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

FEB 16 2017

REPLY TO THE ATTENTION OF:
WW-16J

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

Dear Mr. Skuta:

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

EPA has determined that 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 thirty-seven 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 Mr. Peter Swenson, Chief of the Watersheds and Wetlands Branch, at 312-886-0236.

Sincerely,

Christopher Korleski
Director, Water Division

Enclosure

cc: Celine Lyman, MPCA

wq-iw9-17g

TMDL: Root River Watershed bacteria, sediment and nitrate TMDLs, Dodge, Fillmore, Houston, Mower, Olmsted and Winona Counties, MN
Date: February 16, 2017

DECISION DOCUMENT
FOR THE ROOT RIVER WATERSHED TMDLS, DODGE, FILLMORE, HOUSTON, MOWER, OLMSTED & WINONA COUNTIES, MINNESOTA

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

1. Identification of Water body, Pollutant of Concern, Pollutant Sources, and Priority Ranking

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

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

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

(1) the spatial extent of the watershed in which the impaired water body is located;
(2) the assumed distribution of land use in the watershed (e.g., urban, forested, agriculture);
(3) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources;
(4) present and future growth trends, if taken into consideration in preparing the TMDL (e.g., the TMDL could include the design capacity of a wastewater treatment facility); and

(5) an explanation and analytical basis for expressing the TMDL through *surrogate measures*, if applicable. *Surrogate measures* are parameters such as percent fines and turbidity for sediment impairments; chlorophyll *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

Comment:

Location Description/Spatial Extent:

The Root River Watershed (RRW) (HUC-8 #07040008) is located in the Lower Mississippi River Basin in southeastern Minnesota. The RRW is approximately 1,664 square miles (1,064,961 acres) in size and spans portions of six counties: Dodge, Fillmore, Houston, Mower, Olmsted and Winona counties. Surface waters in the RRW generally flow from west to east where they join the Mississippi River at Navigation Pool #7 near the town of Hokah, Minnesota (Section 3.1 of the final TMDL document). The RRW TMDLs address fifteen (15) impaired segments due to excessive bacteria, sixteen (16) impaired segments due to excessive sediment inputs and six (6) impaired segments due to excessive nitrate (Table 1 of this Decision Document).

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

Water body name	Assessment Unit ID	Affected Use	Pollutant or stressor	TMDL
Middle Branch Root River	07040008-506	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Thompson Creek	07040008-507	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Root River South Fork	07040008-508	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Rush Creek	07040008-523	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Middle Branch Root River	07040008-534	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Root River	07040008-535	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Mill Creek	07040008-536	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Bear Creek	07040008-542	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Deer Creek	07040008-546	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Spring Valley Creek	07040008-548	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Root River South Branch	07040008-550	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Watson Creek	07040008-552	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Willow Creek	07040008-558	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Forrestville Creek	07040008-563	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Trout Run Creek	07040008-G88	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
			Total	**15**
Root River (Lower)	07040008-501	Aquatic Life (Turbidity)	Sediment/TSS	TSS TMDL
Root River (Lower)	07040008-502	Aquatic Life (Turbidity)	Sediment/TSS	TSS TMDL
Root River South Fork	07040008-508	Aquatic Life (Turbidity)	Sediment/TSS	TSS TMDL
Root River South Fork	07040008-509	Aquatic Life (Turbidity)	Sediment/TSS	TSS TMDL
Root River	07040008-520	Aquatic Life (Turbidity)	Sediment/TSS	TSS TMDL
Root River	07040008-522	Aquatic Life (Turbidity)	Sediment/TSS	TSS TMDL
Root River	07040008-527	Aquatic Life (Turbidity)	Sediment/TSS	TSS TMDL
Root River (Middle Branch)	07040008-528	Aquatic Life (Turbidity)	Sediment/TSS	TSS TMDL
Root River South Branch	07040008-550	Aquatic Life (Turbidity)	Sediment/TSS	TSS TMDL
Watson Creek	07040008-552	Aquatic Life (Turbidity)	Sediment/TSS	TSS TMDL
Root River South Branch	07040008-554	Aquatic Life (Turbidity)	Sediment/TSS	TSS TMDL
Root River South Branch	07040008-555	Aquatic Life (Turbidity)	Sediment/TSS	TSS TMDL
Root River South Branch	07040008-556	Aquatic Life (Turbidity)	Sediment/TSS	TSS TMDL

Root River South Fork	07040008-573	Aquatic Life (Turbidity)	Sediment/TSS	TSS TMDL
North Branch Root River	07040008-716	Aquatic Life (Turbidity)	Sediment/TSS	TSS TMDL
North Branch Root River	07040008-717	Aquatic Life (Turbidity)	Sediment/TSS	TSS TMDL
			Total	**16**
Watson Creek	07040008-552	Drinking Water	Nitrates	Nitrate TMDL
Root River South Branch	07040008-555	Drinking Water	Nitrates	Nitrate TMDL
Canfield Creek	07040008-557	Drinking Water	Nitrates	Nitrate TMDL
Willow Creek	07040008-558	Drinking Water	Nitrates	Nitrate TMDL
Etna Creek	07040008-562	Drinking Water	Nitrates	Nitrate TMDL
Forestville Creek	07040008-563	Drinking Water	Nitrates	Nitrate TMDL
			Total	**6**

Land Use:
Land use in the RRW is mix of agricultural land and forested land (see Figure 3 of the final TMDL document). Table 2 of this Decision Document presents land use percentages in the RRW.

Table 2: Root River Watershed Land Cover (based on the National Land Cover Dataset (NLCD) 2011)

Land Use	**Percentage of total watershed**
Cropland - Corn/Soybeans	41%
Forest/Shrub	26%
Pasture/Grassland	20%
Cropland - Other	7%
Developed	5%
Wetland	0.5%
Open Water	0.2%
TOTAL	**100%**

Problem Identification:
Bacteria TMDLs: Bacteria impaired segments identified in Table 1 of this Decision Document were included on the draft 2014 Minnesota 303(d) list due to excessive bacteria. Water quality monitoring within the RRW indicated that these segments were not attaining their designated aquatic recreation uses due to exceedances of the bacteria criteria. Excessive bacteria can negatively impact recreational uses (swimming, wading, boating, fishing etc.) and public health. At elevated levels, bacteria may cause illness within humans who have contact with or ingest bacteria laden water. Recreation-based contact can lead to ear, nose, and throat infections, and stomach illness.

Sediment (Total Suspended Solids) TMDLs: Sediment (turbidity) impaired segments identified in Table 1 of this Decision Document were included on the draft 2014 Minnesota 303(d) list due to excessive sediment 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 turbidity measurements and the negative impact of those conditions on aquatic life (i.e., fish and macroinvertebrate communities).

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

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

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

Nitrate TMDLs: Nitrate impaired segments identified in Table 1 of this Decision Document were included on the draft 2014 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 (NO_3) and nitrite (NO_2) are two of the forms of nitrogen which can be harmful to humans. Nitrite is toxic to humans while nitrate, if ingested, can transform to nitrite. Nitrite has been linked to methemoglobinemia (i.e., blue baby syndrome) in infants. Areas of southeastern Minnesota are particularly susceptible to nitrogen impacting drinking water resources due to the area's karst geology and use of nitrogen based fertilizers in agricultural areas.

MPCA explained that some species of macroinvertebrates and fish are sensitive to nitrate levels in coldwater stream environments (page 10 of the final TMDL document). Certain macroinvertebrate and fish species may experience stress due to high dissolved nitrate levels within their aquatic environments. MPCA does not currently have a nitrate water quality standard to protect aquatic life and instead uses the drinking water standard of 10 mg/L.

Priority Ranking:
The water bodies addressed by the RRW TMDLs were given a priority ranking for TMDL development due to: the impairment impacts on public health and aquatic life, the public value of the impaired water resource, the likelihood of completing the TMDL in an expedient manner, the inclusion of a strong base of existing data, the restorability of the water body, the technical capability and the willingness of local partners to assist with the TMDL, and the appropriate sequencing of TMDLs within a watershed or basin. Areas within the RRW are popular locations for aquatic recreation. Water quality degradation has led to efforts to improve the overall water quality within the RRW, and to the development of TMDLs for these water bodies.

Pollutants of Concern:
The pollutants of concern are bacteria, TSS (sediment) and nitrate (NO_3).

Source Identification (point and nonpoint sources):

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

RRW bacteria TMDLs:

National Pollutant Discharge Elimination Systems (NPDES) permitted facilities: NPDES permitted facilities may contribute bacteria loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge wastewater according to their NPDES permit. MPCA determined that there are wastewater treatment facilities/plants (i.e., WWTFs/WWTPs) in the RRW which contribute bacteria from treated wastewater releases (Table 3 of this Decision Document and Appendix C of the final TMDL report). MPCA assigned each of these facilities a portion of the bacteria wasteload allocation (WLA).

Table 3: Root River Watershed NPDES facilities which received a portion of the WLA

NPDES Facility Name	Permit #	Design Flow (MGD)	Bacteria Load
Bacteria (*E. coli*) Load (billions of bacteria/day)			
Canton WWTP	MN0023001	0.065	0.31
Chatfield WWTP	MN0021857	0.487	2.323
Dexter WWTP	MN0023183	0.045	1.321
Fountain WWTP	MN0050873	0.062	0.296
Grand Meadow WWTP	MN0023558	0.12	4.974
Haven Hutterian Brethren	MNG580071	0.011	0.458
Hokah WWTP	MN0021458	0.102	0.486
Houston WWTP	MNG550007	0.25	1.192
Lanesboro WWTP	MNG550012	0.096	0.458
Lewiston WWTP	MN0023965	0.25	1.192
Mabel WWTP	MN0020877	0.189	0.901
MNDOT Enterprise Rest Area	MN0048844	0.006	0.114
MNDOT High Forest Rest Area	MN0044377	0.003	0.016
Ostrander WWTP	MN0024449	0.04	0.188
Peterson WWTP	MN0024490	0.05	0.238
Preston WWTP	MN0020745	0.392	1.869
Racine WWTP	MN0024554	0.039	0.777
Rushford WWTP	MNG550022	0.33	1.574
Spring Valley WWTP	MN0051934	0.936	4.464
Stewartville WWTP	MN0020681	1.111	5.3
Wykoff WWTP	MN0020826	0.049	0.234

Municipal Separate Storm Sewer System (MS4) communities: Stormwater from MS4s can transport bacteria to surface water bodies during or shortly after storm events. MPCA did not identify any current MS4 permittees in the RRW, but did assign a portion of the WLA for the bacteria TMDLs of segments (07040004-534, 07040004-535) to a future MS4 permit for the City of Stewartville (Table 7 of this Decision Document). MPCA explained that the City of Stewartville may become a state-recognized MS4 community after the 2020 census is completed and MPCA updates its MS4 permit for the City of Stewartville.

