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

REPLY TO THE ATTENTION OF:
W-16J

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

Dear Mr. Skuta:

The U.S. Environmental Protection Agency completed its review of the final Total Maximum Daily Loads (TMDL) for the Cottonwood River Watershed (CRW), including supporting documentation. The CRW is located in southwestern Minnesota. The CRW TMDLs were calculated for bacteria, total suspended solids (TSS), and phosphorus to address the impaired aquatic recreation and aquatic life uses.

The CRW 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 eight (8) bacteria, eleven (11) TSS, and seven (7) phosphorus TMDLs for a total of twenty six (26) TMDLs. EPA describes Minnesota's compliance with the statutory and regulatory requirements in the enclosed decision document.

EPA acknowledges Minnesota's efforts in submitting this TMDL 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 FONG

Digitally signed by TERA FONG
Date: 2023.01.09 16:40:19 -06'00'

Tera L. Fong
Director, Water Division

Cc: Mike Weckwerth, MPCA

wq-iw7-58g

TMDL: Cottonwood River Watershed bacteria, phosphorus and TSS TMDLs in portions of Lyon, Murray, Redwood, Cottonwood, and Brown Counties in southwestern Minnesota
Date: 01/09/2023

DECISION DOCUMENT FOR THE COTTONWOOD RIVER WATERSHED TMDLS IN SOUTHWESTERN 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 Cottonwood River Watershed (CRW) in southwestern Minnesota is part of the Minnesota River basin and covers parts of Lyon, Murray, Redwood, Cottonwood, and Brown counties. The CRW is approximately 1,314 square miles in size and is within the Western Corn Belt Plains (WCBP) ecoregion. Surface water in the CRW generally flows in a west to east direction from the headwaters areas in the western portion of the watershed toward the east into the Minnesota River near New Ulm (Figure 2 of the final TMDL document).

The CRW TMDLs address eight river segments impaired due to excessive bacteria, eleven river segments impaired due to excessive sediment, and seven lakes impaired due to excessive nutrients (specifically phosphorus) (Tables 1 and 2 of this Decision Document). The Minnesota Pollution Control Agency (MPCA) also noted that previous TMDLs addressed waters in the CRW (Table 2 of the final TMDL document). In 2013, the Cottonwood River Fecal Coliform TMDL was approved by the EPA, and addressed eight segments in the CRW; in 2020, the Minnesota River and Greater Blue Earth River Basin TSS TMDL addressed one segment in the CRW, and nine segments are addressed under the Minnesota Statewide Mercury TMDL (2007 and subsequent revisions).

MPCA also noted that numerous water body impairments are not being addressed by TMDLs at this time. MPCA explained that for these segments, there were insufficient data to determine the pollutant responsible for either the fish (Index of Biotic Integrity (IBI)) or the aquatic macroinvertebrate IBI impairment, or that the impairments were due to non-pollutant causes. Section 1.1 of the final TMDL document provide additional information on those segments. MPCA indicated these impairments will continue to be reviewed, and the non-pollutant impairments will be addressed through the Watershed Restoration and Protection Strategy (WRAPS) process.

Table 1. CRW River TMDLs

AUID (07020008 -###)	Water body name (description)	Designated use class	Pollutant
502	Cottonwood River - Headwaters to Meadow Creek	2B	TSS
504	Cottonwood River - Plum Creek to Dutch Charley Creek	2B	TSS
508	Cottonwood River - Coal Mine Creek to Sleepy Eye Creek	2B	TSS
509	Cottonwood River - Sleepy Eye Creek to JD 30	2B	TSS
517	Dutch Charley Creek - Highwater Creek to Cottonwood River	2B	TSS
518	Dutch Charley Creek - Headwaters to Highwater Creek	2B	TSS

519	Highwater Creek - Double Lake outlet to Dutch Charley Creek	2B	TSS
535	Pell Creek - Headwaters to T109 R38W S29, east line	2B	TSS
599	Sleepy Eye Creek - T109 R33W S5, west line to Cottonwood River	2B	TSS
602*	Plum Creek (JD 20A) - Headwaters to -95.576 44.177; -95.576 44.177 to Cottonwood River	2B	TSS
603*	Plum Creek (JD 20A) - Headwaters to -95.576 44.177; -95.576 44.177 to Cottonwood River	2B	TSS
			Total TSS TMDLs - 11
502	Cottonwood River - Headwaters to Meadow Creek	2B	*E. coli*
511	Judicial Ditch 30 - T110 R32W S31, west line to Cottonwood River	7	*E. coli*
519	Highwater Creek - Double Lake outlet to Dutch Charley Creek	2B	*E. coli*
520	Dry Creek - T108 R36W S31, south line to Cottonwood River	2B	*E. coli*
521	Mound Creek - Headwaters to Cottonwood River	2B	*E. coli*
523	Pell Creek - T109 R37W S30, west line to Cottonwood River	2B	*E. coli*
604	Coal Mine Creek - Headwaters to T109 R35W S22, south line	2B	*E. coli*
609	Judicial Ditch 30 - T110 R33W S15, west line to T110 R33W S36, east line	2B	*E. coli*
			Total *E. coli* TMDLs - 8

* - Plum Creek Reach 516 was split into two separate reaches, 602 and 603 during the 2019 assessment process

Table 2. CRW lake TMDLs

AUID/DNR Lake ID #	Water body name	Designated use class (WCBP ecoregion)	Pollutant
17-0054-00	Lake Bean	2B	Phosphorus (Nutrients)
17-0056-01	Double Lake (North Portion)	2B	Phosphorus (Nutrients)
42-0052-00	Rock Lake	2B	Phosphorus (Nutrients)
08-0011-00	Clear Lake	2B	Phosphorus (Nutrients)
08-0054-00	Altermatt Lake	2B	Phosphorus (Nutrients)
08-0096-00	Boise Lake	2B	Phosphorus (Nutrients)
08-0029-00	Bachelor Lake	2B	Phosphorus (Nutrients)
			Total Lake phosphorus TMDLs - 7

Land Use:

Land use in the CRW is fairly consistent across the watershed. The overall land use in the CRW is mainly cropland (85%), with other land uses including rangeland (3.5%), developed lands (6%), wetlands (3%) open water (1%), forest/shrub (1%), and barren lands (<1%) (Section 3.4 and Table 6 of the final TMDL document and Table 3 of this Decision Document). Table 6 of the final TMDL document also contains the information regarding land use in the individual TMDL watersheds.

MPCA noted that population in the watershed is fairly sparse, with the cities of New Ulm (population 13,362) and a portion of Marshall (population 12,432), which lies within the boundaries of the CRW, being the largest cities. MPCA determined that there are no tribal lands in the CRW (Section 3.0 of the final TMDL document).

Table 3: Overall land cover in the Cottonwood River Watershed

Drainage Area (Sq. Miles)	Cropland (%)	Rangeland (%)	Developed (%)	Wetlands (%)	Water (%)	Forest/Shrubland (%)	Barren/Mining (%)
1,314	85	3.5	6	3	1	1	<1

Problem Identification:

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

Phosphorus TMDLs: The lakes identified in Table 2 of this Decision Document were included on the final 2022 Minnesota 303(d) list due to excessive nutrients (phosphorus). Total phosphorus, chlorophyll-*a* (chl-*a*) and Secchi depth (SD) measurements in the CRW indicated that these waters were not attaining their designated aquatic recreation uses due to exceedances of nutrient criteria. Water quality monitoring was completed throughout the CRW, and those data formed the foundation for phosphorus TMDL modeling efforts.

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 depletes dissolved oxygen levels within the water column. The decreases in dissolved oxygen can stress benthic macroinvertebrates and fish. Depletion of oxygen in the water column can also lead to conditions where phosphorus is released from bottom sediments (i.e., internal loading). Also, excess algae can shade the water column which limits the distribution of aquatic vegetation. Aquatic vegetation stabilizes bottom sediments, and also is an important habitat for macroinvertebrates and fish.

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

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

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

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

Priority Ranking:
MPCA's schedule for TMDL completions, as indicated on the 303(d) impaired waters list, reflects Minnesota's priority ranking of this TMDL. MPCA has aligned TMDL priorities with the watershed approach and Watershed Restoration and Protection Strategy (WRAPS) cycle. The schedule for TMDL completion corresponds to the WRAPS report completion on the 10-year cycle. Mainstem river TMDLs, which are not contained in major watersheds and thus not addressed in WRAPS, must also be completed. The MPCA 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 (including the CRW) that were to be addressed by TMDLs by 2022. The waters of the CRW addressed by this TMDL report was part of the MPCA prioritization plan to meet EPA's national measure. An updated TMDL Priority Framework Report is currently under development by MPCA.

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

Source Identification (point and nonpoint sources):

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

<u>CRW bacteria TMDLs:</u>
National Pollutant Discharge Elimination Systems (NPDES) permitted facilities: NPDES permitted facilities may contribute bacteria loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge wastewater according to their NPDES permit. MPCA determined that there are seven wastewater treatment plants (WWTPs) in the CRW which contribute bacteria from treated wastewater releases (Table 30 of the final TMDL document; Table 4 of this Decision Document) to the various impaired segments. MPCA noted that these facilities were assigned a WLA in the TMDL.

Table 4: Minnesota NPDES facilities which contribute bacteria to impaired segments in the Cottonwood River Watershed

Facility Name	Permit #	Impaired Reach	WLA
Facilities assigned bacteria (*E. coli*) WLA (billions bacteria/day)			
Balaton WWTP	MN0020559	502	3.89
Garvin WWTP	MNG580101	502	0.81
Revere WWTP	MNG580114	523	0.71
Sleepy Eye WWTP	MNG580041	511	30.62
Storden WWTP	MNG580106	519	1.26
Walnut Grove WWTP	MN0021776	523	0.97
Westbrook WWTP	MNG580127	519	7.11

Municipal Separate Storm Sewer System (MS4) communities: MPCA noted that there are no MS4 facilities in the bacteria-impaired segments of the CRW (Section 4.3.2 of the final TMDL document).

