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

REPLY TO THE ATTENTION OF:
W-16J

June 30, 2021

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 (TMDLs) for segments within the Shell Rock River Watershed (SRRW), including supporting documentation. The SRRW is located in southeastern Minnesota. The SRRW TMDLs were calculated for bacteria, phosphorus, total suspended solids, and dissolved oxygen substances to address the impaired aquatic life and aquatic recreation uses.

The SRRW 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 two (2) bacteria TMDLs, seven (7) phosphorus TMDLs, two (2) sediment TMDLs and one (1) dissolved oxygen TMDL. 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 submissions by the State of Minnesota. If you have any questions, please contact Mr. David Werbach of the Watersheds and Wetlands Branch at Werbach.david@epa.gov or 312-886-4242.

Sincerely,

Tera L. Fong
Division Director, Water Division

Cc: Emily Zanon, MPCA

wq-iw9-27g

TMDL: Shell Rock River Watershed TMDLs in Freeborn County, Minnesota
Date: 6/30/2021

DECISION DOCUMENT FOR THE SHELL ROCK RIVER WATERSHED TMDLS, 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 Shell Rock River Watershed (SRRW) in southeastern Minnesota is located along the border between Iowa and Minnesota. Several smaller tributaries flow into Albert Lea Lake, and the flow out of the lake forms the Shell Rock River (Figure 1 of the final TMDL document). The river flows south into Iowa, joins the Cedar River, and ultimately drains to the Mississippi River. In Minnesota, the watershed is approximately 246 square miles (approximately 160,000 acres) in size. Several tributaries to Albert Lea Lake are addressed in this TMDL as well as Shell Rock River. Five lakes are also addressed by the TMDL, as noted in Table 1 of this Decision Document. MPCA noted that this TMDL only applies to Minnesota lands.

The Minnesota Pollution Control Agency's (MPCA) 2020 List of Impaired Waters identified a total of 16 aquatic life and aquatic recreation impairments in 9 water bodies in the SRRW (Table 1 of the final TMDL document). The impaired waterbodies that received TMDLs are listed in Table 1 of this Decision Document and shown in Figure 1 of the final TMDL document. A total of 12 TMDLs were developed for 9 impaired water bodies. Of these 12 TMDLs, 2 are for excessive *E. coli*, 5 are for excessive phosphorus in lakes, 2 for excessive total suspended solids (TSS), 2 for excessive phosphorus in river segments and 1 for excessive dissolved oxygen (DO) substances (i.e., low DO).

Table 1 of the final TMDL document also identifies the other impairments in the waterbodies of the SRRW. MPCA determined that the waters in the SRRW are also impaired for additional causes, including macroinvertebrate bioassessments, fish bioassessments, habitat, pH, and algal productivity. During the development of the SRRW TMDLs, MPCA determined that these impairments will be also addressed by the TMDLs, except for nitrate. MPCA explained that there is currently no water quality standard for nitrate (Section 3.5 of the final TMDL document).

Table 1: TMDLs Approved in the Shell Rock River Watershed TMDL

Waterbody	AUID*	Use	Affected Use	TMDL Pollutant
Shell Rock River	-501	2Bg, 3C	ALU[1], ARU[2]	DO substances, Phosphorus, TSS
Bancroft Creek (County Ditch 63	-507	2Bg, 3C	ARU[2]	*E. coli*
Unnamed Creek (Shoff Creek)	-516	2Bg, 3C	ALU[1]	Phosphorus, TSS
Unnamed Creek (Wedge Creek)	-531	2Bg, 3C	ARU[2]	*E. coli*
Albert Lea Lake	24-0014-00	2B, 3C	ARU[2]	Phosphorus
Fountain Lake (East Bay)	24-0018-01	2B, 3C	ARU[2]	Phosphorus
Fountain Lake (West Bay)	24-0018-02	2B, 3C	ARU[2]	Phosphorus
White Lake	24-0024-00	2B, 3C	ARU[2]	Phosphorus

Pickeral Lake	24-0025-00	2B, 3C	ARU[2]	Phosphorus

* - Part of HUC 07080202
1 - Aquatic Life Use
2 - Aquatic Recreation Use

Land Use:
MPCA describes the SRRW land use in Section 3.4.2 and Figure 8 of the final TMDL document. The land use is predominately cultivated cropland (approximately 70%-80%, with 10-15% developed land) (Table 2 of this Decision Document). The impaired waters addressed by this TMDL are located near the City of Albert Lea, which has a population of approximately 18,000.

Table 2: Land use summary for the SRRW TMDL

Name	ID	Drainage Area (Square Miles)	Open Water (%)	Developed (%)	Barren (%)	Forest (%)	Herbaceous (%)	Hay/ Pasture (%)	Row Crops (%)	Wetlands (%)
Shell Rock River	-501	191.8	4.0	13.0	0.1	1.6	5.7	1.5	70.3	3.9
Bancroft Creek	-507	34.1	0.3	10.1	0.0	2.5	4.7	1.5	79.2	1.7
Unnamed Creek (Shoff Creek)	-516	15.3	6.7	12.3	0.0	1.9	6.2	2.6	62.5	7.8
Unnamed Creek (Wedge Creek)	-531	34.0	1.2	8.0	0.0	1.7	3.7	1.4	81.3	2.7
Albert Lea Lake	24-0014-00	147.0	4.9	14.0	0.0	1.7	5.7	1.7	68.2	3.8
Fountain Lake (East Bay)	24-0018-01	97.5	2.9	13.9	0.0	2.0	5.3	2.0	69.9	4.0
Fountain Lake (West Bay)	24-0018-02	37.6	2.5	9.7	0.0	1.8	4.8	2.4	75.2	3.6
Pickeral Lake	24-0025-00	5.8	13.8	18.6	0.7	0.0	6.1	1.9	48.8	10.1
White Lake	24-0024-00	1.8	15.7	10.2	5.8	0.0	13.1	16.5	29.4	9.2

Problem Identification:
Bacteria TMDLs:
Bacteria impaired segments identified in Table 1 of this Decision Document were included on the final 2020 Minnesota 303(d) list due to excessive bacteria. Section 3.5.2.1 of the final TMDL document describes water quality monitoring within the SRRW and indicates 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:
Lakes: Five lakes in the SRRW were identified as having an impaired Aquatic Recreation Use

due to high concentrations of phosphorus and chl-*a* and low Secchi disk transparency depths. All the lakes are classified as shallow lakes under the MPCA lake classification system (Section 3.4.4 of the final TMDL document).

Rivers: Two waterbodies in the SRRW were assessed as not meeting the Aquatic Life Use due to excessive phosphorus (Table 1 of this Decision Document). MPCA reviewed the water quality data for these segments, and determined that the two waterbodies significantly exceeded the phosphorus criteria, and often exceeded the other portions of the river eutrophication standard (RES) (Section 2 of this Decision Document).

The SRRW lake and stream segments were included on the final 2020 Minnesota 303(d) list due to excessive nutrients as indicated by total phosphorus levels. While phosphorus is an essential nutrient for aquatic life, elevated concentrations of phosphorus can lead to nuisance algal blooms that negatively impact aquatic life and recreation (e.g., swimming, boating, fishing, etc.). Algal decomposition can deplete dissolved oxygen levels within the water column and 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 also is an important habitat for macroinvertebrates and fish.

DO Substances TMDL:
In 2012 and 2013, the Shell Rock River Watershed District and MPCA performed continuous DO monitoring of the Shell Rock River (Segment 501), to determine the daily flux (change) in DO levels in the river (Sections 3.5.2.3 and 3.5.2.4 of the final TMDL document). Results indicated that there were significant exceedances of the DO_{flux} water quality standard, as well as the daily minimum DO water quality standard (Figures 22-24 of the final TMDL document).

Low dissolved oxygen concentrations can negatively impact aquatic life use. The decrease in dissolved oxygen can stress benthic macroinvertebrates and fish. Elevated levels of oxygen-consuming pollutants, such as ammonia, nitrogenous oxygen demanding (NOD) substances and carbonaceous biochemical oxygen demanding (CBOD) substances, can reduce dissolved oxygen in the water column, and cause large shifts in dissolved oxygen and pH throughout the day. The decay of organic-rich material in sediments (sediment oxygen demand or SOD) can consume oxygen in the water column, further reducing dissolved oxygen in the system. Excessive amounts of nutrients such as phosphorus can stimulate plant and algal growth, which can negatively impact DO levels in a waterbody as well. Shifting chemical conditions within the water column may stress aquatic biota (i.e., fish and macroinvertebrate species). In some instances, degradations in aquatic habitats or water quality have reduced fish populations or altered fish communities from those communities supporting sport fish species to communities which support more tolerant rough fish species.

TSS TMDLs:
TSS impaired segments identified in Table 1 of this Decision Document were included on the final 2020 Minnesota 303(d) list due to excessive sediment within the water column. Water quality monitoring within the SRRW indicated that these segments were not attaining their

designated aquatic life uses due to TSS measurements and the negative impact of those conditions on fish and macroinvertebrate communities.

TSS is a measurement of the sediment and organic material that inhibits natural light from penetrating the surface water column. When in suspension, sediment can limit visibility and light penetration which may impair foraging and predation activities by certain species. 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 sediment and organic material within the water column can negatively impact fish and macroinvertebrates within the ecosystem via reducing spawning and rearing areas for certain fish species, clogging gills and abrading fish tissue and subjecting sensitive species to unnecessary stress. Excessive amounts of fine sediment in stream environments can degrade aquatic communities.

Excessive fine sediment also may degrade aquatic habitats, alter natural flow conditions in stream environments and add organic materials to the water column. Excess sediment can fill pools, embed substrates, and reduce connectivity between different stream habitats. The result is a decline in habitat types that, in healthy streams, support diverse macroinvertebrate communities. Excess sediment can reduce spawning and rearing habitats for certain fish species. Flow alterations in the SRRW have resulted from drainage improvements on or near agricultural lands. Channelization and contributions from agricultural drain tiles can result in higher peak flows during storm events and flashier flows which erode streambanks and carry sediment loads to streams. Sediment inputs from these flow events can settle in low gradient reaches like some of the low gradient reaches found in portions of the SRRW.

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 developed a state plan, Minnesota's TMDL Priority Framework Report, to meet the needs of EPA's national measure (WQ-27) under EPA's Long-Term Vision for Assessment, Restoration and Protection under the CWA section 303(d) program. As part of these efforts, the MPCA identified water quality-impaired segments that will be addressed by TMDLs by 2022. The waters of the SRRW addressed by this TMDL are part of the MPCA prioritization plan to meet EPA's national measure.

