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

SEP 26 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 (TMDLs) for sixteen waterbodies in the Rum River watershed, including supporting documentation and follow up information. The Rum River watershed is located in Hennepin, Sherburne, Anoka, Isanti, Morrison, Kanabec, Mille Lacs, and Chisago Counties, Minnesota. The TMDLs were calculated for *E. coli*, total phosphorus, and dissolved oxygen-consuming substances. The TMDLs address the impairments of aquatic recreational and aquatic life uses.

EPA has determined that these TMDLs meet the requirements of Section 303(d) of the Clean Water Act and EPA's implementing regulations at 40 C.F.R. Part 130. Therefore, EPA hereby approves Minnesota's sixteen TMDLs in the Rum River watershed. 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 effort in submitting these TMDLs addressing aquatic recreational use, and look forward to future 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
Bonnie Finnerty, MPCA

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BY

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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 reviewed the recent approval of the Rum River Watershed Total Maximum Daily Load (TMDL) report (dated September 26, 2017). EPA has determined there is an error in Section 3 (Table 10 of the Decision Document). The Load Allocations for bacteria for Cedar Creek were incorrect.

EPA has corrected the values in Table 10 within a revised Decision Document, which I am enclosing for your records. If you have any questions, please contact David Werbach at 312-886-4242.

Sincerely,

for Peter Swenson
Chief, Watersheds and Wetlands Branch

Enclosure

cc: Celine Lyman, MPCA
Bonnie Finnerty, MPCA

wq-iw8-56g

TMDL: Rum River Watershed TMDL, Hennepin, Sherburne, Anoka, Isanti, Morrison, Kanabec, Mille Lacs, and Chisago Counties, MN
Date: 9/26/2017 (revised 03/12/2018)

DECISION DOCUMENT FOR THE RUM RIVER WATERSHED TMDL; HENNEPIN, SHERBURNE, ANOKA, ISANTI, MORRISON, KANABEC, MILLE LACS, AND CHISAGO COUNTIES, MN

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 Waterbody, Pollutant of Concern, Pollutant Sources, and Priority Ranking

The TMDL submittal should identify the waterbody as it appears on the State's/Tribe's 303(d) list. The waterbody 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 waterbody 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 waterbody. 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 waterbody 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 Rum River watershed is located in Hennepin, Sherburne, Anoka, Isanti, Morrison, Kanabec, Mille Lacs, and Chisago Counties, Minnesota, north of the Minneapolis metropolitan area. The Rum River begins at Lake Mille Lacs, and flows south to the Mississippi River just north-northwest of Minneapolis. The TMDL addresses ten lakes impaired due excess nutrients, five waterbodies impaired for bacteria, and one waterbody impaired for low dissolved oxygen (DO). Table 1 of this Decision Document identifies the waterbodies addressed in this TMDL. The physical characteristics of the lakes are in Table 2 of this Decision Document, and information on the impaired rivers/creeks are in Table 3 of this Decision Document..

Table 1: Waterbodies Addressed by the Rum River watershed TMDLs

Name	Lake/Stream	ID	Designated use	Pollutant
Baxter	Lake	30011400	2B, 3C	Total Phosphorus
East Hunter	Lake	71002200	2B, 3C	Total Phosphorus
Fannie	Lake	30004300	2B, 3C	Total Phosphorus
Francis	Lake	30008000	2B, 3C	Total Phosphorus
Green	Lake	30013600	2B, 3C	Total Phosphorus
Long	Lake	30007200	2B, 3C	Total Phosphorus
North Stanchfield	Lake	30014300	2B, 3C	Total Phosphorus
Skogman	Lake	30002200	2B, 3C	Total Phosphorus
South Stanchfield	Lake	30013800	2B, 3C	Total Phosphorus
West Hunter	Lake	71002300	2B, 3C	Total Phosphorus
Bogus Brook	Stream	07010207-523	2Bg, 3C	*E. coli*
Cedar Creek	Stream	07010207-521	2Bg, 3C	*E. coli*
Estes Brook	Stream	07010207-679	2Bg, 3C	*E. coli*
Seelye Brook	Stream	07010207-528	2Bg, 3C	*E. coli*
West Branch Rum River	Stream	07010207-525	2Bg, 3C	*E. coli*
Trott Brook	Stream	07010207-680	2Bg, 3C	Oxygen-demanding substances