Concentrated Animal Feedlot Operations (CAFOs): MPCA has identified CAFOs in the CRW (Section 3.6, Table 11, Figure 5 and Appendix E of the final TMDL document). As explained by MPCA, CAFO production areas must be designed to contain all manure, and direct precipitation and manure-contaminated runoff from precipitation events up to the 25-year, 24-hour storm event. In the event of a discharge, the discharge cannot cause or contribute to a violation of a water quality standard (WQS). MPCA noted that any precipitation-caused runoff from the land application of manure at agronomic rates is not considered a point source discharge and is accounted for in the load allocation (LA) of the TMDL.

Combined Sewer Overflows (CSOs) and Sanitary Sewer Overflows (SSOs): MPCA did not identify any CSOs or SSOs which contribute bacteria to waters of the CRW.

Stormwater runoff from permitted construction and industrial areas: MPCA determined that stormwater discharges from permitted construction and industrial dischargers do not contribute bacteria to the CRW (Section 4.3.2 of the final TMDL document).

CRW TSS TMDLs:

National Pollutant Discharge Elimination Systems (NPDES) permitted facilities: NPDES permitted facilities may contribute TSS loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge wastewater according to their NPDES permit. MPCA determined that there are fourteen WWTPs in the CRW which contribute TSS from treated wastewater releases (Table 5 of this Decision Document) to the segments impaired by TSS. MPCA noted that these facilities were assigned a WLA in the TMDL.

Table 5: Minnesota NPDES facilities which contribute TSS to impaired segments in the Cottonwood River Watershed

Facility Name	Permit #	Impaired Reaches	WLA
Facilities assigned TSS WLAs (lbs/day)			
Balaton WWTP	MN0020559	502, 504, 508, 509	306
Clements WWTP	MNG580094	509, 599	61
Garvin WWTP	MNG580101	502, 504, 508, 509	63

Lamberton WWTP	MNG580100	508, 509, 517, 518	489
Lucan WWTP	MNG580112	509, 599	257
Revere WWTP	MNG580114	504, 508, 509	56
Sanborn WWTP	MNG580115	508, 509	128
Springfield WWTP	MN0024953	508, 509	195
Storden WWTP	MNG580106	517, 508, 509, 519	99
Tracy WWTP	MN0021725	504, 508, 509	1312
Wabasso WWTP	MN0025151	509, 599	28
Walnut Grove WWTP	MN0021776	504, 508, 509	51
Wanda WWTP	MNG580126	509, 599	67
Westbrook WWTP	MNG580127	509, 517, 508, 519	611

Municipal Separate Storm Sewer System (MS4) communities: MPCA identified one entity subject to the MS4 stormwater regulations, the City of Marshall (MS400241), within the segments impaired for TSS (Section 4.2.2 of the final TMDL document). Marshall is upstream of three TSS-impaired segments, so MPCA calculated WLAs for the city. However, MPCA also noted that the segment that receives the direct discharge from the MS4 (601) is <u>not</u> impaired for TSS. Therefore, while MPCA developed WLAs, they do not represent a reduction in TSS loads from the city.

Stormwater runoff from permitted construction and industrial areas: Construction and industrial sites may contribute sediment via stormwater runoff during precipitation events. These areas within the CRW 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.

Concentrated Animal Feedlot Operations (CAFOs): MPCA recognized the presence of CAFOs in the CRW (Section 3.6, Table 11, Figure 5 and Appendix E of the final TMDL document). As explained by MPCA, CAFO production areas must be designed to contain all manure and other pollutants, and direct precipitation and manure-contaminated runoff from precipitation events up to the 25-year, 24-hour storm event. In the event of a discharge, the discharge cannot cause or contribute to a violation of a WQS. MPCA noted that any precipitation-caused runoff from the land application of manure at agronomic rates is not considered a point source discharge and is accounted for in the LA section of the TMDL.

<u>CRW phosphorus TMDLs:</u>

Stormwater runoff from permitted construction and industrial areas: Construction and industrial sites may contribute phosphorus via sediment runoff during stormwater events, and were the only potential point sources identified by MPCA (Section 4.4.2 of the final TMDL document). These areas within an impaired lake watershed must comply with the requirements of the MPCA's NPDES Stormwater Program and create a SWPPP that summarizes how stormwater will be minimized from the site.

Nonpoint Source Identification:

The potential nonpoint sources to the CRW include:

CRW bacteria TMDLs:
MPCA utilized data from several sources to develop an overall bacteria loading estimate for the CRW (Section 3.6.2 and Appendix A of the final TMDL document). Results of this analysis are displayed in a table (Table 17 of the final TMDL document) which indicates the greatest source of bacteria throughout the watershed is from crop runoff -surface applied manure, as well as some impacts from livestock near streams and failing septic systems.

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

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

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

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

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

CRW TSS TMDLs:
MPCA identified several nonpoint sources of TSS within the CRW. Figure 6 of the final TMDL document provides a chart showing the predominant source of TSS in the subwatersheds varies between agricultural runoff and near-channel erosion.

Stormwater runoff from agricultural land use practices: Runoff from agricultural lands may contain significant amounts of sediment which may lead to impairments in the CRW. MPCA estimated the runoff to be approximately 184 lbs per acre per year (Section 3.6 of the final TMDL document). MPCA noted that rainfall on unprotected soils, especially in the spring when vegetation has not significantly grown, can dislodge soil particles and then stormwater flows may transport these particles to surface waters. Sediment inputs to surface waters can be exacerbated by tile drainage lines, which channelize the stormwater flows. Tile lined fields and channelized ditches enable particles to move more efficiently into surface waters.

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

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

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

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.

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

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

Wetland and Forest Sources: Phosphorus, organic material and organic-rich sediment may be added to surface waters by stormwater flows through wetland and forested areas in the CRW. 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.

Future Growth:
MPCA noted that the TMDL watershed is relatively sparsely populated, and that populations are likely to decline (Section 5.0 of the final TMDL document). The WLA and load allocations for the CRW TMDLs were calculated for all current and future sources. Any expansion of point or nonpoint sources will need to comply with the respective WLA and LA values calculated in the CRW 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:

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 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 Minnesota R. 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 R. 7050 designates uses for waters of the state. The segments addressed by the CRW TMDLs are designated as Class 2 waters for aquatic recreation use (fishing, swimming, boating, etc.) and aquatic life use (phosphorus and TSS). One water body, Judicial Ditch 30 (Reach 511), is designated as Class 7 (Limited Resource Value Water). However, as noted on the MPCA WQS website:

> "Surface waters that cannot meet Class 2 aquatic life and recreational uses are Class 7 waters, otherwise known as limited resource value waters. Class 7 waters are still expected to meet standards that are protective for downstream waters and other beneficial uses. " https://www.pca.state.mn.us/business-with-us/water-quality-standards

Therefore, to be protective of downstream uses, MPCA has used the Class 2 criteria for Reach 511 to develop the TMDLs for Judicial Ditch 30 (Table 32 of the final TMDL document).

The Class 2 designated use is described in Minnesota R. 7050.0140 (3):

> Aquatic life and recreation includes all waters of the state that support or may support fish, other aquatic life, bathing, boating, or other recreational purposes and for which quality control is or may be necessary to protect aquatic or terrestrial life or their habitats or the public health, safety, or welfare.

Water use classifications for individual water bodies are provided in Minnesota R. 7050.0470, 7050.0425, and 7050.0430. The CRW TMDL report addresses the water bodies that do not meet the standards for Class 2 waters, or to be protective of Class 2 waters. The impaired streams and lakes in this report are classified as Class 2B (except as noted above) (Tables 1 and 2 of this Decision Document).

Standards:
Narrative Criteria:
Minnesota R. 7050.0150 (3) sets forth narrative criteria for Class 2 waters of the State:

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

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

Table 6: Bacteria Water Quality Standards Applicable to the CRW TMDLs

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

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

Bacteria TMDL Targets: The bacteria TMDL targets employed for the CRW bacteria TMDLs are the *E. coli* standards as stated in Table 6 of this Decision Document. The focus of the CRW 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 CRW 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.

TSS TMDLs: In January 2015, EPA approved MPCA's regionally-based TSS criteria for rivers and streams. The TSS criteria replaced Minnesota's statewide turbidity criterion. The TSS criteria provide water clarity targets for measuring suspended particles in rivers and streams.

TSS TMDL Targets: MPCA explained that the impaired waters are within the Southern River Nutrient Region, and therefore have a TSS criteria of **65 mg/L**, not to be exceeded more than 10% of the time (Section 2.2 of the final TMDL document).

Phosphorus TMDLs: Numeric criteria for phosphorus, chlorophyll-*a*, and Secchi Disk depth (SD) are set forth in Minnesota R. 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 lake TMDLs are found in Table 7 of this Decision Document.

In developing the lake nutrient standards for Minnesota lakes, MPCA evaluated data from a large cross-section of lakes within each of the State's ecoregions. Clear relationships were established between the causal factor, phosphorus, and the response variables, chl-*a* and SD depth. MPCA anticipates that by meeting the phosphorus concentrations of shallow lake WCBP ecoregion WQS the response variables chl-*a* and SD will be attained, and the lakes will achieve the 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.

Table 7: **Minnesota Eutrophication Standards for lakes within the WCBP ecoregion**

Parameter	WCBP Eutrophication Standard* (2B shallow lakes)
Total Phosphorus (µg/L)	TP < 90
Chlorophyll-a (µg/L)	chl-*a* < 30
Secchi Depth (m)	SD > 0.7

* - Summer average of all samples; applies from June 1-September 30

Nutrient TMDL Target: MPCA selected a phosphorus target of **90 µg/L** for the lakes. MPCA selected phosphorus as the appropriate target parameter to address eutrophication problem because of the interrelationships between phosphorus and chl-*a*, and phosphorus and Secchi Disk 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 Secchi Disk depth. EPA finds the nutrient targets employed for the lake phosphorus TMDLs to be reasonable.

