs/yr)	Estimated Load Reduction[1] %	TMDL (lbs/day)
TOTAL LOAD		**2,188.7**	**337.2**	**1,868.4**	**85%**	**0.924**
Wasteload Allocation	**Total WLA**	**175.1**	**45.2**	**129.9**	**74%**	**0.124**
	Construction/Industrial Stormwater	**3.4**	**3.4**	**0.0**	**0%**	0.009
	Loretto WWTP	**24.6**	**24.6**	**0.0**	**0%**	0.067
	Corcoran MS4	**8.5**	**1.0**	**7.5**	**88%**	0.003
	Loretto MS4	**33.9**	**4.0**	**29.9**	**88%**	0.011
	Medina MS4	**104.7**	**12.2**	**92.5**	**88%**	0.034
Load Allocation	**Total LA**	**2,013.6**	**275.2**	**1,738.4**	**86%**	**0.754**
	Upstream lake (Peter Lake)	**26.9**	**24.3**	**2.6**	**10%**	0.067
	Non-MS4 Runoff	**1,156.4**	**135.1**	**1,021.3**	**88%**	0.370
	Atmospheric deposition	**21.2**	**21.2**	**0.0**	**0%**	0.058
	Internal load	**809.1**	**94.6**	**714.5**	**88%**	0.259
Margin of Safety		**0.0**	**16.9**	--	--	**0.046**

[1] Existing TP load is an average for the years 2009-2015

Table 4.4 - Half Moon Lake Phosphorus TMDL and Allocations.

Load Category	Load Component	Existing Load (lbs/yr)	Allowable Load (lbs/yr)	Estimated Load Reduction[1] (lbs/yr)	Estimated Load Reduction[1] %	TMDL (lbs/day)
TOTAL LOAD		1,712.8	357.6	1,373.1	80%	0.980
Wasteload Allocation	Total WLA	3.6	3.6	0.0	0%	0.010
	Construction/Industrial Stormwater	3.6	3.6	0.0	0%	0.010
Load Allocation	Total LA	1,709.2	336.1	1,373.1	80%	0.921
	Upstream lake (Spurzem Lake)	771.0	190.8	580.2	75%	0.523
	Non-MS4 Runoff	555.9	81.7	474.2	85%	0.224
	Atmospheric deposition	8.6	8.6	0.0	0%	0.024
	Internal load	373.7	55.0	318.7	85%	0.151
Margin of Safety		0.0	17.9	--	--	0.049

[1] Existing TP load is an average for the years 2009-2015

Table 4.5 - Lake Ardmore Phosphorus TMDL and Allocations.

Load Category	Load Component	Existing Load (lbs/yr)	Allowable Load (lbs/yr)	Estimated Load Reduction[1] (lbs/yr)	Estimated Load Reduction[1] %	TMDL (lbs/day)
TOTAL LOAD		537.90	50.14	490.26	91%	0.1371
Wasteload Allocation	Total WLA	17.50	1.84	15.66	89%	0.0051
	Construction/Industrial Stormwater	0.50	0.50	0.00	0%	0.0010
	Loretto MS4	0.50	0.04	0.46	92%	0.0001
	Medina MS4	16.50	1.30	15.20	92%	0.0040
Load Allocation	Total LA	520.40	45.80	474.50	91%	0.1250
	Non-MS4 Runoff	251.70	20.50	231.10	92%	0.0560
	Atmospheric deposition	3.70	3.70	0.00	0%	0.0100
	Internal load	265.00	21.60	243.40	92%	0.0590
Margin of Safety		0.00	2.50	--	--	0.0070

[1] Existing TP load is an average for the years 2009-2015

Table 4.6 - South Whaletail Lake Phosphorus TMDL and Allocations.

Load Category	Load Component	Existing Load (lbs/yr)	Allowable Load (lbs/yr)	Estimated Load Reduction[1] (lbs/yr)	Estimated Load Reduction[1] %	TMDL (lbs/day)
TOTAL LOAD		528.9	367.0	180.2	34%	1.005
Wasteload Allocation	Total WLA	3.7	3.7	0.0	0%	0.010
	Construction/Industrial Stormwater	3.7	3.7	0.0	0%	0.010
Load Allocation	Total LA	525.2	345.0	180.2	34%	0.945
	Non-MS4 Runoff	60.0	60.0	0.0	0%	0.164
	Atmospheric deposition	41.7	41.7	0.0	0%	0.114
	Internal load	423.5	243.3	180.2	43%	0.667
	SSTS	0.029	0.000	0.029	100%	0.000
Margin of Safety		0.0	18.4	--	--	0.050

[1] Existing TP load is an average for the years 2009-2015

Table 4.7 - North Whaletail Lake Phosphorus TMDL and Allocations.

