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

REPLY TO THE ATTENTION OF:
W-15J

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

Dear Mr. Skuta:

The U.S. Environmental Protection Agency completed its review of the final Total Maximum Daily Loads (TMDL) for segments within the Sauk River Watershed (SRW), including supporting documentation. The SRW encompasses parts of Douglas, Todd, Stearns, and Meeker counties in central Minnesota. The SRW TMDLs address impaired aquatic recreation use due to excessive nutrients and bacteria and impaired aquatic life use due to excessive sediment and nutrients.

The SRW TMDLs meet the requirements of Section 303(d) of the Clean Water Act and EPA's implementing regulations set forth at 40 C.F.R. Part 130. Therefore, EPA approves Minnesota's six bacteria TMDLs, three nutrient (stream) TMDLs, one sediment TMDL, and three nutrient (lake) TMDLs for a total of thirteen TMDLs addressing fifteen impairments. EPA describes Minnesota's compliance with the statutory and regulatory requirements in the enclosed decision document.

EPA acknowledges Minnesota's efforts in submitting these TMDLs and look forward to future TMDL submissions by the State of Minnesota. If you have any questions, please contact Mr. Stephen Feely, at 312-886-5867 or feely.stephen@epa.gov.

Sincerely,

8/2/2023

X

Tera L. Fong
Division Director, Water Division
Signed by: Environmental Protection Agency

wq-iw8-63g

TMDL: Sauk River Watershed *E. coli*, sediment, and phosphorus TMDLs in portions of Douglas, Todd, Stearns, and Meeker counties in central Minnesota
Date:

DECISION DOCUMENT FOR THE SAUK RIVER WATERSHED TMDLS IN CENTRAL MINNESOTA

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 Water body, Pollutant of Concern, Pollutant Sources, and Priority Ranking

The TMDL submittal should identify the water body as it appears on the State's/Tribe's 303(d) list. The water body 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 water body 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 water body. 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 water body 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 Sauk River Watershed (SRW) in central Minnesota covers parts of Douglas, Todd, Stearns and Meeker counties. The SRW is located in the Northern Central Hardwood Forest (NCHF) ecoregion (Section 1.1 of the final TMDL document).

The SRW TMDLs address fifteen impairments in nine (9) stream reaches and three (3) lakes. The SRW TMDLs address six (6) stream segments impaired due to excessive bacteria, one (1) stream segment impaired due to sediment, three (3) stream segments impaired due to excessive nutrients and three (3) lakes impaired due to nutrients (Table 1 of this Decision Document).

Table 1: Sauk River Watershed impaired waters addressed by this TMDL

Water body name	Assessment Unit ID	Affected Use	Pollutant or stressor	TMDL
Crooked Lake Ditch (Unnamed Creek to Lake Osakis)	07010202-552	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Sauk River (Adley Creek to Getchell Creek)	07010202-505	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Unnamed Creek (Unnamed Creek to Sauk River)	07010202-542	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Unnamed Creek (Unnamed Creek to Vails Lake)	07010202-550	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Cold Springs Creek (T123 R20W S15, West Line to Sauk River)	07010202-567	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Unnamed Creek (Grand Lake to Mill Creek)	07010202-560	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
			TOTAL Bacteria TMDLs	**6**
Sauk River (Adley Creek to Getchell Creek)	07010202-505	Aquatic Life	Benthic Macroinvertebrate Bioassessments, Fish Bioassessments	TSS TMDL
			TOTAL TSS TMDLs	**1**
Sauk River (Knaus Lake to Cold Spring Dam)	07010202-517	Aquatic Life	Nutrients (Phosphorus)	Phosphorus TMDL
Sauk River (Cold Spring WWTP to Mill Creek)	07010202-520	Aquatic Life	Benthic Macroinvertebrate Bioassessments; Fish Bioassessments	Phosphorus TMDL
Sauk River (Mill Creek to Mississippi River)	07010202-501	Aquatic Life	Nutrients (Phosphorus)	Phosphorus TMDL
			TOTAL (Stream) Phosphorus TMDLs	**3**
Maria Lake	73-0215-00	Aquatic Recreation	Nutrients (Phosphorus)	Phosphorus TMDL

Ellering Lake	73-0244-00	Aquatic Recreation	Nutrients (Phosphorus)	Phosphorus TMDL
Goodners Lake	73-0076-00	Aquatic Recreation	Nutrients (Phosphorus)	Phosphorus TMDL
			TOTAL (Lake) Phosphorus TMDLs	**3**
			Total TMDLs	**13**

There are no federally recognized tribal lands within the boundary of the SRW, and the TMDL does not allocate pollutant load to any federally recognized Indian tribe in this watershed (Section 1.3 of the final TMDL document).

Land Use:
Land use in the SRW is mainly cropland with some pasture and wetlands (Section 3.4 of the final TMDL document and Table 2 of this Decision Document).

Table 2: Land Use in the Sauk River Watershed

Reach ID 07010202-	Drainage Area (Sq. Miles)	Open Water (%)	Developed (%)	Barren (%)	Forest (%)	Herbaceous (%)	Hay/ Pasture (%)	Row Crops (%)	Wetlands (%)
552	60.4	2.7	4.0	0.0	6.5	0.4	16.5	57.1	12.8
505	624.6	5.3	4.8	0.0	8.7	0.4	11.4	58.1	11.3
542	17.2	12.6	3.5	0.0	23.9	2.9	8.0	44.7	4.4
550	27.0	0.4	3.9	0.1	1.9	0.1	2.5	86.2	4.9
73-0215-00	1.5	11.4	5.9	-	2.8	0.5	8.4	63.8	7.2
73-0244-00	23.1	1.5	4.1	0.1	4.3	0.2	6.0	77.1	6.7
517	941.1	4.7	4.9	0.0	7.7	0.4	9.9	62.9	9.5
567	4.1	0.1	17.1	0.1	4.7	1.3	12.3	59.8	4.6
520	959.6	4.6	5.1	0.0	7.9	0.4	10.0	62.6	9.4
73-0076-00	5.6	6.0	3.9	0.2	14.6	1.6	3.5	58.6	11.6
560	12.3	12.6	3.5	0.0	23.9	2.9	8.0	44.7	4.4
501	1,042.1	4.7	5.9	0.1	8.4	0.6	9.9	61.0	9.4

Problem Identification:
Bacteria TMDLs: Bacteria impaired segments identified in Table 1 of this Decision Document were included on the final 2022 Minnesota 303(d) list due to excessive bacteria. Water quality monitoring within the SRW indicated that these segments were not attaining their designated aquatic recreation uses due to exceedances of the bacteria criteria. Excessive bacteria can negatively impact recreational uses (e.g., swimming, wading, boating, fishing etc.) and public health. At elevated levels, bacteria may cause illness within humans who have contact with or ingest bacteria laden water. Recreation-based contact can lead to ear, nose, and throat infections, and stomach illness.

Phosphorus TMDLs: The lakes and streams identified in Table 1 of this Decision Document were included on the final 2022 Minnesota 303(d) list due to excessive phosphorus. Total phosphorus (TP), chlorophyll-*a* (chl-*a*) and Secchi depth (SD) measurements (for lakes) and TP, chl-*a*, dissolved oxygen flux and biological oxygen demand measurements (for streams) in the SRW indicated that these waters were not attaining their designated aquatic recreation uses due to exceedances of nutrient criteria. Water quality monitoring was completed throughout the SRW, and that data formed the foundation for phosphorus TMDL modeling efforts.

While TP is an essential nutrient for aquatic life, elevated concentrations of TP can lead to nuisance algal blooms that negatively impact aquatic life and recreation (e.g., swimming, boating, fishing, etc.). Algal decomposition can also deplete dissolved oxygen levels within the water column. The decreases in dissolved oxygen can stress benthic macroinvertebrates and fish. Depletion of oxygen in the water column can also lead to conditions where phosphorus is released from bottom sediments (i.e., internal loading). Also, excess algae can shade the water column which limits the distribution of aquatic vegetation. Aquatic vegetation stabilizes bottom sediments and is an important habitat for macroinvertebrates and fish.

Total Suspended Solids (sediment) TMDL: The sediment impaired segment identified in Table 1 of this Decision Document was included on the final 2022 Minnesota 303(d) list due to excessive sediment within the water column. Water quality monitoring within the SRW indicated that this segment was not attaining its designated aquatic life use due to high sediment measurements and the negative impact of those conditions on aquatic life (i.e., fish and macroinvertebrate communities).

Total suspended solids (TSS) is a measurement of the sediment and organic material that inhibits natural light from penetrating the surface water column. Excessive sediment and organic material within the water column can negatively impact fish and macroinvertebrates communities within the ecosystem. Excess sediment and organic material may create turbid conditions within the water column and may increase the costs of treating surface waters used for drinking water or other industrial purposes (e.g., food processing).

Excessive amounts of fine sediment in stream environments can degrade aquatic communities. Sediment can reduce spawning and rearing areas for certain fish species. Excess suspended sediment can clog the gills of fish, stress certain sensitive species by abrading their tissue, and thus reduce fish health. When in suspension, sediment can limit visibility and light penetration which may impair foraging and predation activities by certain species.

Excessive fine sediment also may degrade aquatic habitats, alter natural flow conditions in stream environments and add organic materials to the water column. The potential addition of fine organic materials may lead to nuisance algal blooms which can negatively impact aquatic life and recreation (e.g., swimming, boating, fishing, etc.). Algal decomposition depletes oxygen levels which stresses benthic macroinvertebrates and fish. Excess algae can shade the water column and limit the distribution of aquatic vegetation. Established aquatic vegetation stabilizes bottom sediments and provides important habitat areas for healthy macroinvertebrates and fish communities.

Priority Ranking:
MPCA's schedule for TMDL completions, as indicated on the 303(d) impaired waters list, reflects Minnesota's priority ranking of this TMDL. MPCA has aligned TMDL priorities with the watershed approach and Watershed Restoration and Protection Strategy (WRAPS) cycle. The schedule for TMDL completion corresponds to the WRAPS report completion on the 10-year cycle. Mainstem river TMDLs, which are not contained in major watersheds and thus not addressed in WRAPS, must also be completed. The MPCA is developing a state plan, to meet the needs of EPA's national measure (WQ-

27) as a follow-up to the EPA's Long-Term Vision for Assessment, Restoration and Protection under the CWA section 303(d) program. The waters of the SRW addressed by this TMDL are part of the MPCA draft prioritization plan to meet EPA's national measure.

Pollutants of Concern:
The pollutants of concern are bacteria, TP (nutrients) and TSS (sediment).

Source Identification (point and nonpoint sources):

Point Source Identification: The potential point sources to the SRW are:

SRW Bacteria TMDLs:
National Pollutant Discharge Elimination Systems (NPDES) permitted facilities: NPDES permitted facilities may contribute bacteria loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge wastewater according to their NPDES permit. MPCA determined that there are several wastewater treatment plants (WWTPs) in the SRW which contribute bacteria from treated wastewater releases (Sections 3.9.1.1 and 4.2.4 of the final TMDL document). MPCA assigned each of these facilities a portion of the bacteria wasteload allocation (WLA) (Table 3 of this Decision Document).

Table 3: NPDES facilities which contribute bacteria to impaired segments in the Sauk River Watershed

Facility Name	Permit # / Type	Impaired Reach	WLA (billions org/day)
Facilities assigned bacteria (*E. coli*) WLA (billions org/day)			
GEM Sanitary District	MNG585205/ Controlled	505, Sauk River (Adley Creek to Getchell Creek)	2.9
Melrose WWTP	MN0020290/ Continuous	505, Sauk River (Adley Creek to Getchell Creek)	14.3
Osakis WWTP	MN0020028/ Controlled	505, Sauk River (Adley Creek to Getchell Creek)	21.3
Sauk Centre WWTP	MN0024821/ Continuous	505, Sauk River (Adley Creek to Getchell Creek)	4.2
Lake Henry WWTP	MN0020885/ Continuous	542, Unnamed Creek (Unnamed Creek to Sauk River)	0.2

Municipal Separate Storm Sewer System (MS4) communities: MPCA determined that the SRW does not have MS4 which contribute bacteria to waters of the SRW (WLA = 0).