Pollutants of Concern:
The pollutants of concern are bacteria (*E. coli*), phosphorus, DO substances, and TSS.

Source Identification (point and nonpoint sources):
Point Source Identification: The potential point sources to the SRRW are:

Bacteria Point Sources:
National Pollutant Discharge Elimination Systems (NPDES) permitted facilities: MPCA identified one NPDES permitted facility that impacts bacteria-impaired waters in the SRRW watershed. This facility may contribute bacteria loads to surface waters through discharges of treated wastewater (Section 3.7.1.1 and Figure E-4 of Appendix E of the final TMDL document). Permitted facilities must discharge wastewater according to their NPDES permit. MPCA assigned the facility a portion of the bacteria wasteload allocation (WLA).

Municipal Separate Storm Sewer System (MS4) communities: Stormwater from MS4s can transport bacteria to surface waterbodies during or shortly after storm events. Sources of bacteria include pet wastes, wildlife, and illicit sewer connections. MPCA determined that the MS4 for Albert Lea overlaps the Bancroft Ditch watershed (Section 3.7.1.1 of the final TMDL document). MPCA did not identify any Combined Sewer Overflows (CSOs) nor Sanitary Sewer Overflow (SSOs) in the SRRW.

Concentrated Animal Feedlot Operations (CAFOs): MPCA identified approximately 61 animal feeding operations (AFOs) in the SRRW watershed (Section 3.7.1.1 of the final TMDL document). Of these, MPCA identified three operating under a NPDES Concentrated Animal Feeding Operation (CAFO) permit, all within the Unnamed Creek (Wedge Creek) watershed.

In Minnesota, AFOs that meet the federal definition of a CAFO that have a discharge, and all CAFOs and other AFOs that have 1,000 animal units are required to operate under either the CAFO General NPDES Permit (MNG440000) or the Feedlot General State Disposal System (SDS) Permit (MNG450000) (Section 3.4.3 of the final TMDL document). Federal regulations generally define a CAFO as having a certain type and number of animals confined for more than 45 days in a 12-month period. Under MPCA NPDES permit requirements, the CAFO production areas must be designed to contain all manure and the direct precipitation and manure contaminated runoff from precipitation caused by a 25-year 24-hour storm event. Discharges of pollutants from an overflow at the production area of CAFOs are authorized under the NPDES permit but the overflow must be caused by precipitation, the discharge must not cause or contribute to an exceedance of a water quality standard, and the production area must comply with the aforementioned design criteria and permit requirements for inspection, operation and maintenance, and recordkeeping. Therefore, no wasteload allocations were developed by MPCA for the production areas at CAFOs. Precipitation-caused runoff from the spreading of manure at agronomic rates and in accordance with best management practices for nutrient management established in Minn. R. 7020.2225 and in MPCA's general permits is not regulated as a point source discharge and is therefore considered in the nonpoint source load section discussed below (Section 3.7.1.1 of the final TMDL document).

Permitted Construction and Industrial Stormwater: MPCA determined that permitted construction and industrial stormwater discharges are not significant sources of bacteria in the watershed, and therefore did not develop an allocation for bacteria for these sources (Section 4.2.2 of the final TMDL document).

Phosphorus Point Sources (Lakes):

NPDES permitted facilities: MPCA determined that there are six NPDES permitted facilities discharging phosphorus within the watersheds for two of the impaired lakes (Albert Lea Lake and Fountain Lake (East Bay)) (Sections 3.7.7.1 and 4.8.3 of the final TMDL document). MPCA assigned a portion of the phosphorus allocations to these facilities.

MS4 dischargers: The Albert Lea MS4 discharges to all five of the phosphorus-impaired lakes (Section 4.8.3 of the final TMDL document). Stormwater can contain phosphorus from pet waste, wildlife waste, organic debris, and fertilizer runoff from urban lands.

CAFOs: MPCA determined that there are three active permitted CAFO facilities in the drainage area of Fountain Lake (West Bay and East Bay) (Section 3.7.7.1 of the final TMDL document). As noted in the *Bacteria* source discussion above, no wasteload allocations were developed by MPCA for the production areas at CAFOs.

Permitted Construction and Industrial Stormwater: MPCA determined that a small portion of the SRRW watershed includes lands addressed under a construction stormwater permit (Section 4 of the final TMDL document). MPCA reviewed local records and determined that the approximate annual percentage of land area under construction has been 0.3% in the watershed (Table 37 of the final TMDL document). MPCA also noted that there is a small percentage (0.1%) of industrial stormwater dischargers in the watersheds. Section 5 of this Decision Document further discusses the WLA for stormwater in the TMDLs. Construction and industrial sites may contribute pollutants via runoff during stormwater events. These areas within the SRRW 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.

Phosphorus Point Sources (River):

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 two WWTPs that discharge to the phosphorus-impaired Shell Rock River (501) (Section 3.7.3.1 of the final TMDL document). MPCA assigned each of these facilities a portion of the phosphorus WLA. Section 5 of this Decision Document contains further information on the WLAs for these WWTPs. MPCA noted that several other permitted facilities discharge into or upstream of Albert Lea Lake. MPCA determined that the wasteload allocations for these facilities will be addressed in the specific impaired waterbody (Section 3.7.3.1 of the final TMDL document).

*CAFO*s: MPCA identified three CAFOs in the Shell Rock River watershed upstream of Segment -501, and accounted for these facilities in the specific TMDLs for those segments (Section 3.7.3.1 of the final TMDL document).

MS4: MPCA noted that there is a small portion of the Albert Lea MS4 permit area that drains into the Shell Rock River (501). As noted previously, MS4 discharge can contain phosphorus from a variety of sources. MPCA assigned a portion of the phosphorus allocation to the Albert Lea MS4.

Permitted Construction and Industrial Stormwater: Similar to the discussion for *Phosphorus (Lakes)* above, MPCA determined a portion of the phosphorus allocation for permitted Construction and Industrial Stormwater. A similar process was used to determine an allocation for this source type.

TSS Point Sources:

NPDES permitted facilities: MPCA identified two municipal WWTPs and one industrial stormwater discharger that contribute sediment loads to Shell Rock River (Section 3.7.2.1 and Table 5-1 of the final TMDL document). No individual permitted dischargers were identified by MPCA in Unnamed Creek (Shoff Creek). Permitted facilities must discharge wastewater according to their NPDES permit. MPCA assigned each of these facilities a portion of the TSS allocation. Further information regarding the WLAs are found in Section 5 of this Decision Document.

MS4 communities: MPCA determined that the Albert Lea MS4 discharges to both TSS-impaired segments (Section 3.7.2.1 of the final TMDL document). MS4 discharges can contribute sediment through runoff and erosion in urban areas, and increased flow can cause or contribute to streambed and streambank erosion.

Stormwater runoff from permitted construction and industrial areas: MPCA noted that permitted construction and industrial sites may contribute sediment via stormwater runoff during precipitation events. Similar to the discussion for *Phosphorus (Lakes)* above, MPCA determined a portion of the TSS allocation for permitted Construction and Industrial Stormwater. A similar process was used to determine an allocation for this source type.

DO Substances Point Sources:

NPDES permitted facilities: NPDES permitted facilities may contribute DO substance loads to surface waters through discharges of wastewater. Permitted facilities must discharge treated wastewater according to their NPDES permit. MPCA determined that there are two WWTPs that discharge to the phosphorus-impaired Shell Rock River (Section 3.7.4.1 of the final TMDL document). MPCA assigned each of these facilities a portion of the DO-substance WLA. Section 5 of this Decision Document contains further information on the WLAs for these WWTPs.

*CAFO*s: MPCA noted that there are no permitted CAFOs within the direct watershed of the Shell Rock River (Section 3.7.4.1 of the final TMDL document).

MS4: MPCA noted that there is a small portion of the Albert Lea MS4 permit area that drains into the Shell Rock River. As noted previously, MS4 discharge can contain DO substances from a variety of sources. MPCA assigned a portion of the DO substances allocation to the Albert Lea MS4.

Permitted Construction and Industrial Stormwater: Similar to the discussion above, MPCA determined a portion of the DO substances allocation for permitted Construction and Industrial Stormwater. Similar to the discussion for *Phosphorus (Lakes)* above, MPCA determined a portion of the DO-substances allocation for permitted Construction and Industrial Stormwater. A similar process was used to determine an allocation for this source type.

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

Bacteria NPS sources: MPCA summarized identified sources contributing bacteria in each waterbody segment in the SRRW TMDLs in Section 3.7.1 of the final TMDL document.

Non-regulated urban runoff: Runoff from urban areas (i.e., urban, residential, commercial or industrial land uses) can contribute bacteria to local waterbodies. Stormwater from urban areas, which drain impervious surfaces, may introduce bacteria (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 waterbodies in the SRRW. These areas may contribute bacteria via the mobilization and transportation of pollutant laden waters from feeding, holding and manure storage sites. Feedlots generate manure which may be spread onto and be transported by stormwater to water bodies. fields. Tile drainage lines increase stormwater flow velocities 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 on the stream bottom causing 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 SRRW. 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. Failing SSTS are specifically defined as systems that are failing to protect groundwater from contamination. 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.

Phosphorus NPS Sources (river): Section 3.7.3 of the final TMDL document identifies major nonpoint sources of phosphorus to the impaired streams of the SRRW.

Unrestricted livestock access to streams: Similar to the discussion above in *Bacteria NPS Sources*, livestock with access to stream environments may add nutrients directly to the surface waters or resuspend particles that had settled on the stream bottom.

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.

Stormwater runoff from agricultural land use and feedlot practices: Similar to the discussion above in *Bacteria NPS Sources*, runoff from agricultural lands may contain significant amounts of nutrients, organic material and organic-rich sediment which may lead to impairments in the SRRW.

Discharges from SSTS or unsewered communities: Similar to the discussion above in *Bacteria NPS Sources*, failing septic systems are a potential source of nutrients within the SRRW.

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 SRRW. 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.

Phosphorus NPS Sources (lakes): In addition to the phosphorus sources noted in the *Phosphorus NPS Sources (Rivers)* section above, MPCA identified additional nonpoint sources for the lakes.

Internal loading: The release of phosphorus from lake sediments, the release of phosphorus from lake sediments via physical disturbance from benthic fish (rough fish, e.g., carp), the release of phosphorus from wind mixing the water column, and the release of phosphorus from decaying curly-leaf pondweeds, may all contribute internal phosphorus loading to the lakes of the SRRW. 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.

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 SRRW. Phosphorus can be bound to these particles which may add to the phosphorus inputs to surface water environments.

