REGION 5
CHICAGO, IL 60604

May 21, 2024

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

Dear Mr. Skuta:

The U.S. Environmental Protection Agency has conducted a complete review of the final Total Maximum Daily Loads (TMDLs) for the Root River Watershed (RRW), including supporting documentation. The RRW is in southern Minnesota in parts of Dodge, Fillmore, Houston, Mower, Olmsted, and Winona Counties. The RRW TMDLs address impaired aquatic recreation use due to excessive bacteria, impaired aquatic life use due to excessive sediment (turbidity), and impaired drinking water use due to excessive nitrate.

The RRW 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 one TMDL for bacteria (*E. coli*), seven TMDLs for total suspended solids (TSS) (turbidity), and two for nitrate for a total of 10 TMDLs. The statutory and regulatory requirements, and EPA's review of Minnesota's compliance with each requirement, are described in the enclosed decision document.

We wish to acknowledge Minnesota's efforts in submitting these TMDLs and look forward to future TMDL submissions by the State of Minnesota. If you have any questions, please contact Ms. Wendy Drake at 312-886-6705 or drake.wendy@epa.gov.

Sincerely,

5/21/2024

X

Tera L. Fong
Director, Water Division
Signed by: TERA FONG

Enclosure

cc: Andrea Plevan, MPCA

wq-iw9-28g

REGION 5
CHICAGO, IL 60604

September 23, 2024

REPLY TO THE ATTENTION OF:
WW-16J

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

Dear Mr. Skuta:

Based on additional discussions with Minnesota regarding its submittal, the U.S. Environmental Protection Agency reviewed the EPA's Decision Document (original approval dated May 21, 2024) for the final Total Maximum Daily Loads (TMDLs) for segments within the Root River Watershed (RRW) and determined that corrections are needed in the Decision Document. These corrections include changes to Table 1 regarding the parameters addressed by the TMDLs to include fish and macroinvertebrate impairments. The EPA has made these corrections in a revised RRW Decision Document. I am enclosing a copy of the revised Decision Document for your records.

If you have any questions, please contact Wendy Drake at (312) 886-6705 or drake.wendy@epa.gov.

Sincerely,

9/23/2024

X David Pfeifer

David Pfeifer
Manager, Watersheds and Wetlands Branch
Signed by: DAVID PFEIFER

Enclosure

cc: Andrea Plevan, MPCA

TMDL: Root River Watershed *E. coli*, Total Suspended Solids, and Nitrate TMDL for Streams in portions of Dodge, Fillmore, Houston, Mower, Olmsted, and Winona Counties in southeastern Minnesota
Date: Revised 9/23/2024 (original approval 5/21/2024)

DECISION DOCUMENT FOR THE ROOT RIVER WATERSHED TMDLS IN SOUTHEASTERN 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 Total Maximum Daily Loads (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. The guidelines provided under each heading in this decision document are an attempt to summarize and provide information regarding currently effective statutory and regulatory requirements relating to TMDLs but are not a substitute for statutory requirements or EPA's regulations.

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.

EPA Review of the Root River Watershed TMDL:

Location Description/Spatial Extent:
The Root River Watershed (RRW) (HUC-8) #07040008 is located in the Lower Mississippi River Basin in southeastern Minnesota. The Minnesota portion of the RRW is approximately 1,670 square miles (1,064,961 acres) in size and spans portions of six counties: Dodge, Fillmore, Houston, Mower, Olmsted, and Winona counties. A very small portion of the watershed is located in Iowa and is not addressed in this TMDL (Figure 1 of the final TMDL document). The watershed is within the Driftless Area ecoregion, which includes karst topography and cold water trout streams. Surface waters in the RRW generally flow from west to east where they join the Mississippi River near the town of Hokah, Minnesota (Section 3 of the final TMDL document). The Minnesota Pollution Control Agency (MPCA) noted that a previous TMDL project was approved in 2017 for portions of the Root River Watershed; EPA notes all references in this document refer to the 2024 TMDL submittal. MPCA is not revising any of the 2017 TMDLs and considers the 2024 TMDL document an addendum to the 2017 TMDL document for planning purposes (Section 1.1 of the final TMDL document).

The RRW TMDL addresses one (1) impaired segment due to excessive bacteria (*E. coli*), seven (7) impaired segments due to excessive sediment inputs, and four (4) impaired segments due to excessive nitrate (Table 1 of this Decision Document). MPCA determined that two of the segments with nitrate impairments do not need separate TMDLs (-A47 and -D53), because these impairments are included in the downstream TMDLs (-536 and -548, respectively) (Section 1.2 of the TMDL). MPCA also explained that the TMDLs address 19 impairments, because several segments have more than one listing parameter associated with the total suspended solids (TSS) TMDLs for the aquatic life use; listing parameters for the TSS TMDLs may include TSS, macroinvertebrate bioassessment, and/or fish bioassessment (Table 1 of this Decision Document, Table 1 and Appendix A (Table 65) of the final TMDL document).

Table 1: Impaired stream segments addressed by the Root River Watershed TMDL

Assessment unit ID (07040008-###)[1]	Water body name/description	Affected use (designated use class[2])	Pollutant or stressor	Listing parameter(s)	Category in next (2026) impaired waters list	TMDL
511	South Fork Root River – T102 R9W S26, west line to Wisel Cr	Aquatic Recreation (2Ag)	*E. coli*[3]	*E. coli*	4A	*E. coli* TMDL
					Total *E. coli* TMDLs	**1**
536	Mill Creek – T105 R12W S14, north line to N Br Root R	Aquatic Life (1B, 2Ag)	TSS	Macroinvertebrate bioassessment[a]	5	TSS TMDL
				Fish bioassessment[a]	5	
A18	Bear Creek (Lost Creek) – Unnamed cr to T104 R12W S10, east line	Aquatic Life (2Ag)	TSS	TSS	4A	TSS TMDL
				Macroinvertebrate bioassessment[a]	5	
				Fish bioassessment[a]	5	
540	Upper Bear Creek – T104 R11W S18, west line to M Br Root R	Aquatic Life (2Ag)	TSS	Macroinvertebrate bioassessment[a]	5	TSS TMDL
				Fish bioassessment[a]	5	
548	Spring Valley Creek – T103 R13W S29, west line to Deer Cr	Aquatic Life (1B, 2Ag)	TSS	TSS	4A	TSS TMDL
				Macroinvertebrate bioassessment[a]	5	
				Fish bioassessment[a]	5	
559	Camp Creek – Headwaters to S Br Root R	Aquatic Life (2Ag)	TSS	Macroinvertebrate bioassessment[a]	5	TSS TMDL
				Fish bioassessment[a]	5	
H01	Riceford Creek – -91.814, 43.512 to T101 R8W S17, east line	Aquatic Life (2Bg)	TSS	Macroinvertebrate bioassessment[a]	5	TSS TMDL

[1] MPCA refers to the last three digits of the assessment unit ID as the water body identification number or WID (e.g., -511 is the WID for South Fork Root River).
[2] MPCA's designated use classes are described on pp. 7-8 of the final TMDL.
[3] MPCA uses *E. coli* bacteria as an indicator of potential waterborne pathogens (Section 2.4.1 of the final TMDL document).