Concentrated Animal Feedlot Operations (CAFOs): MPCA recognized the presence of twenty CAFOs in the RRW (Table 4 of this Decision Document). CAFO facilities must be designed to contain all surface water runoff (i.e., have zero discharge from their facilities) and have a current manure management plan. MPCA explained that these facilities do not discharge effluent and therefore were not assigned a portion of the WLA (WLA = 0).

Table 4: Root River Watershed CAFO facilities which received a portion of the WLA

Facility	Permit Number
Jennie-O Turkey Store - Benson Farm	MNG440036
Jennie-O Turkey Store - Chatfield Farm	MNG440035
Jennie-O Turkey Store - Fay Farm	MNG440037
Larson Products Inc Sec 5	MNG440330
Jennie-O Turkey Store - Lingenfelter	MNG440038
Daley Farms of Lewiston LLP	MN0067652
Johnson Rolling Acres Farm - Sec 21	MNG441129
Lanesboro Sales Commission	MNG440958
Schoenfelder Farms LLP - Blue Ridge East	MN0070289
Wilson Hog Properties LLC	MNG4412130
Mensink Family LLC	MNG441177
Hellickson Swine - Home	MNG440416
Ridgeland Farm - Finisher	MNG440077
Minnesota Family Farms - S2	MNG441059
Minnesota Family Farms - Nursery 1	MNG441059
Allan & Kevin Marzolf Farm	MNG440076
CCPC Swine LP	MNG440939
Eric Ruen Farm - Sec 11	MNG441292
Jon & Glenn Oehlke Farms	MNG440068
Smith Farms of Rushford Inc	MNG440455

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

<u>RRW sediment (TSS) TMDLs:</u>
NPDES permitted facilities: NPDES permitted facilities may contribute sediment loads to surface waters through discharges wastewater. Permitted facilities must discharge wastewater according to their NPDES permit. MPCA determined that the facilities in Appendix C of the final TMDL report contribute sediment from treated wastewater releases and assigned each of these facilities a portion of the sediment WLA.

MS4 communities: Stormwater from MS4s can transport sediment to surface water bodies during or shortly after storm events. MPCA did not identify any current MS4 permittees in the RRW, but did assign a portion of the WLA for the sediment TMDLs of segments (07040004-501, 07040004-502, 07040004-520, 07040004-522, 07040004-527, 07040004-528, 07040004-716 and 07040004-717) to a future MS4 permit for the City of Stewartville (Table 8 of this Decision Document).

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.

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 were two facilities which contribute nitrate from treated wastewater releases, Ostrander WWTF (MN0024449) and Fountain WWTF (MN0050873) (Table 9 of this Decision Document and Table 74 of Appendix C of the final TMDL document). MPCA assigned each of these facilities a portion of the nitrate WLA.

Stormwater runoff from permitted construction and industrial areas: Construction and industrial sites may contribute nitrate 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 SWPPP that summarizes how stormwater will be minimized from the site.

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

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

Stormwater from agricultural land use practices and feedlots near surface waters: Animal Feeding Operations (AFOs) in close proximity to surface waters can be a source of bacteria to water bodies in the 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, which channelize the stormwater flows and reduce the time available for bacteria to die-off.

Unrestricted livestock access to streams: Livestock with access to stream environments may add bacteria directly to the 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, while those systems which discharge partially treated sewage to the ground surface, road ditches, tile lines, and directly into streams, rivers and lakes are considered an imminent threat to public health and safety (ITPHS). ITPHS systems also include illicit discharges from unsewered communities.

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

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

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

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

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

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.

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 does not anticipate there to be imminent growth (i.e., in the next 10 years) in the RRW. The MPCA TMDL project manager shared that most of the agricultural areas in the RRW are unlikely to be changing in the near future. The exception being, agricultural areas near larger towns and cities (e.g., the City of Rochester) which may be annexing surrounding agricultural areas as their population grows over time. MPCA explained that it does not anticipate the Rochester city boundaries encroaching into areas of the RRW in the next 10 years (Section 5 of the final TMDL document). Also, MPCA set aside a portion of the bacteria and TSS WLAs for a future MS4 permit for the City of Stewartville, indicating that the loading conditions for the bacteria and TSS TMDLs may be changing in the future. The WLA and load allocations (LA) for the RRW TMDLs were calculated for all current and future sources. Any expansion of point or nonpoint sources will need to comply with the respective WLA and LA values calculated in the RRW TMDLs.

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

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

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

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

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

Minnesota Rule Chapter 7050 designates uses for waters of the state. The segments addressed by the RRW TMDLs are designated as Class 1 waters (1B and 1C) 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). The Class 2 designated use is described in Minnesota Rule 7050.0140 (3):

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

Standards:

Narrative Criteria:

Minnesota Rule 7050.0221 (Subp. 3 and 4) set forth the following narrative criteria for Class 1B and 1C 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.*
>
> *Class 1C waters - The quality of Class 1C waters of the state shall be such that with treatment consisting of coagulation, sedimentation, filtration, storage, and chlorination, or other equivalent treatment processes, 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 waters, and groundwaters in aquifers not considered to afford adequate protection against contamination from surface or other sources of pollution. Such aquifers normally would include fractured and channeled limestone, unprotected impervious hard rock where water is obtained from mechanical fractures or joints with surface connections, and coarse gravels subjected to surface water infiltration. These standards shall also apply to these waters in the untreated state."*

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

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

Numeric criteria:

Bacteria TMDLs: The bacteria water quality standards which apply to RRW TMDLs are:

Table 5: Bacteria Water Quality Standards Applicable to the RRW TMDLs

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

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

Bacteria TMDL Targets: The bacteria TMDL targets employed for the RRW bacteria TMDLs are the *E. coli* standards as stated in Table 5 of this Decision Document. The focus of this TMDL is on the 126 organisms (orgs) per 100 mL (126 orgs/100 mL) portion of the standard. MPCA believes that using the 126 orgs/100 mL portion of the standard for TMDL calculations will result in the greatest bacteria reductions within the RRW and will result in the attainment of the 1,260 orgs/100 mL portion of the standard. While the bacteria TMDLs will focus on the geometric mean portion of the water quality standard, attainment of both parts of the water quality standard is required.

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

Sediment (TSS) TMDL Targets: MPCA employed two TSS targets applicable to streams in the RRW. Criterion from streams classified as 2A (coldwater streams) and 2B (coldwater or warmwater, Southern River Nutrient Region (SRNR)) were applied to the sediment (TSS) TMDLs of the RRW (Table 6 of this Decision Document).

Table 6: Total Suspended Solids Water Quality Standards Applicable in the RRW TMDLs

Parameter	Units	Water Quality Standard
TSS - Class 2A Waters (Southern MN Region)	mg/L	10
TSS - Class 2B Waters (Southern MN Region)	mg/L	65

Nitrate TMDLs: Nitrate impaired waters in the RRW are designated as drinking water sources (Class 1B waters[1]), therefore, the Minnesota nitrate drinking water quality standard is a maximum concentration of 10 mg/L.

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 the second criterion.

[1] Root River Watershed Total Maximum Daily Load, November 2016, Section 2.2.3.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

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

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

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

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

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

Typically loading capacities are expressed as a mass per time (e.g. pounds per day). However, for *E. coli* loading capacity calculations, mass is not always an appropriate measure because *E. coli* is expressed in terms of organism counts. This approach is consistent with the EPA's regulations which define "load" as "an amount of matter that is introduced into a receiving water" (40 CFR §130.2). To establish the loading capacities for the RRW bacteria TMDLs, MPCA used Minnesota's WQS for *E. coli* (126 orgs/100 mL). A loading capacity is, "the greatest amount of loading that a water can receive without violating water quality standards." (40 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.

Separate flow duration curves (FDCs) were created for the each of the bacteria TMDLs in the RRW. The RRW FDCs were developed using daily simulated flow estimates from Hydrologic Simulation Program-Fortran (HSPF) modeling efforts. MPCA focused on daily modeled flows from 1996-2010. 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 explained that three USGS and five Minnesota Department of Natural Resources (DNR) field stations were used to generate flow data for the HSPF modeling efforts (from the Root River Watershed Restoration and Protection Strategies (WRAPS) document, page 44).

FDCs graphs have flow duration interval (percentage of time flow exceeded) on the X-axis and discharge (flow per unit time) on the Y-axis. The FDC were transformed into LDC by multiplying individual flow values by the WQS (126 orgs/100 mL) and then multiplying that value by a conversion factor. The resulting points are plotted onto a load duration curve graph. LDC graphs, for the RRW bacteria TMDLs, have flow duration interval (percentage of time flow exceeded) on the X-axis and *E. coli* loads (number of bacteria per unit time) on the Y-axis. The 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 a conversion factor which allows the individual samples to be plotted on the same figure as the LDCs (e.g., Figures A1 to A26 in Appendix A of the final TMDL document). Individual LDCs are found in Appendix A of the final TMDL document.