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

3. Loading Capacity - Linking Water Quality and Pollutant Sources

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

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

The TMDL submittal should contain documentation supporting the TMDL analysis, including the basis for any assumptions; a discussion of strengths and weaknesses in the analytical process; and results from any water quality modeling. EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

TMDLs must take into account *critical conditions* for steam flow, loading, and water quality parameters as part of the analysis of loading capacity (40 C.F.R. § 130.7(c)(1)). TMDLs should define applicable *critical conditions* and describe their approach to estimating both point and nonpoint source loadings under such *critical conditions*. In particular, the TMDL should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

Comment:

CRW bacteria TMDLs: 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. MPCA believes the geometric mean of the WQS provides the best overall characterization of the status of the watershed. EPA agrees with this assertion, which is consistent with EPA's guidance: "…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."[1] 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 CRW 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 CRW. The CRW FDCs were developed using flow data generated from Hydrologic Simulation Program-Fortran (HSPF) modeling efforts at the outlet/pour point of each impaired reach as well as flow gages on several of the water bodies (Section 4.1.1 and Appendix D of the final TMDL document). MPCA focused on daily recorded flow measurements and HSPF modeled flows from approximately 2008 to 2017. HSPF hydrologic models were developed to simulate flow characteristics within the CRW and flow data focused on dates within the recreation season

[1] U.S. EPA, *The Water Quality Standards for Coastal and Great Lakes Recreation Waters Final Rule,"* 69 *Fed. Reg*. 67218-67243, at 67224.

(April 1 to October 31). Daily stream flows were necessary to implement the load duration curve approach.

HSPF is a comprehensive modeling package used to simulate watershed hydrology and water quality on a basin scale. The package includes both an Agricultural Runoff Model and a more general nonpoint source model. HSPF parametrizes numerous hydrologic and hydrodynamic processes to determine flow rate, sediment, and nutrient loads. HSPF uses continuous meteorological records to create hydrographs and to estimate time series pollution concentrations.[2,3] The output of the HSPF process is a model of multiple hydrologic response units (HRUs), or subwatersheds of the overall CRW. The flow from these HRUs were transferred from nearby U.S. Geological Service (USGS) gages (Appendix D of the final TMDL document).

FDCs graphs have flow duration interval (percentage of time flow exceeded) on the X-axis and discharge (flow per unit time) on the Y-axis. The FDC were transformed into LDC by multiplying individual flow values by the WQS (126 orgs/100 mL) and then multiplying that value by a conversion factor. The resulting points are plotted onto a load duration curve graph. LDC graphs, for the CRW bacteria TMDLs, have flow duration interval (percentage of time flow exceeded) on the X-axis and *E. coli* loads (number of bacteria per unit time) on the Y-axis. The CRW LDC used *E. coli* measurements in billions of bacteria per day. The curved line on a LDC graph represents the TMDL of the respective flow conditions observed at that location.

Water quality monitoring was completed in the CRW and measured *E. coli* concentrations were converted to individual sampling loads by multiplying the sample concentration by the instantaneous flow measurement observed/estimated at the time of sample collection and then by a conversion factor which allows the individual samples to be plotted on the same figure as the LDCs (e.g., Figure 18 of the final TMDL document). Individual LDCs are found in Section 4.3.6 of the final TMDL document.

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

The strengths of using the LDC method are that critical conditions and seasonal variation are considered in the creation of the FDC by plotting hydrologic conditions over the flows measured during the recreation season. Additionally, the LDC methodology is relatively easy to use and

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

cost-effective. The weaknesses of the LDC method are that nonpoint source allocations cannot be assigned to specific sources, and specific source reductions are not quantified. Overall, MPCA believes, and EPA concurs, that the strengths outweigh the weaknesses for the LDC method.

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

MPCA calculated bacteria TMDLs for the CRW and those results are found in Tables 8-15 of this Decision Document. The load allocations were calculated after the determination of the WLA, and the Margin of Safety (MOS) (5% 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 ('Watershed Load') to cover all nonpoint source contributions.

Tables 8-15 of this Decision Document report five points (the midpoints of the designated flow regime) on the loading capacity curve. However, 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 8-15 of this Decision Document identify the loading capacity for the water bodies at each flow regime. Although there are numeric loads for each flow regime, the LDC is what is being approved for this TMDL.

MPCA explained that the allocations for portions of several segments are calculated as formulas rather than loads. In these segments, point source flow discharges theoretically exceed the actual instream flow. For the lowest flow regime, the WLA and LA estimates were set based on the formula of Allocation = (flow contribution from a given source) * 126 orgs/100 mL (bacteria standard).

Tables 8-15: Bacteria (*E. coli*) TMDLs for the Cottonwood River Watershed are located at the end of this Decision Document in Attachment 1.

Tables 8-15 of this Decision Document show MPCA's estimates of reductions required for streams impaired due to excessive bacteria. Attaining these reduction percentage estimates under the flow conditions which the reductions are prescribed to will allow the impaired segment to meet their water quality targets. These loading reductions (i.e., the percentage column) were estimated from existing and TMDL load calculations. MPCA expects that these reductions will result in the attainment of the water quality targets and the stream segment's water quality will return to a level where the designated uses are no longer considered impaired.

EPA concurs with the data analysis and LDC approach utilized by MPCA in its calculation of loading capacities, wasteload allocations, load allocations and the margin of safety for the CRW bacteria TMDLs. The methods used for determining the TMDLs are consistent with EPA technical memos.[4]

CRW TSS TMDLs: MPCA used the same LDC development strategies as it did for the CRW bacteria TMDLs to calculate the loading capacities for the sediment TMDLs in the CRW. These strategies included incorporating HSPF model simulated flows to develop FDCs and water quality monitoring information collected within the CRW informing the LDC. The FDC were transformed into LDC by multiplying individual flow values by the TSS target (65 mg/L) and then multiplying that value by a conversion factor.

MPCA calculated TSS TMDLs (Tables 16-25 of this Decision Document). The load allocations were calculated after the determination of the WLA and the MOS (5% of the loading capacity). Load allocations (e.g., stormwater runoff from agricultural land use practices) were not split among individual nonpoint contributors. Instead, load allocations were combined together into one value to cover all nonpoint source contributions. Tables 16-25 of this Decision Document report five points (i.e., the midpoints of the designated flow regime) on the loading capacity curve. However, 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 sediment monitoring data and allows for the estimation of load reductions necessary for attainment of the TSS water quality standard. Using this method, daily loads were developed based upon the flow in the water body. Loading capacities were determined for each segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Tables 16-25 of this Decision Document identify the loading capacity for each segment at each flow regime. Although there are numeric loads for each flow regime, EPA is approving the LDC for this TMDL.

MPCA explained that the allocations for portions of several segments are calculated as formulas rather than loads. In these segments, point source flow discharges theoretically exceed the actual instream flow. For the lowest flow regime, the WLA and LA estimates were set based on the formula of Allocation = (flow contribution from a given source) * 65 mg/L (TSS standard).

MPCA estimated load reductions needed for the TSS TMDLs to attain the TSS water quality target of 65 mg/L. These loading reductions (i.e., the percentage column) were estimated from existing and TMDL load calculations. MPCA expects that these reductions will result in the attainment of the water quality targets and that water quality will return to a level where the designated uses are no longer considered impaired.

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

Tables 16-25: TSS TMDLs in the Cottonwood River Watershed are located at the end of this Decision Document in Attachment 2.

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

Lake phosphorus TMDLs: MPCA used the U.S. Army Corps of Engineers (USACE) BATHTUB model to calculate the loading capacities for the lake TMDLs noted in Table 2 of this Decision Document (Section 4.4.1 and Appendix B of the final TMDL document). The BATHTUB model was utilized to link observed phosphorus water quality conditions and estimated phosphorus loads to in-lake water quality estimates. MPCA has previously employed BATHTUB successfully in many lake studies in Minnesota. BATHTUB is a steady-state annual or seasonal model that predicts a lake's growing season (June 1 to September 30) average surface water quality. BATHTUB utilizes annual or seasonal time-scales which are appropriate because watershed phosphorus loads are normally impacted by seasonal conditions.

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

MPCA used the BATHTUB model to calculate the loading capacity for the lakes. The loading capacity is the maximum phosphorus load which the lake can receive over an annual period and still meet the lake nutrient WQS (Tables 26-32 of this Decision Document). Loading capacities on the annual scale (pounds per year (lbs/year)) were calculated to meet the WQS during the growing season (June 1 through September 30). The time period of June to September was chosen by MPCA as the growing season because it corresponds to the eutrophication criteria, contains the months that the general public typically uses the lake for aquatic recreation, and is the time of the year when water quality is likely to be impaired by excessive nutrient loading. Loading capacities were divided by 365 to calculate the daily loading capacities.

MPCA subdivided the lake loading capacities among the WLA, LA, and MOS (10% of the loading capacity) components of the TMDL (Tables 26-32 of this Decision Document). These calculations were based on the critical condition, the summer growing season, which is typically when the water quality in each lake is typically degraded and phosphorus loading inputs are the greatest. TMDL allocations assigned during the summer growing season will protect the lakes during the worst water quality conditions of the year. MPCA assumed that the loading capacities established by the TMDL will be protective of water quality during the remainder of the calendar year (October through May).

Tables 26-32 of this Decision Document communicate MPCA's estimates of the reductions required for the lakes to meet the water quality targets. These loading reductions (i.e., the percentage column) were estimated from existing and TMDL load calculations. MPCA expects that these reductions will result in the attainment of the water quality targets and the lake water quality will return to a level where the designated uses are no longer considered impaired.