Assessment unit ID (07040008-###)[1]	Water body name/description	Affected use (designated use class[2])	Pollutant or stressor	Listing parameter(s)	Category in next (2026) impaired waters list	TMDL
518	Riceford Creek – T101 R7W S19, south line to T102 R7W S30, north line	Aquatic Life	TSS	Macroinvertebrate bioassessment[a]	5	TSS TMDL
					Total TSS TMDLs	**7**
536	Mill Creek – T105 R12W S14, north line to N Br Root R	Drinking Water (1B, 2Ag)	Nitrate	Nitrate	4A	Nitrate TMDL
A47	Unnamed Creek (Mill Creek Tributary) – T105 R12W S14, west line to unnamed cr					
548	Spring Valley Creek – T103 R13W S29, west line to Deer Cr	Drinking Water (1B, 2Ag)	Nitrate	Nitrate	4A	Nitrate TMDL
D53	Unnamed Creek (Spring Valley Creek Tributary) – T103 R13W S32, south line to Spring Valley Cr					
					Total Nitrate TMDLs	**2**

a. MPCA categorizes biological impairments as 4A when TMDLs for all pollutant stressors needed to achieve attainment of applicable water quality standards (WQS) have been approved by the EPA. The final TMDL document addresses only one of the identified pollutant stressors (i.e., TSS) resulting in aquatic life use impairments for seven of the water bodies in Table 1 related to the macroinvertebrate and fish bioassessments. Appendix A (Table 65) of the final TMDL document indicates that for the seven waterbodies impaired for macroinvertebrates or fish for the aquatic life use, there are additional confirmed stressors (other than TSS) resulting in impairment of the fish and macroinvertebrate communities, such as nitrate, temperature, physical habitat, and flow alteration, depending on the waterbody. The final TMDL document addresses the TSS stressors associated with these bioassessments, but the final TMDL document does not address the other confirmed stressors included in Table 65, which is the reason the macroinvertebrate and fish bioassessments will remain in category 5 in the next impaired waters list in 2026.

Land Use:
Land use in the RRW is a mix of agricultural land and forested land (Figure 5 of the final TMDL document). Table 2 of this Decision Document presents the average of the primary land use percentages in the RRW for the sub-watersheds included in this TMDL. Row crops, deciduous forest, and grass/pasture are the primary land uses in these sub-watersheds.

Table 2. Root River Watershed primary land cover for TMDL subwatersheds

Land Use	Percentage of Total Watershed
Row crops	52%
Deciduous forest	18%
Grass/pasture	17%
TOTAL	87%

Source: 2021 Cropland Data Layer (CDL).

There are several towns interspersed throughout the watershed. The cities of Chatfield (population 2,997) and Spring Valley (population 2,447) are the largest cities.

MPCA noted that the RRW is located on the traditional homelands of the Dakota Oyate. However, the RRW is not located within the boundary of federally recognized Tribal land, and the TMDLs do not allocate pollutant loads to any federally recognized Tribe (Section 1.3 of the final TMDL document).

Problem Identification:

<u>RRW Bacteria (*E. coli*) TMDL</u>: The *E. coli* bacteria impaired segment identified in Table 1 of this Decision Document was included on the final 2022 Minnesota 303(d) list due to excessive bacteria. Water quality monitoring within the RRW indicated that this segment was not attaining the designated aquatic recreation uses due to exceedances of the *E. coli* criteria. Excessive bacteria can negatively impact recreational uses (e.g., swimming, wading, boating, and 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.

<u>RRW Total Suspended Solids (sediment) TMDLs</u>: The TSS (sediment) impaired segments identified in Table 1 of this Decision Document were included on the final 2022 Minnesota 303(d) list due to excessive TSS/sediment or transparency values[4] within the water column. Water quality monitoring within the RRW indicated that these segments were not attaining their designated aquatic life uses due to high sediment measurements (or related transparency values) 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

[4] MPCA's final TMDL document indicates that transparency values, as measured by transparency tubes (T-tubes), can predict TSS and can be surrogates for TSS (Section 2.4.2 of the final TMDL document).

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, and 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.

RRW Nitrate TMDLs: Nitrate impaired segments identified in Table 1 of this Decision Document were included on the final 2022 Minnesota 303(d) list due to excessive nitrate. Water quality monitoring within the RRW indicated that these segments were not attaining their drinking water designated use due to elevated nitrate measurements.

Nitrate ($N0_3$) and nitrite ($N0_2$) are two of the forms of nitrogen that can be harmful to humans. Nitrate and nitrite are toxic to humans. Nitrite has been linked to methemoglobinemia (i.e., blue baby syndrome) in infants (Section 2.4.3 of the final TMDL document). Areas of southeastern Minnesota are particularly susceptible to nitrogen impacting drinking water resources due to the area's karst geology, which results in a close connection between surface water and ground water, and use of nitrogen-based fertilizers in agricultural areas. In April 2023, EPA received a Safe Drinking Water Act section 1431 emergency petition regarding the southeast karst region of Minnesota.[5]

Priority Ranking:

MPCA's schedule for completing TMDLs is included in the state's 2024 303(d) impaired waters list, which includes the TMDL priority ranking. MPCA's TMDL priorities are correlated with the watershed approach and the Watershed Restoration and Protection Strategy (WRAPS) cycle, which follow the two-year intensive watershed monitoring. MPCA includes information about priority ranking in section 1.4 of the final TMDL document and is developing an updated TMDL priority framework for EPA's *2022-2032 Vision for the Clean Water Act Section 303(d) Program*.

Pollutants of Concern:

The pollutants of concern are bacteria (*E. coli*), TSS (sediment), and nitrate (NO_3).

[5] https://www.epa.gov/mn/southeast-minnesota-groundwater (last accessed May 9, 2024)

Source Identification (Point and Nonpoint Sources):

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

<u>RRW *E. coli* TMDL</u>:
MPCA determined that there are no permitted sources of *E. coli* contributing bacteria to the impaired segment South Fork Root River (-511).

<u>RRW TSS TMDLs</u>:
National Pollutant Discharge Elimination System (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 two wastewater treatment plants (WWTPs) in the RRW that contribute TSS from treated wastewater releases to the segments impaired by TSS (Table 3 of this Decision Document and Section 4.7.2 of the final TMDL document). MPCA noted that these facilities were assigned a WLA in the TMDL.

Table 3. Minnesota NPDES facilities that contribute TSS to impaired segments in the RRW

Facility name	Permit number	HUC-12 location
Spring Valley WWTP	MN0051934	Spring Valley Creek (070400080205)
Mabel WWTP	MN0020877	Riceford Creek (070400080804)

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 RRW 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.

MPCA included pollutant loading from construction stormwater in the watershed runoff estimates and does not consider construction stormwater to be a significant source of sediment in these watersheds (Section 3.5.1 of the final TMDL document).

MPCA determined that there are two permitted industrial stormwater sites covered by a general permit in the RRW contributing to the segments impaired by TSS (Table 4 of this Decision Document). MPCA noted that these facilities were assigned a WLA in the TMDL.

Table 4. Industrial stormwater facilities that contribute TSS to impaired segments in the RRW

Facility name	Permit number	Impaired stream segment (-WID)
Bill Funk Trucking	MNR053CCT	Mill Creek (-536)
Griffin Quarry	MNR053BMN	Mill Creek (-536)

MPCA also determined that there are nine permitted NPDES and state disposal system (SDS) nonmetallic mining facilities contributing TSS to impaired segments of the RRW (Table 5).