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

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

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

Bacteria TMDLs for the RRW were calculated and those results are found in Table 7 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 (ex. 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 7 of this Decision Document reports five points (the midpoints of the designated flow regime) on the loading capacity curve. However, it should be understood that the components of the TMDL equation could be illustrated for any point on the entire loading capacity curve. The LDC method can be used to display collected bacteria monitoring data and allows for the estimation of load reductions necessary for attainment of the bacteria water quality standard. Using this method, daily loads were developed based upon the flow in the water body. Loading capacities were determined for the segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Table 7 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 7: Bacteria (*E. coli*) TMDLs for the Root River Watershed is located at the end of this Decision Document

Table 7 of the Decision Document presents MPCA's loading reduction estimates for each TMDL. These loading reductions (i.e., the percent reduction row at the bottom of each TMDL table) were calculated from field sampling data collected in the RRW. MPCA explained that its load reduction estimates are likely more conservative since they are based on a limited water quality data set.

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 TMDLs. The methods used for determining the TMDL are consistent with U.S. EPA technical memos.[2]

<u>RRW sediment (TSS) TMDLs:</u> MPCA developed LDCs to calculate sediment TMDLs for the sixteen impaired segments of the RRW. The same LDC development strategies were employed for the sediment and bacteria TMDLs (e.g., the incorporation of HSPF model simulated flows to develop FDCs, water

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

quality monitoring information collected within the RRW informing the LDC, etc.). The FDC were transformed into LDC by multiplying individual flow values by the Class 2A target (10 mg/L) or the Class 2B target (65 mg/L) and then multiplying that value by a conversion factor.

Sediment (TSS) TMDLs were calculated (Table 8 of this Decision Document) and load allocations for each impaired segment were calculated after the determination of the WLA, and the MOS. Similar to the bacteria TMDLs, load allocations were not split into individual nonpoint contributors, but combined together into one value to cover all nonpoint source contributions. Table 8 of this Decision Document reports five points (the midpoints of the designated flow regime) on the loading capacity curve. However, it should be understood that the components of the TMDL equation could be illustrated for any point on the entire loading capacity curve.

The LDC method can be used to display collected sediment monitoring data and allows for the estimation of load reductions necessary for attainment of the Class 2A or 2B TSS water quality standard. Using this method, daily loads were developed based upon the flow in the water body. Loading capacities were determined for each segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Table 8 of this Decision Document identifies the loading capacity for each segment at each flow regime. Although there are numeric loads for each flow regime, the LDC is what is being approved for this TMDL.

Table 8: Total Suspended Solids (TSS) TMDLs for the Root River Watershed is located at the end of this Decision Document

Table 8 of the Decision Document presents MPCA's loading reduction estimates for each TSS TMDL. These loading reductions (i.e., the percent reduction row at the bottom of each TMDL table) were calculated from field sampling data collected in the RRW. MPCA explained that its load reduction estimates are likely more conservative since they are based on a limited water quality data set.

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

RRW nitrate TMDLs: MPCA developed LDCs to calculate nitrate TMDLs for the six impaired segments of the RRW. The same LDC development strategies were employed for the nitrate TMDLs as they were for the sediment and bacteria TMDLs (ex. the incorporation of HSPF model simulated flows to develop FDCs, water quality monitoring information collected within the RRW informing the LDC, etc.). The FDC were transformed into LDC by multiplying individual flow values by the nitrate target of 10 mg/L and then multiplying that value by a conversion factor.

Nitrate TMDLs were calculated (Table 9 of this Decision Document). and load allocations for each impaired segment were calculated after the determination of the WLA, and the MOS. Similar to the bacteria and sediment TMDLs, load allocations were not split into individual nonpoint contributors, but combined together into one value 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, it should be understood that the components of the TMDL equation could be illustrated for any point on the entire loading capacity curve.

The LDC method can be used to display collected nitrate monitoring data and allows for the estimation of load reductions necessary for attainment of the nitrate target. 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 9 of this Decision Document identifies the loading capacity for each segment at each flow regime. Although there are numeric loads for each flow regime, the LDC is what is being approved for this TMDL.

Table 9: Nitrate TMDLs for the Root River Watershed is located at the end of this Decision Document

Table 9 of the Decision Document presents MPCA's loading reduction estimates for each nitrate TMDL. These loading reductions (i.e., the percent reduction row at the bottom of each TMDL table) were calculated from field sampling data collected in the RRW. MPCA explained that its load reduction estimates are likely more conservative since they are based on a limited water quality data set.

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 the third criterion.

4. Load Allocations (LA)

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

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

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

RRW sediment (TSS) TMDLs: The calculated LA values for the sediment (TSS) TMDLs are applicable across all flow conditions. MPCA identified several nonpoint sources which contribute sediment loads to the surface waters in the RRW (Table 8 of this Decision Document). Load allocations were recognized as originating from many diverse nonpoint sources including; stormwater contributions from agricultural lands, stream channelization and streambank erosion, wetland and forest sources, and atmospheric deposition. MPCA did not determine individual load allocation values for each of these potential nonpoint source considerations, but aggregated the nonpoint sources into one LA value ('Watershed Load').

RRW nitrate TMDLs: The calculated LA values for the nitrate TMDLs are applicable across all flow conditions. MPCA identified several nonpoint sources which contribute nitrate loads to the surface waters in the RRW (Table 9 of this Decision Document). Load allocations were recognized as originating from; nonpoint source leaching loss, runoff from agricultural land use practices, nitrate contributions from upstream watersheds, and atmospheric deposition. MPCA did not determine individual load allocation values for each of these potential nonpoint source considerations, but aggregated the nonpoint sources into one LA value ('Watershed Load').

EPA finds MPCA's approach for calculating the LA to be reasonable.

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

5. Wasteload Allocations (WLAs)

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

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

Comment:

RRW bacteria TMDLs: MPCA identified NPDES permitted facilities within the RRW and assigned those facilities a portion of the WLA (Table 7 of this Decision Document). The WLAs for each of these individual facilities were calculated based on the facility's wet weather design flow and the *E. coli* WQS (126 orgs /100 mL). MPCA explained that the WLA for each individual WWTP was calculated based on the *E. coli* WQS but WWTFs are regulated for the fecal coliform WQS (200 orgs /100 mL) and that if a facility is meeting its fecal coliform limits, which are set in the facility's discharge permit, MPCA assumes the facility is also meeting the calculated *E. coli* WLA from the RRW TMDLs. The WLA was therefore calculated using the assumption that the *E. coli* standard of 126 orgs/100 mL provides equivalent protection from illness due to primary contact recreation as the fecal coliform WQS of 200 orgs/100 mL.

MS4 allocations were calculated for a future MS4 community for the City of Stewartville. The RRW bacteria MS4 estimate for the City of Stewartville was based on the following equation:

$$(\text{Total LA per AUID} - \text{MOS} - \text{NPDES}_{\text{ALLOCATION}}) * (\text{\% of land area of the MS4 community within the subwatershed for that AUID}) = \text{MS4 WLA}$$

Where:

Total LA per AUID: The estimated LA per AUID

MOS: Margin of safety calculation (10% of the total loading capacity)

$NPDES_{ALLOCATION}$: The total WLA for all permitted industrial and municipal NPDES facilities that discharge into the AUID's drainage area

% of land area of the MS4 community: A GIS estimate of the area of MS4 community which is contributing to that AUID, where the estimated area is based on a future land use data layer provided by the City of Stewartville. (NOTE: Agricultural and open space land use categories were excluded from these calculations)

MPCA acknowledged the presence of CAFOs in the RRW in Section 4.1.3.3 of the final TMDL document. CAFOs and other feedlots are generally not allowed to discharge to waters of the State (Minnesota Rule 7020.2003). CAFOs were assigned a WLA of zero (WLA = 0) for the RRW bacteria TMDLs.

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

RRW sediment (TSS) TMDLs: MPCA identified NPDES permitted facilities within the RRW and assigned those facilities a portion of the WLA (Table 8 of this Decision Document). The WLAs for each of these individual facilities were calculated based on the facility's wet weather design flow and the Class 2A target (10 mg/L) or the Class 2B target (65 mg/L).

MS4 allocations for the future MS4 permit for the City of Stewartville were calculated in the same manner as the MS4 allocations for the RRW bacteria TMDLs (i.e., see calculative method in ***Section 5 - RRW bacteria TMDLs***, within this Decision Document).

MPCA also calculated a portion of the WLA for construction and industrial stormwater. This WLA was represented as a categorical WLA for construction stormwater and a categorical WLA for industrial stormwater. Overall, the construction and industrial stormwater WLA make up a very small portion of the overall loading capacity but MPCA wanted to recognize their contributions. Construction and industrial stormwater were lumped together into a categorical WLA based on an approximation of the land area covered by those activities (Section 4.1.3.2 of the final TMDL document). MPCA accounted for construction and industrial stormwater sources by assuming that 0.1% of the contributing land area for each segment was areas under construction or industrial areas which would contribute stormwater to impaired segment. MPCA multiplied the loading capacity for a particular segment by the 0.1% estimate for construction and industrial stormwater and that value was assigned as the WLA for construction and industrial stormwater.

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 (MNR100001) and properly selects, installs and maintains all BMPs required under MNR1000001 and applicable local construction stormwater ordinances, including those related to impaired waters discharges and any applicable additional requirements found in Appendix A of the Construction General Permit, the stormwater discharges would be expected to be consistent with the WLA in this TMDL. BMPs and other stormwater control measures which act to limit the discharge of the pollutant of concern (TSS) are defined in MNR100001.

The MPCA is responsible for overseeing industrial stormwater loads which impact water quality to 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 General Permit for Construction Sand & Gravel, Rock Quarrying and Hot Mix Asphalt Production facilities (MNG490000). MPCA explained that if a facility owner/operator obtains coverage under the appropriate NPDES/SDS General Stormwater Permit and properly selects, installs and maintains all BMPs required under the permit, the stormwater discharges would be expected to be consistent with the WLA in this TMDL. BMPs and other stormwater control measures which act to limit the discharge of the pollutant of concern (TSS) are defined in MNR050000 and MNG490000.