Tables 26-32: Phosphorus TMDLs for lakes in the Cottonwood River Watershed are located at the end of this Decision Document in Attachment 3.

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 CRW TMDLs can be attributed to different nonpoint sources.

CRW bacteria TMDLs: The calculated LA values for the bacteria TMDLs are applicable across all flow conditions in the CRW (Tables 8-15 of this Decision Document). MPCA identified several nonpoint sources which contribute bacteria loads to the surface waters of the CRW, including; stormwater from agricultural and feedlot areas, failing septic systems, wildlife and bacteria contributions from upstream subwatersheds. MPCA did not determine load allocation values for each of these potential nonpoint source considerations but aggregated the nonpoint sources into one 'watershed load' LA calculation (Tables 8-15 of this Decision Document).

CRW 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 impaired segments in the CRW (Tables 16-25 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, wetland and forest sources, and atmospheric deposition. MPCA did not determine load allocation values for each of these potential nonpoint source considerations but aggregated the nonpoint sources into one "watershed load" LA calculation (Tables 16-25 of this Decision Document).

<u>CRW phosphorus TMDLs:</u> MPCA identified several nonpoint sources which contribute nutrient loading to the impaired lakes (Tables 26-32 of this Decision Document). These nonpoint sources included: watershed contributions from the lake's direct watershed (i.e., lakeshed loading), internal loading, contributions from SSTS and atmospheric deposition. MPCA calculated load allocation values for each of these potential nonpoint source considerations (Tables 26-32 of this Decision Document).

EPA finds MPCA's approach for calculating the LA for bacteria, phosphorus and TSS to be reasonable. The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of the fourth criterion.

5. Wasteload Allocations (WLAs)

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

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

<u>Comment:</u>
<u>CRW bacteria TMDLs:</u> MPCA identified seven NPDES permitted facilities within the CRW and assigned those facilities a portion of the WLA (Tables 4 and 8-15 of this Decision Document). Six of the seven facilities are controlled systems (ponds) and one is a mechanical system (Table 30 of the final TMDL document). For the pond systems, the maximum daily flow was based on a six-inch per day discharge from the facility's secondary pond (Section 4.3.2 of the final TMDL document). The ponds are limited by permit to discharge between March 1-June 30 and September 1-December 31 (unless ice-covered). For the mechanical facility, the maximum daily flow was based upon the average wet weather flow.

MPCA also explained that the WLA for each individual WWTP was calculated based on the *E. coli* WQS but WWTP permits are regulated for the fecal coliform WQS (200 orgs /100 mL 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 CRW TMDLs. The WLA was therefore calculated using the assumption that the *E. coli* standard of 126 orgs/100 mL provides equivalent protection from illness due to primary contact recreation as the fecal coliform WQS of 200 orgs/100 mL.

MPCA acknowledged the presence of CAFOs in the CRW in Section 3.6 of the final TMDL document. CAFOs and other feedlots are generally not allowed to discharge to waters of the State (Minnesota R. 7020.2003). CAFOs were assigned a WLA of zero (WLA = 0) by MPCA for the CRW bacteria TMDLs. 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. 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 TMDL.

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

CRW TSS TMDLs: MPCA identified fourteen NPDES permitted facilities on State Land (Table 5 of this Decision Document) within the CRW and assigned those facilities a portion of the WLA (Tables 5 and 16-25 of this Decision Document). Eleven of the facilities are controlled systems (ponds) (Table 19 of the final TMDL document), and the maximum daily flow was based on a six-inch per day discharge from the facility's secondary pond (Section 4.2.2 of the final TMDL document). The ponds are limited by permit to discharge between March 1-June 30 and September 1-December 31(unless ice-covered). Three of the facilities are mechanical dischargers, (Table 19 of the final TMDL document), and the maximum daily flow was based upon the average wet weather design flow (Section 4.2.2 of the final TMDL document). MPCA also noted in Section 4.2.2 of the final TMDL document that State rules allow a maximum TSS effluent limit of 30 mg/L for mechanical systems and 45 mg/L for pond systems, both well below the TSS in-stream criteria of 65 mg/L.

MPCA identified the City of Marshall as the only MS4 permittee discharging to TSS impaired waters in the CRW (Section 4.2.2 of the final TMDL document). MPCA assigned a portion of the loading based upon the areal extent of the MS4 permitted portion of the watershed. WLAs were determined for Reach 504 (0.2%), 508 (0.1%) and 509 (0.1%). MPCA noted that the direct MS4 discharge is to an unimpaired reach, and therefore did not assign any TSS reductions for the MS4 loads.

MPCA identified construction and industrial stormwater contributions as necessitating a WLA (Tables 16-25 of this Decision Document). Construction and industrial stormwater contributions were combined together to a single line item in the TMDL equations (Tables 16-25 of this Decision Document). The WLA for construction and industrial stormwater was calculated based on the average percent area (0.15%) of the CRW which was covered under a NPDES/State

Disposal System (SDS) Construction and Industrial Stormwater General Permit during the previous five years. The construction and industrial stormwater WLA was calculated as the percent area (0.15%) multiplied by the loading capacity (Section 4.2.2 of the final TMDL document).

Attaining the construction stormwater and industrial stormwater loads described in the CRW TSS TMDLs is the responsibility of construction and industrial site managers. Local MS4 permittees are required to have a construction stormwater ordinance at least as stringent as the State's NPDES/SDS General Stormwater Permit for Construction Activity (MNR100001). In the final TMDL document MPCA explained that if a construction site owner/operator obtains coverage under the NPDES/SDS General Stormwater Permit (MNR100001) and properly selects, installs and maintains all BMPs required under MNR100001 and applicable local construction stormwater ordinances, including those related to impaired waters discharges and any applicable additional requirements found in Appendix A of the Construction General Permit, the stormwater discharges would be expected to be consistent with the WLA in this TMDL. BMPs and other stormwater control measures which act to limit the discharge of the pollutant of concern (TSS) are defined in MNR100001.

The MPCA is responsible for overseeing industrial stormwater loads which impact water quality to lakes and stream segments in the CRW. Industrial sites within lake subwatersheds are expected to comply with the requirements of the State's NPDES/SDS Industrial Stormwater Multi-Sector General Permit (MNR050000) or NPDES/SDS General Permit for Construction Sand & Gravel, Rock Quarrying and Hot Mix Asphalt Production facilities (MNG490000). MPCA explained that if a facility owner/operator obtains coverage under the appropriate NPDES/SDS General Stormwater Permit and properly selects, installs and maintains all BMPs required under the permit, the stormwater discharges would be expected to be consistent with the WLA in this TMDL. BMPs and other stormwater control measures which act to limit the discharge of the pollutant of concern (TSS) 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 CRW TSS TMDLs. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified within 18-months of the approval of the TMDL by the EPA. This applies to sites under permits for MNR100001, MNR050000 and MNG490000.

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

Lake phosphorus TMDLs:

MPCA determined that there are no point sources other than the potential impacts of construction and industrial stormwater runoff in the watershed for the impaired lakes (Section 4.4.2 of the final TMDL document). Similar to the TSS TMDLs, MPCA calculated WLAs for construction and industrial stormwater for the phosphorus TMDLs (Tables 26-32 of this Decision Document). This WLA was represented as a categorical WLA for construction and industrial stormwater. The construction and industrial stormwater allocations for the lake TMDLs were calculated in the same manner as the construction and industrial stormwater allocations for the CRW TSS TMDLs. MPCA's expectations and responsibilities for overseeing construction and industrial stormwater loads for the phosphorus TMDL are the same for the TSS TMDLs.

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

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

6. Margin of Safety (MOS)

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

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

CRW bacteria and TSS TMDLs: The CRW bacteria and TSS TMDLs incorporated a 5% explicit MOS applied to the total loading capacity calculation for each flow regime of the LDC. Five percent of the total loading capacity was reserved for MOS with the remaining load allocated to point and nonpoint sources (Tables 8-25 of this Decision Document). MPCA explained that the Cottonwood River Basin HSPF model was calibrated and validated with 21 years of flow data from 5 stream gages. The results indicate a generally good agreement between the observed lake water quality and the model results, and therefore no additional MOS is needed. The HSPF model results are contained in Appendix D of the final TMDL document.

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 CRW 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 discussed 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.

Lake phosphorus TMDLs: For the lake phosphorus TMDLs, MPCA used an explicit MOS (Tables 26-32 of this Decision Document; Section 4.4.4 of the final TMDL document). MPCA utilized an explicit MOS of 10% to account for any uncertainties in the HSPF model, uncertainties in the assumptions made for estimating internal loading rates and other assumptions used for calibrating the BATHTUB modeling efforts for the lake. MPCA explained that the Cottonwood River Basin HSPF model was calibrated and validated with 21 years of flow data from 5 stream gages. The results indicate a generally good agreement between the observed lake water quality and the model results, and therefore no additional MOS is needed. The HSPF model results are contained in Appendix D of the final TMDL document.

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:
CRW 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 CRW 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).

CRW 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 CRW. Sediment loading in the CRW varies depending on surface water flow, land cover and climate/season. Spring is typically associated with large flows from snowmelt, the summer is associated with the growing season as well as periodic storm events and receding streamflows, and the fall brings increasing precipitation and rapidly changing agricultural landscapes. In all seasons, sediment inputs to surface waters typically occur primarily through wet weather events. Critical conditions that impact the response of CRW 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.

Lake phosphorus TMDLs: Seasonal variation was considered for the lake TMDLs as described in Section 4.4.5 of the final TMDL document. The nutrient targets employed in the TMDL were based on the average nutrient values collected during the growing season (June 1 to September 30). The water quality target was designed to meet the NLF eutrophication 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 CRW phosphorus TMDL effort, the LA and WLA estimates were calculated from modeling efforts which incorporated mean growing season total phosphorus values. Nutrient loading capacities were set in the TMDL development process to meet the WQS during the most critical period. The mid to late summer period is typically when eutrophication standards are exceeded and water quality within the CRW is deficient. By calibrating the modeling efforts to protect the lake during the worst water quality conditions of the year, it is assumed that the loading capacity established by the TMDL will be protective of water quality during the remainder of the calendar year (October through May).