TSS NPS Sources:

MPCA explained in Section 3.7.2 of the final TMDL document the various sources of sediment impacting the SRRW TMDLs. A detailed analysis for each segment is found in this section of the TMDL; a summary is below.

Stream channelization and streambank erosion: Similar to the *Phosphorus NPS Sources (Rivers)* section above, eroding streambanks and channelization efforts add sediment to local surface waters.

Stormwater runoff from agricultural land use and feedlot practices: Similar to the discussion above in *Bacteria NPS Sources,* runoff from agricultural lands may contain significant amounts of sediment which may lead to impairments in the SRRW.

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

DO NPS Sources:

Stormwater runoff from agricultural land use and feedlot practices: Similar to the *Phosphorus NPS Sources (Rivers)* section above, MPCA noted that agricultural operations can generate pollutants that remove dissolved oxygen from the water column (DO substances) that can run off farm fields and enter the waterbodies (Section 3.7.4.3 of the final TMDL document). The use of fertilizers, manure, field debris, and other organic matter can enter the waters, decompose, and use up the dissolved oxygen in the water column. Many of the same processes that contribute phosphorus also contribute other DO substances.

In-stream processes: Organic material can also enter the waters and settle to the streambed during the year, and then as flows are reduced during the late summer, decompose and scavenge oxygen. This is measured as sediment-oxygen demand (SOD). Nutrients can also stimulate the growth of algae and plants, which can consume oxygen during the night hours, causing significant daily swings in DO levels.

Non-regulated stormwater runoff: Non-regulated stormwater runoff can add DO substances to the impaired waters. Many of the same causes of bacteria and phosphorus loading also can contribute nutrients and organic material, such as pet wastes and wildlife.

Failing Septic Systems: Failing septic systems can contribute nutrients as well as bacteria to streams.

Future Growth:

MPCA did not calculate a reserve capacity of the TMDLs. Any expansion of point or nonpoint sources will need to comply with the respective WLA and LA values calculated in the SRRW 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 are 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 SRRW TMDLs are designated as Class 2 and 3 waters, with Class 2 being the most restrictive for the pollutants being addressed by the TMDLs (Section 2 of the final TMDL document). 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."*

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:
In Section 2 of the final TMDL document, MPCA describes the applicable numeric water quality standards (Tables 2 and 4 of the final TMDL document and Tables 3-5 of this Decision Document).

Bacteria Criteria: The bacteria TMDL targets employed for the SRRW bacteria TMDLs are the *E. coli* standards as stated in Table 3 of this Decision Document. The focus of this TMDL is on the **126 organisms (orgs) per 100 mL** (126 orgs/100 mL) portion of the standard. MPCA believes that using the 126 orgs/100 mL portion of the standard for TMDL calculations will result in the greatest bacteria reductions within the SRRW 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.

Table 3: *E. coli* Numeric Criteria for the SRRW TMDL

Parameter	Units	Water Quality Standard
***E. coli* ***	# 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

* - Standards apply only between April 1 and October 31

Phosphorus Criteria (rivers and lakes): Numeric criteria for phosphorus, 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. The numeric eutrophication standards which are applicable to the SRRW lake TMDLs are found in Table 4 of this Decision Document. All five of the impaired lakes are classified as shallow lakes in the Western Corn Belt Plains ecoregion by MPCA (Section 3.4.4 of the final TMDL document).

Table 4: Lake Criteria for the SRRW TMDL

Ecoregion	Lake Type	Total Phosphorus (µg/L)	Chlorophyll-a (µg/L)	Secchi Transparency (meters)
Western Corn Belt Plains	Deep	≤ 65	≤ 22	≥ 0.9
	Shallow	**≤ 90**	**≤ 30**	**≥ 0.7**

Phosphorus TMDL Targets (lakes): MPCA selected phosphorus targets of **90 µg/L** for lakes identified in this Decision Document. MPCA selected phosphorus as the appropriate target parameter to address eutrophication problems because of the interrelationships between phosphorus and chl-*a*, and phosphorus and Secchi Depth (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. These criteria apply from June 1-September 30.

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, phosphorus, and the response variables, chl-*a* and SD depth. MPCA anticipates that by meeting the phosphorus concentrations of Western Corn Belt Plains WQS the response variables chl-*a* and SD will be attained and the lakes of the SRRW 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.

Phosphorus TMDL target (stream): MPCA employed the phosphorus target of **150 µg/L** for the Southern River Nutrient Region to the Shell Rock River watershed (Table 5 of this Decision Document). These standards apply June 1 to September 30.

Table 5: River Eutrophication Criteria Standards for the SRRW TMDL

River Nutrient Region Name	Total Phosphorus (µg/L)	Chlorophyll-a (µg/L)	Dissolved Oxygen Flux (mg/L)	5-Day Biochemical Oxygen Demand (mg/L)
North	≤ 50	≤ 7	≤ 3.0	≤ 1.5
Central	≤ 100	≤ 18	≤ 3.5	≤ 2.0
Southern 2A Streams	≤ 150	≤ 35	≤ 4.5	≤ 3.0
Southern 2B Streams	≤ 150	≤ 40*	≤ 5.0*	≤ 3.5*

*Minn R. 7050.0222 incorrectly lists water quality standards for Chl-*a*, DO flux and BOD for 2B Southern Streams. Standards approved by EPA are: **Chl-*a* ≤ 35 ug/L, DO flux ≤ 4.5 mg/L and BOD_5 ≤ 3.0 mg/L**. MPCA confirmed these are the criteria used to develop the TMDL (Email from Emily Zanon, MPCA). These errors will be addressed in future rule making efforts.

TSS Criteria: Numeric criteria for TSS are set forth in Minnesota Rules 7050.0222. These criteria are based upon the appropriate region of the state. The TSS criteria applicable in the

SRRW is **<u>65 mg/L</u>** TSS to be exceeded no more than 10% of the time (Section 2.2 of the final TMDL document). The SRRW is in the Southern River Nutrient Region.

<u>DO Substances Criteria:</u> Numeric criteria for DO are set forth in Minnesota Rules 7050.0222. These rules state that the DO standard is **<u>5 mg/L</u>** as a daily minimum, and compliance with the standard is required 50% of the days which the flow of the receiving water is equal to the 7Q10 (lowest 7-day average flow over a 10 year period). MPCA also noted that the DO flux river eutrophication standard was also applied to the Shell Rock River (Section 2.4 of the final TMDL document).

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.

<u>Comment:</u>
<u>Bacteria TMDLs:</u>
MPCA used the geometric mean (126 orgs/100 mL) of the *E. coli* water quality standard to calculate loading capacity values for the bacteria TMDLs as described in Section 4.2 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) and that it expects that by attaining the 126 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 SRRW 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 SRRW. MPCA compiled flow data from a variety of sources. Measured or simulated daily stream flows were used to develop load duration curves (LDC) and calculate TMDLs. MPCA noted there is limited data on flow within the SRRW. MPCA utilized the Hydrological Simulation Program – Fortran (HSPF) to model hydrology and water quality in the watershed (Section 3.6 of the final TMDL document). HSPF is a comprehensive watershed hydrology and water quality model that includes modeling and subsurface hydrologic and water quality processes, which can be linked to corresponding stream and reservoir processes. The model can be run to focus on specific environmental conditions, such as high or low flows or seasons, and can simulate the fate and transport or modelled pollutants. MPCA also used the model to analyze various scenarios for certain pollutants to determine attainment of WQS. For the LDCs, MPCA used the model to determine daily river flows (Section 3.6 of the final TMDL document).

Flows were ranked from highest to lowest. Average daily flow values were assigned a flow rank value. The probability of exceedance of each average daily flow value was calculated as a percentage. This created the information needed to create a flow duration curve by plotting probability of exceedance (X-axis) against the flow level (logarithmic Y-axis). Using the allowable concentration of 126 orgs/100 mL and conversion factors, a LDC was developed to show the allowable billions of organisms per day of *E. coli* bacteria for each level of flow along the curve. The curved line on a LDC graph represents the TMDL of the respective flow conditions observed at that location.

The LDC data was used to determine the median loading capacity (LC) for each flow regime. Some low flow regimes were incomplete due to a lack of flow and zero-flow conditions that made up more than 10% of the LDC. Median values for flows and loads were calculated from the remaining records in those flow regimes after zero-flow records were excluded.

Water quality monitoring was completed in the SRRW 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

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, EPA concurs with MPCA 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.

In Section 4.2 of the final TMDL document, MPCA provides a TMDL summary table for each bacteria TMDL in the SRRW TMDL. The loading capacities, load allocations (LA), margins of safety, reserve capacities, and WLAs that were calculated are included for sites along *E. coli*-impaired streams within the SRRW. The results of those calculations are found in Tables 6-7 in Attachment 1 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 together into a categorical LA to cover all nonpoint source contributions.

The TMDLs using LDCs in this Decision Document report 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 6-7 of this Decision Document identify the loading capacity for individual water body segments at each flow regime. Although there are numeric loads for each flow regime, the complete LDC is being approved for this TMDL.

Bacteria (*E. coli*) TMDL Summary Tables (Tables 6-7 in Attachment 1 of this Decision Document).

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 SRRW bacteria TMDLs. The methods used for determining the TMDL are consistent with U.S. EPA technical memos.[1]

<u>TSS TMDLs:</u> MPCA developed LDCs to calculate sediment TMDLs for the impaired segments in Tables 8-9 presented in Attachment 1 of this Decision Document (Section 4.3 of the final TMDL document). The LDC development strategies employed for the bacteria TMDLs were also used to develop sediment TMDLs (e.g., the incorporation of HSPF model simulated flows to develop FDCs, water quality monitoring information collected within the SRRW informing the LDC, etc.). The FDC were transformed into LDC for each stream AUID segment by multiplying individual flow values by the TSS criteria of 65 mg/L and then multiplying that value by a conversion factor.

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 together into one value to cover all nonpoint source contributions. Tables 8-9 in 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. Although there are numeric loads for each flow regime, the LDC is what is being approved for this TMDL.

TSS TMDL Summary Tables (Tables 8-9 in Attachment 1 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 TSS TMDLs. Additionally, EPA concurs with the loading capacities calculated by the MPCA in the sediment

[1] 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.

TSS TMDLs. EPA finds MPCA's approach for calculating the loading capacity for the TSS TMDLs to be reasonable and consistent with EPA guidance.