Concentrated Animal Feedlot Operations (CAFOs): MPCA has identified CAFOs in the SRW (Section 3.9.1.1 and Figures D-6 and D-7 in Appendix D of the final TMDL document). As explained by MPCA, CAFO production areas must be designed to contain all manure, and direct precipitation and manure-contaminated runoff from precipitation events up to the 25-year, 24-hour storm event. In the event of a discharge, the discharge cannot cause or contribute to a violation of a water quality standard (WQS).

MPCA noted that any precipitation-caused runoff from the land application of manure at agronomic rates is not considered a point source discharge and is accounted for in the load allocation (LA) of the TMDL. MPCA explained that these facilities are not designed to discharge effluent and therefore were not assigned a portion of the WLA (WLA = 0).

Combined Sewer Overflows (CSOs) and Sanitary Sewer Overflows (SSOs): MPCA determined that the SRW does not have CSOs nor SSOs which contribute bacteria to waters of the SRW (WLA = 0).

SRW Phosphorus TMDLs:
NPDES permitted facilities: NPDES permitted facilities may contribute nutrient loads to surface waters through discharges of wastewater. Permitted facilities must discharge treated wastewater according to their NPDES permit. MPCA determined that there are several WWTPs in the SRW which contribute TP from treated wastewater releases (Tables 14-16 and Tables 18-20 of this Decision Document). MPCA assigned each of these facilities a portion of the TP WLA.

Stormwater runoff from permitted construction and industrial areas: Construction and industrial sites may contribute phosphorus via sediment runoff during stormwater events. These areas within the SRW must comply with the requirements of the MPCA's NPDES Stormwater Program and create a Stormwater Pollution Prevention Plan (SWPPP) that summarizes how stormwater will be minimized from the site.

MS4 communities: Stormwater from MS4s can transport nutrients to surface water bodies during or shortly after storm events. MPCA identified several MS4 permittee, which were assigned a portion of the WLA for the phosphorus TMDLs (Tables 14-16 and Tables 18-20 of this Decision Document).

SRW TSS TMDL:
NPDES permitted facilities: NPDES permitted facilities may contribute sediment loads to surface waters through discharges of wastewater. Permitted facilities must discharge wastewater according to their NPDES permit. MPCA determined that there are several facilities which contribute sediment from treated wastewater releases (Table 17 of this Decision Document). MPCA assigned each of these facilities a portion of the sediment WLA.

Stormwater runoff from permitted construction and industrial areas: Construction and industrial sites may contribute sediment via stormwater runoff during precipitation events. These areas within the SRW must comply with the requirements of the MPCA's NPDES Stormwater Program and create a SWPPP that summarizes how stormwater will be minimized from the site.

Municipal Separate Storm Sewer System (MS4) communities: MPCA determined, in Section 3.9.3.1 of the final TMDL document, that the SRW does not have MS4 which contribute sediment to waters of the SRW (WLA = 0).

Concentrated Animal Feedlot Operations (CAFOs): MPCA has identified CAFOs in the SRW (Section 3.9.1.1 and Figures D-6 and D-7 in Appendix D of the final TMDL document). As explained by MPCA, CAFO production areas must be designed to contain all manure, and direct precipitation and manure-contaminated runoff from precipitation events up to the 25-year, 24-hour storm event. In the event of a discharge, the discharge cannot cause or contribute to a violation of a WQS. MPCA noted that any precipitation-caused runoff from the land application of manure at agronomic rates is not considered a point source discharge and is accounted for in the LA of the TMDL. MPCA explained that these facilities are not designed to discharge effluent and therefore were not assigned a portion of the WLA (WLA = 0).

Nonpoint Source Identification: The potential nonpoint sources to the SRW are:

SRW Bacteria TMDLs:

Non-regulated urban runoff: Runoff from urban areas (i.e., urban, residential, commercial, or industrial land uses) can contribute bacteria to local water bodies. Stormwater from urban areas, which drain impervious surfaces, may introduce bacteria (e.g., derived from wildlife or pet droppings) to surface waters.

Stormwater from agricultural land use practices and feedlots near surface waters: Animal Feeding Operations (AFOs) in close proximity to surface waters can be a source of bacteria to water bodies in the SRW. These areas may contribute bacteria via the mobilization and transportation of pollutant laden waters from feeding, holding and manure storage sites. Runoff from agricultural lands may contain significant amounts of bacteria which may lead to impairments in the SRW. Feedlots generate manure which may be spread onto fields. Runoff from fields with spread manure can be exacerbated by tile drainage lines, which channelize the stormwater flows and reduce the time available for bacteria to die-off.

Unrestricted livestock access to streams: Livestock with access to stream environments may add bacteria directly to the surfaces waters or resuspend particles that had settled on the stream bottom. Direct deposition of animal wastes can result in very high localized bacteria counts and may contribute to downstream impairments. Smaller animal facilities may add bacteria to surface waters via wastewater from these facilities or stormwater runoff from near-stream pastures.

Discharges from Subsurface Sewage Treatment Systems (SSTS) or unsewered communities: Failing septic systems are a potential source of bacteria within the SRW. Septic systems generally do not discharge directly into a water body, but effluents from SSTS may leach into groundwater or pond at the surface where they can be washed into surface waters via stormwater runoff events. Age, construction, and use of SSTS can vary throughout a watershed and influence the bacteria contribution from these systems.

Failing SSTS are specifically defined as systems that are failing to protect groundwater from contamination, while those systems which discharge partially treated sewage to the ground surface, road ditches, tile lines, and directly into streams, rivers and lakes are considered an imminent threat to public health and safety (ITPHS). ITPHS systems also include illicit discharges from unsewered communities.

Wildlife: Wildlife is a known source of bacteria in water bodies as many animals spend time in or around water bodies. Deer, geese, ducks, raccoons, and other animals all create potential sources of bacteria via contaminated runoff from animal habitats, such as urban park areas, forest, and rural areas.

SRW Phosphorus TMDLs:

Internal loading: The release of phosphorus from lake sediments, the release of phosphorus from lake sediments via physical disturbance from benthic fish (i.e., rough fish (e.g., carp)), the release of phosphorus from wind mixing the water column, and the release of phosphorus from decaying curly-leaf pondweed, may all contribute internal phosphorus loading to the lakes of the SRW. Phosphorus may build up in the bottom waters of the lake and may be resuspended or mixed into the water column when the thermocline decreases, and the lake water mixes.

Stormwater runoff from agricultural land use practices: Runoff from agricultural lands may contain significant amounts of nutrients, organic material and organic-rich sediment which may lead to impairments in the SRW. Manure spread onto fields is often a source of phosphorus, and can be exacerbated by tile drainage lines, which channelize the stormwater. Tile lined fields and channelized ditches enable particles to move more efficiently into surface waters. Phosphorus, organic material and organic-rich sediment may be added via surface runoff from upland areas which are being used for Conservation Reserve Program (CRP) lands, grasslands, and agricultural lands used for growing hay or other crops. Stormwater runoff may contribute nutrients and organic-rich sediment to surface waters from livestock manure, fertilizers, vegetation, and erodible soils.

Unrestricted livestock access to streams: Livestock with access to stream environments may add nutrients directly to the surface waters or resuspend particles that had settled on the stream bottom. Direct deposition of animal wastes can result in very high localized nutrient concentrations and may contribute to downstream impairments. Smaller animal facilities may add nutrients to surface waters via wastewater from these facilities or stormwater runoff from near-stream pastures.

Stream channelization and stream erosion: Eroding streambanks and channelization efforts may add nutrients, organic material, and organic-rich sediment to local surface waters. Nutrients may be added if there is particulate phosphorus bound with eroding soils. Eroding riparian areas may be linked to soil inputs within the water column and potentially to changes in flow patterns. Changes in flow patterns may also encourage down-cutting of the streambed and streambanks. Stream channelization efforts can increase the velocity of flow (via the removal of the sinuosity of a natural channel) and disturb the natural sedimentation processes of the streambed.

Urban/residential sources: Nutrients, organic material and organic-rich sediment may be added via runoff from urban/developed areas near the impaired lakes in the SRW. Runoff from urban/developed areas can include phosphorus derived from fertilizers, leaf and grass litter, pet wastes, and other sources of anthropogenic derived nutrients.

Atmospheric deposition: Phosphorus and organic material may be added via particulate deposition. Particles from the atmosphere may fall onto lake surfaces or other surfaces within the SRW. Phosphorus can be bound to these particles which may add to the phosphorus inputs to surface water environments.

Discharges from SSTS or unsewered communities: Failing septic systems are a potential source of nutrients within the SRW. Septic systems generally do not discharge directly into a water body, but effluents from SSTS may leach into groundwater or pond at the surface where they can be washed into surface waters via stormwater runoff events. Age, construction, and use of SSTS can vary throughout a watershed and influence the nutrient contribution from these systems.

Wetland and Forest Sources: Phosphorus, organic material and organic-rich sediment may be added to surface waters by stormwater flows through wetland and forested areas in the SRW. Storm events may mobilize phosphorus through the transport of suspended solids and other organic debris.

Wildlife: Wildlife is a known source of nutrients in water bodies as many animals spend time in or around water bodies. Deer, geese, ducks, raccoons, and other animals all create potential sources of nutrients via contaminated runoff from animal habitats, such as urban park areas, forest, and rural areas.

SRW TSS TMDL:

Stream channelization and streambank erosion: Eroding streambanks and channelization efforts may add sediment to local surface waters. Eroding riparian areas may be linked to soil inputs within the water column and potentially to changes in flow patterns. Changes in flow patterns may also encourage down-cutting of the streambed and streambanks. Stream channelization efforts can increase the velocity of flow (via the removal of the sinuosity of a natural channel) and disturb the natural sedimentation processes of the streambed. Unrestricted livestock access to streams and streambank areas may lead to streambank degradation and sediment additions to stream environments.

Stormwater runoff from agricultural land use practices: Runoff from agricultural lands may contain significant amounts of sediment which may lead to impairments in the SRW. Sediment inputs to surface waters can be exacerbated by tile drainage lines, which channelize the stormwater flows. Tile lined fields and channelized ditches enable particles to move more efficiently into surface waters.

Wetland and Forest Sources: Sediment may be added to surface waters by stormwater flows through wetland or forested areas in the SRW. Storm events may mobilize decomposing vegetation, organic soil particles through the transport of suspended solids and other organic debris.

Atmospheric deposition: Sediment may be added via particulate deposition. Particles from the atmosphere may fall onto surface waters within the SRW.

Future Growth:

MPCA referenced population trend projects from the Minnesota State Demographic Center for 2015-2045 and shared that the populations in the SRW are projected to increase in some counties (Meeker 19.5%, Morrison 14.7%, Stearns 8.6%, Todd 6.7%, Douglas 2.8%) and decrease in other counties (Pope -1.1%), with an overall growth of 8.3% by 2045 in the six counties that have area in the watershed (Section 5 of the final TMDL document). MPCA acknowledged that potential increases in population and potential development of lakeside properties will likely impact waterbodies in the SRW. However, no load was set aside by Minnesota for future growth.

The WLA and LA for the SRW TMDLs were calculated for all current and future sources. Any expansion of point or nonpoint sources will need to comply with the respective WLA and LA values calculated in the SRW TMDLs.

The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of the first criterion.

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 water body, 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 Uses:
Water quality standards (WQS) are the fundamental benchmarks by which the quality of surface waters is measured. Within the State of Minnesota, WQS are developed pursuant to the Minnesota Statutes Chapter 115, Sections 03 and 44. Authority to adopt rules, regulations, and standards as are necessary and feasible to protect the environment and health of the citizens of the State is vested with the MPCA. Through adoption of WQS into Minnesota's administrative rules (principally Chapters 7050 and 7052), MPCA has identified designated uses to be protected in each of its drainage basins and the criteria necessary to protect these uses.

Minnesota Rule Chapter 7050 designates uses for waters of the state. The segments addressed by the SRW TMDLs are designated as Class 2 waters for aquatic recreation use (fishing, swimming, boating, etc.) and aquatic life use (phosphorus and TSS). The Class 2 designated use is described in Minnesota Rule 7050.0140 (3):

> *"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."*

Water use classifications for individual water bodies are provided in Minnesota Rules 7050.0470, 7050.0425, and 7050.0430. This TMDL report addresses the water bodies that do not meet the standards for Class 2 and 3 waters. The impaired streams in this report are classified as Class 1B, 2Ag, 2Bg and/or 7 waters (Table 1 of the final TMDL document).