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 CRW bacteria, phosphorus and TSS TMDLs provide reasonable assurance that actions identified in the implementation section of the final TMDL (i.e., Sections 6 and 8 of the final TMDL document), will be applied to attain the loading capacities and allocations calculated for the impaired reaches within the CRW. 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 CRW. Mitigation practices will be implemented over the next several years. It is anticipated that staff from Soil and Water Conservation District (SWCDs) (e.g., the Cottonwood County SWCD, Redwood SWCD, etc.), local Minnesota Board of Soil and Water Resources (BWSR) offices, the Redwood-Cottonwood River Control Area (RCRCA) and other local watershed groups will work together to reduce pollutant inputs to the CRW. MPCA has authored the Cottonwood River WRAPS document (December 2022) which provides information on the development of scientifically-supported restoration and protection strategies for implementation planning and action. MPCA sees the WRAPS document as a starting point for which MPCA and local partners can develop tools that will help local governments, 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.

County SWCDs, such as the Cottonwood County SWCD and the Redwood County SWCD, have a history of implementation efforts in the CRW. In addition to the SWCDs, the RCRCA has been applying conservation practices in areas in the CRW and providing educational opportunities to local landowners in order to achieve sound management of natural resources since the 1980s (https://rcrca.com/). The SWCDs and the RCRCA employ various programming, such as shoreline planting programming, native plant, tree and seed planting programming, cost-share opportunities, equipment rentals and other technical services to ensure that efforts are made to improve water quality and conserve water resources in the CRW. Other county SWCDs in the CRW has similar programming efforts which locals can utilize.

The Cottonwood County SWCD developed the "Cottonwood County Comprehensive Local Water Management Plan 2017-2027". The plan, which is similar to plans from other nearby counties, identifies priorities for controlling erosion and improving water quality in the Cottonwood River watershed (https://cottonwoodswcd.org/wp-content/uploads/2018/02/CCCLWP_-__FINAL_APPROVED.pdf). These watershed plans, together with the WRAPS report, provide a detailed blueprint for improving water quality in the CRW.

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 AFO facilities. The MPCA Feedlot Program implements rules governing these activities and provides assistance to counties and the livestock industry. The feedlot rules apply to most aspects of livestock waste management including the location, design, construction, operation and management of feedlots and manure handling facilities.

Reasonable assurance that the WLA set forth will be implemented is provided by regulatory actions. According to 40 C.F.R. § 122.44(d)(1)(vii)(B), NPDES permit effluent limits must be consistent with assumptions and requirements of all WLAs in an approved TMDL. MPCA's stormwater program and the NPDES permit program are the implementing programs for ensuring WLA are consistent with the TMDL. The NPDES program requires construction and industrial sites to create SWPPPs which summarize how stormwater will be minimized from construction and industrial sites. Under the MPCA's Stormwater General Permit, managers of sites under construction or industrial stormwater permits must review the adequacy of local SWPPPs to ensure that each plan meets WLA set in the CRW 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).

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. Figure 35 of the final TMDL document shows the resources spent within the CRW since 2004 (Section 6.2.3 of the final TMDL document). Over $106 million has been spent by Federal, State, local governments, and landowners.

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 CRW (Section 7 of the final TMDL document). Progress of TMDL implementation will be measured through regular monitoring efforts of water quality and total BMPs completed. MPCA anticipates that monitoring will be completed by local groups (e.g., the Cottonwood County SWCD). The RCRCA in particular focuses considerable resources on monitoring efforts in the watershed. At a minimum, the CRW 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 CRW. 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 CRW. 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.

Stream Monitoring:
River and stream monitoring in the CRW, has been completed by a variety of organizations (i.e., SWCDs) and funded by Clean Water Partnership Grants, and other available local funds. MPCA anticipates that stream monitoring in the CRW 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 (MDNR), or other agencies every five to ten years during the summer season.

Lake Monitoring:
The lakes in the CRW have all been periodically monitored by volunteers and staff over the years. Monitoring for some of these locations is planned for the future in order to keep a record of the changing water quality as funding allows. Lakes are generally monitored for TP, chl-*a*, and Secchi disk transparency. MPCA expects that in-lake monitoring will continue as implementation activities are installed across the watersheds. These monitoring activities should continue until water quality goals are met. Some tributary monitoring has been completed on the inlets to the lakes and may be important to continue as implementation activities take place throughout the subwatersheds.

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

The TMDL outlined some implementation strategies in Section 8 of the final TMDL document. MPCA outlined the importance of prioritizing areas within the CRW, education and outreach efforts with local partners, and partnering with local stakeholders to improve water quality within the watershed. The CRW WRAPS document (December 2022) includes additional detail regarding specific recommendations from MPCA to aid in the reduction of bacteria, nutrients and TSS to surface waters of the CRW. Additionally, MPCA referenced the Statewide Nutrient Reduction Strategy (https://www.pca.state.mn.us/water/nutrient-reduction-strategy) for focused implementation efforts targeting phosphorus nonpoint sources in CRW. The reduction goals for the bacteria, nutrient and TSS TMDLs may be met via components of the following strategies:

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

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

Manure management plans: Developing manure management plans can ensure that the storage and application rates of manure are appropriate for land conditions. Determining application rates that 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 bacteria to migrate to surface waters.

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

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

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

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

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

CRW TSS TMDLs:

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

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

Identification of Stream, River, and Lakeshore Erosional Areas: An assessment of stream channel, river channel, and lakeshore erosional areas should be completed to evaluate areas where erosion control strategies could be implemented in the CRW. 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 CRW and minimize or eliminate degradation of habitat.

CRW phosphorus TMDLs:
In addition to several of the implementation activities mentioned above, MPCA identified additional controls needed for the lakes:

Septic Field Maintenance: Septic systems are believed to be a minor source of nutrients to some of the lakes. 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 the lake. MPCA aims to greatly reduce the number of failing SSTS in the future via local septic management programs and educational opportunities. Educating the public on proper septic maintenance, finding and eliminating illicit discharges, and repairing failing systems could lessen the impacts of septic derived nutrients inputs into the CRW.

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

- *Management of fish populations:* Monitor and manage fish populations to maintain healthy game fish populations and reduce rough fish (i.e. carp, bullheads, fathead minnows) populations.
- *Vegetation management:* Improved management of in-lake vegetation in order to limit phosphorus loading and to increase water clarity. Controlling the vitality of curly-leaf pondweeds via chemical treatments (herbicide applications) will reduce one of the significant sources of internal loading, the senescence of curly-leaf plants in the summer months.
- *Chemical treatment:* The addition of chemical reactants (e.g., aluminum sulfate) to lakes of the CRW 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:
The public participation section of the TMDL submittal is found in Section 9 of the final TMDL document. Throughout the development of the CRW TMDLs the public was given various opportunities to participate. As part of the strategy to communicate the goals of the TMDL project and to engage with members of the public, MPCA worked with county and SWCD staff in the CRW to promote water quality, to gain input from landowners via surveys and interviews and to better understand the social dynamics of stakeholders in the CRW. MPCA's goal was to create civic engagement and discussion which would enhance the content of the TMDL and WRAPS. MPCA utilized a Local Work Group composed of staff from various county and state programs to discuss the TMDL development process. Several public informational meetings were held during the development of the TMDL.

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 October 10, 2022 and ended on November 9, 2022. No comments were received by MPCA.

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 Cottonwood River Watershed TMDL document, submittal letter and accompanying documentation from MPCA on December 15, 2022. The transmittal letter explicitly stated that the final TMDLs referenced in Tables 1 and 2 of this Decision Document were being submitted to EPA pursuant to Section 303(d) of the Clean Water Act for EPA review and approval.

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

The EPA finds that the TMDL transmittal letter submitted for the Cottonwood 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 eight (8) bacteria TMDLs, the eleven (11) TSS TMDLs, and the seven (7) phosphorus TMDL satisfy all elements for approvable TMDLs. This TMDL approval is for **twenty six (26) TMDLs**, addressing segments for aquatic recreational and aquatic life use impairments (Tables 1 and 2 of this Decision Document).

The EPA's approval of these TMDLs extends to the water bodies which are identified above with the exception of any portions of the water bodies that are within Indian Country, as defined in 18 U.S.C. Section 1151, and as further discussed in our Decision Document. 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.

ATTACHMENTS

Attachment #1: Tables 8-15: Bacteria (*E. coli*) TMDLs for the Cottonwood River Watershed TMDL

Attachment #2: Tables 16-25: TSS TMDLs for the Cottonwood River Watershed TMDL

Attachment #3: Tables 26-32: Phosphorus TMDLs for lakes in the Cottonwood River Watershed TMDL

Attachment #1 – *E. coli* TMDLs

Table 8. *E. coli* TMDL summary for Cottonwood River Reach 502.

E. coli		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		*E. coli* load (billions of orgs/day)				
Wasteload	Balaton WWTP	4	4	4	4	**
	Garvin WWTP	0.8	0.8	0.8	0.8	**
	Total WLA	**5**	**5**	**5**	**5**	**
Load	**Total LA**	**743**	**197**	**51**	**9**	**
MOS		**39**	**11**	**3**	**0.7**	**0.1**
Total load		**787**	**213**	**59**	**15**	**3**
Existing Concentration, Apr-Oct (org/100 mL)* **		**1,063**				
Maximum Monthly Geometric Mean (org/100mL)* **		**1,859**				
Overall Estimated Percent Reduction* **		**93%**				

* Model simulated flow for HSPF reach 90 from April-October (2008-2017) was used to develop the flow zones and LCs for this reach.
** The permitted wastewater design flows exceed the stream flow in the indicated flow zone(s). The allocations are expressed as an equation rather than an absolute number: allocation = (flow contribution from a given source) x (126 org per 100 mL) x conversion factors.
*** Water quality monitoring station(s) used to estimate reductions: S009-440; the maximum monthly geometric mean of 1,859 is from a month with fewer than 5 samples.