The NPDES program requires construction and industrial sites to create SWPPPs which summarize how stormwater pollutant discharges will be minimized from construction and industrial sites. Under the MPCA's Stormwater General Permit (MNR100001) and applicable local construction stormwater ordinances, managers of sites under construction or industrial stormwater permits must review the adequacy of local SWPPPs to ensure that each plan complies with the applicable requirements in the State permits and local ordinances. As noted above, MPCA has explained that meeting the terms of the applicable permits will be consistent with the WLAs set in the RRW TSS TMDLs. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified within 18-months of the approval of the TMDL by the 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 which were contributing to a nitrate impaired segments (Ostrander WWTF (MN0024449) and Fountain WWTF (MN0050873)) and assigned these facilities a portion of the WLA (Table 9 of this Decision Document). The WLA were calculated based on the facility's wet weather design flow and the nitrate target (10 mg/L).

Similar to the TSS TMDLs, MPCA calculated a portion of the WLA for construction and industrial stormwater for the nitrate TMDLs. This WLA was represented as a categorical WLA for construction and industrial stormwater. Overall, the construction and industrial stormwater WLA make up a very small portion of the overall loading capacity but MPCA wanted to recognize their contributions. The construction and industrial stormwater allocations for the RRW nitrate TMDLs were calculated in the same manner as the construction and industrial stormwater allocations for the RRW TSS TMDLs (i.e., see calculative method in ***Section 5 – RRW TSS TMDLs***, within this decision document).

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

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

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

6. Margin of Safety (MOS)

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

Comment:
The final TMDL submittal outlines the determination of the Margin of Safety for the bacteria, sediment (TSS) and nitrate TMDLs. All parameters employed an explicit MOS set at 10% of the loading capacity.

RRW bacteria, sediment (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 7, 8 and 9 of this Decision Document). MPCA explained that the explicit MOS was set at 10% due to the following factors discovered 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, and conservative assumptions made during the modeling efforts.

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 contains an appropriate MOS satisfying the requirements of the sixth criterion.

7. Seasonal Variation

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

Comment:

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

RRW sediment (TSS) TMDLs: The TSS WQS applies from April to September which is also the time period when high concentrations of sediment are expected in the surface waters of the RRW (Section 4.1.5 of the final TMDL document). 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 which drain agricultural fields. The conditions generally occur in the spring and early summer seasons.

RRW nitrate TMDLs: Critical conditions which may impact nitrate's introduction to surface water are likely very similar to sediment in that these conditions are influences by precipitation events. Nitrate and manure fertilizer application to agricultural areas in the RRW can introduce nitrate concentrations to local surface waters during precipitation events. Critical conditions that impact loading, or the rate that nitrate is delivered to the water body, were identified as those periods where large precipitation events coincide with periods of minimal vegetative cover on fields. Large precipitation events and minimally covered land surfaces can lead to large runoff volumes, especially to those areas which drain agricultural fields. The conditions generally occur in the spring and early summer seasons.

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

8. Reasonable Assurance

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

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

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

Comment:

The RRW bacteria, sediment (TSS) and nitrate TMDLs provide reasonable assurance that actions identified in the implementation section of the final TMDL (i.e., Sections 6 and 8 of the final TMDL document), will be applied to attain the loading capacities and allocations calculated for the impaired reaches within the 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 which have expressed interest in working to improve water quality within the RRW. BMPs are anticipated to be implemented over the next several years via efforts from the following partners; Soil and Water Conservation Districts (SWCDs) (e.g., the Dodge County SWCD, Olmsted County SWCD, Winona County SWCD), local Minnesota Board of Soil and Water Resources (BWSR) offices, and other local watershed groups. MPCA has authored a Root River WRAPS document (November 2016) which provides information on the development of scientifically-supported restoration and protection strategies for implementation planning and action. MPCA sees the WRAPS document as a starting point for which MPCA and local partners can develop tools that will help local governments, land owners, and special interest groups determine (1) the best strategies for making improvements and protecting resources that are already in good condition, and (2) focus those strategies in the best places to do work.

The county SWCDs in the RRW are the committed local groups which will be driving the efforts aimed at initiating and following through on actions to improve water quality in the RRW. The Olmsted SWCD's mission is to assist farmers, community members, watershed planners and landowners in developing and implementing conservation and resource management systems and practices.[3] Certain local SWCDs have different outreach programs which engage the public on the water quality challenges facing the RRW. Efforts to communicate with local farmers regarding utilizing more sustainable resource practices which have positive impacts for water quality (e.g., establishing cover crops, agricultural practices which promote improvements to overall soil health) have been prioritized in the

[3] Olmsted SWCD webpage, https://www.co.olmsted.mn.us/pw/oswcd/Pages/default.aspx

RRW. SWCDs also assist local community members in their efforts to understand local and state rules (e.g., Minnesota's Buffer Law) and to explore financial opportunities available for local stakeholders. The different programs offered by SWCDs demonstrate that at the county level there is great interest in improving water quality and restoring impaired waterbodies as well as protecting waters which are threatened with potential further degradation.

The Winona County SWCD is another active partner whose objectives include improving water quality in the RRW. The Winona County SWCD recently re-adopted the Winona County Comprehensive Local Water Management Plan.[4] The Comprehensive Local Water Management Plan is designed to link land use activities with the protection and improvement of surface and groundwater resources.[5] The plan serves as a guide for policy and capital considerations for local governmental units in Winona County. The plan also allows local units of government to receive Natural Resource Block Grant allocations and apply for additional grant funding to implement water resource management activities in Winona County. A plan for 2011-2015 is available online and provides recommendations for managing sensitive areas in Winona County where agricultural areas abut surface waters and unique geologic features (i.e., karst areas). The ongoing efforts in the RRW demonstrate the commitment of stakeholders to improving water quality in southern Minnesota. While measureable progress may be slow to develop, actions from these groups and other stakeholders in the RRW will ultimately result in improvements to water quality for all of the pollutants addressed in the RRW TMDLs.

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.

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

Reasonable assurance that the WLA set forth will be implemented is provided by regulatory actions. According to 40 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. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified. This applies to sites under the MPCA's General Stormwater Permit for Construction Activity

[4] Whitewater River Watershed Project webpage, Whitewater Joint Powers Board, January 21, 2016, meeting minutes, http://www.whitewaterwatershed.org/pdf/minutes/January-2016.pdf

[5] Winona County (MN) SWCD webpage, http://www.co.winona.mn.us/page/2851

(MNR100001) and its NPDES/SDS Industrial Stormwater Multi-Sector General Permit (MNR050000) or NPDES/SDS General Permit for Construction Sand & Gravel, Rock Quarrying and Hot Mix Asphalt Production facilities (MNG490000).

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

Various funding mechanisms will be utilized to execute the recommendations made in the implementation section of this TMDL. The Clean Water Legacy Act (CWLA) was passed in Minnesota in 2006 for the purposes of protecting, restoring, and preserving Minnesota water. The CWLA provides the protocols and practices to be followed in order to protect, enhance, and restore water quality in Minnesota. The CWLA outlines how MPCA, public agencies and private entities should coordinate in their efforts toward improving land use management practices and water management. The CWLA anticipates that all agencies (i.e., MPCA, public agencies, local authorities and private entities, etc.) will cooperate regarding planning and restoration efforts. Cooperative efforts would likely include informal and formal agreements to jointly use technical, educational, and financial resources.

The CWLA also provides details on public and stakeholder participation, and how the funding will be used. In part to attain these goals, the CWLA requires MPCA to develop WRAPS. The WRAPS are required to contain such elements as the identification of impaired waters, watershed modeling outputs, point and nonpoint sources, load reductions, etc. (*Chapter 114D.26*; CWLA). The WRAPS also contain an implementation table of strategies and actions that are capable of achieving the needed load reductions, for both point and nonpoint sources (*Chapter 114D.26*, Subd. 1(8); CWLA). Implementation plans developed for the TMDLs are included in the table, and are considered "priority areas" under the WRAPS process (*Watershed Restoration and Protection Strategy Report Template*, MPCA). This table includes not only needed actions but a timeline for achieving water quality targets, the reductions needed from both point and nonpoint sources, the governmental units responsible, and interim milestones for achieving the actions. MPCA has developed guidance on what is required in the WRAPS (*Watershed Restoration and Protection Strategy Report Template*, MPCA).

The Minnesota Board of Soil and Water Resources administers the Clean Water Fund as well, and has developed a detailed grants policy explaining what is required to be eligible to receive Clean Water Fund money (FY 2014 Clean Water Fund Competitive Grants Request for Proposal (*RFP*); *Minnesota Board of Soil and Water Resources*, 2014).

The EPA finds that this criterion has been adequately addressed.

9. Monitoring Plan to Track TMDL Effectiveness

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

Comment:
The final TMDL document outlines the water monitoring efforts in the RRW (Section 7 of the final TMDL document). Progress of TMDL implementation will be measured through regular monitoring efforts of water quality and total BMPs completed. MPCA anticipates that monitoring will be completed by local groups (e.g., the Fillmore County SWCD) and volunteers, as long as there is sufficient funding to support the efforts of these local entities. 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 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 in order to build on the current water quality dataset and track changes based on implementation progress. Continuing to monitor water quality and biota scores in the listed segments will determine whether or not stream habitat restoration measures are required to bring the watershed into attainment with water quality standards. At a minimum, fish and macroinvertebrate sampling should be conducted by the MPCA, Minnesota Department of Natural Resources (MN-DNR), or other agencies every five to ten years during the summer season.

The EPA finds that this criterion has been adequately addressed.