Class 2 waters are protected for aquatic life and recreation, and the streams in this project are either Class 2Ag waters, which are characterized as general cold water habitat waters, or Class 2Bg waters, which are characterized as general warm water habitat waters. Class 1B waters are protected for domestic consumption use. Class 7 waters are protected for limited resource value use. The lakes addressed in this report are classified as Class 2B waters, which are protected for aquatic life and recreation. The most stringent class for the impaired waters is Class 2B for waters impaired for TP and TSS. For bacteria, the applicable criteria are noted in Table 4 of this Decision Document.

Standards:
Narrative Criteria:
Minnesota Rule 7050.0150 (3) set forth narrative criteria for Class 2 waters of the State:

> *"For all Class 2 waters, the aquatic habitat, which includes the waters of the state and stream bed, shall not be degraded in any material manner, there shall be no material increase in undesirable slime growths or aquatic plants, including algae, nor shall there be any significant increase in harmful pesticide or other residues in the waters, sediments, and aquatic flora and fauna; the normal fishery and lower aquatic biota upon which it is dependent and the use thereof shall not be seriously impaired or endangered, the species composition shall not be altered materially, and the propagation or migration of the fish and other biota normally present shall not be prevented or hindered by the discharge of any sewage, industrial waste, or other wastes to the waters."*

Numeric criteria:
Bacteria TMDLs: The bacteria water quality standards which apply to SRW TMDLs are:

Table 4: Bacteria Water Quality Standards Applicable to the SRW TMDLs

Class/Parameter	Units	Water Quality Standard
Class 2/E. coli [1]	# of organisms / 100 mL	The geometric mean of a minimum of 5 samples taken within any calendar month may not exceed 126 organisms
		No more than 10% of all samples collected during any calendar month may individually exceed 1,260 organisms
Class 7/E. coli [2]	# of organisms / 100 mL	The geometric mean of a minimum of 5 samples taken within any calendar month may not exceed 630 organisms
		No more than 10% of all samples collected during any calendar month my individually exceed 1,260 organisms

[1] = Standards apply only between April 1 and October 31
[2] = Standards apply only between May 1 and October 31

Bacteria TMDL Targets: The bacteria TMDL targets employed for the SRW bacteria TMDLs are the *E. coli* standards as stated in Table 4 of this Decision Document and Section 2.4.1 of the final TMDL document. MPCA determined that the focus of this TMDL is on the 126 organisms per 100 mL portion of the standard for Class 2 waters and the 630 organisms per 100 mL portion of the standard for Class 7 waters. MPCA believes that using the 126 orgs/100 mL and 630 organisms/100 mL portions of the standard for TMDL calculations will result in the greatest bacteria reductions within the SRW and will result in the attainment of the 1,260 orgs/100 mL portion of the standard. While the bacteria TMDLs will focus on the geometric mean portion of the water quality standard, attainment of both parts of the water quality standard is required.

Phosphorus TMDLs (streams)**:** Numeric thresholds for TP, chlorophyll-*a*, and Secchi Disk depth are set forth in Minnesota Rules 7050.0222. These three parameters form the MPCA eutrophication standard that must be achieved to attain the aquatic recreation designated use (Table 3 of the final

TMDL document). Segments located in the Central River Nutrient Region (CRNR) have a phosphorus standard of **100 µg/L or 0.10 mg/L.**

Table 5: Phosphorus Water Quality Standards Applicable to the SRW TMDLs

Total Phosphorus (µg/L)	Chlorophyll-a (µg/L)	Dissolved Oxygen Flux (mg/L)	BOD_5 (mg/L)
≤ 100	≤ 18	≤ 3.5	≤ 2.0

Phosphorus TMDL Targets (stream segments impaired due to excessive nutrients): MPCA determined that the target for the river TMDLs is total phosphorus (Sections 2.4.2 and 4.3.1 of the final TMDL document). The TMDL target is **100ug/L** for all waters in the CRNR. For all impaired streams segments, a phosphorus exceedance and at least one response variable outlined in Table 3 of the Final TMDL is necessary for the stream reach to be considered impaired. MPCA also notes that a stream will be considered polluted when a chlorophyll-a concentration exceeds 150 milligrams per square meter (mg/m^2) for more than 1 year in 10 years as a summer average.

TSS TMDL**:** In January 2015, EPA approved MPCA's regionally based TSS criteria for rivers and streams. The TSS criteria replaced Minnesota's statewide turbidity criterion (measured in Nephelometric Turbidity Units (NTU)). The TSS criteria provide water clarity targets for measuring suspended particles in rivers and streams.

TSS TMDL Target: MPCA employed the regional TSS criterion for the CRNR, **30 mg/L** from April 1 to September 30, for the SRW TSS TMDL.

Phosphorus TMDLs (lakes): Numeric thresholds for TP, chl-*a*, and SD depth are set forth in Minnesota Rules 7050.0222. These three parameters form the MPCA eutrophication standard that must be achieved to attain the aquatic recreation designated use. The numeric eutrophication standards which are applicable to the SRW lake TMDLs are found in Table 6 of this Decision Document (Table 4 of the final TMDL document).

In developing the lake nutrient standards for Minnesota lakes, MPCA evaluated data from a large cross-section of lakes within each of the State's ecoregions. Clear relationships were established between the causal factor, TP, and the response variables, chl-*a* and SD depth. MPCA anticipates that by meeting the TP concentrations of NCHF WQS the response variables chl-*a* and SD will be attained and the lakes of the SRW TMDL will achieve their designated beneficial uses. For lakes to achieve their designated beneficial use, the lake must not exhibit signs of eutrophication and must allow water-related recreation, fishing, and aesthetic enjoyment. MPCA views the control of eutrophication as the lake enduring minimal nuisance algal blooms and exhibiting desirable water clarity (Section 2.4.4 of the final TMDL document.

Table 6: Minnesota Eutrophication Standards for lakes within the North Central Hardwood Forest (NCHF) ecoregion applicable in the Sauk River Watershed TMDLs

Parameter	NCHF Eutrophication Standard (standard lakes)
Total Phosphorus (µg/L)	TP $\leq$ 40
Chlorophyll-a (µg/L)	chl-*a* $\leq$ 14
Secchi Depth (m)	SD $\geq$ 1.4

Nutrient TMDL Targets (lakes): MPCA selected TP target of **40 µg/L** for lakes identified in Table 1 of this Decision Document. MPCA selected TP as the appropriate target parameter to address eutrophication problems because of the interrelationships between TP and chl-*a*, and TP and SD depth. Algal abundance is measured by chl-*a*, which is a pigment found in algal cells. As more phosphorus becomes available, algae growth can increase. Increased algae in the water column will decrease water clarity that is measured by SD depth. EPA finds the nutrient targets employed for the SRW phosphorus TMDLs to be reasonable.

The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of the second criterion.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a water body 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 steam 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:
SRW Bacteria TMDLs: MPCA used the geometric mean (**126 orgs/100 mL for Class 2; 630 orgs/100 mL for Class 7**) of the *E. coli* water quality standard to calculate loading capacity values for the bacteria TMDLs Section 4.3.1 of the final TMDL document). MPCA believes the geometric mean of the WQS provides the best overall characterization of the status of the watershed. EPA agrees with this assertion,

as stated in the preamble of, *"The Water Quality Standards for Coastal and Great Lakes Recreation Waters Final Rule"* (69 FR 67218-67243, November 16, 2004) on page 67224, "…the geometric mean is the more relevant value for ensuring that appropriate actions are taken to protect and improve water quality because it is a more reliable measure, being less subject to random variation, and more directly linked to the underlying studies on which the 1986 bacteria criteria were based." MPCA stated that the bacteria TMDLs will focus on the geometric mean portion of the water quality standard (126 orgs/100 mL or 630 orgs/100 mL) and that it expects that by attaining the 126 orgs/100 mL or 630 orgs/100 mL portion of the *E. coli* WQS, the 1,260 orgs/100 mL portion of the *E. coli* WQS will also be attained. EPA finds these assumptions to be reasonable.

Typically loading capacities are expressed as a mass per time (e.g., pounds per day). However, for *E. coli* loading capacity calculations, mass is not always an appropriate measure because *E. coli* is expressed in terms of organism counts. This approach is consistent with the EPA's regulations which define "load" as "an amount of matter that is introduced into a receiving water" (40 C.F.R. §130.2). To establish the loading capacities for the SRW bacteria TMDLs, MPCA used Minnesota's WQS for *E. coli* (126 orgs/100 mL). A loading capacity is, "the greatest amount of loading that a water can receive without violating water quality standards." (40 C.F.R. §130.2). Therefore, a loading capacity set at the WQS will assure that the water does not violate WQS. MPCA's *E. coli* TMDL approach is based upon the premise that all discharges (point and nonpoint) must meet the WQS when entering the water body. If all sources meet the WQS at discharge, then the water body should meet the WQS and the designated use.

Separate flow duration curves (FDCs) were created for the each of the bacteria TMDLs in the SRW. The SRW FDCs were developed using flow data generated from Hydrologic Simulation Program-Fortran (HSPF) modeling efforts at the outlet/pour point of each impaired reach (Section 4.1.2 of the final TMDL document). MPCA focused on daily HSPF modeled flows from approximately 2005 to 2014 and bacteria (*E. coli*) water quality data from the same time period. HSPF hydrologic models were developed to simulate flow characteristics within the SRW and flow data focused on dates within the recreation season (April 1 to October 31). Daily stream flows were necessary to implement the load duration curve approach.

HSPF is a comprehensive modeling package used to simulate watershed hydrology and water quality on a basin scale. The package includes both an Agricultural Runoff Model and a more general nonpoint source model. HSPF parametrizes numerous hydrologic and hydrodynamic processes to determine flow rate, sediment, and nutrient loads. HSPF uses continuous meteorological records to create hydrographs and to estimate time series pollution concentrations.[1,2] The output of the HSPF process is a model of multiple hydrologic response units (HRUs), or subwatersheds of the overall SRW. The flow from these HRUs were transferred from a nearby USGS gage (USGS #05460000) (Table 28 of the final TMDL document).

FDCs graphs have flow duration interval (percentage of time flow exceeded) on the X-axis and discharge (flow per unit time) on the Y-axis. The FDC were transformed into LDC by multiplying individual flow values by the WQS (126 orgs/100 mL or 630 orgs/100 mL) and then multiplying that value by a conversion factor. The resulting points are plotted onto a load duration curve graph. LDC

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[1] HSPF User's Manual - https://water.usgs.gov/software/HSPF/code/doc/hspfhelp.zip
[2] EPA TMDL Models Webpage - https://www.epa.gov/exposure-assessment-models/tmdl-models-and-tools

graphs, for the SRW bacteria TMDLs, have flow duration interval (percentage of time flow exceeded) on the X-axis and *E. coli* loads (number of bacteria per unit time) on the Y-axis. The SRW LDC used *E. coli* measurements in billions of bacteria per day. The curved line on a LDC graph represents the TMDL of the respective flow conditions observed at that location.

Water quality monitoring was completed in the SRW and measured *E. coli* concentrations were converted to individual sampling loads by multiplying the sample concentration by the instantaneous flow measurement observed/estimated at the time of sample collection and then by a conversion factor which allows the individual samples to be plotted on the same figure as the LDCs (e.g., Figure 32 of the final TMDL document). Individual LDCs are found in Section 4.2.8 of the final TMDL document.

The LDC plots were subdivided into five flow regimes; very high flow conditions (exceeded 0–10% of the time), high flow conditions (exceeded 10–40% of the time), mid-range flow conditions (exceeded 40–60% of the time), low flow conditions (exceeded 60–90% of the time), and very low flow conditions (exceeded 90–100% of the time). LDC plots can be organized to display individual sampling loads with the calculated LDC. Watershed managers can interpret LDC graphs with individual sampling points plotted alongside the LDC to understand the relationship between flow conditions and water quality exceedances within the watershed. Individual sampling loads which plot above the LDC represent violations of the WQS and the allowable load under those flow conditions at those locations. The difference between individual sampling loads plotting above the LDC and the LDC, measured at the same flow, is the amount of reduction necessary to meet WQS.

The strengths of using the LDC method are that critical conditions and seasonal variation are considered in the creation of the FDC by plotting hydrologic conditions over the flows measured during the recreation season. Additionally, the LDC methodology is relatively easy to use and cost-effective. The weaknesses of the LDC method are that nonpoint source allocations cannot be assigned to specific sources, and specific source reductions are not quantified. Overall, MPCA believes, and EPA concurs, that the strengths outweigh the weaknesses for the LDC method.