Table 9. *E. coli* TMDL summary for Judicial Ditch 30 Reach 511.

E. coli		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		*E. coli* load (billions of orgs/day)				
Wasteload	Sleepy Eye WWTP	31	31	31	**	**
	Total WLA	**31**	**31**	**31**	**	**
Load	**Total LA**	**451**	**149**	**30**	**	**
MOS		**25**	**10**	**3**	**1**	**0.3**
Total load		**507**	**190**	**64**	**20**	**7**
Existing Concentration, Apr-Oct (org/100 mL)* **		**710**				
Maximum Monthly Geometric Mean (org/100mL)* **		**921**				
Overall Estimated Percent Reduction* **		**86%**				

* Model simulated flow for HSPF reach 435 from April-October (2008-2017) was used to develop the flow zones and LCs for this reach.
** The permitted wastewater design flows exceed the stream flow in the indicated flow zone(s). The allocations are expressed as an equation rather than an absolute number: allocation = (flow contribution from a given source) x (126 org per 100 mL) x conversion factors.
*** Water quality monitoring station(s) used to estimate reductions: S009-438; the maximum monthly geometric mean of 921 is from a month with fewer than 5 samples.

Table 10. *E. coli* TMDL summary for Highwater Creek Reach 519.

E. coli		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		*E. coli* load (billions of orgs/day)				
Wasteload	Storden WWTP	1	1	1	1	**
	Westbrook WWTP	8	8	8	8	**
	Total WLA	9	9	9	9	**
Load	Total LA	735	259	71	9	**
MOS		39	14	4	1	0.2
Total load		783	282	84	19	3
Existing Concentration, Apr-Oct (org/100 mL)***		1,897				
Maximum Monthly Geometric Mean (org/100mL)***		2,729				
Overall Estimated Percent Reduction***		95%				

* Model simulated flow for HSPF reach 279 from April-October (2008-2017) was used to develop the flow zones and LCs for this reach.

** The permitted wastewater design flows exceed the stream flow in the indicated flow zone(s). The allocations are expressed as an equation rather than an absolute number: allocation = (flow contribution from a given source) x (126 org per 100 mL) x conversion factors.

*** Water quality monitoring station(s) used to estimate reductions: S009-443; the maximum monthly geometric mean of 2,729 is from a month with fewer than 5 samples.

Table 11. *E. coli* TMDL summary for Dry Creek Reach 520.

E. coli		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		*E. coli* load (billions of orgs/day)				
Load	Total LA	329	108	25	6	1
MOS		17	6	1	0.3	0.1
Total load		346	114	26	6	1
Existing Concentration, Apr-Oct (org/100 mL)**		2,033				
Maximum Monthly Geometric Mean (org/100mL)**		3,248				
Overall Estimated Percent Reduction**		96%				

* Model simulated flow for HSPF reach 291 from April-October (2008-2017) was used to develop the flow zones and LCs for this reach.

** Water quality monitoring station(s) used to estimate reductions: S009-442; the maximum monthly geometric mean of 3,248 is from a month with fewer than 5 samples.

Table 12. *E. coli* TMDL summary for Mound Creek Reach 521.

E. coli		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		*E. coli* load (billions of orgs/day)				
Load	Total LA	433	142	35	9	1
	MOS	23	7	2	0.5	0.1
	Total load	456	149	37	10	1
Existing Concentration, Apr-Oct (org/100 mL)**		1,553				
Maximum Monthly Geometric Mean (org/100mL)**		1,709				
Overall Estimated Percent Reduction**		93%				

* Model simulated flow for HSPF reach 311 from April-October (2008-2017) was used to develop the flow zones and LCs for this reach.
** Water quality monitoring station(s) used to estimate reductions: S005-690.

Table 13. *E. coli* TMDL summary for Pell Creek Reach 523.

E. coli		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		*E. coli* load (billions of orgs/day)				
Wasteload	Walnut Grove WWTP	1	1	1	1	**
	Revere WWTP	0.7	0.7	0.7	0.7	**
	Total WLA	2	2	2	2	**
Load	Total LA	358	113	27	5	**
	MOS	19	6	2	0.4	0.1
	Total load	379	121	31	7	1
Existing Concentration, Apr-Oct (org/100 mL)***		937				
Maximum Monthly Geometric Mean (org/100mL)***		2,005				
Overall Estimated Percent Reduction***		94%				

* Model simulated flow for HSPF reach 215 from April-October (2008-2017) was used to develop the flow zones and LCs for this reach.
** The permitted wastewater design flows exceed the stream flow in the indicated flow zone(s). The allocations are expressed as an equation rather than an absolute number: allocation = (flow contribution from a given source) x (126 org per 100 mL) x conversion factors.
*** Water quality monitoring station(s) used to estimate reductions: S009-444; the maximum monthly geometric mean of 2,005 is from a month with fewer than 5 samples.

Table 14. ***E. coli*** **TMDL summary for Coal Mine Creek Reach 604.**

E. coli		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		*E. coli* load (billions of orgs/day)				
Load	Total LA	321	105	29	7	2
	MOS	17	6	2	0.4	0.1
	Total load	338	111	31	7	2
Existing Concentration, Apr-Oct (org/100 mL)**		1,401				
Maximum Monthly Geometric Mean (org/100mL)**		1,740				
Overall Estimated Percent Reduction**		93%				

* Model simulated flow for HSPF reach 335 from April-October (2008-2017) was used to develop the flow zones and LCs for this reach.
** Water quality monitoring station(s) used to estimate reductions: S005-691 and S009-439.

Table 15. ***E. coli*** **TMDL summary for Judicial Ditch 30 Reach 609.**

E. coli		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		*E. coli* load (billions of orgs/day)				
Load	Total LA	378	140	48	15	5
	MOS	20	7	3	0.8	0.3
	Total load	398	147	51	16	5
Existing Concentration, Apr-Oct (org/100 mL)**		787				
Maximum Monthly Geometric Mean (org/100mL)**		2,064				
Overall Estimated Percent Reduction**		94%				

* Model simulated flow for HSPF reach 435 from April-October (2008-2017) was used to develop the flow zones and LCs for this reach.
** Water quality monitoring station(s) used to estimate reductions: S005-688.

Attachment #2- TSS TMDLs

Table 16. TSS TMDL summary for Cottonwood River Reach 502.

Total Suspended Solids		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		TSS load (lbs/day)				
Wasteload	Garvin WWTP (MNG580101)	63	63	63	63	**
	Balaton WWTP (MN0020559)	306	306	306	306	**
	Construction/Industrial SW	86	23	6	2	**
	Total WLA	**455**	**392**	**375**	**371**	**
Load	**Total LA**	**54,513**	**14,430**	**3,708**	**608**	**
	MOS	**2,893**	**780**	**215**	**52**	**10**
	Total load	**57,861**	**15,602**	**4,298**	**1,031**	**199**
Existing 90th percentile concentration (mg/L)* **		**75**				
Overall estimated percent reduction* **		**13%**				

* Model simulated flow for HSPF reach 90 (2008-2017) was used to develop the flow zones and LCs for this reach.
** The permitted wastewater design flows exceed the stream flow in the indicated flow zone(s). The allocations are expressed as an equation rather than an absolute number: allocation = (flow contribution from a given source) x (65 mg/L or NPDES permit concentration) x (conversion factors). The LA is the remainder after the WLA is applied.
*** Water quality monitoring station(s) used to estimate reductions: S009-440.

Table 17. TSS TMDL summary for Cottonwood River Reach 504.

Total Suspended Solids		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		TSS load (lbs/day)				
Wasteload	Garvin WWTP (MNG580101)	63	63	63	63	**
	Revere WWTP (MNG580114)	56	56	56	56	**
	Tracy WWTP (MN0021725)	1,312	1,312	1,312	1,312	**
	Balaton WWTP (MN0020559)	306	306	306	306	**
	Walnut Grove WWTP (MN0021776)	51	51	51	51	**
	City of Marshall MS4 (MS400241)***	591	184	47	10	**
	Construction/Industrial SW	360	112	29	6	**
	Total WLA	**2,739**	**2,084**	**1,864**	**1,804**	**
Load	**Total LA**	**227,061**	**69,361**	**16,411**	**2,179**	**
	MOS	**12,095**	**3,760**	**962**	**210**	**42**
	Total load	**241,895**	**75,205**	**19,237**	**4,193**	**836**
Existing 90th percentile concentration (mg/L)** **		**78**				
Overall estimated percent reduction** **		**17%**				

* Model simulated flow for HSPF reach 250 (2008-2017) was used to develop the flow zones and LCs for this reach.
** The permitted wastewater design flows exceed the stream flow in the indicated flow zone(s). The allocations are expressed as an equation rather than an absolute number: allocation = (flow contribution from a given source) x (65 mg/L or NPDES permit concentration) x (conversion factors). The LA is the remainder after the WLA is applied.
*** Although a small portion of the city of Marshall falls within the drainage area for this reach, reductions are not required (see Section 4.2.2 of the final TMDL document).
**** Water quality monitoring station(s) used to estimate reductions: S002-247.

Table 18. TSS TMDL summary for Cottonwood River Reach 508.