Table 5. Nonmetallic mining facilities that contribute TSS to impaired segments in the RRW

Facility name	Permit number	Impaired stream segment (-WID)
Bruening Rock Products – Harmony: Big Springs Quarry (SD 008)	MNG490115	
Bruening Rock Products – Harmony: Elton Sand Pit (SD 009)	MNG490115	Camp Creek (-559)
Bruening Rock Products – Harmony: Underpass Quarry Houston County (SD 024)	MNG490115	
Bruening Rock Products – Harmony: Oefstedahl Sand Pit-Houston County (SD 039)	MNG490115	
Bruening Rock Products – Harmony: Swenson Quarry-Fillmore County (SD 041)	MNG490115	
Mathy Construction – Engrav Quarry #521 (SD104)	MNG490081	
Gjere Construction – Gjere Quarry (SD 001)	MNG490391	Riceford Creek (-518)
Mathy Construction – Willey Dr. Quarry #445 (SD 059)	MNG490081	Mill Creek (-536)
Croell Inc. Spring Valley (SD 008)	MNG490540	Spring Valley Creek (-548)

MPCA does not consider industrial stormwater a significant source of TSS if the facilities comply with the permit.

RRW Nitrate TMDLs:
NPDES permitted facilities: NPDES permitted facilities may contribute nitrate loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge wastewater according to their NPDES permit. MPCA determined that there was one WWTP contributing nitrate from treated wastewater releases, Spring Valley WWTP (also referenced in Table 3 of this Decision Document), to Spring Valley Creek (Section 5.3.2 and Table 46 of the final TMDL document). MPCA assigned this facility a portion of the nitrate WLA in Spring Valley Creek.

MPCA determined that there was one NPDES-permitted concentrated animal feeding operation (CAFO) facility, Schoenfelder Farms LLP (MNG442167), with two locations within one of the impaired segments of Mill Creek (-536). MPCA assigned a nitrate WLA of zero (0) for this facility as discussed in Section 5 of the Decision Document. MPCA indicates that all NPDES and SDS permitted feedlots are required to contain all manure and runoff contaminated with manure from a 25-year, 24-hour storm event and does not consider these facilities a significant source of nitrogen (Section 3.5.2 and 5.1.2 of the final TMDL document).

Stormwater runoff from permitted construction and industrial areas: Industrial sites may contribute nitrate via stormwater runoff during precipitation events. These areas within the RRW must comply with the requirements of MPCA's NPDES Stormwater Program and create a SWPPP that summarizes how stormwater will be minimized from the site. MPCA assigned an industrial stormwater WLA in the Mill Creek and Spring Valley nitrate TMDLs (Tables 29 and 46 of the final TMDL document).

Nonpoint Source Identification: The potential nonpoint sources to the RRW include:

<u>RRW *E. coli* TMDL</u>:
MPCA determined that nonpoint sources of *E. coli* include runoff from non-NPDES/non-state disposal system (SDS) permitted animal feedlots, land applied manure, pasture, under-treated domestic sewage, and wildlife.

Stormwater from agricultural land use practices and feedlots near surface waters: Animal Feeding Operations (AFOs) near surface waters can be a source of bacteria to water bodies in the RRW. 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 RRW. 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 surface 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 RRW. 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, and systems discharging 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.

<u>RRW TSS TMDLs</u>:
MPCA identified several nonpoint sources of TSS within the RRW. MPCA determined that most of the TSS is from near channel areas, such as eroding stream banks and floodplains, as well as agricultural area runoff and steep slopes.

Stormwater runoff from agricultural land use practices: Runoff from agricultural lands may contain significant amounts of sediment, which may lead to impairments in the RRW. 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 stream bank degradation and sediment additions to stream environments.

RRW Nitrate TMDLs:
Leaching loss from manure and nitrogen-based fertilizer application in agricultural areas: MPCA identified nitrogen-based fertilizer and manure usage in agricultural areas as nonpoint sources of nitrogen leaching into shallow groundwater. Nitrate and nitrite can easily mix into groundwater and move through the subsurface soils via interflow and karst pathways, which are a part of the geology in southeastern Minnesota. Recent monitoring data indicate that 80 percent of the nitrogen applied to agricultural fields is transported to groundwater, tile drains, springs, streams, and rivers in the RRW (Section 3.5.2 of the final TMDL document).

Stormwater runoff from agricultural land use practices: Runoff from agricultural lands may contain significant amounts of nitrates, which may lead to impairments in the RRW. Nitrate 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.

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

Future Growth:
MPCA noted that population and land use changes within the TMDL watershed may result in changes to the pollution sources (Section 6.0 of the final TMDL document). Specifically, the City of Rochester may continue to grow within the watershed. In addition, the City of Stewartville will likely become an MS4 community within the next 10 years. Recent trends have shown the number of registered feedlots is declining, and the number of animal units within each feedlot are increasing. The WLA and load allocations for the RRW TMDLs were calculated for all current and future sources. MPCA did calculate a WLA in the nitrate TMDLs for industrial stormwater dischargers (Section 4.8.2 of the final TMDL). MPCA stated that this was set aside for any future industrial stormwater dischargers. Any expansion of point or nonpoint sources will need to comply with the respective WLA and LA values calculated in the RRW TMDLs.

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

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

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the 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.

EPA Review of the Root River Watershed TMDL:

Designated uses:
Water quality standards (WQS) are the fundamental benchmarks by which the quality of surface waters is measured. Within the State of Minnesota, WQS are developed pursuant to the Minnesota Statutes Chapter 115, Sections 03 and 44. Authority to adopt rules, regulations, and standards as 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 impaired streams in this report are classified as Class 1 waters (1B) for drinking water use (nitrates) and Class 2 waters for aquatic recreation use (fishing, swimming, boating, etc.) and aquatic life use (*E. coli* and TSS) (Table 1 of this Decision Document).

The Class 1 waters designated use is described in Minnesota R. 7050.040 (Subp. 2):

> "Domestic consumption includes all waters of the state that are or may be used as a source of supply for drinking, culinary or food processing use, or other domestic purposes and for which quality control is or may be necessary to protect the public health, safety, or welfare."

The Class 2 waters designated use is described in Minnesota R. 7050.0140 (Supb. 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."[6]

Standards:

Narrative Criteria:

Minnesota R. 7050.0221 (Subparts 3 and 4)[7] set forth narrative criteria for Class 1B waters of the state:

> "Class 1B waters - The quality of class 1B waters of the state shall be such that with approved disinfection, such as simple chlorination or its equivalent, the treated water will meet both the primary (maximum contaminant levels) and secondary drinking water standards issued by the United States Environmental Protection Agency as referenced in subpart 1. The Environmental Protection Agency drinking water standards are adopted and incorporated by reference, except as noted in subpart 1.
>
> These standards will ordinarily be restricted to surface and underground waters with a moderately high degree of natural protection and apply to these waters in the untreated state."

Minnesota R. 7050.0150 (Subp. 3)[8] set forth narrative criteria for Class 2 waters of the state:

> "For all class 2 waters, the aquatic habitat, which includes the waters of the state and stream bed, shall not be degraded in any material manner, there shall be no material increase in undesirable slime growths or aquatic plants. including algae, nor shall there be any significant increase in harmful pesticide or other residues in the waters, sediments, and aquatic flora and fauna; the normal biota 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 aquatic 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:

RRW *E. coli* TMDL: The bacteria (*E. coli*) WQS that apply to RRW TMDL are:

Table 6: *E. coli* Water Quality Standards Applicable to the RRW TMDL

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

Note: Standards apply only between April 1 and October 31.