Implementing the results shown by the LDC requires watershed managers to understand the sources contributing to the water quality impairment and which Best Management Practices (BMPs) may be the most effective for reducing bacteria loads based on flow magnitudes. Different sources will contribute bacteria loads under varying flow conditions. For example, if exceedances are significant during high flow events this would suggest storm events are the cause and implementation efforts can target BMPs that will reduce stormwater runoff and consequently bacteria loading into surface waters. This allows for a more efficient implementation effort.

Bacteria TMDLs for the SRW were calculated by MPCA and those results are found in Tables 7-12 of this Decision Document. The load allocations were calculated after the determination of the WLA, and the Margin of Safety (MOS) (10% of the loading capacity). Load allocations (e.g., stormwater runoff from agricultural land use practices and feedlots, SSTS, wildlife inputs etc.) were not split among individual nonpoint contributors. Instead, load allocations were combined into a categorical LA (‘Watershed Load’) to cover all nonpoint source contributions.

Tables 7-12 of this Decision Document reports five points (the midpoints of the designated flow regime) on the loading capacity curve. However, it should be understood that the components of the TMDL equation could be illustrated for any point on the entire loading capacity curve. The LDC method can be used to display collected bacteria monitoring data and allows for the estimation of load reductions necessary for attainment of the bacteria water quality standard. Using this method, daily loads were developed based upon the flow in the water body. Loading capacities were determined for the segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Tables 7-12 of this Decision Document identifies the loading capacity for the water body at each flow regime. Although there are numeric loads for each flow regime, the LDC is what is being approved for this TMDL.

Tables 7-12: Bacteria (*E. coli*) TMDLs for the Sauk River Watershed are located at the end of this Decision Document

Tables 7-12 of this Decision Document communicates MPCA's estimates of reductions required for streams impaired due to excessive bacteria. Attaining these reduction percentage estimates under the flow conditions which the reductions are prescribed to will allow the impaired segment to meet their water quality targets. These loading reductions (i.e., the percentage column) were estimated from existing and TMDL load calculations. MPCA expects that these reductions will result in the attainment of the water quality targets and the stream segment's water quality will return to a level where the designated uses are no longer considered impaired.

EPA concurs with the data analysis and LDC approach utilized by MPCA in its calculation of loading capacities, wasteload allocations, load allocations and the margin of safety for the SRW bacteria TMDLs. The methods used for determining the TMDL are consistent with EPA technical memos.[3]

SRW Phosphorus TMDLs (streams): The language of the MPCA river eutrophication standard (RES) explains that the RES must be maintained for the long-term summer concentration of TP, when averaged over all flows (Section 2.4.2 of the final TMDL document). MPCA explained that to align with the language of the RES the loading capacity value was based on the seasonal (June 1 to September 30) average of midpoint flows of five equally spaced flow regimes (0% to 20%, 20% to 40%, 40% to 60%, 60% to 80% and 80% to 100%). Selecting the midpoint flow values from these equally spaced flow regimes avoids weighting certain flow regimes more than other flow regimes when calculating the average flow across all flow regimes. The loading capacity was calculated as the average seasonal flow multiplied by the river eutrophication target of 100 µg/L (CRNR) (Section 4.3.1 of the final TMDL document). MPCA notes the three impaired stream reaches are downstream of Knaus Lake, the most downstream impaired lake in the approved Sauk River Chain of Lakes TMDL. Knaus Lake serves as a boundary condition for the Reach 517 phosphorus TMDL. Reach 517 serves as a boundary condition for Reach 520 because Reach 520 is the next downstream impairment from Reach 517. MPCA notes that Pearl Lake, which has an approved TMDL, along with Reach 520 serve as a boundary condition for Reach 501 phosphorus TMDL (Section 4.3.2 of the final TMDL Document). The relationship between the impaired stream reaches and their boundary condition is highlighted in Table 37 of the final TMDL Document and Table 13 of this Decision Document. Under the TMDL scenario, the phosphorus criteria for Knaus Lake is 90 µg/L, which is the approved Knaus Lake site-specific standard, and the phosphorus criteria for Pearl Lake is 40 µg/L, which is the basis for the Pearl Lake TMDL (Section 4.3.1 of the Final TMDL Document).

[3] U.S. Environmental Protection Agency. August 2007. *An Approach for Using Load Duration Curves in the Development of TMDLs*. Office of Water. EPA-841-B-07-006. Washington, D.C.

Table 13: Boundary Conditions in Sauk River Stream Phosphorus TMDLs

Impaired Reach	Boundary Condition	Calculation
Reach 517	Knaus Lake	Median simulated June-Sept flow in Knaus Lake outlet x 90 µg/L
Reach 520	Reach 517	Reach 517 loading capacity
Reach 501	Reach 520 Pearl Lake	Reach 520 loading capacity Median simulated June-Sept flow in Pearl Lake outlet x 40 µg/L

MPCA estimated the allocations for each of the permitted facilities, the MOS set at 10% of the loading capacity, the upstream contributions (if appropriate) and the remainder of the load was attributed to the LA. Load allocations (e.g., stormwater runoff from agricultural land use practices and feedlots, SSTS, wildlife inputs etc.) were not split among individual nonpoint contributors. Instead, load allocations were combined into a categorical LA to cover all nonpoint source contributions.

Tables 14-16: Total Phosphorus (TP) TMDLs for streams of the Sauk River Watershed are located at the end of this Decision Document

EPA supports the data analysis and modeling approach utilized by MPCA in its calculation of wasteload allocations, load allocations and the margin of safety for the SRW TP TMDLs. Additionally, EPA concurs with the loading capacities calculated by the MPCA in these TP TMDLs. EPA finds MPCA's approach for calculating the loading capacity to be reasonable and consistent with EPA guidance.

SRW TSS TMDL: MPCA used the same LDC development strategies as it did for the SRW bacteria TMDLs to calculate the loading capacities for the TSS TMDLs in the SRW. These strategies included incorporating HSPF model simulated flows to develop FDCs and water quality monitoring information collected within the SRW informing the LDC. The FDC were transformed into LDC by multiplying individual flow values by the TSS target (30 mg/L) and then multiplying that value by a conversion factor.

A TSS TMDL was calculated (Table 17 of this Decision Document). The load allocation was calculated after the determination of the WLA, and the MOS. Load allocations (e.g., stormwater runoff from agricultural land use practices) was not split among individual nonpoint contributors. Instead, load allocations were combined into one value to cover all nonpoint source contributions. Table 17 of this Decision Document reports five points (i.e., the midpoints of the designated flow regime) on the loading capacity curve. However, it should be understood that the components of the TMDL equation could be illustrated for any point on the entire loading capacity curve.

The LDC method can be used to display collected TSS monitoring data and allows for the estimation of load reductions necessary for attainment of the TSS water quality standard. Using this method, daily loads were developed based upon the flow in the water body. Loading capacities were determined for each segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Table 17 of this Decision Document identifies the loading capacity for each segment at each flow regime. Although there are numeric loads for each flow regime, the LDC is what is being approved for this TMDL.

Table 17. Sauk River (Adley Creek to Getchell Creek) Reach 505 TSS TMDL summary

<table>
<tr><th colspan="2">07010202-505</th><th colspan="10">TSS TMDL Component by Flow Zone
(tons/day)</th></tr>
<tr><th colspan="2">TMDL Component Name</th><th colspan="2">Very High</th><th colspan="2">High</th><th colspan="2">Mid</th><th colspan="2">Low</th><th colspan="2">Very Low</th></tr>
<tr><td rowspan="7">Wasteload Allocation</td><td>GEM Sanitary District</td><td>0.12</td><td rowspan="7">1.82</td><td>0.12</td><td rowspan="7">1.62</td><td>0.12</td><td rowspan="7">1.56</td><td>0.12</td><td rowspan="7">1.52</td><td>0.12</td><td rowspan="7">1.48</td></tr>
<tr><td>Melrose WWTP</td><td>0.38</td><td>0.38</td><td>0.38</td><td>0.38</td><td>0.38</td></tr>
<tr><td>NuStar-Sauk Centre Terminal</td><td>0.01</td><td>0.01</td><td>0.01</td><td>0.01</td><td>0.01</td></tr>
<tr><td>Osakis WWTP</td><td>0.84</td><td>0.84</td><td>0.84</td><td>0.84</td><td>0.84</td></tr>
<tr><td>Sauk Centre WWTP</td><td>0.11</td><td>0.11</td><td>0.11</td><td>0.11</td><td>0.11</td></tr>
<tr><td>Industrial Stormwater</td><td>0.18</td><td>0.08</td><td>0.05</td><td>0.03</td><td>0.01</td></tr>
<tr><td>Construction Stormwater</td><td>0.18</td><td>0.08</td><td>0.05</td><td>0.03</td><td>0.01</td></tr>
<tr><td colspan="2">Load Allocation</td><td colspan="2">82.27</td><td colspan="2">34.56</td><td colspan="2">20.92</td><td colspan="2">14.28</td><td colspan="2">4.97</td></tr>
<tr><td colspan="2">Margin of Safety</td><td colspan="2">9.34</td><td colspan="2">4.02</td><td colspan="2">2.50</td><td colspan="2">1.76</td><td colspan="2">0.72</td></tr>
<tr><td colspan="2">Loading Capacity</td><td colspan="2">93.43</td><td colspan="2">40.20</td><td colspan="2">24.98</td><td colspan="2">17.56</td><td colspan="2">7.17</td></tr>
<tr><td colspan="2">Current Load</td><td colspan="2">52.95</td><td colspan="2">58.95</td><td colspan="2">33.30</td><td colspan="2">12.29</td><td colspan="2">3.35</td></tr>
<tr><td colspan="2">Current Load Exceedance of Loading Capacity (%)</td><td colspan="2">0%</td><td colspan="2">32%</td><td colspan="2">25%</td><td colspan="2">0%</td><td colspan="2">0%</td></tr>
</table>

MPCA estimated load reductions needed for the TSS TMDL to attain the TSS water quality target of 30 mg/L. These loading reductions (i.e., the percentage column) were estimated from existing and TMDL load calculations. MPCA expects that these reductions will result in the attainment of the water quality targets and that water quality will return to a level where the designated uses are no longer considered impaired.

EPA supports the data analysis and modeling approach utilized by MPCA in its calculation of wasteload allocations, load allocations and the margin of safety for the TSS TMDLs. Additionally, EPA concurs with the loading capacities calculated by the MPCA in the TSS TMDL. EPA finds MPCA's approach for calculating the loading capacity for the TSS TMDL to be reasonable and consistent with EPA guidance.

The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of the third criterion.

SRW Phosphorus TMDLs (lakes): MPCA used the U.S. Army Corps of Engineers (USACE) BATHTUB model to calculate the loading capacities for the SRW lake phosphorus TMDLs (Section 4.5.1 of the final TMDL document). The BATHTUB model was utilized to link observed phosphorus water quality conditions and estimated phosphorus loads to in-lake water quality estimates. MPCA has previously employed BATHTUB successfully in many lake studies in Minnesota. BATHTUB is a steady-state annual or seasonal model that predicts a lake's growing season (June 1 to September 30) average surface water quality. BATHTUB utilizes annual or seasonal timescales which are appropriate because watershed TP loads are normally impacted by seasonal conditions.

BATHTUB has built-in statistical calculations which account for data variability and provide a means for estimating confidence in model predictions. BATHTUB employs a mass-balance TP model that accounts for water and TP inputs from tributaries, direct watershed runoff, the atmosphere, and sources internal to the lake, and outputs through the lake outlet, water loss via evaporation, and TP sedimentation and retention in the lake sediments. BATHTUB provides flexibility to tailor model inputs to specific lake morphometry, watershed characteristics and watershed inputs. The BATHTUB model also allows MPCA to assess different impacts of changes in nutrient loading. BATHTUB allows the user the choice of several different mass-balance TP models for estimating loading capacity.