Total Suspended Solids		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		TSS load lbs/day)				
Wasteload	Sanborn WWTP (MNG580115)	128	128	128	128	**
	Springfield WWTP (MN0024953)	195	195	195	195	**
	Balaton WWTP (MN0020559)	306	306	306	306	**
	Garvin WWTP (MNG580101)	63	63	63	63	**
	Revere WWTP (MNG580114)	56	56	56	56	**
	Tracy WWTP (MN0021725)	1,312	1,312	1,312	1,312	**
	Walnut Grove WWTP (MN0021776)	51	51	51	51	**
	Storden WWTP (MNG580106)	99	99	99	99	**
	Westbrook WWTP (MNG580127)	611	611	611	611	**
	Lamberton WWTP (MNG580100)	489	489	489	489	**
	City of Marshall MS4 (MS400241)***	591	184	47	10	**
	Construction/Industrial SW	726	247	66	16	**
	Total WLA	**4,627**	**3,741**	**3,423**	**3,336**	**
Load	**Total LA**	**458,470**	**153,751**	**38,880**	**7,114**	**
MOS		**24,374**	**8,289**	**2,226**	**550**	**103**
Total load		**487,471**	**165,781**	**44,529**	**11,000**	**2,059**
Existing 90th percentile concentration (mg/L)* **		**130**				
Overall estimated percent reduction* **		**50%**				

* Model simulated flow for HSPF reach 370 (2008-2017) was used to develop the flow zones and LCs for this reach.
** The permitted wastewater design flows exceed the stream flow in the indicated flow zone(s). The allocations are expressed as an equation rather than an absolute number: allocation = (flow contribution from a given source) x (65 mg/L or NPDES permit concentration) x (conversion factors). The LA is the remainder after the WLA is applied.
*** Although a small portion of the city of Marshall falls within the drainage area for this reach, reductions are not required (see Section 4.2.2 of the final TMDL document).
**** Water quality monitoring station(s) used to estimate reductions: S001-920.

Table 19. TSS TMDL summary for Cottonwood River Reach 509.

Total Suspended Solids		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		TSS load (lbs/day)				
Wasteload	Sanborn WWTP (MNG580115)	128	128	128	128	**
	Springfield WWTP (MN0024953)	195	195	195	195	**
	Balaton WWTP (MN0020559)	306	306	306	306	**
	Garvin WWTP (MNG580101)	63	63	63	63	**
	Revere WWTP (MNG580114)	56	56	56	56	**
	Tracy WWTP (MN0021725)	1,312	1,312	1,312	1,312	**
	Walnut Grove WWTP (MN0021776)	51	51	51	51	**

	Storden WWTP (MNG580106)	99	99	99	99	**
	Westbrook WWTP (MNG580127)	611	611	611	611	**
	Lamberton WWTP (MNG580100)	489	489	489	489	**
	Lucan WWTP (MNG580112)	257	257	257	257	**
	Wanda WWTP (MNG580126)	67	67	67	67	**
	Clements WWTP (MNG580094)	61	61	61	61	**
	Wabasso WWTP (MN0025151)	28	28	28	28	**
	City of Marshall MS4 (MS400241)***	591	184	47	10	**
	Construction/Industrial SW	968	339	91	23	**
	Total WLA	**5,282**	**4,246**	**3,861**	**3,756**	**
Load	**Total LA**	**611,988**	**211,942**	**54,449**	**10,661**	**
MOS		**32,488**	**11,378**	**3,069**	**759**	**180**
Total load		**649,758**	**227,566**	**61,379**	**15,176**	**3,598**
Existing 90th percentile concentration (mg/L)**		**104**				
Overall estimated percent reduction**		**38%**				

* Model simulated flow for HSPF reach 430 (2008-2017) was used to develop the flow zones and LCs for this reach.
** The permitted wastewater design flows exceed the stream flow in the indicated flow zone(s). The allocations are expressed as an equation rather than an absolute number: allocation = (flow contribution from a given source) x (65 mg/L or NPDES permit concentration) x (conversion factors). The LA is the remainder after the WLA is applied.
*** Although a small portion of the city of Marshall falls within the drainage area for this reach, reductions are not required (see Section 4.2.2 of the final TMDL document).
**** The impairment listing for this reach is based on Secchi Tube data (see Table 8) as no TSS data has been collected for this reach. Therefore, reductions are based on HSPF simulated TSS loads/concentrations.

Table 20. TSS TMDL summary for Dutch Charley Creek Reach 517.

Total Suspended Solids		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		TSS load (lbs/day)				
Wasteload	Storden WWTP (MNG580106)	99	99	99	99	**
	Westbrook WWTP (MNG580127)	611	611	611	611	**
	Lamberton WWTP (MNG580100)	489	489	489	489	**
	Construction/Industrial SW	165	59	18	4	**
	Total WLA	**1,364**	**1,258**	**1,217**	**1,203**	**
Load	**Total LA**	**104,035**	**36,612**	**10,094**	**1,589**	**
MOS		**5,547**	**1,993**	**595**	**147**	**23**
Total load		**110,946**	**39,863**	**11,906**	**2,939**	**456**
Existing 90th percentile concentration (mg/L)***		**79**				
Overall estimated percent reduction***		**18%**				

* Model simulated flow for HSPF reach 281 (2008-2017) was used to develop the flow zones and LCs for this reach.
** The permitted wastewater design flows exceed the stream flow in the indicated flow zone(s). The allocations are expressed as an equation rather than an absolute number: allocation = (flow contribution from a given source) x (65 mg/L or NPDES permit concentration) x (conversion factors). The LA is the remainder after the WLA is applied.
*** Water quality monitoring station(s) used to estimate reductions: S001-915.

Table 21. TSS TMDL summary for Dutch Charley Creek Reach 518.

Total Suspended Solids		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		TSS load (lbs/day)				
Wasteload	Lamberton WWTP (MNG580100)	489	489	489	489	**
	Construction/Industrial SW	78	27	8	2	**
	Total WLA	567	516	497	491	**
Load	Total LA	49,303	16,749	4,468	756	**
MOS		2,625	909	261	66	10
Total load		52,495	18,174	5,226	1,313	194
Existing 90th percentile concentration (mg/L)***		****				
Overall estimated percent reduction***		5%				

* Model simulated flow for HSPF reach 267 (2008-2017) was used to develop the flow zones and LCs for this reach.
** The permitted wastewater design flows exceed the stream flow in the indicated flow zone(s). The allocations are expressed as an equation rather than an absolute number: allocation = (flow contribution from a given source) x (65 mg/L or NPDES permit concentration) x (conversion factors).
*** Water quality monitoring station(s) used to evaluate reductions: S004-879.
**** The 90th percentile flow-zone corrected monitored TSS concentration is at or below 65 mg/L and therefore a 5% load reduction is recommended to ensure the TSS standard is met. There were 22 TSS measurements collected in this reach from 2008-2017 and therefore more monitoring would help determine if reductions beyond 5% are needed.

Table 22. TSS TMDL summary for Highwater Creek Reach 519.

Total Suspended Solids		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		TSS load (lbs/day)				
Wasteload	Storden WWTP (MNG580106)	99	99	99	99	**
	Westbrook WWTP (MNG580127)	611	611	611	611	**
	Construction/Industrial SW	86	31	9	2	**
	Total WLA	796	741	719	712	**
Load	Total LA	53,847	18,990	5,136	622	**
MOS		2,876	1,038	308	70	11
Total load		57,519	20,769	6,163	1,404	229
Existing 90th percentile concentration (mg/L)***		****				
Overall estimated percent reduction***		5%				

* Model simulated flow for HSPF reach 279 (2008-2017) was used to develop the flow zones and LCs for this reach.
** The permitted wastewater design flows exceed the stream flow in the indicated flow zone(s). The allocations are expressed as an equation rather than an absolute number: allocation = (flow contribution from a given source) x (65 mg/L or NPDES permit concentration) x (conversion factors). The LA is the remainder after the WLA is applied.
*** Water quality monitoring station(s) used to evaluate reductions: S009-443.
**** The 90th percentile flow-zone corrected monitored TSS concentration is at or below 65 mg/L and therefore a 5% load reduction is recommended to ensure the TSS standard is met. There were 22 TSS measurements collected in this reach from 2008-2017 and therefore more monitoring would help determine if reductions beyond 5% are needed.

Table 23. TSS TMDL summary for Pell Creek Reach 535.

Total Suspended Solids		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		TSS load (lbs/day)				
Wasteload	Construction/Industrial SW	11	3	0.9	0.2	0.03
	Total WLA	11	3	0.9	0.2	0.03
Load	Total LA	6,789	2,113	569	121	17
MOS		358	111	30	6	0.9
Total load		7,158	2,227	600	127	18
Existing 90th percentile concentration (mg/L)**		***				
Overall estimated percent reduction**		5%				

* Model simulated flow for HSPF reach 211 (2008-2017) was used to develop the flow zones and LCs for this reach.
** The impairment listing for this reach is based on Secchi Tube data (see Table 8) as no TSS data have been collected for this reach. Therefore, reductions were evaluated using HSPF simulated TSS loads/concentrations.
*** The 90th percentile flow-zone corrected HSPF simulated TSS concentration is at or below 65 mg/L and therefore a 5% load reduction is recommended to ensure the TSS standard is met. No TSS measurements have been collected in this reach. Future monitoring would help determine if reductions beyond 5% are needed.

Table 24. TSS TMDL summary for Sleepy Eye Creek Reach 599.

Total Suspended Solids		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		TSS load (lbs/day)				
Wasteload	Clements WWTP (MNG580094)	61	61	61	61	61
	Lucan WWTP (MNG580112)	257	257	257	257	257
	Wabasso WWTP (MN0025151)	28	28	28	28	28
	Wanda WWTP (MNG580126)	67	67	67	67	67
	Construction/Industrial SW	246	75	19	5	1
	Total WLA	659	488	432	418	414
Load	Total LA	156,318	47,368	11,601	2,619	366
MOS		8,262	2,519	633	160	41
Total load		165,239	50,375	12,666	3,197	821
Existing 90th percentile concentration (mg/L)**		85				
Overall estimated percent reduction**		24%				

* Model simulated flow for HSPF reach 407 (2008-2017) was used to develop the flow zones and LCs for this reach. ** Water quality monitoring station(s) used to estimate reductions: S001-919.