<u>Phosphorus TMDLs (river):</u> Two waterbodies in the SRRW are impaired due to eutrophication from high levels of phosphorus, Shell Rock River (-501) and Unnamed Creek (Shoff Creek) (-516). MPCA calculated TMDLs at the pour points of the two watersheds, as noted on Figure E-2 of Appendix E of the final TMDL document (Tables 10-11 in Attachment 1 of this Decision Document). To determine the loading capacity of phosphorus for the waterbodies, MPCA multiplied the median of the daily average simulated flows over the growing season from 2009-2018 with the target phosphorus concentration of 0.150 mg/L and the appropriate conversion factors (Section 4.4.1 of the final TMDL document). The flows utilized in the calculations were from the HSPF model, and were revised to account for the discharge from the Albert Lea and Glenville WWTFs.

MPCA also reviewed the contribution of phosphorus from Albert Lea Lake, directly upstream of the Shell Rock River. A background load of phosphorus was calculated by MPCA based upon model results for Albert Lea Lake, and assumes that the lake is meeting its lake criteria. The HSPF model was utilized to determine several loading scenarios regarding Alber Lea Lake discharges and Albert Lea WWTF discharges. The loading allocations for phosphorus for Shell Rock River represent the results of the modeling scenarios to demonstrate attainment of the WQS (Section 4.4.5 of the final TMDL document)

The language of the RES explains that the RES must be maintained for the long-term summer concentration (June-September) of phosphorus. 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.

Total Phosphorus (River) TMDL Summary Tables (Tables 10-11 of Attachment 1 of this Decision Document).

<u>Phosphorus TMDLs (lakes):</u> The phosphorus TMDLs developed for the five impaired lakes were calculated using the U.S. Army Corps of Engineers (USACE) BATHTUB Model (Section 4.8 and Appendix F of the final TMDL document; Tables 12-16 in Attachment 1 of this Decision Document). The BATHTUB model was used to calculate loading capacities for these lakes and to link observed phosphorus water quality conditions and estimate phosphorus loads to determine in-lake water quality. 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 time-scales which are appropriate because watershed phosphorus loads are normally impacted by seasonal conditions. Watershed loading inputs for the model were developed utilizing the HSPF model.

MPCA explained in Section 4.8.2.3 of the final TMDL document how the BATHTUB model was used to estimate the current amount of internal loading based on modeled inputs. MPCA explained that there is no site-specific data on phosphorus amounts in lake sediments (internal load). MPCA reviewed the initial modeling results to determine if the models accurately represented the lakes and the default internal load portion of the model was sufficient. Results of the review indicated that additional internal load needed to be added to four of the five lakes; White, Fountain (East), Fountain (West), and Albert Lea. MPCA determined that the BATHTUB model accurately represented Pickeral Lake without increasing the internal load.

Loading capacities (pounds per day (lbs/day)) were calculated during the growing season (June 1 through September 30) using BATHTUB and then allocated to the WLA, LA, and MOS. The results are summarized in Tables 12-16 in Attachment 1 of this Decision Document. To simulate the load reductions needed to achieve the WQS, a series of model simulations were performed. Each simulation reduced the total current amount of phosphorus entering each of the water bodies from June 1 through September 30 and computed the anticipated water quality response within the lake.

The June to September growing season was chosen by MPCA because it corresponds to the eutrophication criteria, contains the months that the general public typically uses lakes in the SRRW for aquatic recreation, and is the time of the year when water quality is likely to be impaired by excessive nutrient loading.

Total Phosphorus (Lake) TMDL Summary Tables (Tables 12-16 of Attachment 1 of this Decision Document).

DO substances TMDL: To determine the loading capacity for DO substances in the Shell Rock River, MPCA utilized the HSPF model. As discussed in detail in Sections 3.7.4 and 4.5.5 of the final TMDL document, MPCA used the model to review several scenarios in which SOD, CBOD, NOD, and phosphorus were reduced until the WQS of 5.0 mg/L was attained. MPCA noted that a separate phosphorus TMDL was developed for the Shell Rock River, and therefore the DO substances for the TMDL are SOD, CBOD, and NOD. Table 17 in Attachment 1 of this Decision Document contains the DO substances allocations for the Shell Rock River.

MPCA explained that while SOD is the dominant oxygen scavenger in the system, NOD and CBOD to contribute to the reduction in DO in the system. Much of the CBOD and NOD material settles into the river sediments, and is thus available to decay and utilize oxygen from the system. MPCA accounted for the impacts of phosphorus from Albert Lea Lake, and modeled the reduction of phosphorus from the lake over time as the DO model was utilized.

DO-Substances TMDL Summary Table (Table 17 in Attachment 1 of this Decision Document).

Other impairments: MPCA also determined the impacts of implementing the TMDLs on other impairments in the shell Rock River (Sections 4.6-4.7 of the final TMDL document). In Table 1 of the final TMDL document, the Shell Rock River is listed as impaired for macroinvertebrate bioassessment (MIBI), fish bioassessment (FIBI), and pH. A Stressor ID study by MPCA (MPCA, 2014) noted that elevated levels of nitrate, phosphorus, pH, chl-*a*, and DO fluctuations contributed significant stress to the biology in Shell Rock River. MPCA has targeted phosphorus and DO directly in TMDLs. For pH, the Stressor ID study notes that pH levels can be elevated as a result of eutrophication, and MPCA determined that the phosphorus and DO TMDLs will also control the pH impairment. MPCA also noted that the RES criteria target chl-a (a measure of algal production). MPCA concluded that reducing phosphrous in Albert Lea Lake and Shell Rock River will reduce algal production in the system. MPCA does not have a criteria for nitrate, but concluded that if the remaining impairments are addressed, the impacts on MIBI and FIBI will be reduced and the appropriate WQS attained (Sections 3.7.7 and 4.7 of the final TMDL document).

Conclusion: 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 bacteria, TSS, DO substances and phosphorus TMDLs. Additionally, EPA concurs with the loading capacities calculated by the MPCA for these TMDLs. EPA finds MPCA's approach for calculating the loading capacity for the TMDLs 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.

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 SRRW TMDLs can be attributed to different nonpoint sources.

Bacteria TMDLs: MPCA explains its method for determining the *E. coli* LA in Section 4.2 of the final TMDL document. MPCA identified several nonpoint sources which contribute bacteria loads to the surface waters of the SRRW, including; non-regulated urban stormwater runoff, stormwater from agricultural and feedlot areas, failing septic systems, wildlife (e.g., deer, geese, ducks, raccoons, turkeys and other animals). MPCA did not determine individual load allocation values for each of these potential nonpoint source considerations but aggregated the nonpoint sources into a categorical LA value. The calculated LA values for each bacteria TMDL segment for each of 5 flow regimes are available in TMDL summary Tables 6-7 in Attachment 1 of this Decision Document.

TSS TMDLs: The calculated LA values for the TSS TMDLs are applicable across all flow conditions. MPCA identified several nonpoint sources which contribute sediment loads to the surface waters in the SRRW (Tables 8-9 in Attachment 1 of this Decision Document). Load allocations were recognized as originating from many diverse nonpoint sources including;

stormwater contributions from agricultural lands, stream channelization and streambank erosion, and wetland and forest sources.

MPCA included allocations for upstream boundary conditions in the TSS TMDL to account for upstream TSS loads from Albert Lea Lake (Section 4.3 of the final TMDL document). The result was to focus the LA and load reductions within the immediate drainage area of Shell Rock River. Nearly all the exceedance of the 65 mg/L TSS standard occurred during the high-flow events during months of May through July in the Shell Rock River (Figures 12 and 45 of the final TMDL document) when spring runoff and early-summer storms can cause high flows, channel erosion, and runoff from bare or freshly planted fields. For Unnamed Creek (Shoff Creek), the data are more variable; exceedances are slightly larger in the high flows, but also occur at lower flow regimes (Figures 13 and 45 of the final TMDL document). MPCA did not determine individual load allocation values for each of these potential nonpoint source considerations but aggregated the nonpoint sources into one LA value.

Phosphorus TMDLs (river): MPCA explains its method for determining the phosphorus LAs in Section 4.4.3 of the final TMDL document. MPCA identified several nonpoint sources which contribute phosphorus loads to the two waterbodies, including; non-regulated urban stormwater runoff, stormwater from agricultural and feedlot areas, failing septic systems, and wildlife. MPCA did not determine individual load allocation values for each of these potential nonpoint source considerations but aggregated the nonpoint sources into a categorical LA value. The calculated LA value for the phosphorus TMDL river segments for each of 5 flow regimes are available in TMDL summary Tables 10-11 in Attachment 1 of this Decision Document. A load was reserved from the LC to account for boundary conditions from Albert Lea Lake.

Phosphorus TMDLs (lake): MPCA identified several nonpoint sources which contribute nutrient loading to the lakes of the SRRW (Section 4.8 of the final TMDL document and Tables 12-16 in Attachment 1 of this Decision Document). These nonpoint sources included: watershed contributions from each lake or streams' direct watershed, internal loading and atmospheric deposition. For the lake nutrient TMDLs, MPCA, calculated individual load allocation values for watershed runoff (lakeshed), internal loading, septic systems, and atmospheric deposition.

DO substances TMDL: Similar to the other TMDLs for the Shell Rock River, MPCA determined the LA using a boundary condition at Albert Lea Lake (Section 4.5 of the final TMDL document). MPCA identified several nonpoint sources which contribute DO substance loads to the two waterbodies, including; non-regulated urban stormwater runoff, stormwater from agricultural and feedlot areas, failing septic systems, and wildlife. For the DO substance TMDL, MPCA identified a LA for local sources, as well as a load from upstream (Table 17 in Attachment 1 of this Decision Document).

EPA finds MPCA's approach for calculating the LA 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:
Bacteria TMDLs: MPCA identified one NPDES permitted wastewater facility within the SRRW and assigned the facility a portion of the WLA (Tables 6 and 7 in Attachment 1 of this Decision Document). The Clarks Grove WWTF is pond system, and discharges periodically throughout the year. The WLA for this facility was calculated based on the facility's permitted maximum daily discharge rate and the permitted fecal coliform effluent limit.

MPCA explained that the WLA for the WWTF was calculated based on the *E. coli* WQS but WWTF permits are regulated for fecal coliform (200 orgs/100 mL as a 30-day geometric mean) 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 SRRW 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.

MS4 Stormwater - MPCA also determined WLAs for the Albert Lea MS4 (Tables 6-7 in Attachment 1 of this Decision Document). The WLA is based upon the jurisdictional area of the MS4 multiplied by the total bacteria loading in the watershed.

CAFOs – MPCA identified three CAFOs operating under NPDES permits. 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, and even in the event of a discharge, the discharge cannot cause or contribute to a violation of a WQS. For the SRRW TMDL, MPCA assigned all NPDES permitted CAFOs a

WLA equivalent to zero (WLA = 0). 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 section of the final TMDL document.