The BATHTUB modeling efforts were used to calculate the loading capacity for each lake. The loading capacity is the maximum phosphorus load which each of these water bodies can receive over an annual period and still meet the shallow and general lake nutrient WQS (Tables 18-20 of this Decision Document). Loading capacities on the annual scale (pounds per year (lbs/year)) were calculated by MPCA to meet the WQS during the growing season (June 1 through September 30). The time period of June to September was chosen by MPCA as the growing season because it corresponds to the eutrophication criteria, contains the months that the general public typically uses lakes in the SRW for aquatic recreation, and is the time of the year when water quality is likely to be impaired by excessive nutrient loading. Loading capacities were divided by 365 to calculate the daily loading capacities.

MPCA subdivided the loading capacity among the WLA, LA, and MOS components of the TMDL (Tables 18-20 of this Decision Document). These calculations were based on the critical condition, the summer growing season, which is typically when the water quality in each lake is typically degraded, and phosphorus loading inputs are the greatest. TMDL allocations assigned during the summer growing season will protect the SRW lakes during the worst water quality conditions of the year. MPCA assumed that the loading capacities established by the TMDL will be protective of water quality during the remainder of the calendar year (October through May).

Tables 18-20: Total phosphorus TMDLs for lakes in the Sauk River Watershed are located at the end of this Decision Document

Tables 18-20 of this Decision Document communicate MPCA's estimates of the reductions required for the lakes of the SRW to meet their water quality targets. These loading reductions (i.e., the percentage column) were estimated from existing and TMDL load calculations. MPCA expects that these reductions will result in the attainment of the water quality targets and the lake water quality will return to a level where the designated uses are no longer considered impaired.

EPA supports the data analysis and modeling approach utilized by MPCA in its calculation of wasteload allocations, load allocations and the margin of safety for the SRW TP TMDLs. Additionally, EPA concurs with the loading capacities calculated by the MPCA in these TP TMDLs. EPA finds MPCA's approach for calculating the loading capacity to be reasonable and consistent with EPA guidance.

4. Load Allocations (LA)

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:
MPCA determined the LA calculations for each of the TMDLs based on the applicable WQS. MPCA recognized that LAs for each of the individual TMDLs addressed by the SRW TMDLs can be attributed to different nonpoint sources.

SRW Bacteria TMDLs: The calculated LA values for the bacteria TMDLs are applicable across all flow conditions in the SRW (Tables 7-12 of this Decision Document). MPCA identified several nonpoint sources which contribute bacteria loads to the surface waters of the SRW, including non-regulated urban stormwater runoff, stormwater from non-regulated agricultural and feedlot areas, failing septic systems, wildlife (e.g., deer, geese, ducks, raccoons, turkeys, and other animals) and bacteria contributions from upstream subwatersheds. MPCA did not determine individual load allocation values for each of these potential nonpoint source considerations but aggregated the nonpoint sources into one 'watershed load' LA calculation (Tables 7-12 of this Decision Document).

SRW Phosphorus TMDLs (streams and lakes): MPCA identified several nonpoint sources which contribute nutrient loading to the stream segments of the SRW (Tables 14-16 of this Decision Document) and lakes (Tables 18-20 of this Decision Document). These nonpoint sources included: watershed contributions from each stream or lakes' direct watershed, watershed contributions from upstream watersheds, non-regulated urban (i.e., non-MS4) stormwater runoff, internal loading, and atmospheric deposition. For both stream phosphorus TMDLs and lake phosphorus TMDLs, MPCA did not determine individual load allocation values for each of these potential nonpoint source considerations but aggregated the nonpoint sources into one LA calculation.

SRW TSS TMDL: The calculated LA values for the TSS TMDL are applicable across all flow conditions. MPCA identified several nonpoint sources which contribute TSS loads to the surface waters in the SRW (Table 17 of the Decision Document). Load allocations were recognized as originating from many diverse nonpoint sources including stormwater contributions from agricultural lands, stream channelization and streambank erosion, wetland and forest sources, and atmospheric deposition. MPCA did not determine individual load allocation values for each of these potential nonpoint source considerations but aggregated the nonpoint sources into one "watershed load" LA calculation (Table 17 of this Decision Document).

EPA finds MPCA's approach for calculating the LA for bacteria, phosphorus and TSS to be reasonable.

The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of the fourth criterion.

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 permittees 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:

SRW Bacteria TMDLs: MPCA identified NPDES permitted facilities (Table 3 of this Decision Document) within the SRW and assigned those facilities a portion of the WLA (Tables 7-12 of this Decision Document). WLAs for continuous flow facilities (Table 30 of the final TMDL document) were calculated based on the facility's maximum allowable discharge and permitted concentration limits. MPCA explained that the WLA for each individual WWTP was calculated based on the *E. coli* WQS, but WWTP permits are regulated for the fecal coliform WQS (200 orgs /100 mL) and that if a facility is meeting its fecal coliform limits, which are set in the facility's discharge permit, MPCA assumes the facility is also meeting the calculated *E. coli* WLA from the SRW TMDLs. The WLA was therefore calculated using the assumption that the *E. coli* standard of 126 orgs/100 mL provides equivalent protection from illness due to primary contact recreation as the fecal coliform WQS of 200 orgs/100 mL.

MPCA has identified CAFOs in the SRW (Section 3.9.1.1 and Figures D-6 and D-7 in Appendix D of the final TMDL document). As explained by MPCA, CAFO production areas must be designed to contain all manure, and direct precipitation and manure-contaminated runoff from precipitation events up to the 25-year, 24-hour storm event. In the event of a discharge, the discharge cannot cause or contribute to a violation of a WQS (Minnesota Rule 7020.2003). MPCA noted that any precipitation-caused runoff from the land application of manure at agronomic rates is not considered a point source discharge and is accounted for in the LA of the TMDL. MPCA explained that these facilities are not designed to discharge effluent and therefore were not assigned a portion of the WLA (WLA = 0).

EPA finds the MPCA's approach for calculating the WLAs for the SRW bacteria TMDLs to be reasonable and consistent with EPA guidance.

SRW Phosphorus TMDLs (streams): MPCA identified five NPDES permitted facilities in the contributing watersheds for the SRW stream phosphorus TMDLs and assigned those facilities a portion of the WLA (Tables 14-16 of this Decision Document). The MPCA developed a Total Phosphorus Effluent Limit Review: Lower Sauk River Watershed (MPCA 2014) to determine the necessary TP WLAs and water quality based effluent limits (WQBELs) for wastewater treatment facilities discharging in the SRW (Section 4.3.4 of the SRW final TMDL document).

The WLA for construction stormwater was calculated based on the average percent area (0.22%) of the SRW which was covered under a NPDES/SDS (State Disposal System) Construction Stormwater General Permit during the previous five years (Section 4.3.4 of the final TMDL document). The construction and industrial stormwater WLAs were calculated as the percent area (0.22%) multiplied by the loading capacity.

Attaining the construction stormwater and industrial stormwater loads described in the SRW phosphorus TMDLs is the responsibility of construction and industrial site managers. For example, for the Sauk River (Knaus Lake to Cold Spring Dam) Reach 517 phosphorus TMDL, local permittees are responsible for overseeing that construction and/or industrial stormwater loads which impact water quality in Sauk River (Knaus Lake to Cold Spring Dam) Reach 517 do not exceed the WLA assigned to those areas. Local MS4 permittees are required to have a construction stormwater ordinance at least as stringent as the State's NPDES/SDS General Stormwater Permit for Construction Activity (MNR100001). In the final TMDL document MPCA explained that if a construction site owner/operator obtains coverage under the NPDES/SDS General Stormwater Permit (MNR100001) and properly selects, installs and maintains all BMPs required under MNR100001 and applicable local construction stormwater ordinances, including those related to impaired waters discharges and any applicable additional requirements found in Appendix A of the Construction General Permit, the stormwater discharges would be expected to be consistent with the WLA in this TMDL. BMPs and other stormwater control measures which act to limit the discharge of the pollutant of concern (phosphorus) are defined in MNR100001.

The MPCA is responsible for overseeing industrial stormwater loads which impact water quality to lakes and stream segments in the SRW. Industrial sites within lake subwatersheds are expected to comply with the requirements of the State's NPDES/SDS Industrial Stormwater Multi-Sector General Permit (MNR050000) or NPDES/SDS General Permit for Construction Sand & Gravel, Rock Quarrying and Hot Mix Asphalt Production facilities (MNG490000). MPCA explained that if a facility owner/operator obtains coverage under the appropriate NPDES/SDS General Stormwater Permit and properly selects, installs and maintains all BMPs required under the permit, the stormwater discharges would be expected to be consistent with the WLA in this TMDL. BMPs and other stormwater control measures which act to limit the discharge of the pollutant of concern (phosphorus) are defined in MNR050000 and MNG490000.

The NPDES program requires construction and industrial sites to create SWPPPs which summarize how stormwater pollutant discharges will be minimized from construction and industrial sites. Under the MPCA's Stormwater General Permit (MNR100001) and applicable local construction stormwater ordinances, managers of sites under construction or industrial stormwater permits must review the adequacy of local SWPPPs to ensure that each plan complies with the applicable requirements in the State permits and local ordinances. As noted above, MPCA has explained that meeting the terms of the applicable permits will be consistent with the WLAs set in the SRW phosphorus TMDLs. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified within 18-months of the approval of the TMDL by the EPA. This applies to sites under permits for MNR100001, MNR050000 and MNG490000.

MS4 allocations are based on the percent of the MS4 area in the watershed below the boundary condition. MPCA notes that MS4s make up 44% of the area contributing to the Sauk River Reach 501 below the upstream boundary condition. To calculate the total MS4 WLA, MPCA multiplied the contributing MS4 area fraction (0.44) by the total load allocated to watershed runoff. The total load allocated to watershed runoff was calculated by using the watershed runoff concentration of 207 µg/L and the HSPF-simulated flow at the outlet minus the boundary condition flows and the point-source flows (Section 4.3.4 of the final TMDL document). To calculate individual MS4 WLAs, the total MS4 WLA was multiplied by the individual MS4 area percentages (Table 39 of the final TMDL document). These MS4 allocations are also found in Tables 14-16 of this Decision Document.

SRW TSS TMDL: MPCA identified five NPDES facilities in the contributing watersheds for SRW. The TSS WLAs for the SRW were calculated based on existing permit calendar month average loading limits (Table 43 of the final TMDL document). MPCA states that the existing permit limits are consistent with TSS WLA assumptions. Individual WLAs were calculated by MPCA for each of these individual facilities based on the information in the facilities NPDES permit:

- **Load Limit:** When a permit defined a calendar monthly average TSS load limit, that limit was used as the basis of the WLA.
- **Design flow and concentration limits:** When a permit did not define a TSS load limit but did define one or more design flows and TSS concentration limits, the WLA was calculated by MPCA using a design flow and the concentration limit. If an average wet weather design flow was defined, it was used to calculate the WLA; if the average wet weather design flow was not defined, then the maximum design flow was used to calculate the WLA. If a monthly average TSS concentration limit was defined, then that limit was used to calculate the WLA; if only a daily maximum concentration limit was defined, then that limit was used to calculate the WLA.
- **No design flow and concentration limits:** If a permit did not define a design flow, the WLA was calculated using an estimated design flow and the TSS concentration limit of 30 mg/L. The design flow was estimated as the average reported flows for similar sites in the vicinity of the project area.

Similar to the phosphorus stream TMDLs, MPCA calculated a portion of the WLA for construction and industrial stormwater for the TSS TMDL. This WLA was represented as a categorical WLA for construction and industrial stormwater. The construction and industrial stormwater allocations for the SRW TSS TMDLs were calculated in the same manner as the construction and industrial stormwater allocations for the SRW phosphorus stream TMDLs (i.e., see calculative method in ***Section 5 – SRW phosphorus TMDLs (streams)***, within this Decision Document). The average annual (median value from 2016-2020) area that is permitted through construction permits was calculated by MPCA to be 0.22% (Section 4.4.3 of the final TMDL document).

MPCA's expectations and responsibilities for overseeing construction and industrial stormwater loads for the phosphorus TMDLs are the same for the TSS TMDL. Construction and industrial sites are expected to create SWPPPs which summarize how stormwater pollutant discharges will be minimized from construction and industrial sites. Under the MPCA's Stormwater General Permit (MNR100001) and applicable local construction stormwater ordinances, managers of sites under construction or industrial stormwater permits must review the adequacy of local SWPPPs to ensure that each plan complies with the applicable requirements in the State permits and local ordinances. As noted above, MPCA has explained that meeting the terms of the applicable permits will be consistent with the WLAs set in the TSS TMDLs for SRW. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified within 18-months of the approval of the TMDL by the EPA. This applies to sites under permits for MNR100001, MNR050000 and MNG490000.