Load Category	Load Component	Existing Load (lbs/yr)	Allowable Load (lbs/yr)	Estimated Load Reduction[1] (lbs/yr)	Estimated Load Reduction[1] %	TMDL (lbs/day)
TOTAL LOAD		801.4	620.2	212.2	26%	1.699
Wasteload Allocation	Total WLA	6.2	6.2	0.0	0%	0.017
	Construction/Industrial Stormwater	6.2	6.2	0.0	0%	0.017
Load Allocation	Total LA	795.2	583.0	212.2	27%	1.597
	Upstream lake (Whaletail - S)	107.5	86.2	21.3	20%	0.236
	Non-MS4 Runoff	297.4	201.0	96.5	32%	0.551
	Atmospheric deposition	99.2	99.2	0.0	0%	0.272
	Internal load	291.0	196.6	94.4	32%	0.539
	SSTS	0.06	0.00	0.06	100%	0.000
Margin of Safety		0.0	31.0	--	--	0.085

[1] Existing TP load is an average for the years 2009-2015

Table 4.9 - Sarah Creek *E.coli* TMDL summary.

		Flow Regime*				
		Very High	High	Mid	Low	Very Low
		E. coli Load (billions of organisms/day)				
Wasteload	**Total WLA****	--	--	--	--	--
	Permitted Wastewater Dischargers	--	--	--	--	--
	Permitted MS4s	--	--	--	--	--
Load	**Total LA**	**103.34**	**17.33**	**18.03**	**22.95**	**2.33**
	Lake Sarah Boundary Condition	89.87	15.07	15.68	19.96	2.03
	Greenfield City	2.21	0.37	0.39	0.49	0.05
	Watershed LA	11.26	1.89	1.96	2.50	0.25
MOS		**5.44**	**3.17**	**2.07**	**1.21**	**0.56**
Unallocated Load		**0.00**	**42.92**	**21.25**	**0.00**	**8.31**
TOTAL LOAD (TMDL)		**108.78**	**63.42**	**41.35**	**24.16**	**11.20**
Existing Load (geomean of observed data)		NA***	20.50	20.10	28.76	2.90
Estimated Reduction (%)		NA***	0%	0%	16%	0%

* Data collected between 2008-2014 were used to develop the flow regimes and loading capacities for this reach
** There are no permitted point discharges from industries, municipalities, WWTF, or individually permitted sources within the Sarah Creek Watershed
*** Not enough data at this time to estimate a load reduction

Table 4.10 - Pioneer Creek *E.coli* TMDL summary.

		Flow Regime*				
		Very High	High	Mid	Low	Very Low
		E. coli Load (billions of organisms/day)				
Wasteload	**Total WLA****	**6.24**	**2.07**	**1.15**	**0.26**	**0.12**
	Permitted Wastewater Dischargers	--	--	--	--	--
	Independence City MS4	1.23	0.41	0.23	0.05	0.02
	Maple Plain City MS4	5.01	1.66	0.92	0.21	0.10
Load	**Total LA**	**222.62**	**73.75**	**40.91**	**9.26**	**4.32**
	Lake Independence Boundary Condition	109.33	36.22	20.09	4.55	2.12
	Watershed LA	113.29	37.53	20.82	4.71	2.20
MOS		**12.05**	**5.69**	**2.21**	**0.50**	**0.23**
Unallocated Load		**0.00**	**32.32**	**0.00**	**0.00**	**0.00**
TOTAL LOAD (TMDL)		**240.91**	**113.82**	**44.27**	**10.02**	**4.67**
Existing Load (geomean of observed data)		633.97	81.50	53.35	19.96	6.16
Estimated Reduction (%)		62%	0%	19%	51%	26%

* Data collected between 2008-2014 were used to develop the flow regimes and loading capacities for this reach.
** There are no permitted point discharges from industries, municipalities, WWTF, or individually permitted sources within the Sarah Creek Watershed

Table 4.11 - Unnamed Creek *E.coli* TMDL summary.