10. Implementation

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

Comment:
The findings from the 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 8 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 document includes additional detail regarding specific recommendations from MPCA to aid in the reduction of bacteria, sediment (TSS) and nitrate to surface waters of the RRW. Additionally, MPCA referenced the Statewide Nutrient Reduction Strategy (https://www.pca.state.mn.us/water/nutrient-reduction-strategy) for focused implementation efforts targeting phosphorus and nitrate nonpoint sources in RRW. The reduction goals for the bacteria, sediment (TSS) and nitrate TMDLs may be met via components of the following strategies:

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

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

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

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

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

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

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

RRW nitrate TMDLs:

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

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.

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

11. Public Participation

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

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

Comment:

The public participation section of the TMDL submittal is found in Section 9 of the final TMDL document. Throughout the development of the RRW TMDLs the public was given various opportunities to participate. As part of the strategy to communicate the goals of the TMDL project and to engage with members of the public, MPCA formed various technical committees (e.g., Root River Technical Advisory Group, Root River Stakeholder Advisory Group and the Root River Citizen Advisory Group, see Section 9 of the final TMDL document) to discuss goals of the TMDL, strategies and approaches to reducing pollutant inputs to waters in the RRW and ongoing and future implementation efforts in the RRW. A full description of civic engagement activities associated with the TMDL process is available within in the RRW WRAPS report.

MPCA posted the draft TMDL online at (http://www.pca.state.mn.us/water/tmdl) for a public comment period. The 30-day public comment period was started on April 18, 2016 and ended on May 17, 2016. MPCA received six public comments during the public comment period.

Heidi Peterson, of the Minnesota Department of Agriculture (MDA), shared comments which requested that MPCA revisit certain areas of the public notice draft and update discussion within this document to better represent the conditions of the RRW. Ms. Peterson highlighted the following areas and requested MPCA revise these topics; inclusion of appropriate journal articles and fixing references within the main body of the TMDL document, MPCA's nitrate source discussion (e.g., atmospheric contributions), MPCA's discussions supporting its findings related to nitrate source discussions, along with other edits and suggestions. MPCA answered Ms. Peterson's requests and updated the final TMDL appropriately in its response to Ms. Peterson's comment.

Erik Heinen of Great River Energy requested that MPCA update the TSS WLA assigned to the Pleasant Valley Station (MN0067717) which reflects the existing permit limit and maximum discharge flow from this facility. Mr. Heinen suggested a revised TSS WLA to be used in the RRW TSS TMDLs. MPCA verified that the suggested TSS WLA was correct and incorporated the new value for Pleasant Valley Station (MN0067717) within relevant TSS TMDLs.

Jeff Weiss of the Minnesota Department of Natural Resources (MDNR) submitted comments on the TMDL and the WRAPS documents. Mr. Weiss requested that MPCA clarify information within the draft TMDL document related to highlighting segments sampled and addressed in the RRW TMDLs against segments which were not sampled or assessed, MPCA's consideration of hatchery discharge information, MPCA's consideration of aquatic life use impairments in the TMDL development process, the incorporation of flood data as it pertains to local flow modeling in the RRW and physical habitat stressors. MPCA answered each of Mr. Weiss's questions and updated the final RRW TMDL appropriately.

Cynthia Christensen of the Houston County Farm Bureau shared comments on the draft TMDL and highlighted certain sections which Ms. Christensen believed needed additional description and clarifying language. Ms. Christensen cited MPCA's discussion of nitrate WQS and their applicability to drinking water and trout streams, its discussion of nitrate ambient water quality conditions and their impact on aquatic communities, MPCA's explanation of working with local entities (e.g., SWCDs) and developing partnerships with local stakeholders. MPCA answered Ms. Christensen's comments, provided direction to areas of the TMDL text which answer Ms. Christensen's comments and where appropriate, revised the final TMDL document.

Samantha Kaster of Milestone Materials/Mathy Construction Company requested that MPCA update NPDES permit information for specific permits in the draft TMDL document. Ms. Kaster provided corrections to various tables involving the following NPDES permittees; the Stewartville I-90 facility, the Stewartville Quarry and the Panhandle Quarry. MPCA reviewed this information and made the necessary corrections to the final RRW TMDL.

Betsy Lawton, of the Minnesota Center for Environmental Advocacy (MCEA), submitted comments to MPCA on the RRW TMDL developmental efforts. MCEA highlighted a few different topics within the draft TMDL which it felt needed additional clarification. MCEA's nitrate comments focused on: the lack of TMDLs for all of the aquatic life impaired segments in the RRW and MPCA's failure to establish nitrate TMDLs to protect all designated uses in the RRW. MCEA's comments on point and nonpoint source loading in the RRW focused on whether MPCA had appropriately considered current loads from point sources and the location and magnitude of nonpoint source loads. MCEA's TSS comments focused on: the calculation of WLAs assigned to facilities which are contributing to sediment impaired segments, whether TMDLs will ultimately meet water quality standards and greater clarification on nonpoint source reductions and reasonable assurance that LA will be achievable. MPCA answered each of MCEA's comments in a letter dated October 27, 2016.

Nitrate comments from MCEA:
In its response to MCEA, MPCA explained that nitrate TMDLs for the RRW were developed for segments where there are promulgated nitrate WQS (i.e., the 10 mg/L drinking water standard). MPCA noted that there are currently no promulgated WQS addressing aquatic toxicity due to excessive nitrate/nitrogen for coldwater and warmwater stream environments. Therefore, until an aquatic life toxicity standard for nitrate/nitrogen is promulgated by the State, MPCA cannot propose TMDLs for coldwater and warmwater segments which have been identified by the State as being impaired due to excessive nitrate/nitrogen. MPCA communicated that it anticipates that the 2017 triennial standards review (TSR) will prioritize the development of a nitrate/nitrogen WQS to address aquatic toxicity.

MPCA provided references to the TMDL and WRAPS documents which outline MPCA discussions related to its efforts to characterize nitrate/nitrogen point and nonpoint source pollution in the RRW, hydrologic transport mechanisms in the RRW, surface and groundwater interactions in the RRW related to nitrogen mobility, and overall reduction goals for nitrate/nitrogen in the RRW (i.e., a 20% reduction by 2025). MPCA also referenced sections of the WRAPS document which describe example BMPs and suites of BMPs, which MPCA believes will help local entities attain the nitrate/nitrogen reduction goals of the TMDL and the watershed reduction goals of the WRAPS. Additionally, MPCA directed the commenter to portions of the WRAPS document which outlined nitrogen sources in the RRW, to maps in the WRAPS document which highlight subwatersheds in the RRW which disproportionately contribute nitrogen to the surface waters of the RRW and to tables which outline BMPs which MPCA advocates should be employed to reduce nitrogen inputs to the RRW. MPCA believes that nitrogen reduction efforts outlined in the WRAPS will have a positive impact water quality in the RRW, whether those impacts are directly tied to approved TMDL segments addressing nitrate drinking water impairments or nitrogen stressed coldwater and warmwater stream environments which do not have approvable TMDLs.

Point and nonpoint source load comments from MCEA:
EPA believes that MPCA presents an appropriate discussion of point and nonpoint sources in the TMDL and subsequent WRAPS document. MPCA discusses point and nonpoint sources within Section 3 of the TMDL and summarizes sources within the WRAPS document (Section 2). MPCA also cites nitrate source information which was presented in the Minnesota Nutrient Reduction Strategy (September 2014) and incorporated into the RRW WRAPS document. MPCA responded to MCEA's comments on point and nonpoint source discussions by highlighting current source loading information and magnitude and location information which are referenced in the TMDL and nitrate/nitrogen source materials within the WRAPS document.

TSS WLA comments from MCEA:
MPCA explained its approach to calculating WLAs within the RRW TMDL document and further answered specific questions in its response to MCEA's comments. TSS WLAs were based on the appropriate water quality standard 'target' value and the facility's design flow. The WLA calculation (i.e., water quality standard multiplied by the design flow) is a starting point for determining the maximum amount which a facility can discharge under variable flow conditions. MPCA explained that the calculated WLA and TMDL does not 'authorize' a permittee to increase its discharge from its facility and does not authorize the permittee to discharge above its current permit limit. EPA supports this approach for calculating WLA for permitted facilities. MPCA indicated that for permitted facilities in the RRW, individual facility permit limits are more stringent than water quality standards applied to downstream waters. Therefore, assuming that the facility is in compliance with the discharge limits of its NPDES permit, the facility will not cause nor contribute an impairment downstream of its effluent discharge. MPCA NPDES permit writers are expected to translate WLAs to NPDES permit limits which are consistent with the assumptions and requirements of the TMDL (See 40 CFR § 122.44(d)(1)(vii)(B)).

TSS nonpoint source load reduction comments from MCEA:
MPCA referenced implementation tables in the WRAPS document which outline proposed suites of BMPs and actions which it believes will cumulatively result in attainment of nonpoint source reductions necessary to attain the reductions called for the TMDL. EPA believes that the detail provided in the WRAPS document is a sound starting point for providing a focused, comprehensive implementation plan on the watershed scale. Subsequent work in the watershed by the Minnesota Board of Water and Soil Resource (BWSR) to further refine implementation on the local level via its One Watershed, One Plan (1W1P) document should also serve to enhance implementation discussions included in the WRAPS document.

Reasonable Assurance comments from MCEA:
MPCA addressed reasonable assurance topics in Sections 6 and 8 of the final TMDL document. Also, MPCA has included further discussion of specific BMPs to target point and nonpoint sources of bacteria, sediment (TSS) and nitrate in its WRAPS document (November 2016). EPA notes that MPCA has a process in place which supplements the reasonable assurance and implementation discussions of the TMDL with an MPCA-authored WRAPS document and BWSR-authored 1W1P document. These documents will provide additional specific detail regarding ongoing and planned implementation efforts within the RRW. Specifically, the WRAPS document will include a summary of current conditions, sources, goals, timelines, milestones, responsible parties for implementation efforts, and will describe

restoration and protection strategies. EPA understands that the 1W1P document will continue to build off of the TMDL and WRAPS documents and provide a focused, comprehensive implementation plan on the watershed scale.[6]

Additional detail on these issues is provided in MPCA's October 27, 2016 response to MCEA's comments. EPA believes that MPCA adequately addressed the comments received from MCEA during the public notice period and where necessary updated the final TMDL document in response to those comments.