Construction/Industrial Stormwater: MPCA determined that stormwater from construction or industrial sites are unlikely to contain significant amounts of bacteria, and therefore no WLA was developed for these sources (Section 4.2.2 of the final TMDL document).

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

Phosphorus TMDLs (lakes): MPCA stated that there are six NPDES permitted facilities within the lake watersheds in the SRRW TMDL (Section 4.8.3 of the final TMDL document). Tables 12-16 in Attachment 1 of this Decision Document contains the WLAs for phosphorus to the impaired lakes.

MS4 Stormwater: Similar to the bacteria TMDL, MPCA calculated a WLA for the Albert Lea MS4 discharges into the impaired lakes (Section 4.4.4.2 of the final TMDL document). The WLA is based upon the jurisdictional area of the Albert Lea MS4 in the TMDL watersheds, multiplied by the phosphorus loading in the watershed.

CAFOs – MPCA identified three CAFOs operating under NPDES permits. 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, and even in the event of a discharge, the discharge cannot cause or contribute to a violation of a WQS. For the SRRW TMDL, MPCA assigned all NPDES permitted CAFOs a WLA equivalent to zero (WLA = 0). 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 section of the final TMDL document.

Construction and Industrial Stormwater: MPCA also calculated a portion of the WLA and assigned it to both construction stormwater and industrial stormwater. Overall, the construction and industrial stormwater WLA make up a very small portion of the overall loading capacity but MPCA wanted to recognize their contributions. Both of these WLAs were represented as a categorical WLA and WLAs were not subdivided out into individual WLAs. The industrial stormwater WLA was set equal to the construction stormwater WLA.

MPCA's calculation of construction and industrial stormwater WLAs was based on their review of the *Minnesota Stormwater Manual's* estimate of average construction activity within Freeborn County. This estimate was area weighted for each impaired watershed. For each lake TMDL, the construction stormwater WLA was calculated as the construction stormwater percent area multiplied by the existing watershed load. It is assumed that loads from permitted construction stormwater sites that operate in compliance with their permits are meeting the WLA.

Attaining the construction stormwater and industrial stormwater loads described in the phosphorus TMDLs is the responsibility of construction and industrial site managers. 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 in the SRRW. Industrial sites within these 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 SRRW 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 U.S. EPA. This applies to sites under permits for MNR100001, MNR050000 and MNG490000.

Phosphorus TMDL (river): MPCA identified two NPDES permitted facility in the contributing watershed for the SRRW stream phosphorus TMDLs. Both are in the Shell Rock River watershed. MPCA calculated the WLAs for individual permittees as outlined in Section 4.4.4.1 of the final TMDL document and in Tables 10 -11 in Attachment 1 of this Decision Document. The WLA assigned to the Albert Lea WWTF was calculated based upon the dry-weather design flow (9.125 MGD) and a effluent concentration of 0.636 mg/L (Table 30 of the final TMDL document; Table 18 of this Decision Document; RESPEC 2019). The EPA notes that this approval only applies to the phosphorus WLA (48.4 lbs/day); the permitted flow and effluent limit will be addressed in the NPDES permit process.

The WLA for the Glenville WWTF is a pond system that discharges only during certain times of the year (as per the NPDES permit). The facility is not allowed to discharge from June 15-September 15, when flows are low in the river. This results in the facility able to discharge during 24.6% of the growing season. MPCA developed the phosphorus WLA (2.7 lbs/day) based upon discharging 24.6% of the growing season (Section 4.4.4.1 and Table 30 of the final TMDL document).

Table 18. Total phosphorus WLAs for permitted point sources.

Impaired Reach	Facility	Permit	Design Flow (mgd)	TMDL Concentration (mg/L)	Total Phosphorus WLA (lbs/day)	Impaired Reach Point Source WLA
501	Glenville WWTF	MN0021245	0.647	2.000	2.7	51.1
	Albert Lea WWTF	MN004192	9.125	0.636	48.4	

MS4 Stormwater: Similar to the bacteria TMDL, MPCA calculated a WLA for the Albert Lea MS4 discharges into both impaired waters (Section 4.4.4.2 of the final TMDL document). The WLA is based upon the jurisdictional area of the Albert Lea MS4 in the TMDL watershed, multiplied by the phosphorus loading in the watershed (Tables 10-11 in Attachment 1 of this Decision Document).

Construction/Industrial Stormwater: Similar to the phosphorus lake TMDLs, MPCA calculated a portion of the WLA and assigned it to both construction stormwater and industrial stormwater. Overall, the construction and industrial stormwater WLA make up a very small portion of the overall loading capacity but MPCA wanted to recognize their contributions. Both of these WLAs were represented as a categorical WLA and WLAs were not subdivided out into individual WLAs. The construction and industrial stormwater allocations for the SRRW stream phosphorus TMDLs were calculated in the same manner as the construction and industrial stormwater allocations for the SRRW lake phosphorus TMDLs (i.e., see calculative method in *Section 5 – Phosphorus TMDLs (lakes)*, within this Decision Document). MPCA's expectations and responsibilities for overseeing construction and industrial stormwater loads for the SRRW stream phosphorus TMDLs are the same for the SRRW lake phosphorus TMDLs.

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

TSS TMDLs: MPCA identified two NPDES permitted facilities within the SRRW and assigned those facilities a portion of the WLA (Table 27 of the final TMDL document; Tables 8-9 in Attachment 1 of this Decision Document). Individual WLAs were calculated for each of these facilities based the maximum permitted daily discharge and the permit effluent limit of either 30 mg/L TSS (Albert Lea WWTF) or 45 mg/L TSS (Glenville WWTF). In the Shell Rock River TMDL, MPCA noted that under very low flows, the permitted discharge flow from the Albert Lea facility exceeded the actual instream flow. To address this, the facility is limited to discharge at or below the effluent limit. The EPA notes this effluent limit (30 mg/L) is well below the TSS criteria of 65 mg/L.

MS4 Stormwater: Similar to the bacteria TMDL, MPCA calculated a WLA for the Albert Lea MS4 discharges. The WLA is based upon the jurisdictional area of the Albert Lea MS4 in the

TMDL watershed, multiplied by the TSS loading in the watershed (Section 4.3.2 of the final TMDL document).

Construction/Industrial Stormwater: Similar to the SRRW lake phosphorus TMDLs, MPCA calculated a portion of the WLA and assigned it to both construction stormwater and industrial stormwater. Overall, the construction and industrial stormwater WLA make up a very small portion of the overall loading capacity but MPCA wanted to recognize their contributions. Both of these WLAs were represented as a categorical WLA and WLAs were not subdivided out into individual WLAs. The construction and industrial stormwater allocations for the SRRW sediment (TSS) TMDLs were calculated in the same manner as the construction and industrial stormwater allocations for the SRRW lake phosphorus TMDLs (i.e., see calculative method in *Section 5 – Phosphorus TMDLs (lakes)*, within this decision document).

DO Substances TMDL: MPCA identified two NPDES permitted facility in the contributing watershed for the SRRW stream DO substances TMDL for Shell Rock River. MPCA calculated the WLAs for individual permittees as outlined in Section 4.5.4 of the final TMDL document and are in Table 19 of this Decision Document.

MPCA noted that during the modeling time period of the TMDL, the Albert Lea facility discharged at a much lower average rate than currently permitted. MPCA performed the HSPF modeling scenarios at the higher permitted rate of 9.125 MGD as noted in Table 33 of the final TMDL document. The effluent concentration was then lowered until the model demonstrated that the DO standard was attained. Table 19 of this Decision Document contains the WLAs for DO substances for the two facilities that discharge into Shell Rock Creek.

The EPA notes that this approval only applies to the DO substances WLA (167.1 lbs/day); the permitted flow and effluent limit will be addressed in the NPDES permit process. The EPA also notes that Table 33 in the TMDL contains a slightly larger WLA for phosphorus for the Albert Lea WWTF. This WLA is based upon the HSPF DO modeling, whereas the WLA for phosphorus for the Albert Lea WWTF in Table 18 of this Decision Document (Table 30 of the final TMDL document) is the WLA required to attain the phosphorus criteria. To ensure all appropriate WQSs are attained, the most restrictive WLA for phosphorus (Table 18 of this Decision Document) is the approved WLA for phosphorus for the Albert Lea WWTF.

The WLA for the Glenville WWTF is a pond system that discharges only during certain times of the year (as per the NPDES permit). The facility is not allowed to discharge from June 15-September 15, when flows are low in the river. This results in the facility able to discharge during 24.6% of the growing season. MPCA developed the DO substances WLA (8.7 lbs/day) based upon discharging 24.6% of the growing season (Sections 4.4.4.1 and 4.5.4 and Tables 30 and 33 of the final TMDL document).

Table 19: DO-Substances WLAs for Shell Rock River (501)

Impaired Reach	Facility	Permit	Design Flow (mgd)	Permitted Concentration (mg/L)	Total Phosphorus WLA (lbs/day)	Associated Oxygen Demand WLA (lb/day)	Impaired Reach Point Source WLA
501	Glenville WWTF	MN0021245	0.647	2.00	2.7	8.7	175.8
	Albert Lea WWTF	MN0041092	9.125	0.68	51.8 *	167.1	

* - See Table 18 of this Decision Document for the approved WLA for phosphorus for Albert Lea

<u>MS4 Stormwater</u>: Similar to the bacteria TMDL, MPCA calculated a WLA for the Albert Lea MS4 discharges into the Shell Rock River (Section 4.5.4 of the final TMDL document). The WLA is based upon the jurisdictional area of the Albert Lea MS4 in the TMDL watershed, multiplied by the DO substance loading in the watershed.

<u>Construction/Industrial Stormwater:</u> Similar to the phosphorus lake TMDLs, MPCA calculated a portion of the WLA and assigned it to both construction stormwater and industrial stormwater. Overall, the construction and industrial stormwater WLA make up a very small portion of the overall loading capacity but MPCA wanted to recognize their contributions. Both of these WLAs were represented as a categorical WLA and WLAs were not subdivided out into individual WLAs. The construction and industrial stormwater allocations for the SRRW stream phosphorus TMDLs were calculated in the same manner as the construction and industrial stormwater allocations for the SRRW lake phosphorus TMDLs (i.e., see calculative method in *Section 5 – Phosphorus TMDLs (lakes)*, within this Decision Document).

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

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.

<u>**Comment:**</u>
<u>**Bacteria TMDLs:**</u> The bacteria TMDLs incorporated an explicit MOS of 10% which was applied to the loading capacity (Section 4.2.3 of the final TMDL document, Tables 6-7 in Attachment 1 of this Decision Document). MPCA explained that the explicit MOS was set at 10% due to the level of variability in sample results discovered during TMDL development.