		Flow Regime*				
		Very High	High	Mid	Low	Very Low
		E. coli Load (billions of organisms/day)				
Wasteload	**Total WLA****	--	--	--	--	--
	Permitted Wastewater Dischargers	--	--	--	--	--
	Permitted MS4s	--	--	--	--	--
Load	**Total LA**	**36.57**	**23.83**	**29.07**	**16.08**	**6.55**
	Oak & Mud Lake Boundary Conditions	25.40	16.55	20.19	11.17	4.55
	Watershed LA	11.17	7.28	8.88	4.91	2.00
MOS		**4.73**	**2.77**	**1.53**	**0.85**	**0.35**
Unallocated Load		**53.36**	**28.78**	**0.00**	**0.00**	**0.00**
TOTAL LOAD (TMDL)		**94.65**	**55.38**	**30.60**	**16.93**	**6.90**
Existing Load (geomean of observed data)		41.30	26.60	41.93	24.17	8.41
Estimated Reduction (%)		0%	0%	27%	30%	18%

* Data collected between 2008-2014 was used to develop the flow regimes and loading capacities for this reach.

** There are no permitted point discharges from industries, municipalities, WWTF, or individually permitted sources within the Unnamed Creek Watershed.

Table 4.12 - Deer Creek *E.coli* TMDL summary.

		Flow Regime*				
		Very High	High	Mid	Low	Very Low
		E. coli Load (billions of organisms/day)				
Wasteload	**Total WLA****	--	--	--	--	--
	Permitted Wastewater Dischargers	--	--	--	--	--
	Permitted MS4s	--	--	--	--	--
Load	**Total LA**	**46.28**	**13.07**	**2.64**	**0.29**	**0.06**
	Whaletail Lake Boundary Condition	21.88	6.18	1.25	0.14	0.03
	Watershed LA	24.40	6.89	1.39	0.15	0.03
MOS		**2.44**	**0.69**	**0.16**	**0.03**	**0.003**
Unallocated Load		**0.00**	**0.00**	**0.48**	**0.31**	**0.00**
TOTAL LOAD (TMDL)		**48.72**	**13.76**	**3.28**	**0.63**	**0.07**
Existing Load (geomean of observed data)		103.66	16.20	2.80	0.32	NA***
Estimated Reduction (%)		53%	15%	0%	0%	NA***

* Data collected between 2008-2014 were used to develop the flow regimes and loading capacities for this reach.

** There are no permitted point discharges from industries, municipalities, WWTF, or individually permitted sources within the Deer Creek Watershed.

*** Not enough data at this time to estimate a load reduction.

Methodology for Nutrients (phosphorus) in Lakes: In Section 4.2.1 of the TMDL, several methods are discussed that were used to develop the TMDL.

- BATHTUB is a lake response model, described in Section 4.2.1 and Appendix C of the TMDL. The model version 6.20 was used to model in-lake water quality conditions. It is a steady state model that uses a mass balance approach and inputs such as annual phosphorus loading, mean lake depth and hydraulic flushing time to predict the lake's phosphorus concentration. After calibration, the model defines a load response curve to show the relationship of loading to water quality. Loading was calculated to meet the June through September phosphorus standards for shallow and deep lakes, as applicable. The model was calibrated to in-lake total phosphorus concentrations, followed by calibration of chlorophyll-a concentration and Secchi depth transparency. Data were generally from a 1-3 year time period within the timeframe between 2006-2015 and reflected long term average precipitation conditions that included seasonal variation; water quality data were collected by the Three Rivers Park District and/or the Metropolitan Council's Citizen Assisted Monitoring Program.

The model estimates atmospheric loading, external watershed loading, and internal lake loading.

- Atmospheric loading - reduction was estimated within the BATHTUB model using a default value multiplied by the total surface area of the lake. Documentation is in Appendix C3 of the TMDL.
- The Generalized Watershed Loading Function - E (GWLF-E) model - (also described in Appendix C of the TMDL) was used to estimate the watershed loading for each lake. The model was run for each year from 2009-2015. GWLF outputs were used as BATHTUB inputs for tributary loading from the watershed to the lakes.
- Internal loading from sediments is the primary internal source of loading in the lakes. There are two primary methods of phosphorus release that occur in the lakes, from sediment and from Curly Leaf Pondweed (CLPW) senescence (death). The internal load for each lake was a "residual load", so that the modeled load could achieve the observed in-lake load after the atmospheric load + external load was accounted for. The Nürnberg approach was used as a comparison to ensure that the lake estimates of the residual were supported, based mostly on the extent and duration of low DO periods affecting lake sediments under various conditions. CLPW growth and senescence was included in the approach when aquatic vegetation surveys occurred (Appendix D). The estimates came within 20% of the mid-point of the range of values using the Nürnberg approach.
    - Sediment phosphorus release was measured under both aerobic and anaerobic conditions which occur at distinctive depths in stratified lakes, and generally there are higher release rates under anaerobic conditions. Temperature and DO profiles were used to determine the depth and time period of stratification in each lake. Release rates were measured from lab incubation experiments using in-lake sediment cores, then multiplied by the surface areas of anaerobic depth (defined at < 2 mg/L DO concentration) or aerobic conditions, and multiplied by the number of anoxic days/year. These calculations applied to the stratification period. In shallower lakes there is not as much stratification and more aerobic conditions; deeper lakes have more anaerobic (anoxic) influences. Where data could identify variations in annual stratification, the annual time period of anoxia was used to establish the range of internal loading.
    - CLPW senescence occurs by the end of June or early July and provides an internal nutrient source as it releases nutrients in soluble form readily available for algal uptake and growth. CLPW was sampled using quadrant surveys with nuisance growth