EPA finds the MPCA's approach for calculating the WLA for the SRW TSS TMDL to be reasonable and consistent with EPA guidance.

SRW Phosphorus TMDLs (lakes): MPCA identified construction and industrial stormwater contributions as necessitating a WLA (Tables 18-20 of this Decision Document). Similar to the phosphorus stream TMDLs, MPCA calculated a portion of the WLA for construction and industrial stormwater for the phosphorus (lakes) TMDL. This WLA was represented as a categorical WLA for construction and industrial stormwater. The construction and industrial stormwater allocations for the SRW phosphorus (lakes) TMDLs were calculated in the same manner as the construction and industrial stormwater allocations for the SRW phosphorus TMDLs (streams) (i.e., see calculative method in ***Section 5 – SRW phosphorus TMDLs (streams)***, within this Decision Document).

EPA finds the MPCA's approach for calculating the WLA for the SRW phosphorus TMDLs to be reasonable and consistent with EPA guidance.

The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of the fifth criterion.

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:
The final TMDL submittal outlines the determination of the Margin of Safety for the bacteria, phosphorus, and TSS TMDLs.

SRW Bacteria, Phosphorus, and TSS TMDLs: The SRW bacteria, phosphorus (stream and lake), and TSS TMDLs incorporated a 10% explicit MOS applied to the total loading capacity calculation for each flow regime of the LDC. Ten percent of the total loading capacity was reserved for MOS with the remaining load allocated to point and nonpoint sources (Tables 7-12 and 14-20 of this Decision Document). MPCA explained in Section 4 of the final TMDL document that the explicit MOS was set at 10% due to the following factors discovered during TMDL development for these pollutants:

- Uncertainty in simulated flow data from the HSPF model;
- Environmental variability in pollutant loading and water quality data (i.e., collected water quality monitoring data, field sampling error, etc.);
- Uncertainty with regrowth, die-off, and natural background levels of *E. coli;*
- Uncertainty in observed daily flow records;
- Calibration and validation processes of the LDC/BATHTUB modeling efforts, uncertainty in modeling outputs, and conservative assumptions made during the modeling efforts; and
- MPCA's confidence in the BATHTUB model's performance during the development of TP TMDLs.

The MOS for the SRW bacteria TMDLs also incorporated certain conservative assumptions in the calculation of the TMDLs. No rate of decay, or die-off rate of pathogen species, was used in the TMDL calculations or in the creation of load duration curves for *E. coli*. Bacteria have a limited capability of surviving outside their hosts, and normally a rate of decay would be incorporated. MPCA determined that it was more conservative to use the WQS (126 orgs/100 mL) and not to apply a rate of decay, which could result in a discharge limit greater than the WQS.

As stated in *EPA's Protocol for Developing Pathogen TMDLs* (EPA 841-R-00-002), many different factors affect the survival of pathogens, including the physical condition of the water. These factors include, but are not limited to sunlight, temperature, salinity, and nutrient deficiencies. These factors vary depending on the environmental condition/circumstances of the water, and therefore it would be difficult to assert that the rate of decay caused by any given combination of these environmental variables was sufficient to meet the WQS of 126 orgs/100 mL (or 630 orgs/100mL). Thus, it is more conservative to apply the State's WQS as the bacteria target value because this standard must be met at all times under all environmental conditions.

The EPA finds that the TMDL document submitted by MPCA contains an appropriate MOS satisfying the requirements of the sixth criterion.

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:

SRW Bacteria TMDLs: In Section 4.2.6 of the final TMDL document, MPCA explained that bacterial loads vary by season, typically reaching higher numbers in the dry summer months when low flows and bacterial growth rates contribute to their abundance and reaching relatively lower values in colder months when bacterial growth rates attenuate and loading events, driven by stormwater runoff events aren't as frequent. Bacterial WQS need to be met between April 1st to October 31st, regardless of the flow condition. The development of the LDCs utilized simulated flow data which were validated and calibrated with local flow gage data. Modeled flow measurements represented a variety of flow conditions from the recreation season. LDCs developed from these modeled flow conditions represented a range of flow conditions within the SRW and thereby accounted for seasonal variability over the recreation season.

Critical conditions for *E. coli* loading occur in the dry summer months. This is typically when stream flows are lowest, and bacterial growth rates can be high. By meeting the water quality targets during the summer months, it can reasonably be assumed that the loading capacity values will be protective of water quality during the remainder of the calendar year (November through March).

SRW Phosphorus TMDLs: Seasonal variation was considered for the SRW phosphorus TMDLs (both streams and lakes) as described in Section 4.3.6 and 4.5.6, respectively, of the final TMDL document. The nutrient targets employed in the SRW phosphorus TMDLs were based on the average nutrient values collected during the growing season (June 1 to September 30). The water quality targets were designed to meet the CRNR eutrophication WQS for streams and NCHF Ecoregion eutrophication WQS for lakes during the period of the year where the frequency and severity of algal growth is the greatest.

The Minnesota eutrophication standards state that total phosphorus WQS are defined as the mean concentration of phosphorus values measured during the growing season. In the SRW phosphorus TMDL efforts, the LA and WLA estimates were calculated from modeling efforts which incorporated mean growing season total phosphorus values. Nutrient loading capacities were set in the TMDL development process to meet the WQS during the most critical period. The mid to late summer period is typically when eutrophication standards are exceeded and water quality within the SRW is deficient. By calibrating the modeling efforts to protect these water bodies during the worst water quality conditions of the year, it is assumed that the loading capacities established by the TMDLs will be protective of water quality during the remainder of the calendar year (October through May).

SRW TSS TMDL: In Section 4.4.5 of the final TMDL document, MPCA explained that the TSS WQS applies from April 1 to September 30 which is also the time period when high concentrations of sediment are expected in the surface waters of the SRW. Sediment loading in the SRW varies depending on surface water flow, land cover and climate/season. Spring is typically associated with large flows from snowmelt, the summer is associated with the growing season as well as periodic storm events and receding streamflows, and the fall brings increasing precipitation and rapidly changing agricultural landscapes. In all seasons, sediment inputs to surface waters typically occur primarily through wet weather events. Critical conditions that impact the response of SRW water bodies to sediment inputs may typically occur during periods of low flow. During low flow periods, sediment can accumulate within the impacted water bodies, there is less assimilative capacity within the water body, and generally sediment is not transported through the water body at the same rate it is under normal flow conditions.

Critical conditions that impact loading, or the rate that sediment is delivered to the water body, were identified as those periods where large precipitation events coincide with periods of minimal vegetative cover on fields. Large precipitation events and minimally covered land surfaces can lead to large runoff volumes, especially to those areas which drain agricultural fields. The conditions generally occur in the spring and early summer seasons.

The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of the seventh criterion.

8. Reasonable Assurance

When a TMDL is developed for waters impaired by point sources only, the issuance of a 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.

Comment:
The SRW bacteria, phosphorus, and TSS TMDLs provide reasonable assurance that actions identified in the implementation section of the final TMDL (i.e., Sections 6 and 8 of the final TMDL document), will be applied to attain the loading capacities and allocations calculated for the impaired reaches within the SRW. The recommendations made by MPCA will be successful at improving water quality if the appropriate local groups work to implement these recommendations. Those mitigation suggestions will require commitment from state agencies and local stakeholders to carry out the suggested actions.

MPCA has identified several local partners which have expressed interest in working to improve water quality within the SRW. Implementation practices will be implemented over the next several years. It is anticipated that staff from Soil and Water Conservation District (SWCDs) (e.g., the Stearns County SWCD) staff, local Minnesota Board of Soil and Water Resources (BWSR) offices, lake associations and watershed districts (e.g., Sauk River Watershed District (SRWD) and other local watershed groups, will work together to reduce pollutant inputs to the SRW. MPCA has authored an update to the Sauk River WRAPS document (May 2023) which provides information on the development of scientifically supported restoration and protection strategies for implementation planning and action. MPCA sees the WRAPS document as a starting point for which MPCA and local partners can develop tools that will help local governments, landowners, and special interest groups determine (1) the best strategies for making improvements and protecting resources that are already in good condition, and (2) focus those strategies within the best places to do work.

County SWCDs, such as the Stearns County SWCD, have a history of implementation efforts in the SRW. The Stearns County SWCD continues to apply conservation practices in areas in the SRW and provide educational opportunities to local landowners in order to achieve sound management of natural resources (https://www.stearnscountyswcd.net/). The SWCD employs various programming, such as shoreline restoration projects, native planting, water quality assessments, cover crop assistance, agricultural resource management, and other technical services to ensure that efforts are made to improve water quality and conserve water resources in the SRW. Most notably, Stearns County SWCD recently partnered with private landowners, DNR, and BSWR to complete two Cedar Island Lake Shoreland Stabilization projects. These two projects, completed in 2009 and 2015, are expected to remove over 550 lbs/year of phosphorus and 480 tons/year of sediment.

Continued water quality monitoring within the basin is supported by MPCA. Additional water quality monitoring results could provide insight into the success or failure of BMP systems designed to reduce bacteria, nutrient and sediment loading into the surface waters of the watershed. Local watershed managers would be able to reflect on the progress of the various pollutant removal strategies and would have the opportunity to change course if observed progress is unsatisfactory.

The MPCA regulates the collection, transportation, storage, processing and disposal of animal manure and other livestock operation wastes at State registered animal feeding operation (AFO) facilities. The MPCA Feedlot Program implements rules governing these activities and provides assistance to counties and the livestock industry. The feedlot rules apply to most aspects of livestock waste management including the location, design, construction, operation and management of feedlots and manure handling facilities.

Reasonable assurance that the WLA set forth will be implemented is provided by regulatory actions. According to 40 C.F.R. § 122.44(d)(1)(vii)(B), NPDES permit effluent limits must be consistent with assumptions and requirements of all WLAs in an approved TMDL. MPCA's stormwater program and the NPDES permit program are the implementing programs for ensuring WLA are consistent with the TMDL. The NPDES program requires construction and industrial sites to create SWPPPs which summarize how stormwater will be minimized from construction and industrial sites. Under the MPCA's Stormwater General Permit, managers of sites under construction or industrial stormwater permits must review the adequacy of local SWPPPs to ensure that each plan meets WLA set in the SRW TMDLs. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified. This applies to sites under the MPCA's General Stormwater Permit for Construction Activity (MNR100001) and its NPDES/SDS Industrial Stormwater Multi-Sector General Permit (MNR050000) or NPDES/SDS General Permit for Construction Sand & Gravel, Rock Quarrying and Hot Mix Asphalt Production facilities (MNG490000).

MPCA is responsible for applying federal and state regulations to protect and enhance water quality within the TMDL study area. MPCA oversees all regulated MS4 entities (e.g., St. Joseph City) in stormwater management accounting activities. MS4 permits require permittees to implement BMPs to reduce pollutants in stormwater runoff to the Maximum Extent Practicable.

All regulated MS4 communities are required to satisfy the requirements of the MS4 general permit which requires the permittee to develop a SWPPP which addresses all permit requirements, including the following six minimum control measures:

- Public education and outreach;
- Public participation;
- Illicit Discharge Detection and Elimination Program;
- Construction-site runoff controls;
- Post-construction runoff controls; and

- Pollution prevention and municipal good housekeeping measures.

The MS4 General Permit requires permittees to develop compliance schedules for any TMDL that received EPA-approval prior to the effective date of the General Permit. This schedule must identify BMPs that will be implemented over the five-year permit term, timelines for their implementation, an assessment of progress, and a long-term strategy for continued progress toward ultimately achieving those WLAs.

MPCA requires MS4 applicants to submit their application materials and SWPPP documentation to MPCA for review. Prior to extension of coverage under the general permit, all application materials are placed on 30-day public notice by the MPCA, to ensure adequate opportunity for the public to comment on each permittee's stormwater management program. Upon extension of coverage by the MPCA, the permittees are to implement the activities described within their SWPPP and submit annual reports to MPCA by June 30 of each year. These reports document the implementation activities which have been completed within the previous year, analyze implementation activities already undertaken, and outline any changes within the SWPPP from the previous year.