RRW E. coli *TMDL Targets:* The *E. coli* TMDL targets employed for the RRW bacteria TMDL are the

[6] https://www.revisor.mn.gov/rules/7050.0140/ (last accessed May 13, 2024)
[7] https://www.revisor.mn.gov/rules/7050.0221/ (last accessed May 10, 2024)
[8] https://www.revisor.mn.gov/rules/7050.0150/ (last accessed May 10, 2024)

E. coli standards as stated in Table 6 of this Decision Document. The focus of the RRW 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 RRW and will result in the attainment of the 1,260 orgs/100 mL portion of the standard. Although the *E. coli* TMDL will focus on the geometric mean portion of the WQS, attainment of both parts of the *E. coli* WQS is required.

RRW TSS TMDLs: The TSS and transparency criteria provide water clarity targets for measuring suspended particles in rivers and streams.

RRW TSS TMDL Targets: MPCA employed two TSS targets applicable to streams in the RRW. Criterion from streams classified as 2A (cold water streams) and 2B (cool water or warm water, South River Nutrient Region) were applied to the sediment (TSS) TMDLs of the RRW (Table 7 of this Decision Document). MPCA also considers transparency values measured by transparency tubes (or T-tubes) as a surrogate for TSS to assess WQS attainment (Table 8 of this Decision Document). See Section 2.4.2 in the final TMDL document for additional information about the TSS and transparency relationship.

Table 7: Total Suspended Solids Water Quality Standards Applicable to the RRW TMDLs

Parameter	Units	Water Quality Standard	Applicable waterbody
TSS – Class 2A waters (cold water; statewide)	mg/L	≤ 10	Mill Creek (536) Bear Creek (Lost Creek) (A18) Upper Bear Creek (540) Spring Valley Creek (548) Camp Creek (559) Riceford Creek (518)
TSS – Class 2B waters (cool water or warm water; South River Nutrient Region)	mg/L	≤ 65	Riceford Creek (H01)

Note: Standards apply only between April 1 and October 31, and TSS may be exceeded for no more than 10% of the time.

Table 8: Transparency Water Quality Surrogate Targets Applicable to the RRW TMDLs

Parameter	Units	Water Quality Standard
Transparency – Class 2A waters	cm	TSS is not meeting WQS if transparency (T-tube) < 55 cm, and TSS is meeting WQS if T-tube > 95 cm
Transparency – Class 2B waters	cm	TSS is not meeting WQS if transparency (T-tube) < 10 cm, and TSS is meeting WQS if T-tube > 15 cm

Note: Transparency is a surrogate for determining whether the TSS standard is exceeded. Standards apply only between April 1 and September 30, and transparency may be exceeded for no more than 10% of the time.

RRW Nitrate TMDLs: Nitrate impaired waters in the RRW are designated as drinking water sources (Class 1B waters), therefore, MPCA applied the Minnesota nitrate drinking water quality standard of a maximum concentration of 10 mg/L. For a waterbody to be meeting the standard, only one exceedance of the acute standard is allowed within a three-year period (Section 2.4.3 of the final TMDL document).

RRW Nitrate TMDL Targets: MPCA employed the nitrate drinking water quality standard of **10 mg/L**.

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

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)). 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.

EPA Review of the Root River Watershed TMDL:

RRW E. coli TMDL: MPCA used the geometric mean **(126 orgs/100 mL)** of the *E. coli* water quality standard to calculate loading capacity values for the bacteria TMDL. 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."[9] MPCA stated that the state's bacteria TMDLs will focus on the geometric mean portion of the WQS (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

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

"an amount of matter that is introduced into a receiving water" (40 CFR § 130.2). To establish the loading capacities for the RRW bacteria TMDL, 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 CFR §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.

A flow duration curve (FDC) was created for the bacteria TMDL in the RRW. The RRW FDC was 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. MPCA focused on daily recorded flow measurements and HSPF modeled flows from 1994-2021. HSPF hydrologic models were developed to simulate flow characteristics within the RRW, and flow data focused on dates within the recreation season (April 1 to October 31). Daily stream flows were necessary to implement the load duration curve approach.

MPCA notes in the final TMDL document that the original Root River HSPF model utilized in the 2017 TMDL was updated to improve its ability to simulate surface water leaching through karst in 2018, as well as to include updated meteorological data, stream flow, surface water quality data, atmospheric deposition, and permitted point source discharge data in 2022.

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.[10,11] The output of the HSPF process is a model of multiple hydrologic response units (HRUs), or subwatersheds of the overall RRW. The flow from these HRUs were transferred from nearby U.S. Geological Service (USGS) gages.

An FDC graph has the flow duration interval (percentage of time flow exceeded) on the X-axis and discharge (flow per unit time) on the Y-axis. The FDC was transformed into an 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. The LDC graph for the RRW bacteria TMDL has 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 RRW 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 RRW 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

[10] HSPF User's Manual https://water.usgs.gov/software/HSPF/code/doc/hspfhelp.zip (last accessed May 13, 2024)
[11] EPA TMDL Modeling website https://www.epa.gov/tmdl/tmdl-modeling (last accessed May 13, 2024)

a conversion factor, which allows the individual samples to be plotted on the same figure as the LDC (i.e., Figure 36 of the final TMDL document).

The LDC plot was 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 that plot above the LDC represent violations of the WQS and the allowable load under those flow conditions at those locations. The difference between individual sampling loads plotting above the LDC and the LDC, measured at the same flow, is the amount of reduction necessary to meet WQS.

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

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

The bacteria TMDL for the RRW was calculated and those results are found in Table 9 of this Decision Document. The load allocations were calculated after the determination of the WLA, and the Margin of Safety (MOS) (10% of the loading capacity). Load allocations (e.g., stormwater runoff from agricultural land use practices and feedlots, SSTS, wildlife inputs, etc.) were not split among individual nonpoint contributors. Instead, load allocations were combined together into a categorical LA ("watershed load") to cover all nonpoint source contributions.

Table 9 of this Decision Document reports 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. Table 9 of this Decision Document identifies the loading capacity for the water body at each flow regime. Although there are numeric loads for each flow regime, the LDC is what is being approved for this TMDL.

Table 9: Bacteria (*E. coli*) TMDL for the Root River Watershed is located at the end of this Decision Document.

Table 9 of this Decision Document show MPCA's estimates of reductions required for the stream 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 RRW bacteria TMDL. The methods used for determining the TMDL are consistent with U.S. EPA technical memos.[12]

RRW TSS TMDLs: MPCA used the same LDC development strategies as it did for the RRW bacteria TMDL to calculate the loading capacities for the sediment TMDLs in the RRW. These strategies included incorporating HSPF model simulated flows to develop FDCs and water quality monitoring information collected within the RRW informing the LDC. The FDCs were transformed into LDCs by multiplying individual flow values by the TSS Class 2A target (10 mg/L) or the Class 2B target (65 mg/L) and then multiplying that value by a conversion factor.

MPCA calculated TSS TMDLs (Table 10 of this Decision Document). The load allocations were calculated after the determination of the WLA and the MOS (10% 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. Table 10 of this Decision Document reports 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.

MPCA explained that the allocation at very low flows for Spring Valley Creek (-548) is calculated as a formula rather than a load. In this segment, 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) * 10 mg/L (TSS standard).

MPCA estimated load reductions needed for the TSS TMDLs to attain the TSS water quality target of 10 mg/L or 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

[12] U.S. EPA, 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).

attainment of the water quality targets and that water quality will return to a level where the designated uses are no longer considered impaired.

Table 10: Total Suspended Solids (TSS) TMDLs for the Root River Watershed is located at the end of this Decision Document.

EPA supports the data analysis and modeling approach utilized by MPCA in its calculation of wasteload allocations, load allocations, and the margin of safety for the sediment (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.