Challenges associated with quantifying *E. coli* loads include the dynamics and complexity of bacteria in stream environments. Factors such as die-off and re-growth contribute to general uncertainty that makes quantifying stormwater bacteria loads particularly difficult. The MOS for the SRRW 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. 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.

TSS, phosphorus (lakes), phosphorus (river), and DO Substances TMDLs: MPCA explained that the TSS, phosphorus and DO substances TMDLs utilized an explicit MOS of 10% (Sections 4.3.3, 4.4.2, 4.5.2, and 4.8.4 of the final TMDL document and Tables 8-17 in Attachment 1 of this Decision Document). This accounts for the variability of sampling results and pollutant loading in the natural systems. The HSPF model used to generate loading information as well a flow results indicated generally good calibration, as did the BATHTUB model (Section 3.6.3 and Appendix F of the final TMDL document). Additional recalibration was performed on the HSPF model to ensure the most recent data were included (RESPEC, 2019).

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:

Bacteria TMDLs: 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 SRRW 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).

Phosphorus (lakes and river) and DO Substances TMDLs: Seasonal variation was considered for the SRRW phosphorus and DO substances TMDLs via the nutrient targets which 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 ecoregion eutrophication and DO WQS 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 SRRW nutrient 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 summertime period is typically when eutrophication standards are exceeded and water quality within the SRRW 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).

TSS TMDLs: The TSS WQS applies from April to September which is also the time period when high concentrations of sediment are expected in the surface waters of the SRRW (Section 4 of the final TMDL document). Sediment loading in the SRRW 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 season's sediment inputs to surface waters typically occur primarily through wet weather events. Critical conditions that impact the response of SRRW 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 SRRW bacteria, phosphorus, DO substances, and TSS TMDLs provide reasonable assurance that actions identified in the implementation section of the TMDL (i.e., Sections 7 and 9 of the final TMDL document), will be applied to attain the loading capacities and allocations calculated for the impaired reaches within the SRRW. 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, which fall outside of regulatory authority, 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 SRRW. Watershed districts (WD) have a significant role in the SRRW in terms of monitoring, planning and implementation efforts. It is anticipated that WDs and other local watershed groups will work together to reduce pollutant inputs to the SRRW. MPCA has authored a SRRW WRAPS document, which was approved by MPCA in May 2021. The WRAPS 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, land owners, 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 in the best places to do work.

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 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 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 SRRW 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 noted in Section 9.1.5 of the final TMDL document that improvements are needed at some of the NPDES permitted facilities. MPCA reviewed discharge reports for the facilities noted only minor permit exceedances, but noted that there will likely need to be reductions in the phosphorus discharges for some of the facilities in the SRRW. Implementation of the phosphorus WLA will be addressed in the MPCA NPDES program.

MPCA noted that several local partners have been implementing actions and activities to control pollutants in the SRRW for many years. One example is the dredging operation currently underway in Fountain Lake. The Shell Rock River Watershed District (SRRWD) has been leading an effort to remove phosphorus-rich sediment from the lake to improve habitat and water quality (https://www.shellrock.org/projects). Using a mixture of State and local funds, the SRRWD is planning to remove over 1.2 million cubic yards of sediment from portions of Fountain Lake. The SRRWD is planning to pursue funds for additional dredging in 2021 and beyond. The SRRWD website lists many projects completed or underway in the watershed that will affect the impaired waters.

Freeborn County has developed a "*Comprehensive Water Plan – Amendment to Implementation: 2016-2021*" (Water Plan), approved in 2015, which outlines priorities and goals for the County. Goals include surface water protection, groundwater protection, and soil erosion control. In addition to pollutant controls in the SRRW TMDL, the Water Plan identifies several other approved TMDLs in the County, and identifies projects and plans to implement the various pollutant controls needed to meet the TMDLs. The Water Plan provides cost estimates for addressing the identified goals.

The Freeborn SWCD has developed "*2021 Annual Work Plan*" (Work Plan) to identify a course of action for the SWCD to protect resources in Freeborn County. The efforts discussed in the Work Plan identify efforts in County Water Plan, to coordinate efforts in the County. The efforts include soil erosion controls, drainage concerns, and surface water protections, amongst other controls.

MPCA noted that numerous projects impacting all four pollutants in the TMDL watershed that have been developed over that last several years. MPCA noted that many of the BMPs and projects will impact multiple pollutants. For example, streambank stabilization efforts will not only reduce sediment eroding from the streambanks, but also reduce the phosphorus loads, as particulate phosphorus is often attached to the soil particles. The construction of wetlands reduced sediment loading, can sequester phosphorus, and allow bacteria to be filters out of the flow. Streambank reconstruction not only reduces sediment erosion, but keeps cattle out of the streams, reducing bacteria and DO substance loads.

MPCA also highlighted the recent Buffer Law now in effect in Minnesota. This law requires perennial grass buffers to be planted along public waters. The width of the buffer depends upon the type and size of water body, and provides for financial support in installing these buffers. The buffers can filter out sediment and nutrients, as well as other pollutants.

Various funding mechanisms will be utilized to execute the recommendations made in the implementation section of this TMDL. 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 SRRW. 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 (e.g., WDs) and volunteers, as long as there is sufficient funding to support the efforts of these local entities. At a minimum, the SRRW will be monitored once every 10 years as part of the MPCA's Intensive Watershed Monitoring cycle.

Water quality monitoring is a critical component of the adaptive management strategy employed as part of the implementation efforts utilized in the SRRW. 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 SRRW. 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.

River and stream monitoring in the SRRW has been completed by a variety of organizations and funded by Clean Water Partnership Grants, and other available local funds. The SRRWD has maintained sampling locations at numerous sites within the TMDL watershed (https://www.shellrock.org/streams), in conjunction with many of the implementation efforts underway in the watershed.

MPCA noted that since there are many BMPs that have been developed, monitoring has not only focused on water quality, but BMP effectiveness monitoring as well. MPCA also identified several additional sites that should be monitored to provide additional data on the TMDLs.

MPCA anticipates that stream monitoring in the SRRW should continue in order to build on the current water quality dataset and track changes based on implementation progress. Continuing to monitor water quality and biota scores in the listed segments will determine whether or not stream habitat restoration measures are required to bring the watershed into attainment with water quality standards. At a minimum, fish and macroinvertebrate sampling should be conducted by the MPCA, Minnesota Department of Natural Resources (MN-DNR), or other agencies every five to ten years during the summer season.

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 SRRW TMDLs will be used to inform the selection of implementation activities as part of the SRRW 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.

MPCA outlined the importance of prioritizing areas within the SRRW, education and outreach efforts with local partners, and partnering with local stakeholders to improve water quality within the watershed. The SRRW WRAPS document includes additional detail regarding specific recommendations from MPCA to aid in the reduction of bacteria, nutrients, and TSS and to surface waters of the SRRW. Efforts to reduce pollutant loads in the watershed are discussed below.

Pasture management/livestock exclusion plans: Reducing livestock access to stream environments will lower the opportunity for direct transport of bacteria, nutrients and TSS 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, TSS, and phosphorus, and erosion of streambanks to 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 and phosphorus inputs.

Manure Collection and Storage Practices: Manure has been identified as a source of bacteria, DO substances, and phosphorus. These pollutants can be transported to surface water bodies via stormwater runoff. Bacteria, DO substances and phosphorus laden water can also leach into groundwater resources. Improved strategies for the collection, storage and management of manure can minimize impacts of bacteria and nutrients entering the surface and groundwater system. Repairing manure storage facilities or building roofs over manure storage areas may decrease the amount of bacteria and phosphorus 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 take into account 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 pollutants 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 pollutants to surface water environments. Additionally, cleaner stormwater runoff can be diverted away from feedlots so as to not liberate bacteria.

Septic Field Maintenance: Septic systems are believed to be a source of bacteria and nutrients to waters in the SRRW. 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 bacteria and nutrient inputs into the SRRW.

Stormwater wetland treatment systems: Constructed wetlands with the purpose of treating wastewater or stormwater inputs could be explored in selected areas of the SRRW. 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.

Education and Outreach Efforts: Increased education and outreach efforts to the general public bring greater awareness to the issues surrounding pollutant contamination and strategies to reducing loading and transport of bacteria. Education efforts targeted to the general public are commonly used to provide information on the status of impacted waterways as well as to address pet waste and wildlife issues. Education efforts may emphasize aspects such as cleaning up pet waste or managing the landscape to discourage nuisance congregations of wildlife and waterfowl. Education can also be targeted to municipalities, wastewater system operators, land managers and other groups who play a key role in the management of pollutant sources.

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 SRRW. 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 SRRW and minimize or eliminate degradation of habitat.

Internal Loading Reduction Strategies (lakes): Internal nutrient loads may be addressed to meet the TMDL allocations outlined in the SRRW lake 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. As noted in Section 8 of this Decision Document, there is an on-going dredging operation in Fountain Lake.

- *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 SRRW 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.

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:

Throughout the development of the SRRW 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 WD staff to promote water quality, to gain input from landowners via surveys and interviews and to better understand the social dynamics of stakeholders in the SRRW. 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 in Section 10 of the final TMDL document.

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 July 27, 2020 and ended on September 25, 2020. The MPCA received eight comment letters and adequately addressed these comments. A summary of some of the major issues and MPCA responses is below.

Source of the phosphorus: Several commentors noted that the link between the eutrophication impairment on the Shell Rock River and WWTF phosphorus discharges was poorly explained. The commentors stated that the TMDL document explained that Albert Lea Lake was the major source of the phosphorus causing or contributing to the impairment, and that WWTF discharges had little to no impact on the condition of the Shell Rock River. The commentors believe that the TMDL demonstrates that once Albert Lea Lake meets the appropriate lake phosphorus criteria, reductions in WLAs are not necessary and are far more restrictive than needed.

MPCA explained that Albert Lea Lake and the WWTF discharges both have an impact on water quality in the Shell Rock River. MPCA noted that the model was carefully validated and verified using data from 2009-2018, and developed several scenarios to determine which set of conditions would result in attainment of the WQS. Based upon these scenarios, MPCA determined that phosphorus is the controlling variable for the RES impairment and a significant contributor to the DO impairment. The model was run targeting both the DO impacts under the RES criteria, as well as the overall DO criteria.

The MPCA noted that when Albert Lea Lake attains the appropriate lake criteria, the model results indicate that the river will still not meet the appropriate WQS, and additional reductions will be needed in the river watershed, including point source loads. MPCA noted that the flow-weighted mean (flow-weighted mean is the total load divided by the flow rate) for the Albert Lea facility is highest in the state at 5.22 mg/L (*Response #1 to the City of Albert Lea*). MPCA noted that they have worked with the City of Albert Lea to address the NPDES permit issues raised by the City, and will be following up in the NPDES permit process.