conditions, providing an estimate of dry weight biomass and TP concentration. The estimate was converted to the average pounds of phosphorus/acre. The extent of the acreage of CLPW used aquatic vegetation point intercept survey data (in Appendix D of the TMDL), with varying rake density of the CLPW samples.

Methodology for E. coli in streams – Section 4.3.3 of the TMDL states that the Load Duration Curve (LDC) methodology was used in calculations of the TMDLs. The LDC below is for Sarah Creek Watershed; the other creeks also use this methodology.

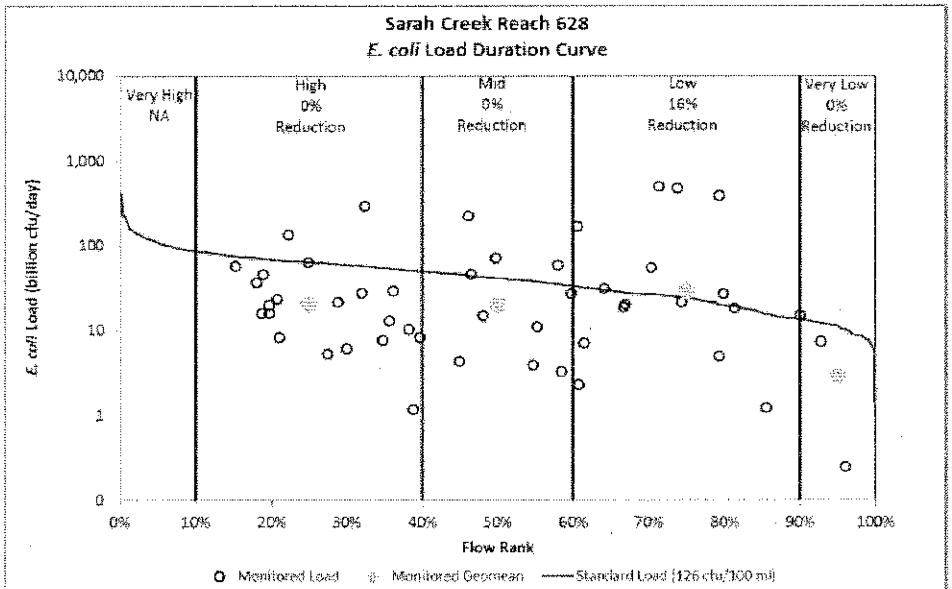

Figure 4-B - Sarah Creek *E. coli* load duration curve and TMDL reductions.

Load duration curves were developed using the full range of hydrological conditions at each monitoring site to ensure all flow conditions were considered, including critical conditions. This method includes ranking daily flow values from highest to lowest, computing the percentage of days in the period of record with flows that exceed each daily value, and then plotting daily flow versus the exceedance percentage (or flow duration interval). The resultant load curves show flow values and the frequency that the standard is exceeded. Both flood conditions and low flow are represented, as well as conditions in the middle range. Flow data for the four watersheds draining to the streams were from 2008 – 2014.

Each plot was divided into five flow duration intervals (very low, low, mid-range, moist, and high flow conditions). High flow exceedences more often occur from precipitation-related sources and more under spring conditions (run-off from upland pastures, cropland with surface manure application) on the left portion of the plot, and non-precipitation related events occur more in the fall when there are large amounts of cattle access from pastures near streams, or from point sources, and exceedences occur under low flow conditions on the right portion of the plot. The larger green dots are geomeans calculated per flow regime. The TMDL for each flow regime was established by using the midpoint flow condition multiplied by the concentration target. In the example above (Figure 4-8) for Sarah Creek, there are no samples under very high flow conditions on the left side of the plot, and a 16% TMDL reduction is needed only in the low flow regime. Different reaches of the creeks have individual reductions in various flow regimes, not only during low flow as in this example. EPA notes that while the TMDL will focus on the geometric mean portion of the water quality standard, both parts of the water quality standards must be met.