RRW Nitrate TMDLs: MPCA used the same LDC development strategies as it did for the bacteria and sediment TMDLs to calculate the loading capacities for the nitrate TMDLs in the RRW. However, as noted in Section 1 of this Decision Document, two of four the segments with nitrate impairments do not have separate TMDLs (-A47 and -D53), because these impairments are included in the downstream TMDLs (-536 and -548, respectively). These strategies included incorporating HSPF model simulated flows to develop FDCs and water quality monitoring information collected within the RRW informing the LDCs. The FDCs were transformed into LDCs by multiplying individual flow values by the nitrate target of 10 mg/L and then multiplying that value by a conversion factor.

MPCA calculated nitrate TMDLs (Table 11 of this Decision Document). The load allocations were calculated after the determination of the WLA and the MOS (10% 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. Table 11 of this Decision Document reports 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 nitrate monitoring data and allows for the estimation of load reductions necessary for attainment of the nitrate water quality standard. Using this method, daily loads were developed based upon the flow in the water body. Loading capacities were determined for each segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Table 11 of this Decision Document identifies 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 estimated load reductions needed for the nitrate TMDLs to attain the nitrate water quality target of 10 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.

Table 11: Nitrate TMDLs for the Root River Watershed is located at the end of this Decision Document.

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

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

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.

EPA Review of the Root River Watershed TMDL:
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 RRW TMDLs can be attributed to different nonpoint sources.

RRW *E. coli* TMDL: The calculated LA values for the bacteria TMDL are applicable across all flow conditions in the RRW (Table 9 of this Decision Document). MPCA identified several nonpoint sources that contribute bacteria loads to the impaired segment in the RRW, 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 value calculation (Table 9 of this Decision Document).

RRW TSS TMDLs: The calculated LA values for the TSS TMDLs are applicable across all flow conditions. MPCA identified several nonpoint sources that contribute sediment loads to the impaired segments in the RRW (Table 10 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. MPCA did not determine individual load allocation values for each of these potential nonpoint source considerations but aggregated the nonpoint sources into one "watershed load" LA calculation (Table 10 of this Decision Document).

RRW Nitrate TMDLs: The calculated LA values for the nitrate TMDLs are applicable across all flow conditions. MPCA identified several nonpoint sources that contribute nitrate loads to the impaired segments in the RRW (Table 11 of this Decision Document). Load allocations were recognized as originating from nonpoint sources, including manure from animals and commercial nitrogen fertilizer applications to agricultural lands. MPCA stated that vertical leaching from the land to the underlying groundwater aquifer or drain tiles is the primary way that nitrate is entering surface water in the RRW. As a result of the karst geology, surface runoff of nitrate from fertilizer use, for example, likely contributes much less nitrogen to the surface waters (Section 3.5.2 of the final TMDL document). MPCA did not determine individual load allocation values for each of these potential nonpoint source considerations but aggregated the nonpoint sources into one “watershed load” LA calculation (Table 11 of this Decision Document).

EPA finds MPCA’s approach for calculating the LA for *E. coli*, TSS, and nitrate to be reasonable. The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of this fourth element.

5. Wasteload Allocations (WLAs)

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

The individual WLAs may take the form of uniform percentage reductions or individual mass-based limitations for dischargers where it can be shown that this solution meets WQSs.

EPA Review of the Root River Watershed TMDL:

RRW *E. coli* TMDL: MPCA did not identify any NPDES permitted facilities within the RRW; therefore, there are not any facilities assigned a portion of the WLA (Table 9 of this Decision Document).

RRW TSS TMDLs: MPCA identified two NPDES permitted facilities within the RRW and assigned those facilities a portion of the WLA (Table 10 of this Decision Document; Table 10 of the final TMDL document). MPCA developed WLAs for the two municipal WWTPs—Mabel WWTP and Spring Valley WWTP (Table 3 in this Decision Document)—for the Riceford Creek (-518) and Spring Valley Creek (-548) TSS TMDLs, respectively. The WLAs for these individual facilities were calculated based on each of the facility’s average wet weather design flow and the TSS permit limit (30 mg/L).

As noted in Table 7 of this Decision Document, both of these facilities are located on stream segments with an in-stream criteria of ≤ 10 mg/L TSS. MPCA determined that the current permitted effluent limits of 30 mg/L TSS are sufficient to protect the water quality of the creeks. MPCA explained that TSS is comprised of organic and inorganic particles; the organic portion is measured as volatile suspended solids (VSS), and the inorganic portion is measured as nonvolatile suspended solids (NVSS). TSS in municipal wastewater is primarily organic or VSS, and VSS does not have a tendency to remain in the environment. Municipal activated sludge WWTPs, such as the Mabel and Spring Valley WWTPs, generally discharge TSS that includes only 19% NVSS. MPCA’s 2015 memo, “Compatibility of existing technology based effluent limits (TBELs) with new TSS water quality standards,” indicates that the TSS WQS represents the inorganic (NVSS) particle concentration. Therefore, MPCA considers the 30 mg/L TSS permit limit for these WWTPs adequate to prevent the NVSS discharge concentrations from exceeding the 10 mg/L inorganic TSS concentration. MPCA also states that monitoring of the WWTP discharges may be necessary to confirm that the facilities are meeting the WQS and that the NPDES permits for these facilities may be changed in the future to include water quality based effluent limits (WQBELs) that take into account the NVSS and TSS relationship. Further, if MPCA determines that the WWTP discharges are causing or have a reasonable potential to cause or contribute to concentrations above 10 mg/L NVSS, the permits may be changed to have more limited WQBELs (Section 4.7.2 of the final TMDL document).

MPCA identified construction and industrial stormwater contributions as necessitating a WLA (Table 10 of this Decision Document). The WLA for industrial stormwater was calculated based on the acreage of industrial disturbed areas within the RRW of industrial stormwater permitted facilities. MPCA used aerial images from Google Earth to determine the acreages for the nonmetallic mining facilities (Table 18 of the final TMDL document).

MPCA included a small WLA equal to the construction stormwater WLA for the subwatersheds without any industrial stormwater permitted facilities and indicated that reductions are currently not needed to meet the TMDL for those subwatersheds (Section 4.7.2 of the final TMDL document). MPCA noted that TSS is not a significant source in industrial stormwater when facilities comply with their permits.

MPCA determined that the five-year average (between 2018 through 2022) of the RRW area covered by permitted construction is about 0.05%. MPCA calculated the construction stormwater TSS WLA by subtracting the MOS from the loading capacity and multiplying by 0.05%. MPCA incorporated construction stormwater loading in the watershed runoff estimates and does not consider construction stormwater to be a significant source in the RRW.

Attaining the construction stormwater and industrial stormwater loads described in the RRW TSS TMDLs is the responsibility of construction and industrial site managers. In the final TMDL document MPCA explained that if a construction site owner/operator obtains coverage under the NPDES/SDS General Stormwater Permit (MNR1000001) 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 Section 23 of the Construction Stormwater General Permit, the stormwater discharges would be expected to be consistent with the WLA in this TMDL. BMPs and other stormwater control measures that act to limit the discharge of the pollutant of concern (TSS) are defined in MNR100001.

The MPCA is responsible for overseeing industrial stormwater loads that impact water quality to surface waters in the RRW. Industrial sites are expected to comply with the requirements of the state's NPDES/SDS Industrial Stormwater Multi-Sector General Permit (MNR050000) or NPDES/SDS Nonmetallic Mining/Associated Activities General Permit (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 that 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 RRW TSS TMDLs. If the SWPPP does not meet the WLA, the SWPPP will need to be modified within 18 months of the approval of the TMDL by the U.S. EPA. This applies to sites under permits for MNR100001, MNR050000, and MNG490000.