Algae and SOD: Commentors raised concerns that the MPCA improperly applied the RES DO_{flux} criteria and the DO criteria when calculating the phosphorus WLAs in the Shell Rock River. The commentors explained that the attached algae in the river, rather than WWTF phosphorus discharge, may be the primary cause of the DO_{flux} exceedances. The commentors also explained that SOD is the primary cause of low DO in the Shell Rock River, and that the WLAs for phosphorus will not address that cause of impairment.

MPCA responded that modeling results clearly show that both attached algae (periphyton) and surface (sestonic) algae were accounted for in the model, and the HSPF model has component applicable to each form of algae. MPCA acknowledged that both forms of algae are present in the river, but that the levels of algae were not sufficient to produce the extremely high daily swings in DO. MPCA explained that the cause of the high algal growth was the high levels of nutrients (particularly phosphorus). MPCA noted that the reduction in phosphorus (and other nutrients) in the Shell Rock River will reduce the algae growth in the river, thereby reducing the BOD, NOD, and SOD, and ultimately improving the long-term DO levels.

MPCA further explained that while SOD is driving much of the DO problems in the river, the model results indicate that much of the SOD material is algal material that forms or settles on the bottom sediments. When this material dies and decomposes, oxygen is used, thus lowering the DO levels in the river. SOD levels impact the daily minimum DO levels in the river, and the model scenarios indicate that as phosphorus levels are reduced and less algae is produced, the SOD will also be reduced.

RES WQS: Several commentors noted that the draft TMDL referenced incorrect criteria for the river eutrophication standard. They noted that the RES criteria as published by MPCA have a higher chl-a, DO_{flux} and BOD_5 than those used in the model for the TMDL, and therefore the WLAs are more restrictive than necessary.

MPCA explained that the criteria in Table 2 of the final TMDL document (both draft and final versions) are those currently in the Minnesota rules. MPCA explained that the more restrictive criteria were published as draft State criteria and submitted to the EPA for approval. The EPA approved the criteria in January 2015. However, during the transcription process for publication of the final criteria in the Minnesota Register, a transcription error occurred. Table 2 of the final TMDL document (Table 5 of this Decision Document) was revised to note the differing criteria. MPCA confirmed that the TMDL was developed using the EPA-approved criteria (email from Emily Zenon, dated 06/22/2021), and that the errors will be corrected in future rulemaking. The MPCA also noted that the primary target for the RES is the phosphorus criteria of 150 ug/L, which has not changed.

EPA believes that MPCA adequately addressed the comment received during the public notice period and where necessary updated the final TMDL in response to the comment. All public comments and MPCA responses to publicly submitted comments were shared with EPA.

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 Shell Rock River Watershed TMDLs, the submittal letter and accompanying documentation from MPCA on June 1, 2021. 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 final 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 CFR 130.

The EPA finds that the TMDL transmittal letter submitted for the Shell Rock 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 2 bacteria TMDLs, the 5 phosphorus lake TMDLs, the 2 phosphorus river TMDLs, the 1 DO substances TMDL, and the 2 TSS TMDLs satisfy all elements for approvable TMDLs. This TMDL approval is for **twelve (12) TMDLs**, addressing segments for aquatic recreational and aquatic life use impairments (Table 1of 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.

Attachment 1

TMDL Summary Tables for the SRRW TMDL

Table 6: Bancroft Creek (County Ditch 63) Reach 507 *E. coli* TMDL summary.

07080202-507						**Flow Zone**					
***E. coli* TMDL Component (billion org/day)**		**Very High**		**High**		**Mid**		**Low**		**Very Low**	
Wasteload Allocations	Permitted Wastewater Dischargers	5.05	15.10	5.05	9.10	5.05	7.18	5.05	6.00	5.05	5.20
	MS4	10.05		4.05		2.13		0.950		0.147	
	Industrial and Construction Stormwater	–		–		–		–		–	
Load Allocation		382		148		77.8		34.7		5.33	
Margin of Safety		44.20		17.40		9.44		4.52		1.17	
Loading Capacity (TMDL)		441.3		174.5		94.42		45.22		11.697	
Current Load		2,310		1,450		225		77.8		(a)	
Current Load Exceedance of Loading Capacity (%)		80.89		87.96		58.03		41.87		(a)	

(a) No data available to calculate current load.

Table 7: Unnamed Creek (Wedge Creek) Reach 531 *E. coli* TMDL summary.

07080202-531						**Flow Zone**					
***E. coli* TMDL Component (billion org/day)**		**Very High**		**High**		**Mid**		**Low**		**Very Low**	
Wasteload Allocations	Permitted Wastewater Dischargers	–	–	–	–	–	–	–	–	–	–
	MS4	–		–		–		–		–	
	Industrial and Construction Stormwater	–		–		–		–		–	
Load Allocation		391		153		82.3		38.7		9.05	
Margin of Safety		43.50		17.00		9.14		4.29		1.01	
Loading Capacity (TMDL)		434.5		170		91.44		42.99		10.06	
Current Load		2140		356		113		136		(a)	
Current Load Exceedance of Loading Capacity (%)		80		52		19		68		(a)	

(a) No data available to calculate current load.

Table 8: Shell Rock River Reach 501 TSS TMDL Summary.

07080202-501		Flow Zone									
TSS TMDL Component (tons/day)		**Very High**		**High**		**Mid**		**Low**		**Very Low**	
Wasteload Allocations	Permitted Wastewater Dischargers	2.42	2.85	2.42	2.56	2.42	2.50	2.42	2.45	*	0.03
	Industrial/Construction Stormwater	0.12		0.04		0.02		0.01		0.01	
	MS4 (MS400263)	0.31		0.1		0.06		0.02		0.02	
Load Allocation	Local	30.65	136.22	9.78	56.55	5.82	32.89	2.19	16.52	1.72	4.45
	Albert Lea Lake Boundary Condition (BC) Load	105.57		46.77		27.07		14.33		2.73	
Margin of Safety (10% of the Overall Allowable Load from the Impaired Reach Local Watershed)		3.72		1.37		0.92		0.52		0.19	
Loading Capacity	At Impairment Pour point (TMDL)	142.79		60.48		36.31		19.49		4.67	
	Adjusted for Albert Lea Lake BC	37.22		13.71		9.24		5.16		1.94	
Current Load	At Impairment Pour point	327.26		48.26		27.36		11.31		1.42	
	From Albert Lea Lake BC	235.90		27.86		21.46		9.83		1.45	
	Adjusted for Albert Lea Lake BC	91.36		20.40		5.90		1.48		0.00	
Current Load Exceedance of Loading Capacity (%)	At Impairment Pour point	56		0		0		0		0	
	Below Albert Lea Lake BC	59		33		0		0		0	

* - The WLAs for the permitted wastewater dischargers are based upon facility design flows. The WLA that exceeded the low-flow regime total daily loading capacity is denoted in the table with an asterisk. For this flow regime, the WLA and the nonpoint source LA is determined by the following formula:

Allocation + (flow contribution from a given source) x (TSS concentration limit or standard x conversion factor

Table 9: Shoff Creek Reach 516 TSS TMDL summary.

07080202-516		Flow Zone									
TSS TMDL Component (tons/day)		**Very High**		**High**		**Mid**		**Low**		**Very Low**	
Wasteload Allocations	Permitted Wastewater Dischargers	N/A	0.34	N/A	0.13	N/A	0.076	N/A	0.043	N/A	0.011
	Industrial/Construction Stormwater	0.03		0.01		0.006		0.003		0.001	
	MS4 (MS400263)	0.31		0.12		0.07		0.04		0.01	
Load Allocation	Local	6.17	11.91	2.38	4.63	1.39	2.62	0.72	1.25	0.20	0.20
	Pickeral Lake Boundary Condition (BC) Load	5.74		2.25		1.23		0.53		0.00	
Margin of Safety (10% of the Overall Allowable Load from the Impaired Reach Local Watershed)		0.72		0.28		0.16		0.09		0.02	
Loading Capacity	At Impairment Pour point (TMDL)	12.97		5.04		2.86		1.38		0.23	
	Adjusted for Pickeral Lake BC	7.23		2.79		1.63		0.85		0.23	
Current Load	At Impairment Pour point	23.45		3.36		0.98		0.62		0.05	
	From Pickeral Lake BC	7.07		2.11		0.55		0.45		0.00	
	Adjusted for Pickeral Lake BC	16.38		1.25		0.43		0.17		0.05	
Current Load Exceedance of Loading Capacity (%)	At Impairment Pour point	44.69		0		0		0		0	
	Below Pickeral Lake BC	56		0		0		0		0	

Table 10: Shell Rock River Reach 501 total phosphorus TMDL.

09020309-501 Total Phosphorus TMDL Component		Load Allocation (lbs/day)	
Wasteload Allocation	Permitted Wastewater Dischargers	51.1	51.5
	MS4 (MS400263)	0.3	
	Industrial/Construction	0.1	
Load Allocation	Local	27.9	94.5
	Albert Lea Lake Boundary Condition (BC) Load	66.6	
Margin of Safety (10% of the Overall Allowable Load from the Impaired Reach Local Watershed)		8.8	
Loading Capacity	At Impairment Pour point (TMDL)	154.8	
	Adjusted for Albert Lea Lake BC	88.2	
Current Load	At Impairment Pour point	433.6	
	From Albert Lea Lake BC	88.4	
	Adjusted for Albert Lea Lake BC	345.2	
Current Load Exceedance of Loading Capacity (%)	At Impairment Pour point	64.3%	
	Below Albert Lea Lake BC	74.4%	

Table 11: Shoff Creek Reach 516 total phosphorus TMDL summary.