Table 25. TSS TMDL summary for Plum Creek Reach 602 and 603*.**

Total Suspended Solids		Flow zones*				
		Very high	High	Midrange	Low	Very low
Sources		TSS load (lbs/day)				
Wasteload	Construction/Industrial SW	73	23	6	1	0.2
	Total WLA	**73**	**23**	**6**	**1**	**0.2**
Load	**Total LA**	**46,565**	**14,829**	**3,827**	**747**	**103**
MOS		**2,455**	**782**	**202**	**39**	**5**
Total load		**49,093**	**15,634**	**4,035**	**787**	**108**
Existing 90th percentile concentration (mg/L)**		**77**				
Overall estimated percent reduction**		**16%**				

* Model simulated flow for HSPF reach 191 (2008-2017) was used to develop the flow zones and LCs for this reach.
** Water quality monitoring station(s) used to estimate reductions: S001-913.
*** Plum Creek Reach 516 was split into two separate reaches, 602 and 603, during 2019 assessment process

Attachment #3 -Lake phosphorus TMDLs

Table 26. Rock Lake (42-0052-00) phosphorus TMDL summary.

Phosphorus		Existing TP load*		Allowable TP load		Estimated load reduction	
Sources		lbs/year	lbs/day	lbs/year	lbs/day	lbs/year**	%
Wasteload	Construction/Industrial SW	3	0.01	3	0.01	0	0%
	Total WLA	**3**	**0.01**	**3**	**0.01**	**0**	**0%**
Load	Watershed runoff	1,699	4.65	841	2.30	858	50%
	SSTS	15	0.04	9	0.03	6	39%
	Atmospheric deposition	91	0.25	91	0.25	0	0%
	Internal load	3,722	10.19	496	1.36	3,226	87%
	Total LA	**5,527**	**15.13**	**1,437**	**3.94**	**4,090**	**74%**
MOS				**160**	**0.44**		
Total load		**5,530**	**15.14**	**1,600**	**4.39**	**4,090**	**71%**

*Model calibration year(s): 2002, 2007 & 2017.
** Net reduction from current load to TMDL is 3,930 lbs/yr; but the gross load reduction from all sources must accommodate the MOS as well, and hence is 3,930 + 160 = 4,090 lbs/yr.

Table 27. Bean Lake (08-0011-00) phosphorus TMDL summary.

Phosphorus		Existing TP load*		Allowable TP load		Estimated load reduction	
Sources		lbs/year	lbs/day	lbs/year	lbs/day	lbs/year**	%
Wasteload	Construction/Industrial SW	0.5	0.001	0.5	0.001	0.0	0%
	Total WLA	**0.5**	**0.001**	**0.5**	**0.001**	**0.0**	**0%**
Load	Watershed runoff	326.0	0.893	211.6	0.579	114.4	35%
	SSTS	2.5	0.007	1.2	0.003	1.3	54%
	Atmospheric deposition	39.2	0.107	39.2	0.107	0.0	0%
	Internal load	1,191.8	3.263	591.2	1.619	600.6	50%
	Total LA	**1,559.5**	**4.270**	**843.2**	**2.308**	**716.3**	**46%**
MOS				**93.7**	**0.257**		
Total load		**1,560.0**	**4.271**	**937.4**	**2.566**	**716.3**	**40%**

* Model calibration year(s): 2007, 2008 & 2017.
** Net reduction from current load to TMDL is 622.6 lbs/yr; but the gross load reduction from all sources must accommodate the MOS as well, and hence is 622.6 + 93.7 = 716.3 lbs/yr.

Table 28. Double (North Portion) Lake (17-0056-01) phosphorus TMDL summary

Phosphorus		Existing TP load*		Allowable TP load		Estimated load reduction	
Sources		lbs/year	lbs/day	lbs/year	lbs/day	lbs/year**	%
Wasteload	Construction/Industrial SW	0.5	0.001	0.5	0.001	0.0	0%
	Total WLA	**0.5**	**0.001**	**0.5**	**0.001**	**0.0**	**0%**
Load	Watershed runoff	365.2	1.000	103.8	0.284	261.4	72%
	SSTS	10.9	0.030	5.2	0.014	5.7	52%
	Upstream lake (Bean)	145.8	0.399	97.8	0.268	48.0	33%
	Atmospheric deposition	32.5	0.089	32.5	0.089	0.0	0%
	Internal load	468.2	1.282	329.0	0.901	139.2	30%
	Total LA	**1,022.6**	**2.800**	**568.3**	**1.556**	**454.3**	**44%**
MOS				**63.2**	**0.173**		
Total load		**1,023.1**	**2.801**	**632.0**	**1.730**	**454.3**	**38%**

* Model calibration year(s): 2007, 2008, 2017 and 2018.

** Net reduction from current load to TMDL is 391.1 lbs/yr; but the gross load reduction from all sources must accommodate the MOS as well, and hence is 391.1 + 63.2 = 454.3 lbs/yr.

Table 29. Clear Lake (08-0011-00) phosphorus TMDL summary

Phosphorus		Existing TP load*		Allowable TP load		Estimated load reduction	
Sources		lbs/year	lbs/day	lbs/year	lbs/day	lbs/year**	%
Wasteload	Construction/Industrial SW	1.6	0.004	1.6	0.004	0.0	0%
	Total WLA	**1.6**	**0.004**	**1.6**	**0.004**	**0.0**	**0%**
Load	Watershed Runoff	1,055.8	2.891	605.3	1.657	450.5	43%
	SSTS	16.3	0.045	7.6	0.021	8.7	53%
	Atmospheric deposition	66.2	0.181	66.2	0.181	0.0	0%
	Internal load	1,289.0	3.529	344.6	0.943	944.4	73%
	Total LA	**2,427.3**	**6.646**	**1,023.7**	**2.802**	**1,403.6**	**58%**
MOS				**113.9**	**0.312**		
Total load		**2,428.9**	**6.650**	**1,139.2**	**3.118**	**1,403.6**	**53%**

* Model calibration year(s): 2009, 2010 and 2017.

** Net reduction from current load to TMDL is 1,289.7 lbs/yr; but the gross load reduction from all sources must accommodate the MOS as well, and hence is 1,289.7 + 113.9 = 1,403.6 lbs/yr.

Table 30. Altermatt Lake (08-0054-00) phosphorus TMDL summary

Phosphorus		Existing TP load*		Allowable TP load		Estimated load reduction	
Sources		lbs/year	lbs/day	lbs/year	lbs/day	lbs/year**	%
Wasteload	Construction/Industrial SW	1	0.004	1	0.004	0	0%
	Total WLA	**1**	**0.004**	**1**	**0.004**	**0**	**0%**
Load	Watershed runoff	978	2.679	374	1.025	604	62%
	SSTS	9	0.026	4	0.012	5	54%
	Atmospheric deposition	29	0.080	29	0.080	0	0%
	Internal load	3,169	8.677	50	0.136	3,119	98%
	Total LA	**4,185**	**11.462**	**457**	**1.253**	**3,728**	**89%**
MOS				**51**	**0.140**		
Total load		**4,186**	**11.466**	**509**	**1.397**	**3,728**	**88%**

* Model calibration year(s): 2009 and 2010.
** Net reduction from current load to TMDL is 3,677 lbs/yr; but the gross load reduction from all sources must accommodate the MOS as well, and hence is 3,677 + 51 = 3,728 lbs/yr.

Table 31. Boise Lake (08-0096-00) phosphorus TMDL summary

Phosphorus		Existing TP load*		Allowable TP load		Estimated load reduction	
Sources		lbs/year	lbs/day	lbs/year	lbs/day	lbs/year**	%
Wasteload	Construction/Industrial SW	1	0.003	1	0.003	0	0%
	Total WLA	**1**	**0.003**	**1**	**0.003**	**0**	**0%**
Load	Watershed runoff	804	2.202	258	0.706	546	68%
	SSTS	8	0.023	4	0.010	4	50%
	Atmospheric deposition	42	0.114	42	0.114	0	0%
	Internal load	1,333	3.649	96	0.264	1,237	93%
	Total LA	**2,187**	**5.988**	**400**	**1.094**	**1,787**	**82%**
MOS				**44**	**0.122**		
Total load		**2,188**	**5.991**	**445**	**1.219**	**1,787**	**80%**

* Model calibration year(s): 2011 and 2012.
** Net reduction from current load to TMDL is 1,743 lbs/yr; but the gross load reduction from all sources must accommodate the MOS as well, and hence is 1,743 + 44 = 1,787 lbs/yr.

Table 32. Bachelor Lake (08-0029-00) phosphorus TMDL summary.

Phosphorus		Existing TP load*		Allowable TP load		Estimated load reduction	
Sources		lbs/year	lbs/day	lbs/year	lbs/day	lbs/year**	%
Wasteload	Construction/Industrial SW	0.4	0.001	0.4	0.001	0.0	0%
	Total WLA	**0.4**	**0.001**	**0.4**	**0.001**	**0.0**	**0%**
Load	Watershed runoff	282.2	0.773	50.5	0.138	231.7	82%
	SSTS	0.6	0.002	0.4	0.001	0.2	33%
	Atmospheric deposition	23.3	0.064	23.3	0.064	0.0	0%
	Internal load	962.8	2.636	63.6	0.174	899.2	93%
	Total LA	**1,268.9**	**3.475**	**137.8**	**0.377**	**1,131.1**	**89%**
MOS				**15.4**	**0.042**		
Total load		**1,269.3**	**3.476**	**153.6**	**0.420**	**1,131.1**	**88%**

* Model calibration year(s): 2011 and 2012.

** Net reduction from current load to TMDL is 1,115.7 lbs/yr; but the gross load reduction from all sources must accommodate the MOS as well, and hence is 1,115.7 + 15.4 = 1,131.1 lbs/yr.