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

RRW Nitrate TMDLs: MPCA identified two NPDES permitted facilities in the RRW contributing to nitrate impaired segments in Mill Creek and Spring Valley Creek—an animal feeding operation, Schoenfelder Farms LLP (MNG442167) and Spring Valley WWTP (MN0051934), respectively. MPCA assigned Spring Valley WWTP a portion of the WLA. However, Schoenfelder Farms LLP received a WLA of zero (Table 11 of this Decision Document). The WLA for Spring Valley WWTP was calculated based on the facility's wet weather design flow and the nitrate target (10 mg/L). MPCA determined that permitted points sources in the RRW account for about 1% of the nitrogen load (Section 3.5.2 of the final TMDL document).

Spring Valley WWTP's NPDES permit was reissued in September 2023, which requires the facility to monitor weekly for total nitrite + nitrate, total ammonia, and total Kjeldahl nitrogen. The facility also has a new total nitrogen limit of 10 mg/L, which is a monthly average. The facility has a compliance schedule to give the owner/operator until January 2031 to comply with the new limit.

MPCA acknowledged the presence of CAFOs in the RRW in Section 4.8 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 RRW 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.

MPCA also stated that NPDES permitted construction stormwater is not a nitrogen source, and there are no permitted industrial stormwater facilities with nitrate or that are required to monitor for nitrogen in the subwatersheds included in this TMDL. However, MPCA developed a small WLA for potential industrial stormwater activity in the future (Section 4.8.2 of the final TMDL document).

MPCA's expectations and responsibilities for overseeing industrial stormwater loads for the nitrate TMDLs are the same as for the TSS TMDLs. Industrial sites are expected to create SWPPPs, which summarize how stormwater pollutant discharges will be minimized from construction and industrial sites. As noted above, MPCA has explained that meeting the terms of the applicable permits will be consistent with the WLAs set in the nitrate TMDLs for RRW. If the SWPPP does not meet the WLA, the SWPPP will need to be modified within 18 months of the approval of the TMDL by the U.S. EPA. This applies to sites under permits for MNR050000.

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

6. Margin of Safety (MOS)

The Clean Water Act, § 303(d)(1)(c), and 40 C.F.R. 130.7 (c)(1) require that a TMDL include a margin of safety (MOS) "which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality." 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. The MOS may include both explicit and implicit components.

EPA Review of the Root River Watershed TMDL:
The final TMDL submittal from MPCA outlines the determination of the Margin of Safety for the bacteria, TSS (sediment) and nitrate TMDLs. All parameters employed an explicit MOS set at 10% of the loading capacity (Section 4.5 of the final TMDL document).

RRW *E. coli*, TSS and Nitrate TMDLs:
The RRW TMDLs incorporated a 10% explicit MOS applied to the total loading capacity calculation for each flow regime of the LDC. Ten percent of the total loading capacity was reserved for MOS with the remaining load allocated to point and nonpoint sources (Tables 9, 10, and 11 of this Decision Document). MPCA explained that the explicit MOS was set at 10% due to the following factors identified during TMDL development for these pollutants:

- Environmental variability in pollutant loading,
- Variability in water quality data (i.e., collected water quality monitoring data, field sampling error, etc.),
- Calibration and validation processes of LDC modeling efforts, uncertainty in modeling outputs, conservative assumptions made during the modeling efforts, and drainage area-ratio method limitations when extrapolating flow data.

MPCA also noted the generally good correlation and calibration of the HSPF model used to develop the flow rates in the impaired waters (Section 4.5 of the final TMDL document). MPCA explained that the RRW HSPF model was updated in 2021 and was calibrated and validated with flow data from three stream gages. The results indicate a generally good agreement between the observed flow rates and the model results, and therefore no additional MOS is needed.

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

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

The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of this sixth element.

7. Seasonal Variation

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

EPA Review of the Root River Watershed TMDL:

RRW *E. coli* TMDL: 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 RRW 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).

<u>RRW TSS TMDLs</u>: The TSS WQS applies from April to September, which is also the period when high concentrations of sediment are expected in the surface waters of the RRW. Sediment loading in the RRW 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 RRW 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 draining agricultural fields. The conditions generally occur in the spring and early summer seasons.

<u>RRW Nitrate TMDLs</u>: The nitrate standard is applicable for the entire year (Section 4.3 of the final TMDL document). In the karst region of southeastern Minnesota, nitrate is transported to aquifers by leaching from the surface into the groundwater and into disappearing streams—surface streams that disappear subsurface, flow underground, and then resurface in downstream surface water. As a result, the baseflow is comprised primarily of groundwater sources, and the primary path of nitrate loading to surface waters in the RRW is from groundwater. The highest nitrate concentrations in the RRW are generally observed in the headwater monitoring stations, which is where groundwater contributions to surface water are also high. Nitrate concentrations are diluted during precipitation events in the RRW (Section 3.5.2 of the final TMDL document). In the Mill Creek watershed, MPCA stated that the RRW HSPF model supports the correlation between high density of row crop land use and high density of springs, which results in an increased likelihood of elevated nitrate concentrations in surface water. MPCA stated that nitrate can also be transported to surface water through drain tiles and runoff from land, but these are less significant sources in Spring Valley Creek (Section 5.3.2 of the final TMDL document).

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

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 Review of the Root River Watershed TMDL:
The RRW bacteria, sediment (TSS) and nitrate TMDLs provide reasonable assurance that actions identified in the implementation section of the final TMDL (i.e., Sections 7 and 9 of the final TMDL document), will be applied to attain the loading capacities and allocations calculated for the impaired reaches within the RRW. 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 that have expressed interest in working to improve water quality within the RRW. Mitigation practices will be implemented over the next several years. It is anticipated that staff from six Soil and Water Conservation Districts (SWCDs), local Minnesota Board of Soil and Water Resources (BWSR) offices, Friends of the Root River, Fishers and Farmers Partnership, Root River Field to Stream Partnership, and other local watershed groups will work together to reduce pollutant inputs to the RRW. MPCA has authored a Root River WRAPS report update[13] (April 2024), which provides information on the development of scientifically supported restoration and protection strategies for implementation planning and action. MPCA sees the WRAPS document as a starting point for which MPCA and local partners can develop tools that will help local governments, landowners, and special interest groups determine (1) the best strategies for making improvements and protecting resources that are already in good condition, and (2) focus those strategies in the best places to do work.

County SWCDs in the RRW have a history of implementation efforts in the RRW, and SWCD staff address the bacteria, TSS, and nitrate impairments by working with landowners to plan and implement conservation projects and educating the public. For example, the Fillmore SWCD provides nutrient management, grazing management, and tree sales services.[14] Other county SWCDs in the RRW have similar programming efforts that local stakeholders can use.

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, sediment, and nitrate 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.

---

[13] MPCA's *Root River Watershed Restoration and Protection Strategy Report: Update 2024*, April 2024, available at https://www.pca.state.mn.us/watershed-information/root-river (last accessed May 9, 2024).
[14] https://www.fillmoreswcd.org/ (last accessed May 14, 2024)

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. The following requirements to prevent nitrate leaching/loss were included in the most recent Feedlot General Permit—additional winter application restrictions of solid manure, cover crop requirements in September, and additional BMPs to address nitrogen loss in early October.