09020309-516 Total Phosphorus TMDL Component		Load Allocation (lbs/day)	
Wasteload Allocations	Permitted Wastewater Dischargers	NA	0.43
	MS4 (MS400263)	0.4	
	Industrial/Construction	0.03	
Load Allocation	Local	6.8	9.6
	Pickeral Lake Boundary Condition (BC) Load	2.8	
Margin of Safety (10% of the Overall Allowable Load from the Impaired Reach Local Watershed)		0.8	
Loading Capacity	At Impairment Pour point (TMDL)	10.83	
	Adjusted for Pickeral Lake BC	8.0	
Current Load	At Impairment Pour point	11.2	
	From Pickeral Lake BC	4.0	
	Adjusted for Pickeral Lake BC	7.2	
Current Load Exceedance of Loading Capacity (%)	At Impairment Pour point	3.8%	
	Below Pickeral Lake BC	0.0%	

Table 12: Pickeral Lake nutrient TMDL Summary

Pickeral Lake Load Allocation		Existing Total Phosphorus Load			Allowable Total Phosphorus Load			Estimated Load Reduction	
		lbs/yr	lbs/day	Daily Load (%)	lbs/yr	lbs/day	Daily Load (%)	lbs/yr	%
Loading Capacity					**2,134.4**	**5.83459**			
Margin of Safety 10%					**213.4**	**0.58**			
Wasteload	**Total WLA**	**139.8**	**0.38309**	**3.9**	**122.1**	**0.33459**	**6.4**	**17.7**	**13**
	MS4 (Albert Lea City MS400263)	131.3	0.3597	3.7	113.6	0.3112	5.9	17.7	13
	Construction/Industrial Stormwater	8.5	0.02339	0.2	8.5	0.02339	0.4	0.0	–
Load	**Total LA**	**3,401.5**	**9.31**	**96.1**	**1798.9**	**4.92**	**93.6**	**1,602.6**	**47**
	Lakeshed	1602.6	4.39	45.3	742.0	2.03	38.6	860.6	54
	Reach 191 (Unnamed)	1095.8	3.00	30.9	734.1	2.01	38.2	361.7	33
	Internal Loading	435.0	1.19	12.3	76.7	0.21	4.0	358.3	82
	SSTS	22.0	0.06	0.6	0.0	0.00	0.0	22.0	100
	Atmospheric Deposition	246.1	0.67	6.9	246.1	0.67	12.8	0.0	–
Total Load		**3,541.4**	**9.70**	**100.0**	**1,921.0**	**5.26**	**100.0**	**1,620.4**	**46**

Table 13: White Lake nutrient TMDL Summary

White Lake Load Allocation		Existing Total Phosphorus Load			Allowable Total Phosphorus Load			Estimated Load Reduction	
		lbs/yr	lbs/day	Daily Load (%)	lbs/yr	lbs/day	Daily Load (%)	lbs/yr	%
Loading Capacity					**455.4**	**1.247792**			
Margin of Safety 10%					**45.6**	**0.12**			
Wasteload	**Total WLA**	**55.3**	**0.151692**	**6.0**	**46.6**	**0.127792**	**11.4**	**8.7**	**16**
	MS4 (Albert Lea City MS400263)	53.5	0.1467	5.8	44.8	0.1228	10.9	8.7	16
	Construction/Industrial Stormwater	1.8	0.004992	0.2	1.8	0.004992	0.4	0.0	–
Load	**Total LA**	**860.0**	**2.36**	**94.0**	**363.2**	**1.00**	**88.6**	**496.8**	**58**
	Lakeshed	395.5	1.08	43.2	241.9	0.66	59.0	153.6	39
	Internal Loading	385.3	1.06	42.1	53.1	0.15	13.0	332.2	86
	SSTS	11.0	0.03	1.2	0.0	0.00	0.0	11.0	100
	Atmospheric Deposition	68.2	0.19	7.5	68.2	0.19	16.6	0.0	–
Total Load		**915.5**	**2.51**	**100**	**410.0**	**1.12**	**100.0**	**505.5**	**55**

Table 14: Fountain Lake (West Bay) nutrient TMDL Summary

Fountain Lake (West Bay) Load Allocation		Existing Total Phosphorus Load			Allowable Total Phosphorus Load			Estimated Load Reduction	
		lbs/yr	lbs/day	Daily Load (%)	lbs/yr	lbs/day	Daily Load (%)	lbs/yr	%
Loading Capacity					**6,902.9**	**18.90415**			
Margin of Safety 10%					**690.3**	**1.89**			
Wasteload	**Total WLA**	**159.6**	**0.43745**	**0.8**	**140.2**	**0.38415**	**2.3**	**19.4**	**12**
	MS4 (Albert Lea City MS400263)	132.0	0.3618	0.6	112.6	0.3085	1.8	19.4	15
	Construction/Industrial Stormwater	27.6	0.07565	0.1	27.6	0.07565	0.4	0.0	–
Load	**Total LA**	**20,936.0**	**57.36**	**99.2**	**6072.4**	**16.63**	**97.7**	**14,863.6**	**71**
	Tributary 70 (Wedge Creek - 517)	16844.9	46.15	79.9	5658.8	15.50	91.1	11186.1	66
	White Lake BC	654.2	1.79	3.1	329.4	0.90	5.3	324.9	50
	Tributary 73 (Outlet of White Lake to Fountain Lake)	7.4	0.02	0.0	6.8	0.02	0.1	0.6	8
	Lakeshed	20.5	0.06	0.1	17.4	0.05	0.3	3.1	15
	Internal Loading	3331.4	9.13	15.8	0.0	0.00	0.0	3331.4	100
	SSTS	17.6	0.05	0.1	0.0	0.00	0.0	17.6	100
	Atmospheric Deposition	60.0	0.16	0.3	60.0	0.16	1.0	0.0	–
Total Load		**21,095.7**	**57.80**	**100.0**	**6,212.6**	**17.02**	**100.0**	**14,883.1**	**71**

Table 15: Fountain Lake (East Bay) nutrient TMDL Summary

Fountain Lake (East Bay) Load Allocation		Existing Total Phosphorus Load			Allowable Total Phosphorus Load			Estimated Load Reduction	
		lbs/yr	lbs/day	Daily Load (%)	lbs/yr	lbs/day	Daily Load (%)	lbs/yr	%
Loading Capacity					**18,435.1**	**50.5119**			
Margin of Safety 10%					**1,843.5**	**5.05**			
Wasteload	**Total WLA**	**1,826.0**	**5.00229**	**3.4**	**1617.4**	**4.4319**	**9.7**	**208.6**	**11**
	Albert Lea WTP SD 002	7.0	0.01909	0.0	60.9	0.1669	0.4	-	-
	Clarks Grove WWTP	284.1	0.7782	0.5	706.9	1.937	4.3	-	-
	MS4 (Albert Lea City MS400263)	1,461.2	4.003	2.7	775.9	2.126	4.7	685.3	47
	Construction/Industrial Stormwater	73.7	0.2020	0.1	73.7	0.2020	0.4	0.0	–
Load	**Total LA**	**51,940.8**	**142.31**	**96.6**	**14,974.2**	**41.03**	**90.3**	**36,966.6**	**71**
	Tributary 80 (Fountain Lake West Bay) BC	20,748.0	56.84	38.6	6,043.6	16.56	36.4	14,704.4	71
	Tributary 87 (Shoff Creek -516)	4,809.9	13.18	8.9	2,585.2	7.08	15.6	2,224.7	46
	Tributary 102 (Bancroft Creek)	17,748.7	48.63	33.0	6,241.0	17.10	37.6	11,507.7	65
	Internal Loading	8,529.8	23.37	15.9	0.0	0.00	0.0	8,529.8	100
	Atmospheric Deposition	104.4	0.29	0.2	104.4	0.29	0.6	0.0	–
Total Load		**53,766.7**	**147.31**	**100**	**16,591.7**	**45.46**	**100**	**37,175.1**	**69**

"-" indicates that no reduction is required.

Table 16: Albert Lea Lake nutrient TMDL Summary

Albert Lea Lake Load Allocation		Existing Total Phosphorus Load			Allowable Total Phosphorus Load			Estimated Load Reduction	
		lbs/yr	**lbs/day**	**Daily Load (%)**	**lbs/yr**	**lbs/day**	**Daily Load (%)**	**lbs/yr**	**%**
Loading Capacity					**33,625.0**	**92.12497**			
Margin of Safety 10%					**3,362.5**	**9.21**			
Wasteload	**Total WLA**	**1055.9**	**2.8924**	**1.3**	**1224.6**	**3.35497**	**4.0**	**–168.9**	**–16**
	Albert Lea WTP SD001	5.1	0.01384	0.0	60.9	0.1669	0.2	-	-
	Cargill Value Added Meats SD 001	36.7	0.1006	0.0	92.9	0.2546	0.3	-	-
	DNR Myre Big Island State Park SD 001	5.6	0.01526	0.0	30.5	0.08347	0.1	-	-
	Hayward WWTP	55.9	0.1532	0.1	136.7	0.3745	0.5	-	-
	MS4 (Albert Lea City MS400263)	818.1	2.241	1.0	769.1	2.107	2.5	49.0	6
	Construction/Industrial Stormwater	134.5	0.3685	0.2	134.5	0.3685	0.4	0.0	**–**
Load	**Total LA**	**81,820.8**	**224.16**	**98.7**	**29037.9**	**79.56**	**96.0**	**52,782.9**	**65**
	Tributary 120 (Fountain Lake) BC	53190.4	145.73	64.2	18430.8	50.50	60.9	34759.5	65
	Tributary 147 (Peter Lund Creek -512)	13003.0	35.62	15.7	6866.5	18.81	22.7	6136.5	47
	Tributary 131 (CD 16 -513)	1704.0	4.67	2.1	1298.3	3.56	4.3	405.7	24
	Lakeshed	2175.6	5.96	2.6	1321.5	3.62	4.4	854.1	39
	Internal Loading	10605.0	29.05	12.8	0.0	0.00	0.0	10605.0	100
	SSTS	22.0	0.06	0.0	0.0	0.00	0.0	22.0	100
	Atmospheric Deposition	1120.8	3.07	1.4	1120.8	3.07	3.7	0.0	–
Total Load		**82,876.6**	**227.06**	**100.0**	**30,262.6**	**82.91**	**100.0**	**52,614.0**	**63**

"-" indicates that no reduction is required.

Table 17: Shell Rock River Reach 501 DO TMDL Summary

TMDL Component		Oxygen Demand[a] (lb/day)	
Wasteload Allocation	Permitted Wastewater Dischargers	175.8	176.4
	MS4 (MS400263)	0.4355	
	Construction and Industrial Stormwater	0.1742	
Load Allocation	Local	42.94	263.2
	Albert Lea Lake Boundary Condition (BC) Load	220.3	
Margin of Safety (10% of the Overall Allowable Load from the Impaired Reach Local Watershed)		24.37	
Loading Capacity	At Impairment Pour point (TMDL)	464.0197	
	Adjusted for Albert Lea Lake BC	243.7	
Current Load at Impairment Pour point		1529	
Current Load Exceedance of Loading Capacity (%) at Impairment Pour point		69.7%	

(a) Oxygen demand accounts for the combination of SOD, NOD, and BOD.

(b) If RES TP TMDL is met, HSPF model indicates that DO TMDL will also be met.