In the resulting loading capacity, there were some locations and flow regimes where the calculated pollutant loads were less than the TMDL calculation. The existing pollutant load was used for load and wasteload calculations in order to follow antidegradation requirements rather than the allowable load. The difference between the existing (below allowable) and allowable load was classified as the "unallocated load." The reductions vary in each stream, with the results shown in the regimes as shown in Tables 4.9 – 4.12 of this Decision Document as follows:

Critical Conditions: Section 4.2.5 of the TMDL for nutrients states that the critical conditions in the impaired lakes occur during the growing season when the lakes are used most intensively for direct and indirect contact aquatic recreation. Since the TMDL is based on growing season averages, the critical period is covered by the TMDL. Section 4.3.5 of the TMDL for *E. coli* states that all seasons and all flow regimes are covered in the methodology, so that the critical conditions are inherently included.

EPA finds MPCA's approach for calculating the loading capacity to be reasonable and consistent with EPA guidance. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this third element.

4. Load Allocations (LAs)

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity attributed to existing and future nonpoint sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. §130.2(g)). Where possible, load allocations should be described separately for natural background and nonpoint sources.

Comment:
The Load Allocations are presented in the Section 3 above. The existing loadings for the streams are predominantly nonpoint source. The lake loading includes nonpoint sources via nonpoint source runoff, atmospheric deposition, internal lake loading, SSTS, and in some locations an upstream lake.

EPA finds MPCA's approach for calculating the LA to be reasonable and consistent with EPA guidance. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this fourth element.

5. Wasteload Allocations (WLAs)

EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to individual existing and future point source(s) (40 C.F.R. §130.2(h), 40 C.F.R. §130.2(i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit.

The individual WLAs may take the form of uniform percentage reductions or individual mass based limitations for dischargers where it can be shown that this solution meets WQSs and does not result in localized impairments. These individual WLAs may be adjusted during the NPDES permitting process. If the WLAs are adjusted, the individual effluent limits for each permit issued to a discharger on the impaired water must be consistent with the assumptions and requirements of the adjusted WLAs in the TMDL. If the WLAs are not adjusted, effluent limits contained in the permit must be consistent with the individual WLAs specified in the TMDL. If a draft permit provides for a higher load for a discharger than the corresponding individual WLA in the TMDL, the State/Tribe must demonstrate that the total WLA in the TMDL will be achieved through reductions in the remaining individual WLAs and that localized impairments will not result. All permitees should be notified of any deviations from the initial individual WLAs contained in the TMDL. EPA does not require the establishment of a new TMDL to reflect these revised allocations as long as the total WLA, as expressed in the TMDL, remains the same or decreases, and there is no reallocation between the total WLA and the total LA.

Comment:
The Waste Load Allocations for TP in the six lakes are calculated for construction and industrial stormwater and need no reduction. MS4s are located in only three of the six lakes, Peter Lake, Spurzem Lake, and Lake Ardmore, and include the cities of Corcoran, Medina, and Loretto. Of the three lakes, MS4s and a WWTP need wasteload reduction in Spurzem Lake, and MS4s in Lake Ardmore. MPCA calculated individual WLAs for each MS4 (Tables 4.2, 4.3, and 4.5 above from the TMDL).

The WLAs for *E. coli* in the four streams are minimal because there are no permitted facilities in the creek watersheds, although there are two MS4s wasteload allocations in the Pioneer Creek watershed for Independence and Maple Plain City. MPCA calculated individual WLAs for each MS4 based upon the areal extent expected in the 2030 service area plan (Table 4.10 above from the TMDL).

EPA finds MPCA's approach for calculating the WLA to be reasonable and consistent with EPA guidance. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this fifth element.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)). EPA's 1991 TMDL Guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

Comment:
Section 4.2.4 of the TMDL states that an explicit 5% MOS was used in the phosphorus modeling effort. MPCA set aside 5% of the phosphorus loading in the lakes. MPCA believes the MOS is appropriate because there were comparable simulated and observed TP concentration values. The allocation methods included relevant processes, such as internal lake loading, to more accurately simulate the loading. As stated previously, loadings were further cross-checked with the Nürnberg approach, which yielded good correlation of simulated and measured values.

Section 4.3.4 of the TMDL states that an explicit 5% MOS was used in the modeling for *E. coli* in the streams and MPCA believes the MOS is appropriate because the LDC approach reduces uncertainty due to using monitored flow data, over a multi-year period. Further, the approach was conservative because no bacteria die-off rate was used in the calculation.