In an August 11, 2016 letter[7] to EPA, MCEA requested that EPA review MPCA's responses to MCEA's comments from the public notice period, and require MPCA to correct deficiencies identified by MCEA in the final draft of the RRW TMDL. MCEA reiterated some of the same comments it had submitted to MPCA during the public notice period. EPA reviewed MPCA's responses to MCEA's comments from the public notice period and determined that MPCA's assumptions and rationale for calculating the RRW TMDLs, especially WLAs and LAs, were consistent with EPA expectations of an approvable TMDL.

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

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

12. Submittal Letter

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

Comment:

The EPA received the final Root River watershed TMDL document, submittal letter and accompanying documentation from MPCA on December 7, 2016. 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

[6] Minnesota Board of Water & Soil Resources webpage - http://www.bwsr.state.mn.us/planning/1W1P/index.html

[7] MCEA letter to Dave Werbach, U.S. EPA R5, *Re: Draft Root River and Cannon River Watershed TMDLs*, August 11, 2016.

causes/pollutants of concern. This TMDL was submitted per the requirements under Section 303(d) of the Clean Water Act and 40 CFR 130.

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

13. Conclusion

After a full and complete review, the EPA finds that the 15 bacteria TMDLs, the 16 sediment (TSS) TMDLs and the 6 nitrate TMDLs satisfy all elements for approvable TMDLs. This TMDL approval is for **thirty-seven 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. The EPA is taking no action to approve or disapprove TMDLs for those waters at this time. The EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under the CWA Section 303(d) for those waters.

ATTACHMENTS

Attachment #1: Table 7: Bacteria (*E. coli*) TMDLs for the Root River Watershed

Attachment #2: Table 8: Total Suspended Solid (TSS) TMDLs for the Root River Watershed

Attachment #3: Table 9: Nitrate TMDLs for the Root River Watershed

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Table 7: Bacteria (*E. coli*) TMDLs for the Root River Watershed

Allocation	Source	Very High	High	Mid	Low	Very Low
		E. coli (billions of bacteria/day)				
TMDL for Thompson Creek (07040008-507)						
Wasteload Allocation		0.00	0.00	0.00	0.00	0.00
Load Allocation	Watershed load	17.00	1.64	0.59	0.40	0.15
Margin Of Safety (10%)		1.89	0.18	0.07	0.04	0.02
	Loading Capacity (TMDL)	**18.89**	**1.82**	**0.66**	**0.44**	**0.17**
Estimated Load Reduction (%)		95.2%	95.6%	65.1%	78.5%	47.9%
TMDL for Trout Run Root River (07040008-G88)						
Wasteload Allocation		0.00	0.00	0.00	0.00	0.00
Load Allocation	Watershed load	143.06	110.04	95.36	58.69	47.68
Margin Of Safety (10%)		15.90	12.23	10.60	6.52	5.30
	Loading Capacity (TMDL)	**158.96**	**122.27**	**105.96**	**65.21**	**52.98**
Estimated Load Reduction (%)		95.5%	86.0%	71.9%	92.0%	79.4%
TMDL for Middle Branch Root River (07040008-534)						
Wasteload Allocation	Permitted Municipal and Industrial Wastewater Facilities (see Table 67 in Appendix C)	19.87	19.87	19.87	19.87	19.87
	MS4: City of Stewartville (future MS4 load)	36.45	14.31	8.36	4.68	2.15
	WLA Totals	56.32	34.18	28.23	24.55	22.02
Load Allocation	Watershed load	3008.86	1180.87	689.84	386.70	177.21
Margin Of Safety (10%)		340.58	135.01	79.79	45.70	22.14
	Loading Capacity (TMDL)	**3405.76**	**1350.06**	**797.86**	**456.95**	**221.37**
Estimated Load Reduction (%)		99.0%	73.9%	--	84.4%	--
TMDL for Middle Branch Root River (07040008-506)						
Wasteload Allocation	Permitted Municipal and Industrial Wastewater Facilities (see Table 68 in Appendix C)	10.45	10.45	10.45	10.45	10.45
	WLA Totals	10.45	10.45	10.45	10.45	10.45
Load Allocation	Watershed load	1526.88	630.87	385.25	227.19	115.30
Margin Of Safety (10%)		170.81	71.26	43.97	26.40	13.97

	Loading Capacity (TMDL)	**1708.14**	**712.58**	**439.67**	**264.04**	**139.72**
	Estimated Load Reduction (%)	96.6%	86.4%	79.2%	73.5%	--
TMDL for Bear Creek (07040008-542)						
Wasteload Allocation	Racine WWTP (MN0024554)	0.78	0.78	0.78	0.78	0.78
	WLA Totals	0.78	0.78	0.78	0.78	0.78
Load Allocation	Watershed load	660.61	272.43	167.65	99.41	52.30
	Margin Of Safety (10%)	73.49	30.36	18.71	11.13	5.90
	Loading Capacity (TMDL)	**734.88**	**303.57**	**187.14**	**111.32**	**58.98**
	Estimated Load Reduction (%)	94.9%	92.8%	74.3%	78.1%	--
TMDL for Deer Creek (07040008-546)						
Wasteload Allocation	Grand Meadow WWTP (MN0023558)	4.97	4.97	4.97	4.97	4.97
	WLA Totals	4.97	4.97	4.97	4.97	4.97
Load Allocation	Watershed load	381.01	156.66	95.65	55.39	27.72
	Margin Of Safety (10%)	42.89	17.96	11.18	6.71	3.63
	Loading Capacity (TMDL)	**428.87**	**179.59**	**111.80**	**67.07**	**36.32**
	Estimated Load Reduction (%)	96.8%	95.1%	91.5%	86.9%	--
TMDL for Spring Valley Creek (07040008-548)						
Wasteload Allocation	Spring Valley WWTP (MN0051934)	4.46	4.46	4.46	4.46	4.46
	WLA Totals	4.46	4.46	4.46	4.46	4.46
Load Allocation	Watershed load	197.35	80.15	47.76	27.43	12.31
	Margin Of Safety (10%)	22.42	9.40	5.80	3.54	1.86
	Loading Capacity (TMDL)	**224.23**	**94.01**	**58.02**	**35.43**	**18.63**
	Estimated Load Reduction (%)	96.2%	94.8%	94.3%	89.5%	--
TMDL for Root River (07040008-535)						
Wasteload Allocation	Permitted Municipal and Industrial Wastewater Facilities (see Table 69 in Appendix C)	9.42	9.42	9.42	9.42	9.42
	MS4: City of Stewartville (future MS4 load)	43.11	15.55	7.97	4.08	1.74
	WLA Totals	52.53	24.97	17.39	13.50	11.16
Load Allocation	Watershed load	1633.67	583.43	294.33	145.93	56.79
	Margin Of Safety (10%)	187.36	67.60	34.64	17.71	7.55
	Loading Capacity (TMDL)	**1873.56**	**676.00**	**346.36**	**177.14**	**75.50**
	Estimated Load Reduction (%)	97.4%	94.2%	88.9%	85.4%	61.8%
TMDL for Mill Creek (07040008-536)						
	Wasteload Allocation	0.00	0.00	0.00	0.00	0.00
Load Allocation	Watershed load	52.57	4.53	1.22	0.97	0.74

Margin Of Safety (10%)		5.84	0.50	0.14	0.11	0.08
Loading Capacity (TMDL)		**58.41**	**5.03**	**1.36**	**1.08**	**0.82**
Estimated Load Reduction (%)		98.7%	88.7%	93.5%	67.0%	67.8%
TMDL for Rush Creek (07040008-523)						
Wasteload Allocation	Permitted Municipal and Industrial Wastewater Facilities (see Table 72 in Appendix C)	1.31	1.31	1.31	1.31	1.31
	WLA Totals	1.31	1.31	1.31	1.31	1.31
Load Allocation	Watershed load	357.77	257.74	212.72	179.27	138.32
Margin Of Safety (10%)		39.90	28.78	23.78	20.06	15.51
Loading Capacity (TMDL)		**398.98**	**287.83**	**237.81**	**200.64**	**155.14**
Estimated Load Reduction (%)		95.3%	--	--	54.9%	--
TMDL for Root River South Branch (07040008-550)						
Wasteload Allocation	Permitted Municipal and Industrial Wastewater Facilities (see Table 73 in Appendix C)	2.88	2.88	2.88	2.88	2.88
	WLA Totals	2.88	2.88	2.88	2.88	2.88
Load Allocation	Watershed load	1651.92	744.41	459.24	288.52	155.56
Margin Of Safety (10%)		183.87	83.03	51.35	32.38	17.60
Loading Capacity (TMDL)		**1838.67**	**830.32**	**513.47**	**323.78**	**176.04**
Estimated Load Reduction (%)		97.5%	46.7%	62.3%	20.4%	--
TMDL for Watson Creek (07040008-552)						
Wasteload Allocation	Permitted Municipal and Industrial Wastewater Facilities (see Table 74 in Appendix C)	0.30	0.30	0.30	0.30	0.30
	WLA Totals	0.30	0.30	0.30	0.30	0.30
Load Allocation	Watershed load	178.74	81.23	49.56	29.66	15.08
Margin Of Safety (10%)		19.89	9.06	5.54	3.33	1.71
Loading Capacity (TMDL)		**198.93**	**90.59**	**55.40**	**33.29**	**17.09**
Estimated Load Reduction (%)		96.9%	88.4%	81.8%	84.2%	--
TMDL for Willow Creek (07040008-558)						
Wasteload Allocation		0.00	0.00	0.00	0.00	0.00
Load Allocation	Watershed load	238.97	106.64	66.34	39.89	20.57
Margin Of Safety (10%)		26.55	11.85	7.37	4.43	2.29
Loading Capacity (TMDL)		**265.52**	**118.49**	**73.71**	**44.32**	**22.86**
Estimated Load Reduction (%)		96.2%	96.0%	95.4%	89.1%	--
TMDL for Forrestville Creek (07040008-563)						
Wasteload Allocation		0.00	0.00	0.00	0.00	0.00
Load Allocation	Watershed load	95.28	40.12	24.37	14.55	7.63
Margin Of Safety (10%)		10.59	4.46	2.71	1.62	0.85
Loading Capacity (TMDL)		**105.87**	**44.58**	**27.08**	**16.17**	**8.48**