MPCA stated that the Feedlot Program is also considering recommendations from the EPA's response to a Safe Drinking Water Act Section 1431 emergency petition regarding nitrate contamination in public water systems and underground sources of drinking water in the southeast karst region of Minnesota.[15] In the petition, EPA advised that "Minnesota should consider adopting monitoring requirements in NPDES/SDS permits related to (1) subsurface discharges from manure, litter, and process wastewater storage, as well as (2) discharges from land application." The EPA also encouraged Minnesota "to consider modifications to the state's Technical Standards for Nutrient Management with regard to land application of manure, litter or process wastewater, and any Minnesota guidelines for land application of commercial fertilizer, specific to Karst areas."

Reasonable assurance that the WLA set forth will be implemented is provided by regulatory actions. According to 40 CFR 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 RRW TMDLs. If 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 Nonmetallic Mining/Associated Activities General Permit (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 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 47 of the final TMDL document shows the resources spent within the RRW for watershed implementation projects since 2004 (Section 7.5 of the final TMDL document). About $168,055,000 has been spent by

[15] https://www.epa.gov/mn/southeast-minnesota-groundwater (last accessed on May 14, 2024)

federal, state, local governments, and landowners between 2004 and 2023. The Minnesota BWSR administers the Clean Water Fund and has developed a detailed grants policy explaining what is required to be eligible to receive Clean Water Fund money.[16] Examples of funding sources include BWSR's Clean Water Fund Watershed-based Implementation Funding (WBIF), Clean Water Fund Competitive Grants, CWA Section 319 funds, and conservation funding from the Natural Resources Conservation Service.

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).[17] The WRAPS also contain an implementation table of strategies and actions 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 (WRAPS Report Template, MPCA).[18] 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 (WRAPS Report Template, MPCA).

The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of this eighth element.

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.

EPA Review of the Root River Watersheds TMDL:
The final TMDL document outlines the water monitoring efforts in the RRW (Section 8 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 Fillmore County SWCD). At a minimum, the RRW 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 RRW. Water quality information will aid watershed

[16] https://bwsr.state.mn.us/cwf_programs (last accessed May 14, 2024)
[17] https://www.revisor.mn.gov/statutes/cite/114D.26 (last accessed May 14, 2024)
[18] https://www.pca.state.mn.us/business-with-us/tmdl-and-wraps-guidance (last accessed May 14, 2024)

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 RRW. Watershed managers will have the opportunity to reflect on the progress or lack of progress and will have the opportunity to change course if progress is unsatisfactory. Review of BMP efficiency is expected to be completed by the local and county partners.

River and stream monitoring in the RRW 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 RRW should continue 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 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 (MNDNR), or other agencies every five to ten years during the summer season.

The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of this ninth element.

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.

EPA Review of the Root River Watershed TMDL:
The findings from the RRW TMDLs will be used to inform the selection of implementation activities as part of the Root River Watershed 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 9 of the final TMDL document. MPCA outlined the importance of prioritizing areas within the RRW, education and outreach efforts with local partners, and partnering with local stakeholders to improve water quality within the watershed. The RRW WRAPS report update document (April 2024) includes additional detail regarding specific recommendations from MPCA to aid in the reduction of bacteria, TSS, and nitrate to surface waters of the RRW. Additionally, MPCA referenced the Statewide Nutrient Reduction Strategy[19] for focused

[19] https://www.pca.state.mn.us/water/nutrient-reduction-strategy (last accessed May 14, 2024)

implementation efforts targeting phosphorus and nitrate nonpoint sources in RRW. The reduction goals for the bacteria, TSS, and nitrate TMDLs may be met via components of the following strategies:

<u>RRW *E. coli* TMDL</u>:

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 to avoid liberating 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 RRW.

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

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.

RRW 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 RRW. 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 RRW. Implementation actions (e.g., planting deep-rooted vegetation near water bodies to stabilize streambanks) could be prioritized to target areas that are actively eroding. This strategy could prevent additional sediment inputs into surface waters of the RRW and minimize or eliminate degradation of habitat.

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

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

MPCA stated that mapping "springsheds" using dye-tracing techniques should be conducted in Mill Creek, particularly in the upper section of the watershed, to determine the land surface area that contributes to the underlying aquifer and the impaired streams.

EPA encourages watershed plans to consider nutrient pollution to both surface water and groundwater in the southeast Minnesota region, because of the connection between the surface and groundwater in the RRW. It is important to identify BMP co-benefits that address nitrates in both surface water and groundwater/drinking water.

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.

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.

EPA Review of the Root River Watershed TMDL:
The public participation section of the TMDL submittal is found in Section 10 of the final TMDL document. MPCA posted the draft TMDL online at https://www.pca.state.mn.us/water/tmdl for a public comment period. The public comment period was started on February 20, 2024, and ended on March 21, 2024. No comments were received by MPCA. The WRAPS report includes more information about additional public participation, which is available at https://www.pca.state.mn.us/watershed-information/root-river.

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.

EPA Review of the Root River Watershed TMDL:
The EPA received the final Root River Watershed TMDL document, submittal letter, and accompanying documentation from MPCA on April 26, 2024. The transmittal letter explicitly stated that the final TMDLs referenced in Table 1 of this Decision Document were being submitted to EPA pursuant to Section 303(d) of the Clean Water Act for EPA review and approval.

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

The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of this twelfth element.

13. Conclusion

After a full and complete review, the EPA finds that the two (2) nitrate TMDLs, the seven (7) TSS TMDLs, and the one (1) *E. coli* TMDL satisfy all elements for approvable TMDLs. This TMDL approval is for **ten (10) TMDLs**, addressing segments for aquatic recreational, aquatic life, and drinking water use impairments (Table 1 of this Decision Document).

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

ATTACHMENT: TMDL Tables for the Root River Watershed

Table 9: Bacteria (*E. coli*) TMDL for the Root River Watershed*

Allocation	Source	Very High	High	Mid	Low	Very Low
		E. coli *(billions of bacteria/day)*				
TMDL for Upper South Fork Root River (07040008-511)						
Wasteload Allocation		0	0	0	0	0
Load Allocation	Watershed load	35	19	13	10	5.8
Margin of Safety (10%)		3.9	2.1	1.4	1.1	0.64
Loading Capacity (TMDL)		**39**	**21**	**14**	**11**	**6.4**
Estimated Load Reduction (%)		76%				

***MPCA follows the rounding process outlined in the "All Things TMDL" State TMDL guidance.**

Table 10: Total Suspended Solids (TSS) TMDLs for the Root River Watershed*

Allocation	Source	Very High	High	Mid	Low	Very Low
		TSS (tons/day)				
TMDL for Mill Creek (07040008-536)						
Wasteload Allocation	Industrial stormwater (MNR050000 and MNG490000)	0.0026	0.00063	0.00030	0.00015	0.000061
	Construction stormwater (MNR100001)	0.00044	0.00011	0.000050	0.000024	0.000010
	WLA Totals	0.00304	0.00074	0.00035	0.000174	0.000071
Load Allocation	Watershed load	0.87	0.21	0.10	0.048	0.021
Margin of Safety (10%)		0.097	0.023	0.011	0.0054	0.0023
Loading Capacity (TMDL)		**0.97**	**0.23**	**0.11**	**0.054**	**0.023**
Estimated Load Reduction (%)		17%				
TMDL for Bear Creek/Lost Creek (07040008-A18)						
Wasteload Allocation	Industrial stormwater (MNR050000 and MNG490000)	0.0003	0.00013	0.00007	0.00004	0.00002
	Construction stormwater (MNR100001)	0.0003	0.00013	0.00007	0.00004	0.00002
	WLA Totals	0.0006	0.00026	0.00014	0.00008	0.00004
Load Allocation	Watershed load	1.1	0.44	0.23	0.13	0.050
Margin of Safety (10%)		0.13	0.049	0.026	0.014	0.0056
Loading Capacity (TMDL)		**1.2**	**0.49**	**0.26**	**0.14**	**0.056**
Estimated Load Reduction (%)		Insufficient data to calculate; transparency will need to increase by about 77 cm from 18 cm, the 10th percentile depth, to meet the T-tube WQS (> 95 cm).				
TMDL for Upper Bear Creek (07040008-540)						