Various funding mechanisms will be utilized to execute the recommendations made in the implementation section of this TMDL. Some examples of funding sources include BWSR's Watershed-based Implementation Funding, Clean Water Fund Competitive Grants (e.g., Projects and Practices), and conservation funds from Natural Resources Conservation Service (e.g., Environmental Quality Incentives Program and Conservation Stewardship Program). According to MPCA, over $126,000,000 has been spent on watershed implementation projects in the SRW from 2004-2021 (Figure 42 in the Final TMDL Document).

The Clean Water Legacy Act (CWLA) was passed in Minnesota in 2006 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 provides 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). 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 actions. MPCA has developed guidance on what is required in the WRAPS (*Watershed Restoration and Protection Strategy Report Template*, MPCA).

The Minnesota Board of Soil and Water Resources administers the Clean Water Fund as well and has developed a detailed grants policy explaining what is required to be eligible to receive Clean Water Fund money (*http://bwsr.state.mn.us/cwf_programs*).

The 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:
The final TMDL document outlines the water monitoring efforts in the SRW (Section 7 of the final TMDL document). Progress of TMDL implementation will be measured through regular monitoring efforts of water quality and total BMPs completed. MPCA anticipates that monitoring will be completed by local groups including, but not limited to, the SRWD, DNR, MPCA, and local SWCDs, and local volunteers (through the Volunteer Lake and Stream Monitoring Program), as long as there is sufficient funding to support the efforts of these local entities. Monitoring is an ongoing effort, and work is anticipated to continue further, in the SRW.

The SRWD currently maintains an annual water quality monitoring program that collects data from multiple locations through the SRW. This annual data can be utilized to set benchmarks against which water quality progress can be measured throughout the implementation of this TMDL and to aid in adaptive management strategies. Details of this monitoring strategy are outlined in the SRW Wraps Report (May 2023). In addition to the SRWD monitoring strategy, MPCA plans to repeat monitoring within the SRW every ten years.

Water quality monitoring is a critical component of the adaptive management strategy employed as part of the implementation efforts utilized in the SRW. Water quality information will aid watershed managers in understanding how BMP pollutant removal efforts are impacting water quality. Water quality monitoring combined with an annual review of BMP efficiency will provide information on the success or failure of BMP systems designed to reduce pollutant loading into water bodies of the SRW. Watershed managers will have the opportunity to reflect on the progress or lack of progress and will have the opportunity to change course if progress is unsatisfactory. Review of BMP efficiency is expected to be completed by the local and county partners.

The 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:

The findings from the SRW TMDLs will be used to inform the selection of implementation activities as part of the Sauk River WRAPS process. The purpose of the WRAPS report is to support local working groups and jointly develop scientifically supported restoration and protection strategies to be used for subsequent implementation planning.

The TMDL outlined some implementation strategies in Section 8 of the final TMDL document. MPCA outlined the importance of prioritizing areas within the SRW, education and outreach efforts with local partners, and partnering with local stakeholders to improve water quality within the watershed. The SRW WRAPS document (May 2023) includes additional detail regarding specific recommendations from MPCA to aid in the reduction of bacteria, nutrients and TSS to surface waters of the SRW. Additionally, MPCA referenced the Statewide Nutrient Reduction Strategy (https://www.pca.state.mn.us/water/nutrient-reduction-strategy) for focused implementation efforts targeting phosphorus nonpoint sources in SRW. The reduction goals for the bacteria, nutrient and TSS TMDLs may be met via components of the following strategies:

SRW Bacteria TMDLs:

Pasture management/livestock exclusion plans: Reducing livestock access to stream environments will lower the opportunity for direct transport of bacteria to surface waters. The installation of exclusion fencing near stream and river environments to prevent direct access for livestock, installing alternative water supplies, and installing stream crossings between pastures, would work to reduce the influxes of bacteria and improve water quality within the watershed. Additionally, introducing rotational grazing to increase grass coverage in pastures, and maintaining appropriate numbers of livestock per acre for grazing, can also aid in the reduction of bacteria inputs.

Manure Collection and Storage Practices: Manure has been identified as a source of bacteria. Bacteria can be transported to surface water bodies via stormwater runoff. Bacteria laden water can also leach into groundwater resources. Improved strategies for the collection, storage and management of manure can minimize impacts of bacteria entering the surface and groundwater system. Repairing manure storage facilities or building roofs over manure storage areas may decrease the amount of bacteria in stormwater runoff.

Manure management plans: Developing manure management plans can ensure that the storage and application rates of manure are appropriate for land conditions. Determining application rates that consider the crop to be grown on that particular field and soil type will ensure that the correct amount of manure is spread on a field given the conditions. Spreading the correct amount of manure will reduce the availability of bacteria to migrate to surface waters.

Feedlot runoff controls: Treatment of feedlot runoff via diversion structures, holding/storage areas, and stream buffering areas can all reduce the transmission of bacteria to surface water environments. Additionally, cleaner stormwater runoff can be diverted away from feedlots so as to not liberate bacteria.

Subsurface septic treatment systems: Improvements to septic management programs and educational opportunities can reduce the occurrence of septic pollution. Educating the public on proper septic maintenance, finding and eliminating illicit discharges and repairing failing systems could lessen the impacts of septic derived bacteria inputs into the SRW.

Stormwater wetland treatment systems: Constructed wetlands with the purpose of treating wastewater or stormwater inputs could be explored in selected areas of the SRW. Constructed wetland systems may be vegetated, open water, or a combination of vegetated and open water. MPCA explained that recent studies have found that the more effective constructed wetland designs employ large treatment volumes in proportion to the contributing drainage area, have open water areas between vegetated areas, have long flow paths and a resulting longer detention time, and are designed to allow few overflow events.

Riparian Area Management Practices: Protection of streambanks within the watershed through planting of vegetated/buffer areas with grasses, legumes, shrubs, or trees will mitigate bacteria inputs into surface waters. These areas will filter stormwater runoff before the runoff enters the main stem or tributaries of the SRW.

Bioinfiltration of stormwater: Biofiltration practices rely on the transport of stormwater and watershed runoff through a medium such as sand, compost, or soil. This process allows the medium to filter out sediment and therefore sediment-associated bacteria. Biofiltration/bioretention systems, are vegetated and are expected to be most effective when sized to limit overflows and designed to provide the longest flow path from inlet to outlet.

SRW Phosphorus TMDLs:

Septic Field Maintenance: Septic systems are believed to be a source of nutrients to waters in the SRW. Failing systems are expected to be identified and addressed via upgrades to those SSTS not meeting septic ordinances. MPCA explained that SSTS improvement priority should be given to those failing SSTS on lakeshore properties or those SSTS adjacent to streams within the direct watersheds for each water body. MPCA aims to greatly reduce the number of failing SSTS in the future via local septic management programs and educational opportunities. Educating the public on proper septic maintenance, finding, and eliminating illicit discharges, and repairing failing systems could lessen the impacts of septic derived nutrients inputs into the SRW.

Manure management (feedlot and manure stockpile runoff controls): Manure has been identified as a potential source of nutrients in the SRW. Nutrients derived from manure can be transported to surface water bodies via stormwater runoff. Nutrient laden water can also leach into groundwater resources. Improved strategies in the collection, storage and management of manure can minimize impacts of nutrients entering the surface and groundwater system. Repairing manure storage facilities or building roofs over manure storage areas may decrease the amount of nutrients in stormwater runoff.

Pasture management and agricultural reduction strategies: These strategies involve reducing nutrient transport from fields and minimizing soil loss. Specific practices would include erosion control through conservation tillage, reduction of winter spreading of fertilizers, elimination of fertilizer spreading near open inlets and sensitive areas, installation of stream and lake shore buffer strips, streambank stabilization practices (gully stabilization and installation of fencing near streams), and nutrient management planning.

Urban/Residential Nutrient Reduction Strategies: These strategies involve reducing stormwater runoff from lakeshore homes and other residences within the SRW. These practices would include rain gardens, lawn fertilizer reduction, lake shore buffer strips, vegetation management and replacement of failing septic systems. Water quality educational programs could also be utilized to inform the public on nutrient reduction efforts and their impact on water quality.

Municipal activities: Municipal programs, such as street sweeping, can also aid in the reduction of nutrients to surface water bodies within the SRW. Municipal partners can team with local watershed groups or water district partners to assess how best to utilize their monetary resources for installing new stormwater BMPs (e.g., vegetated swales) or retrofitting existing stormwater BMPs.

Internal Loading Reduction Strategies: Internal nutrient loads may be addressed to meet the TMDL allocations outlined in the SRW phosphorus TMDLs. MPCA recommends that before any strategy is put into action, an intensive technical review, to evaluate the costs and feasibility of internal load reduction options be completed. Several options should be considered to manage internal load inputs to each of the water bodies addressed in this TMDL.

- *Management of fish populations:* Monitor and manage fish populations to maintain healthy game fish populations and reduce rough fish (i.e., carp, bullheads, fathead minnows) populations.
- *Vegetation management:* Improved management of in-lake vegetation in order to limit phosphorus loading and to increase water clarity. Controlling the vitality of curly-leaf pondweeds via chemical treatments (herbicide applications) will reduce one of the significant sources of internal loading, the senescence of curly-leaf plants in the summer months.
- *Chemical treatment:* The addition of chemical reactants (e.g., aluminum sulfate) to lakes of the SRW in order for those reactants to permanently bind phosphorus into the lake bottom sediments. This effort could decrease phosphorus releases from sediment into the lake water column during anoxic conditions.

SRW TSS TMDL:

Improved Agricultural Drainage Practices: A review of local agricultural drainage networks should be completed to examine how improving drainage ditches and drainage channels could be reorganized to reduce the influx of TSS to the surface waters in the SRW. The reorganization of the drainage network could include the installation of drainage ditches or sediment traps to encourage particle settling during high flow events. Additionally, cover cropping, and residue management is recommended to reduce erosion and thus siltation and runoff into streams.

Reducing Livestock Access to Stream Environments: Livestock managers should be encouraged to implement measures to protect riparian areas. Managers should install exclusion fencing near stream environments to prevent direct access to these areas by livestock. Additionally, installing alternative watering locations and stream crossings between pastures may aid in reducing sediments to surface waters.

Identification of Stream, River, and Lakeshore Erosional Areas: An assessment of stream channel, river channel, and lakeshore erosional areas should be completed to evaluate areas where erosion control strategies could be implemented in the SRW. Implementation actions (e.g., planting deep-rooted vegetation near water bodies to stabilize streambanks) could be prioritized to target areas which are actively eroding. This strategy could prevent additional sediment inputs into surface waters of the SRW and minimize or eliminate degradation of habitat.

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

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:

The public participation section of the TMDL submittal is found in Section 9 of the final TMDL document. Throughout the development of the SRW TMDLs the public was given various opportunities to participate. As part of the strategy to communicate the goals of the TMDL project and to engage with members of the public, MPCA worked with county and SWCD staff from the eight counties in the SRW to promote water quality, to gain input from landowners via surveys and interviews and to better understand the social dynamics of stakeholders in the SRW. MPCA's goal was to create civic engagement and discussion which would enhance the content of the TMDL and WRAPS documents. A full description of civic engagement activities associated with the TMDL process is available within Section 3 of the SRW WRAPS report (November 2022).

MPCA posted the draft TMDL online at (http://www.pca.state.mn.us/water/tmdl) for a public comment period. The public comment period was started on May 1, 2023, and ended on May 31, 2023. MPCA states that they received, and responded to, one comment letter resulting from the public notice period. The comment and MPCA's response were made available to EPA staff. The comment was made by an interested citizen, encouraging MPCA to address pollution issues for the waterbodies of the Sauk River Watershed. EPA determined that MPCA responded to this comment as appropriate.

The Sauk River Watershed does not include any tribal lands within the watershed boundary (Section 1.3 of the final TMDL document).

The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of 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 water body, and the pollutant(s) of concern.

Comment:

The EPA received the final Sauk River Watershed TMDL document, submittal letter and accompanying documentation from MPCA on July 18, 2023. The transmittal letter explicitly stated that the final TMDLs referenced in Table 1 of this Decision Document were being submitted to EPA pursuant to Section 303(d) of the Clean Water Act for EPA review and approval.

The letter clearly stated that this was a final TMDL submittal under Section 303(d) of CWA. The letter also contained the name of the watershed as it appears on Minnesota's 303(d) list, and the causes/pollutants of concern. This TMDL was submitted per the requirements under Section 303(d) of the Clean Water Act and 40 C.F.R. §130.