Estimated Load Reduction (%)		100.0%	95.3%	63.1%	--	--
TMDL for South Fork Root River (07040008-508)						
Wasteload Allocation	Canton WWTF (MN0023001) and Mabel WWTF (MN0020877)	1.21	1.21	1.21	1.21	1.21
	WLA Totals	1.21	1.21	1.21	1.21	1.21
Load Allocation	Watershed load	839.04	590.67	491.25	400.81	234.25
Margin Of Safety (10%)		93.36	65.77	54.72	44.67	26.16
Loading Capacity (TMDL)		**933.61**	**657.65**	**547.18**	**446.69**	**261.62**
Estimated Load Reduction (%)		97.6%	95.5%	--	82.3%	--

Table 8: Total Suspended Solids (TSS) TMDLs for the Root River Watershed

Allocation	Source	Very High	High	Mid	Low	Very Low
		TSS (tons/day)				
TMDL for Root River (lower) (07040008-501)						
Wasteload Allocation	Permitted Municipal and Industrial Wastewater Facilities (see Table 62 in Appendix C)	10.85	10.85	10.85	10.85	10.85
	Industrial Stormwater - Pro-Corn LLC dba POET Biorefining - Preston, Station SD002 (MN0064017)*	0.01	0.01	0.01	0.01	0.01
	Industrial Stormwater - Pro-Corn LLC dba POET Biorefining - Preston, Station SD003 (MN0064017)*	0.01	0.01	0.01	0.01	0.01
	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	0.47	0.23	0.17	0.14	0.11
	MS4: City of Stewartville (future MS4 load)	1.63	0.78	0.58	0.46	0.35
	WLA Totals	12.97	11.88	11.62	11.47	11.33
Load Allocation	Watershed load	456.33	219.05	160.79	128.42	97.55
Margin Of Safety (10%)		52.14	25.66	19.16	15.54	12.10
Loading Capacity (TMDL)		**521.44**	**256.59**	**191.57**	**155.43**	**120.98**
Estimated Load Reduction (%)		98%	69%	--	--	--
TMDL for Root River (lower) (07040008-502)						
Wasteload Allocation	Permitted Municipal and Industrial Wastewater Facilities (see Table 62 in Appendix C)	10.85	10.85	10.85	10.85	10.85
	Industrial Stormwater - Pro-Corn LLC dba POET Biorefining - Preston, Station SD002 (MN0064017)*	0.01	0.01	0.01	0.01	0.01
	Industrial Stormwater - Pro-Corn LLC dba POET Biorefining - Preston, Station SD003 (MN0064017)*	0.01	0.01	0.01	0.01	0.01
	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	0.43	0.22	0.15	0.11	0.07

	MS4: City of Stewartville (future MS4 load)	1.53	0.76	0.52	0.38	0.220
	WLA Totals	12.83	11.85	11.54	11.36	11.16
Load Allocation	Watershed load	414.25	204.99	139.36	102.29	58.61
Margin Of Safety (10%)		47.45	24.09	16.77	12.63	7.75
Loading Capacity (TMDL)		**474.53**	**240.93**	**167.67**	**126.28**	**77.52**
Estimated Load Reduction (%)		97%	79%	38%	15%	--
TMDL for Root River (07040008-520)						
Wasteload Allocation	Permitted Municipal and Industrial Wastewater Facilities (see Table 63 in Appendix C)	9.68	9.68	9.68	9.68	9.68
	Industrial Stormwater - Pro-Corn LLC dba POET Biorefining - Preston, Station SD002 (MN0064017)*	0.01	0.01	0.01	0.01	0.01
	Industrial Stormwater - Pro-Corn LLC dba POET Biorefining - Preston, Station SD003 (MN0064017)*	0.01	0.01	0.01	0.01	0.01
	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	0.38	0.18	0.12	0.08	0.05
	MS4: City of Stewartville (future MS4 load)	1.74	0.81	0.51	0.35	0.200
	WLA Totals	11.82	10.69	10.33	10.13	9.95
Load Allocation	Watershed load	364.75	168.97	106.92	72.28	40.98
Margin Of Safety (10%)		41.84	19.96	13.03	9.16	5.66
Loading Capacity (TMDL)		**418.41**	**199.62**	**130.28**	**91.57**	**56.59**
Estimated Load Reduction (%)		96.7%	14.3%	--	--	--
TMDL for Root River (07040008-522)						
Wasteload Allocation	Permitted Municipal and Industrial Wastewater Facilities (see Table 64 in Appendix C)	9.65	9.65	9.65	9.65	9.65
	Industrial Stormwater - Pro-Corn LLC dba POET Biorefining - Preston, Station SD002 (MN0064017)*	0.01	0.01	0.01	0.01	0.01
	Industrial Stormwater - Pro-Corn LLC dba POET Biorefining - Preston, Station SD003 (MN0064017)*	0.01	0.01	0.01	0.01	0.01
	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	0.37	0.17	0.11	0.08	0.05
	MS4: City of Stewartville (future MS4 load)	1.82	0.82	0.52	0.34	0.190
	WLA Totals	11.86	10.66	10.30	10.09	9.91
Load Allocation	Watershed load	365.41	161.21	100.72	66.54	36.82
Margin Of Safety (10%)		40.92	19.10	12.33	8.51	5.19
Loading Capacity (TMDL)		**418.19**	**190.97**	**123.35**	**85.14**	**51.92**
Estimated Load Reduction (%)		96.7%	14.3%	--	--	--
TMDL for Root River (07040008-527)						

Wasteload Allocation	Permitted Municipal and Industrial Wastewater Facilities (see Table 65 in Appendix C)	9.62	9.62	9.62	9.62	9.62
	Industrial Stormwater - Pro-Corn LLC dba POET Biorefining - Preston, Station SD002 (MN0064017)*	0.01	0.01	0.01	0.01	0.01
	Industrial Stormwater - Pro-Corn LLC dba POET Biorefining - Preston, Station SD003 (MN0064017)*	0.01	0.01	0.01	0.01	0.01
	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	0.33	0.14	0.09	0.05	0.03
	MS4: City of Stewartville (future MS4 load)	1.92	0.79	0.46	0.27	0.120
	WLA Totals	11.89	10.57	10.19	9.96	9.79
Load Allocation	Watershed load	318.26	130.76	76.66	44.08	19.17
Margin Of Safety (10%)		36.68	15.70	9.65	6.00	3.22
Loading Capacity (TMDL)		**366.83**	**157.03**	**96.50**	**60.04**	**32.18**
Estimated Load Reduction (%)		96.7%	14.3%	--	--	--
TMDL for Middle Branch Root River (07040008-528)						
Wasteload Allocation	Permitted Municipal and Industrial Wastewater Facilities (see Table 66 in Appendix C)	8.36	8.36	8.36	8.36	8.36
	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	0.22	0.09	0.05	0.03	0.02
	MS4: City of Stewartville (future MS4 load)	2.01	0.77	0.43	0.22	0.070
	WLA Totals	10.59	9.22	8.84	8.61	8.45
Load Allocation	Watershed load	206.83	79.21	44.00	22.10	6.64
Margin Of Safety (10%)		24.16	9.83	5.87	3.41	1.68
Loading Capacity (TMDL)		**241.58**	**98.26**	**58.71**	**34.12**	**16.77**
Estimated Load Reduction (%)		97.7%	83.0%	--	--	--
TMDL for North Branch Root River (07040008-716)						
Wasteload Allocation	Permitted Municipal and Industrial Wastewater Facilities (see Table 70 in Appendix C)	1.29	1.29	1.29	1.29	1.29
	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	0.11	0.03	0.02	0.01	0.01
	MS4: City of Stewartville (future MS4 load)	3.06	0.91	0.53	0.30	0.160
	WLA Totals	4.46	2.23	1.84	1.60	1.46
Load Allocation	Watershed load	109.00	32.19	18.24	10.21	5.17
Margin Of Safety (10%)		12.60	3.82	2.23	1.31	0.74
Loading Capacity (TMDL)		**126.06**	**38.24**	**22.31**	**13.12**	**7.37**
Estimated Load Reduction (%)		98.1%	62.7%	--	--	--
TMDL for North Branch Root River (07040008-717)						