EPA finds MPCA's approach for calculating the MOS to be reasonable and consistent with EPA guidance. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this sixth element.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The TMDL must describe the method chosen for including seasonal variations. (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)).

Comment:
Seasonal variation was considered for TP in the lakes as described in Section 4.2.5 of the TMDL. MPCA takes this variability into account by setting standards with growing season averages

representing critical conditions, and MPCA considers eutrophication, as the standards are not only for TP but also for Chlorophyll-a and Secchi Depth.

Seasonal variation was considered for *E. coli* as described in Section 4.3.5 of the TMDL. Standards are developed for April through October when the potential for recreation is the greatest, and water is warmer in these months when bacteria is most productive. Further, stream flow decreases and has less potential for dilution. This variation and critical conditions were considered in developing this TMDL.

EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this seventh element.

8. Reasonable Assurance

When a TMDL is developed for waters impaired by point sources only, the issuance of a National Pollutant Discharge Elimination System (NPDES) permit(s) provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 C.F.R. 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with "the assumptions and requirements of any available wasteload allocation" in an approved TMDL.

When a TMDL is developed for waters impaired by both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur, EPA's 1991 TMDL Guidance states that the TMDL should provide reasonable assurances that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable. This information is necessary for EPA to determine that the TMDL, including the load and wasteload allocations, has been established at a level necessary to implement water quality standards.

EPA's August 1997 TMDL Guidance also directs Regions to work with States to achieve TMDL load allocations in waters impaired only by nonpoint sources. However, EPA cannot disapprove a TMDL for nonpoint source-only impaired waters, which do not have a demonstration of reasonable assurance that LAs will be achieved, because such a showing is not required by current regulations.

<u>Comment:</u>
MPCA states in Section 6 of the TMDL that many factors add to the reasonable assurance that the TMDL efforts will occur and result in nutrient and bacteria load reductions to the waterbodies included in this TMDL study.

The BMPs and other actions outlined in the TMDL in Section 7 (implementation) are endorsed by local organizations and cooperating agencies. Watershed and stakeholder groups have been represented in the implementation recommendations, including lake associations. The Pioneer

Sarah Creek Watershed Management Commission (PSCWMC) has developed and adopted its Third Generation Watershed Management Plan at http://www.pioneersarahcreek.org/third-generation-plan.html, which has implementation elements for new development and re-development, a public education and outreach program, a capital projects selection and funding process, a monitoring program and updated stormwater requirements, including the Minimal Impact Designs (MIDs) standards recommended by the MPCA.

The issuance of an NPDES Permit provides reasonable assurance that the WLAs contained in a TMDL will be achieved, including MS4 general permits and construction permits, and all local governments within the TMDL area are required to prepare local watershed management plans, capital improvement programs, and controls to bring local water management into conformance with the PSCWMC Watershed Management Plan, as reviewed and approved by the PSCWMC. Further, a WRAPS report (approved by MPCA on 7/26/17) was prepared with this TMDL which outlines key implementation elements for each water body, including specific management measures and expected implementation schedules, which will be supporting information to assist in acquiring funding.

The MPCA Feedlot Program regulates many activities related to the livestock industry and provides assistance in aspects of location, design, construction, operation and management of feedlots and manure from flowing into water, and ensuring that application rates, times and methods are appropriate.

MPCA's reasonable assurance also includes the approach of evaluating subwatershed assessments on a small scale to identify the best opportunities for pollutant load reductions, especially parcels of land in rural areas, to assess specific BMP impacts. To facilitate both the subwatershed assessments themselves and help with landowner cooperation/agricultural project implementation, Hennepin County and the University of Minnesota Extension Service intends to jointly hire an agricultural specialist in 2017. Projects may be funded through a tax levy imposed through Hennepin County at the PSCWMC's request anywhere within the PSCWMC jurisdictional limits. The tax is one of the main funding mechanisms and can be supplemented with cost-share contributions. Minnesota also describes the available funding mechanisms: tax levies and fees, the Clean Water Partnership Program to control NPS, financial assistance through loans for activities such as fixing failing septic systems, and MPCA's 319 NPS management program.

The Clean Water Legacy Act (CWLA) was passed in Minnesota for the purposes of protecting, restoring, and preserving Minnesota water. The CWLA provides the protocols and practices to be followed in order to protect, enhance, and restore water quality in Minnesota. The CWLA outlines how MPCA, public agencies and private entities should coordinate in their efforts toward improving land use management practices and water management. The CWLA anticipates that all agencies (i.e., MPCA, public agencies, local authorities and private entities, etc.) will cooperate regarding planning and restoration efforts. Cooperative efforts would likely include informal and formal agreements to jointly use technical, educational, and financial resources.