Allocation	Source	Very High	High	Mid	Low	Very Low
		TSS (tons/day)				
Wasteload Allocation	Industrial stormwater (MNR050000 and MNG490000)	0.00059	0.00023	0.00012	0.000064	0.000026
	Construction stormwater (MNR100001)	0.00059	0.00023	0.00012	0.000064	0.000026
	WLA Totals	0.00118	0.00046	0.00024	0.000128	0.000052
Load Allocation	Watershed load	1.2	0.45	0.24	0.13	0.052
Margin of Safety (10%)		0.13	0.050	0.027	0.014	0.0058
Loading Capacity (TMDL)		**1.3**	**0.50**	**0.27**	**0.14**	**0.058**
Estimated Load Reduction (%)		Insufficient data to calculate; transparency will need to increase by about 65.4 cm from 29.6 cm, the 10th percentile depth, to meet the T-tube WQS (> 95 cm).				
TMDL for Spring Valley Creek (07040008-548)						
Wasteload Allocation	Industrial stormwater (MNR050000 and MNG490000)	0.00018	0.000067	0.000036	0.000020	0.0000085
	Construction stormwater (MNR100001)	0.00078	0.00029	0.00016	0.000086	0.000037
	Spring Valley WWTF (MN0051934)	0.12	0.12	0.12	0.12	--[20]
	WLA Totals	0.12096	0.12036	0.12020	0.12011	--
Load Allocation	Watershed load	1.4	0.46	0.19	0.051	0.07
Margin of Safety (10%)		0.17	0.065	0.035	0.019	0.0083
Loading Capacity (TMDL)		**1.7**	**0.65**	**0.35**	**0.19**	**0.083**
Estimated Load Reduction (%)		64%				
TMDL for Camp Creek (07040008-559)						
Wasteload Allocation	Industrial stormwater (MNR050000 and MNG490000)	0.0022	0.00074	0.00040	0.00022	0.00012
	Construction stormwater (MNR100001)	0.00015	0.00005	0.000027	0.000015	0.0000079
	WLA Totals	0.00235	0.00079	0.000427	0.000235	0.0001279
Load Allocation	Watershed load	0.48	0.16	0.088	0.049	0.026
Margin of Safety (10%)		0.054	0.018	0.0099	0.0055	0.0029
Loading Capacity (TMDL)		**0.54**	**0.18**	**0.10**	**0.055**	**0.029**
Estimated Load Reduction (%)		Insufficient data to calculate; transparency will need to increase by about 88.7 cm from 6.3 cm, the 10th percentile depth, to meet the T-tube WQS (> 95 cm).				
TMDL for Riceford Creek (07040008-H01)						

[20] The WLA for the very low flow zone is an equation (allocation = flow contribution from a given source) x 10 mg/L instead of a number, because the permitted wastewater design flows exceeded the simulated stream flow.

Allocation	Source	Very High	High	Mid	Low	Very Low
		TSS (tons/day)				
Wasteload Allocation	Industrial stormwater (MNR050000 and MNG490000)	0.00038	0.00018	0.00012	0.000089	0.000054
	Construction stormwater (MNR100001)	0.00038	0.00018	0.00012	0.000089	0.000054
	WLA Totals	0.00076	0.00036	0.00024	0.000178	0.000108
Load Allocation	Watershed load (Minnesota portion)	0.53	0.24	0.17	0.12	0.075
	Boundary condition (at Iowa border)[21]	0.23	0.11	0.073	0.054	0.032
Margin of Safety (10%)		0.085	0.039	0.027	0.020	0.012
Loading Capacity (TMDL)		**0.85**	**0.39**	**0.27**	**0.20**	**0.12**
Estimated Load Reduction (%)		Insufficient data to calculate; transparency will need to increase by about 9 cm from 6 cm, the 10th percentile depth, to meet the T-tube WQS (> 15 cm).				
TMDL for Riceford Creek (07040008-518)						
Wasteload Allocation	Industrial stormwater (MNR050000 and MNG490000)	0.0011	0.00051	0.00035	0.00026	0.00016
	Construction stormwater (MNR100001)	0.00033	0.00015	0.00010	0.000077	0.000046
	Mabel WWTF (MN0020877)	0.023	0.023	0.023	0.023	0.023
	WLA Totals	0.02443	0.02366	0.02345	0.023337	0.023206
Load Allocation	Watershed load (Minnesota portion)	0.56	0.25	0.16	0.11	0.06
	Boundary condition (Iowa border)	0.07	0.032	0.022	0.016	0.0099
Margin of Safety (10%)		0.073	0.034	0.023	0.017	0.010
Loading Capacity (TMDL)		**0.73**	**0.34**	**0.23**	**0.17**	**0.10**
Estimated Load Reduction (%)		Insufficient data to calculate; transparency will need to increase by about 74.5 cm from 20.5 cm, the 10th percentile depth, to meet the T-tube WQS (> 95 cm).				

*** MPCA follows the rounding process outlined in the "All Things TMDL" State guidance.**

Table 11: Nitrate TMDLs for the Root River Watershed*

Allocation	Source	Very High	High	Mid	Low	Very Low
		Nitrate (lbs/day)				
TMDL for Mill Creek (07040008-536) and Unnamed Creek (Mill Creek Tributary; 07040008-A47)						
Wasteload Allocation	Schoenfelder Farms LLP (MNG442167)	0	0	0	0	0
	Industrial stormwater (MNR050000)	0.87	0.21	0.10	0.049	0.021
WLA Totals		0.87	0.21	0.10	0.049	0.021

[21] This boundary condition at the Iowa border is not a TMDL allocation. See 5.6.1 (Table 61) of the final TMDL document.

Allocation	Source	Very High	High	Mid	Low	Very Low
		Nitrate (lbs/day)				
Load Allocation	Watershed load	1,747	421	201	98	41
Margin of Safety (10%)		194	47	22	11	4.6
Loading Capacity (TMDL)		**1,941**	**468**	**223**	**109**	**46**
Estimated Load Reduction (%)		10%				
TMDL for Spring Valley Creek (07040008-548) and Unnamed Creek (Spring Valley Creek Tributary; 07040008-D53)						
Wasteload Allocation	Spring Valley WWTP (MN0051934)	78	78	78	78	78
	Industrial stormwater (MNR050000)	1.6	0.59	0.32	0.17	0.075
	WLA Totals	79.6	78.59	78.32	78.17	78.075
Load Allocation	Watershed load	3,043	1,095	557	265	71
Margin of Safety (10%)		347	130	71	38	17
Loading Capacity (TMDL)		**3,470**	**1,304**	**706**	**381**	**166**
Estimated Load Reduction (%)		10%				

*** MPCA follows the rounding process outlined in the "All Things TMDL" State guidance.**