The EPA finds that the TMDL transmittal letter submitted for the Sauk River Watershed TMDLs by MPCA satisfies the requirements of this twelfth element.

13. Conclusion

After a full and complete review, the EPA finds that the 6 bacteria TMDLs, the 3 phosphorus river TMDLs, the 1 TSS TMDL, and the 3 phosphorus lake TMDLs satisfy all elements for approvable TMDLs. This TMDL approval is for **thirteen (13) TMDLs**, addressing fifteen (15) impairments for aquatic recreational and aquatic life uses (Table 1 of this Decision Document).

The EPA's approval of these TMDLs extends to the water bodies which are identified above with the exception of any portions of the water bodies that are within Indian Country, as defined in 18 U.S.C. Section 1151. The EPA is taking no action to approve or disapprove TMDLs for those waters at this time. The EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under the CWA Section 303(d) for those waters.

Table 7: Crooked Lake Ditch (Unnamed Creek to Lake Osakis) Reach 552 *E. coli* TMDL summary

Reach 552	E. Coli TMDL Component by Flow Zone (billion org/day)				
TMDL Component Name	**Very High**	**High**	**Mid**	**Low**	**Very Low**
Load Allocation	328.6	144.7	77.4	45	16.2
Margin of Safety	36.5	16.1	8.6	5	1.8
Loading Capacity (TMDL)	365.10	160.8	86	50	18
Current Load	3,808.00	135.3	84.7	38.8	10
Current Load Exceedance of Loading Capacity (%)	90%	0%	0%	0%	0%

Table 8: Sauk River (Adley Creek to Getchell Creek) Reach 505 *E. coli* TMDL summary

Reach 505		E. Coli TMDL Component by Flow Zone (billion org/day)				
TMDL Component Name		**Very High**	**High**	**Mid**	**Low**	**Very Low**
Boundary Condition: Upstream TMDLs for reaches 503 and 527		1,643.80	681.9	358.9	216.4	83.1
Wasteload Allocation	GEM Sanitary District MNG585205	2.9	2.9	2.9	2.9	(a)
	Melrose WWTP MN0020290	14.3	14.3	14.3	14.3	(a)
	Osakis WWTP MN0020028	21.3	21.3	21.3	21.3	(a)
	Sauk Centre WWTP MN0024821	4.2	4.2	4.2	4.2	(a)
Load Allocation		101.8	31.2	48.9	38.2	(a)
Margin of Safety		16.1	8.2	10.2	9	4.4
Loading Capacity (TMDL)		1,804.40	764	460.7	306.3	126.6
Current Load		375.9	981.3	269.5	247.3	96.2
Current Load Exceedance of Loading Capacity (%)		0%	22%	0%	0%	0%

(a) The permitted wastewater design flows exceed the stream flows in the indicated flow zones. The allocations are expressed as an equation rather than an absolute number: Allocation = (flow contribution from a given source) × (*E. coli* concentration limit or standard) × conversion factor.

Table 9: Unnamed Creek (Unnamed Creek to Sauk River) Reach 542 *E. coli* TMDL summary

Reach 542		E. Coli TMDL Component by Flow Zone (billion org/day)				
TMDL Component Name		**Very High**	**High**	**Mid**	**Low**	**Very Low**
Wasteload Allocation	Lake Henry WWTP MN0020885[(a)]	0.2	0.2	0.2	0.2	0.2
Load Allocation		98.4	35.3	16.8	9.7	3.5
Margin of Safety		11	4	1.9	1.1	0.4
Loading Capacity (TMDL)		109.60	39.5	18.9	11	4.1
Current Load		1,136.80	364.9	134.3	106.1	5.1
Current Load Exceedance of Loading Capacity (%)		90%	89%	86%	90%	19%

(a) The Lake Henry WWTP fecal coliform permit limit applies from May through October, whereas its WLA applies from April through October. The effluent is not likely to be a significant *E. coli* source in April (Section 3.9.1.1). Future permit analysis will determine whether the permit limit will apply during April.

Table 10: Unnamed Creek (Unnamed Creek to Vails Lake) Reach 550 *E. coli* TMDL summary

Reach 550	E. Coli TMDL Component by Flow Zone (billion org/day)				
TMDL Component Name	**Very High**	**High**	**Mid**	**Low**	**Very Low**
Load Allocation	663.9	263.8	135.9	82.3	29.8
Margin of Safety	73.8	29.3	15.1	9.1	3.3
Loading Capacity (TMDL)	737.70	293.1	151	91.4	33.1
Current Load	613.30	109.7	41.2	18.1	(a)
Current Load Exceedance of Loading Capacity (%)[b]	0%	0%	0%	0%	(a)
Maximum Monthly Geometric Mean (org/100 mL)	690				
Current Concentration Exceedance of Monthly Standard (%)	9%[c]				

(a) No data available to calculate current load.
(b) Reductions are required for this reach because there is a 9% concentration exceedance, and the reach is listed as impaired.
(c) The geometric mean concentrations by flow zone are all less than the standard (630 org/100 mL). An alternative exceedance magnitude was calculated by comparing the highest observed (monitored) monthly geometric mean from the months that the standard applies to the geometric mean standard (monitored – standard / monitored).

Table 11: Cold Spring Creek (T123 R30W S15, West Line to Sauk River) Reach 567 *E. coli* TMDL summary

Reach 567	E. Coli TMDL Component by Flow Zone (billion org/day)				
TMDL Component Name	**Very High**	**High**	**Mid**	**Low**	**Very Low**
Load Allocation	15.4	6.4	3.8	2.4	1.1
Margin of Safety	1.7	0.7	0.4	0.3	0.1
Loading Capacity (TMDL)	17.10	7.1	4.2	2.7	1.2
Current Load	5.40	2.3	0.8	3.8	1.3
Current Load Exceedance of Loading Capacity (%)	0%	0%	0%	29%	2%

Table 12: Unnamed Creek (Grand Lake to Mill Creek) Reach 560 *E. coli* TMDL summary

Reach 560	E. Coli TMDL Component by Flow Zone (billion org/day)				
TMDL Component Name	**Very High**	**High**	**Mid**	**Low**	**Very Low**
Load Allocation	67.2	28.4	14.6	9.1	3.6
Margin of Safety	7.5	3.2	1.6	1	0.4
Loading Capacity (TMDL)	74.70	31.6	16.2	10.1	4
Current Load	(a)	24.6	28.2	16.2	(a)
Current Load Exceedance of Loading Capacity (%)	(a)	0%	42%	38%	(a)

(a) No data available to calculate current load.

Table 14: Sauk River (Knaus Lake to Cold Spring Dam) Reach 517 total phosphorus TMDL

Sauk River (Knaus Lake to Cold Spring Dam) Reach 517 Total Phosphorus TMDL Component		Load Allocation (lb/day)	
Boundary Condition: Knaus Lake		217	
Wasteload Allocation	Construction Stormwater	0.0023	0.0046
	Industrial Stormwater	0.0023	
Load Allocation		1.1	
Margin of Safety		0.10	
Loading Capacity (TMDL)		218	
Current Load		363	
Current Load Exceedance of Loading Capacity (%)		40%	

Table 15: Lower Sauk River (Cold Spring WWTP to Mill Creek) Reach 520 total phosphorus TMDL

Sauk River (Cold Spring WWTP to Mill Creek) Reach 520 Total Phosphorus TMDL Component		Load Allocation (lb/day)	
Boundary Condition: Reach 517		218	
Wasteload Allocation	Cold Spring WWTP, MN0023094	4.29	9.3
	Pilgrims, MN0047261	5.03	
	Construction Stormwater	0.012	
	Industrial Stormwater	0.012	
Load Allocation		5.5	
Margin of Safety		1.60	
Loading Capacity (TMDL)		234	
Current Load		386	
Current Load Exceedance of Loading Capacity (%)		39%	

Table 16: Lower Sauk River (Mill Creek to Mississippi River) Reach 501 total phosphorus TMDL

Sauk River (Cold Spring WWTP to Mill Creek) Reach 520 Total Phosphorus TMDL Component		Load Allocation (lb/day)	
Boundary Condition: Reach 520 and Pearl Lake		237	
Wasteload Allocation	Bel Clare Estates WWTP, MN0045721	1.53	18.4
	Cold Spring Granite Company, MNG490143[(a)]	0.08	
	Martin Marietta Materials Inc., MN0004031[(a)]	6.61	
	St. Joseph City MS4000125	1.1	
	Waite Park City MN4000127	2.2	
	Le Sauk Township MS400143	0.26	
	St. Joseph Township MS400157	2.6	
	VA Medical Center - St. Cloud MS400298	0.098	
	St. Cloud City MS400052	3.5	
	Sartell City MS400048	0.020	
	Stearns County MS400159	0.17	
	MnDOT Outstate District MS400180	0.10	
	Constructions Stormwater	0.049	
	Industrial Stormwater	0.049	
Load Allocation		12	
Margin of Safety		3.40	
Loading Capacity (TMDL)		271	
Current Load		384	
Current Load Exceedance of Loading Capacity (%)		29%	

(a) Upon permit reissuance, a WQBEL will be developed if the discharge is found to have a reasonable potential to cause or contribute to excursions above the water quality standards. WQBELs must be consistent with assumptions and requirements of any EPA approved TMDL WLA. If the Knaus Lake phosphorus TMDL is met, phosphorus reductions are not needed downstream of the lake, including regulated wastewater (Section 4.3.2).

Table 18: Maria Lake phosphorus TMDL

TMDL Parameter		Existing TP Load		TMDL TP Load		Estimated Load Reduction	
		lb/yr	lb/day	lb/yr	lb/day	lb/yr	%
WLA	Construction Stormwater	0.67	0.0018	0.67	0.0018	0	-
	Industrial Stormwater	0.67	0.0018	0.67	0.0018	0	-
	Total WLA	**1.3**	**0.0036**	**1.3**	**0.0036**	**0**	**-**
LA	Watershed Runoff	305	0.84	189	0.51	116	38
	SSTS	4.4	0.012	4.4	0.012	0	-
	Atmospheric Deposition	23	0.063	23	0.063	0	-
	Total LA	**332**	**0.92**	**216**	**0.59**	**116**	**35**
MOS		**-**	-	**24**	**0.066**	**-**	**-**
Total Load		**334**	**0.92**	**242**	**0.65**	**116**	**35**

Table 19: Ellering Lake phosphorus TMDL

TMDL Parameter		Existing TP Load		TMDL TP Load		Estimated Load Reduction	
		lb/yr	lb/day	lb/yr	lb/day	lb/yr	%
WLA	GEM Sanitary District[(a)]	182	0.50	247	0.68	0	-
	Construction Stormwater	9.3	0.025	9.3	0.025	0	-
	Industrial Stormwater	9.3	0.025	9.3	0.025	0	-
	Total WLA	**201**	**0.55**	**266**	**0.73**	**0**	**-**
LA	Watershed Runoff	4,222	12	961	2.6	3,261	77
	Atmospheric Deposition	10	0.027	10	0.027	0	-
	Total LA	**4,232**	**12**	**971**	**2.6**	**3,261**	**77**
MOS		**-**	-	**138**	**0.38**	**-**	**-**
Total Load		**4,433**	**13**	**1,375**	**3.7**	**3,261**	**74**

(a) The daily load is calculated as 1/365 of the annual WLA. The existing permit contains 1 mg/L and 112 kg/year (247 lb/yr) phosphorus limits, which are fully consistent with the WLA.

Table 20: Goodners Lake phosphorus TMDL

TMDL Parameter		Existing TP Load		TMDL TP Load		Estimated Load Reduction	
		lb/yr	**lb/day**	**lb/yr**	**lb/day**	**lb/yr**	**%**
WLA	Construction Stormwater	0.87	0.0024	0.87	0.0024	0	-
	Industrial Stormwater	0.87	0.0024	0.87	0.0024	0	-
	Total WLA	**1.7**	**0.0048**	**1.7**	**0.0048**	**0**	**-**
LA	Watershed Runoff	395	1.10	211	0.58	184	47
	SSTS	6.6	0.018	6.6	0.018	0	-
	Atmospheric Deposition	46	0.130	46	0.13	0	-
	Total LA	**448**	**1.20**	**264**	**0.73**	**184**	**41**
MOS		**-**	-	**29**	**0.079**	**-**	**-**
Total Load		**449**	**1.30**	**294**	**0.81**	**184**	**41**