The CWLA also provided details on public and stakeholder participation, and how the funding will be used. In part to attain these goals, the CWLA requires MPCA to develop WRAPS. The WRAPS are required to contain such elements as the identification of impaired waters, watershed modeling outputs, point and nonpoint sources, load reductions, etc. (*Chapter 114D.26*; CWLA). The WRAPS also contain an implementation table of strategies and actions that are capable of achieving the needed load reductions, for both point and nonpoint sources (*Chapter 114D.26*, Subd. 1(8); CWLA). Implementation plans developed for the TMDLs are included in the table, and are considered "priority areas" under the WRAPS process (*Watershed Restoration and Protection Strategy Report Template,* MPCA). https://www.pca.state.mn.us/sites/default/files/wq-ws4-03.docx). This Table includes not only needed actions but a timeline for achieving water quality targets, the reductions needed from both point and nonpoint sources, the governmental units responsible, and interim milestones for achieving the action. MPCA has developed guidance on what is required in the WRAPS. Section 6 of the TMDL also states that a WRAPS was completed as a companion document to this TMDL.
https://www.pca.state.mn.us/sites/default/files/wq-ws4-32a.pdf

In an update described in this TMDL, Minnesota voters approved the CWLA amendment in 2008, which increased the state sales and use tax rate by three-eighths of 1% on all taxable sales, starting July 1, 2009, and continuing through 2034. Approximately one third of the funds have been dedicated to a Clean Water Fund to, "protect, enhance, and restore water quality in lakes, rivers, streams, and groundwater, with at least 5% of the fund targeted to protect drinking water sources." (MPCA 2014). Funding for implementation is also available through other nonpoint source programs and the 319 funding mechanism.

EPA finds that this criterion has been adequately addressed.

9. Monitoring Plan to Track TMDL Effectiveness

EPA's 1991 document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (EPA 440/4-91-001), recommends a monitoring plan to track the effectiveness of a TMDL, particularly when a TMDL involves both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur. Such a TMDL should provide assurances that nonpoint source controls will achieve expected load reductions and, such TMDL should include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring and leading to attainment of water quality standards.

Comment:
Section 7 of the TMDL states that monitoring of both the lakes and streams will be conducted to track and document progress in achieving the TMDL allocations. There are several cooperating agencies that will assist MPCA with monitoring, and the Intensive Watershed Monitoring program is expected to include North Fork Crow Watershed, and South Fork Crow Watershed

and to give a better, longer term, larger analysis on a rotating scale. Many lakes will be monitored every two years or three, and aquatic plant surveys taken every three to five years, as well as fish surveys. There will also be tracking of BMPs in cities as part of their MS4 permits.

EPA finds that this criterion has been adequately addressed.

10. Implementation

EPA policy encourages Regions to work in partnership with States/Tribes to achieve nonpoint source load allocations established for 303(d)-listed waters impaired by nonpoint sources. Regions may assist States/Tribes in developing implementation plans that include reasonable assurances that nonpoint source LAs established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. In addition, EPA policy recognizes that other relevant watershed management processes may be used in the TMDL process. EPA is not required to and does not approve TMDL implementation plans.

Comment:
Section 8 of the TMDL includes MPCA's implementation framework, and states that a significant amount of land use changes will occur in some of the subwatersheds, ranging from 0-85% change of the drainage area land use (an average of 52%). Land use transition (developments) will have to comply with storm water management requirements, and there were new standards adopted by the PSCWMC for water quality, runoff volume and rate control in 2015. These controls require new developers to:

- Comply with lower thresholds, i.e., any one acre of disturbed surface in development regardless of land use;
- Require infiltration rates (1.1 inches of runoff volume equates to 76% reduction in TP) off new impervious surfaces based on MPCA's Minimal Impact Design Standards (MIDS) and NPDES General and Construction permits, and if not infiltrated, discharge must be filtered. Credits would be given for actions that include disconnection of impervious surface, conservation of existing native vegetation, and use of de-compacted and amended soil as a BMP;
- Comply with a performance standard for stormwater quality to have good infiltration or no net increase of TP or TSS; the infiltration rate change could result in as much as 76% reduction in TP, which is better than a detention pond;
- Consider retro-fitting projects to increase infiltration;
- Intensify street cleaning where BMP implementation may be limited; and.
- Enhance stormwater treatment such as iron enhanced sand filters at stormwater ponds.