Wasteload Allocation	Permitted Municipal and Industrial Wastewater Facilities (see Table 71 in Appendix C)	1.16	1.16	1.16	1.16	1.16
	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	0.05	0.02	0.01	0.01	0.00
	MS4: City of Stewartville (future MS4 load)	0.07	0.02	0.01	0.01	0.003
	WLA Totals	1.28	1.20	1.18	1.17	1.17
Load Allocation	Watershed load	46.64	13.36	7.30	3.82	1.63
Margin Of Safety (10%)		5.32	1.62	0.94	0.55	0.31
Loading Capacity (TMDL)		**53.24**	**16.18**	**9.42**	**5.54**	**3.11**
Estimated Load Reduction (%)		95%	37%	--	--	--
TMDL for Root River South Branch (07040008-550)						
Wasteload Allocation	Permitted Municipal and Industrial Wastewater Facilities (see Table 77 in Appendix C)	0.93	0.93	0.93	0.93	0.93
	Industrial Stormwater - Pro-Corn LLC dba POET Biorefining - Preston, Station SD002 (MN0064017)*	0.01	0.01	0.01	0.01	0.01
	Industrial Stormwater - Pro-Corn LLC dba POET Biorefining - Preston, Station SD003 (MN0064017)*	0.01	0.01	0.01	0.01	0.01
	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	0.014	0.01	0.00	0.00	0.00
	WLA Totals	0.96	0.96	0.95	0.95	0.95
Load Allocation	Watershed load	13.52	5.58	3.09	1.60	0.44
Margin Of Safety (10%)		1.61	0.73	0.45	0.28	0.15
Loading Capacity (TMDL)		**16.09**	**7.27**	**4.49**	**2.83**	**1.54**
Estimated Load Reduction (%)		99.8%	95.3%	44.9%	67.2%	13.6%
TMDL for Watson Creek (07040008-552)						
Wasteload Allocation	Permitted Municipal and Industrial Wastewater Facilities (see Table 74 in Appendix C)	0.01	0.01	0.01	0.01	0.01
	Industrial Stormwater - Pro-Corn LLC dba POET Biorefining - Preston, Station SD002 (MN0064017)*	0.01	0.01	0.01	0.01	0.01
	Industrial Stormwater - Pro-Corn LLC dba POET Biorefining - Preston, Station SD003 (MN0064017)*	0.01	0.01	0.01	0.01	0.01
	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	0.0016	0.0007	0.0004	0.0003	0.0001
	WLA Totals	0.03	0.03	0.03	0.03	0.03
Load Allocation	Watershed load	1.53	0.68	0.40	0.23	0.10
Margin Of Safety (10%)		0.17	0.08	0.05	0.03	0.02

	Loading Capacity (TMDL)	**1.73**	**0.79**	**0.48**	**0.29**	**0.15**
	Estimated Load Reduction (%)	98.6%	72.2%	45.4%	--	--
TMDL for Root River South Branch (07040008-554)						
Wasteload Allocation	Permitted Municipal and Industrial Wastewater Facilities (see Table 75 in Appendix C)	0.05	0.05	0.05	0.05	0.05
	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	0.014	0.005	0.003	0.002	0.001
	WLA Totals	0.06	0.06	0.05	0.05	0.05
Load Allocation	Watershed load	14.23	5.33	3.36	2.26	1.23
	Margin Of Safety (10%)	1.59	0.60	0.38	0.26	0.14
	Loading Capacity (TMDL)	**15.88**	**5.99**	**3.79**	**2.57**	**1.42**
	Estimated Load Reduction (%)	99.5%	87.4%	--	--	--
TMDL for Root River South Branch (07040008-555)						
Wasteload Allocation	Ostrander WWTF (MN0024449)	0.004	0.004	0.004	0.004	0.004
	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	0.007	0.0029	0.0017	0.0010	0.0005
	WLA Totals	0.0107	0.0069	0.0057	0.0050	0.0045
Load Allocation	Watershed load	6.66	2.90	1.70	1.02	0.53
	Margin Of Safety (10%)	0.74	0.32	0.19	0.11	0.06
	Loading Capacity (TMDL)	**7.41**	**3.23**	**1.90**	**1.14**	**0.59**
	Estimated Load Reduction (%)	99.0%	86.5%	98.8%	--	--
TMDL for Root River South Branch (07040008-556)						
Wasteload Allocation	Ostrander WWTF (MN0024449)	0.004	0.004	0.004	0.004	0.004
	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	0.004	0.0015	0.0009	0.0005	0.0003
	WLA Totals	0.0075	0.0055	0.0049	0.0045	0.0043
Load Allocation	Watershed load	3.45	1.53	0.87	0.53	0.27
	Margin Of Safety (10%)	0.38	0.17	0.10	0.06	0.03
	Loading Capacity (TMDL)	**3.84**	**1.71**	**0.97**	**0.59**	**0.30**
	Estimated Load Reduction (%)	99.0%	86.5%	98.8%	--	--
TMDL for South Fork Root River (07040008-508)						
Wasteload Allocation	Canton WWTF (MN0023001) and Mabel WWTF (MN0020877)	0.03	0.03	0.03	0.03	0.03
	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	0.048	0.034	0.028	0.023	0.013
	WLA Totals	0.08	0.06	0.06	0.05	0.04
Load Allocation	Watershed load	47.75	33.63	27.97	22.83	13.36
	Margin Of Safety (10%)	5.31	3.74	3.11	2.54	1.49
	Loading Capacity (TMDL)	**53.14**	**37.43**	**31.14**	**25.42**	**14.89**
	Estimated Load Reduction (%)	98.4%	87.9%	60.3%	36.6%	--

TMDL for South Fork Root River (07040008-509)						
Wasteload Allocation	Canton WWTF (MN0023001) and Mabel WWTF (MN0020877)	0.03	0.03	0.03	0.03	0.03
	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	0.048	0.034	0.028	0.023	0.013
	WLA Totals	0.08	0.06	0.06	0.05	0.04
Load Allocation	Watershed load	47.70	33.60	27.95	22.81	13.35
Margin Of Safety (10%)		5.31	3.74	3.11	2.54	1.49
Loading Capacity (TMDL)		**53.09**	**37.40**	**31.12**	**25.40**	**14.88**
Estimated Load Reduction (%)		98.9%	92.0%	73.9%	58.1%	--
TMDL for South Fork Root River (07040008-573)						
Wasteload Allocation	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	0.00482	0.00119	0.00048	0.00019	0.00002
	WLA Totals	0.00482	0.00119	0.00048	0.00019	0.00002
Load Allocation	Watershed load	4.82	1.19	0.47	0.19	0.02
Margin Of Safety (10%)		0.54	0.13	0.05	0.02	0.00
Loading Capacity (TMDL)		**5.36**	**1.32**	**0.52**	**0.21**	**0.02**
Estimated Load Reduction (%)		99.0%	44.5%	--	1.6%	--

* = An Industrial Stormwater WLA was calculated for the Pro-Corn POET Biorefining permit (MN0064017) at its two outfalls (SD002 and SD003) (see pages 82-83 of the final TMDL document for details on the calculation). All other stormwater is addressed under the General Permits for Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000) via a categorical WLA for these two General Permits see page 82 of the final TMDL document).

Table 9: Nitrate TMDLs for the Root River Watershed

Allocation	Source	Very High	High	Mid	Low	Very Low
		Nitrate (lbs/day)				
TMDL for Watson Creek (07040008-552)						
Wasteload Allocation	Permitted Municipal and Industrial Wastewater Facilities (see Table 74 in Appendix C)	5.18	5.18	5.18	5.18	5.18
	Permitted Industrial Stormwater Facilities	0.00	0.00	0.00	0.00	0.00
	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	3.13	1.43	0.87	0.52	0.27
WLA Totals		8.31	6.61	6.05	5.70	5.45
Load Allocation	Watershed load	3124.32	1419.77	866.20	518.44	263.59
Margin Of Safety (10%)		348.07	158.49	96.92	58.24	29.89
Loading Capacity (TMDL)		**3480.70**	**1584.87**	**969.17**	**582.38**	**298.93**
Estimated Load Reduction (%)		64.3%	48.8%	17.0%	10.5%	--
TMDL for Root River South Branch (07040008-555)						
Wasteload Allocation	Ostrander WWTF (MN0024449)	2.51	2.51	2.51	2.51	2.51
	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	13.34	5.81	3.42	2.05	1.08

	WLA Totals	15.85	8.32	5.93	4.56	3.59
Load Allocation	Watershed load	13324.97	5802.16	3416.91	2043.07	1073.14
Margin Of Safety (10%)		1482.31	645.61	380.32	227.51	119.64
Loading Capacity (TMDL)		**14823.13**	**6456.09**	**3803.16**	**2275.14**	**1196.37**
Estimated Load Reduction (%)		49.3%	29.1%	7.2%	9.7%	--
TMDL for Canfield Creek (07040008-557)						
Wasteload Allocation	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	3.27	1.45	0.89	0.54	0.28
	WLA Totals	3.27	1.45	0.89	0.54	0.28
Load Allocation	Watershed load	3263.27	1443.72	885.25	534.74	280.02
Margin Of Safety (10%)		362.95	160.57	98.46	59.48	31.14
Loading Capacity (TMDL)		**3629.49**	**1605.74**	**984.60**	**594.76**	**311.44**
Estimated Load Reduction (%)		61.0%	34.1%	--	--	--
TMDL for Willow Creek (07040008-558)						
Wasteload Allocation	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	4.18	1.87	1.16	0.70	0.36
	WLA Totals	4.18	1.87	1.16	0.70	0.36
Load Allocation	Watershed load	4177.04	1864.01	1159.62	697.22	359.51
Margin Of Safety (10%)		464.58	207.32	128.98	77.55	39.99
Loading Capacity (TMDL)		**4645.80**	**2073.20**	**1289.76**	**775.47**	**399.86**
Estimated Load Reduction (%)		40.9%	33.9%	13.1%	--	--
TMDL for Etna Creek (07040008-562)						
Wasteload Allocation	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	0.68	0.30	0.17	0.10	0.05
	WLA Totals	0.68	0.30	0.17	0.10	0.05
Load Allocation	Watershed load	676.53	299.26	171.77	103.08	53.69
Margin Of Safety (10%)		75.25	33.28	19.11	11.47	5.97
Loading Capacity (TMDL)		**752.46**	**332.84**	**191.05**	**114.65**	**59.71**
Estimated Load Reduction (%)		91.5%	25.0%	--	--	--
TMDL for Forestville Creek (07040008-563)						
Wasteload Allocation	Construction Stormwater (MNR100001) & Industrial Stormwater (MNR050000)	1.67	0.70	0.43	0.25	0.13
	WLA Totals	1.67	0.70	0.43	0.25	0.13
Load Allocation	Watershed load	1665.50	701.36	425.94	254.44	133.41
Margin Of Safety (10%)		185.24	78.01	47.37	28.30	14.84
Loading Capacity (TMDL)		**1852.41**	**780.07**	**473.74**	**282.99**	**148.38**
Estimated Load Reduction (%)		76.5%	23.2%	--	10.5%	--