Point source programmatic requirements will also occur via permits for construction and industrial stormwater (Sections 8.2.2 and 8.2.3 of the TMDL). Nonpoint source implementation will include manure management, livestock management, SSTSs management, management of internal loading by treatment to reduce curly-leaf pondweed, and reduction of internal loading from enriched bottom sediments (addressed via sediment treatment or reduced loading). Additional implementation includes education of the public on the importance of fertilizer application needs and lawn care management. In locations near water, the public is taught the benefits of a healthy rooted aquatic plant community, installation and enhancement of buffer/shoreline restoration to maintain shoreline, reduce erosion, and improve riparian habitat. Where appropriate, rough fish management to maintain healthy fish communities, and subwatershed assessment for site-specific remedies should be implemented to limit rough fish reproduction, recruitment and migration. MPCA also discussed cost estimates and adaptive management, allowing for course corrections as the effectiveness of the BMPs are measured and adjustments made.

EPA reviews, but does not approve, implementation plans. EPA finds that this criterion has been adequately addressed.

11. Public Participation

EPA policy is that there should be full and meaningful public participation in the TMDL development process. The TMDL regulations require that each State/Tribe must subject calculations to establish TMDLs to public review consistent with its own continuing planning process (40 C.F.R. §130.7(c)(1)(ii)). In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval should describe the State's/Tribe's public participation process, including a summary of significant comments and the State's/Tribe's responses to those comments. When EPA establishes a TMDL, EPA regulations require EPA to publish a notice seeking public comment (40 C.F.R. §130.7(d)(2)).

Provision of inadequate public participation may be a basis for disapproving a TMDL. If EPA determines that a State/Tribe has not provided adequate public participation, EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by EPA.

Comment:
Section 9 of the TMDL states that there was considerable opportunity for public participation throughout the course of development. Cities, agencies and organizations added input, including Corcoran, Greenfield, Independence, Loretto, Maple Plain, Medina, and Minnetrista. Surveys showed there was a very high awareness of the connection of peoples' actions and the quality of water in local lakes. MPCA hosted community conversations between November 2014 and June 2017, bringing together a broad cross-section of people to discuss and provide information about the conditions of water resources.

The TMDL was public noticed from May 1, 2017 to May 31, 2017. Copies of the draft TMDL were made available upon request and on the Internet web site:

https://www.pca.state.mn.us/sites/default/files/wq-iw8-55b.pdf. MPCA received two public comment letters during the public comment period from the Minnesota Department of Agriculture (MDA) and the Metropolitan Council Environmental Services (MCES). MDA's comments included suggestions regarding livestock contribution as a P source, quantification of livestock from hobby farms, some site specific details regarding manure application, wetland influence on the reduction of P, and inclusion of MDA's Minnesota Ag Water Quality Certification Program to provide assistance on many levels for promoting water quality found at http://www.mda.state.mn.us/awqcp. MCES comments included suggestions to include working with regional parks and the Three River Park District for civic engagement, public outreach and education, including information on priority lakes in the area (identified by the MCES and in the WRAPS report), enlarging maps, and keeping consistent descriptions of the watersheds in the TMDL and WRAPS (MPCA made modification to WRAPS descriptions). MPCA adequately addressed the comments, as well as addressing EPA comments before the public draft.

EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this eleventh element.

12. Submittal Letter

A submittal letter should be included with the TMDL submittal, and should specify whether the TMDL is being submitted for a *technical review* or *final review and approval*. Each final TMDL submitted to EPA should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final review and approval, should contain such identifying information as the name and location of the waterbody, and the pollutant(s) of concern.

Comment:
The EPA received the final Pioneer-Sarah Creek TMDL on August 3, 2017, accompanied by a submittal letter on August 9, 2017. In the submittal letter, MPCA states that the submission includes the final TMDLs for phosphorous in six lakes and *E. coli* in four streams.

EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this twelfth element.

13. Conclusion

After a full and complete review, EPA finds that the phosphorus and *E. coli* TMDLs for the Pioneer-Sarah Subwatershed TMDL satisfies all of the elements of approvable TMDLs.

This approval addresses six lakes for phosphorus contributing to excess nutrient impairment, and four streams for *E. coli*, impairing aquatic life and recreational use.

EPA's approval of this TMDL does not extend to those waters that are within Indian Country, as defined in 18 U.S.C. Section 1151. EPA is taking no action to approve or disapprove TMDLs for those waters at this time. EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under the CWA Section 303(d) for those waters.