Table 2: Lake Physical Characteristics

Name	Lake Surface Area (acres)	Mean Depth (feet)	Max. Depth (feet)	Lake Volume (acre-feet)	Littoral Area (%)	Watershed Area (acres)	Watershed ratio	Residence Time (years)
Shallow Lakes								
Baxter	88	5	10	440	100	8035	91.3	0.08
East Hunter	55	5	7	385	98	683	12.1:1	0.58
Francis	264	5	8.5	1320	100	5400	20.5	0.42
Long	382	4	11	1681	100	7416	19.4	0.16
North Stanchfield	143	4	10.5	634	100	15907	111.2	0.048
South Stanchfield	398	8	17	3088	92	6675	16.8	0.07
West Hunter	60	5	6	360	97	559	9.3:1	0.71
Deep Lakes								
Fannie	354	7.6	33	2702	87	7340	20.7	0.63
Green	833	16	28	13499	43	15877	19.1	1.36
Skogman	223	13	36	2839	61	3384	15.17	1.51

Table 3: Impaired River/Creek information

Impaired Reach	ID (07010107)	Major Subwatershed (HUC 10)	Pollutant	Reach Length (miles)	Drainage area (acres)
Bogus Brook	523	Upper Rum River	*E. coli*	12.6	15973
Cedar Creek	521	Cedar Creek	*E. coli*	28.6	51711
Estes Brook	679	West Branch Rum River	*E. coli*	13.6	27924
Seelye Brook	528	Lower Rum River	*E. coli*	12.4	24699
West Branch Rum River	525	West Branch Rum River	*E. coli*	15.8	118360
Trott Brook	680	Lower Rum River	DO substances	4.4	19008

Land Use:

The Rum River watershed is a mixture of forest, grassland, and agricultural land, with some urban land in the southern watersheds. The land use for the lake watersheds are in Table 4 of this Decision Document. The land use for the river watersheds are in Table 5 of this Decision Document. MPCA does not anticipate changes in bacteria, DO substances, or phosphorus loading due to changes in land use within the watersheds. MPCA does not expect significant growth in the watershed.

Table 4 . Lake Watershed Land Cover Distribution by Impaired Lake

Impairment	Open Water (%)	Wetlands (%)	Forest (%)	Grassland/ Managed Grass (%)	Hay/ Pastures (%)	Row Crops (%)	Urban (%)
North Stanchfield	5.8	35.2	15.4	10.0	0.4	28.3	4.9
Green	6.1	21.7	23.3	14.4	0.3	27.4	6.8
Fannie	10.0	16.4	22.6	15.7	0.0	23.8	11.4
Francis	6.5	23.4	25.8	11.8	0.0	24.6	7.8
Long	11.4	17.2	30.7	13.9	0.0	18.4	8.4
East Hunter	17.2	0.3	13.2	21.2	0.0	21.4	26.6
Baxter	6.9	15.8	33.8	24.3	0.0	9.4	9.7
South Stanchfield	9.1	24.3	17.7	10.0	0.8	31.6	6.4
Skogman	8.8	15.6	26.5	17.0	0.1	24.1	8.0
West Hunter	10.9	0.4	11.6	25.2	0.0	26.2	25.7

Table 5: Watershed Land Cover Distribution by Impaired River/Creek

Impairment	Open Water (%)	Wetlands (%)	Forest (%)	Grassland/ Managed Grass (%)	Hay/ Pastures (%)	Row Crops (%)	Urban (%)
Bogus Brook	0.0	21.4	34.5	10.3	13.6	13.4	6.7
West Branch Rum River	0.2	16.5	32.6	10.7	12.8	20.5	6.6
Seelye Brook	2.0	32.0	28.1	21.3	0.3	9.1	7.2
Cedar Creek	3.9	27.9	26.7	17.8	0.6	11.3	11.6
Trott Brook	2.3	21.2	27.1	24.8	1.1	7.1	16.5
Estes Brook	0.1	13.7	29.4	10.2	10.8	28.6	7.1

Problem Identification:

Almost all the waterbodies were placed on the MPCA 303(d) list of impaired waters in 2015. The five *E. coli*-impaired segments were placed on the MPCA 303(d) list of impaired waters due to exceedances of the *E. coli* criteria. Table 3-11 of the TMDL summarizes the data from 2006-2015, and indicates that at least one month per recreational season exceeds the criteria.

For DO, data from 2006-2015 were summarized in Table 3-12 of the TMDL. Results indicate the DO minimum was violated on numerous occasions. During 2013, Trott Brook was monitored continuously for DO for 11 days. The monitoring results showed that the DO fell to 2 mg/L, well below the DO minimum of 5.0 mg/L, and the daily flux exceeded the state criteria of 3.5 mg/L per day (Figure 3-19 and Section 3.5.2.2 of the TMDL).

Review of the nutrient data for the ten lakes indicates the lakes vary in exceedences of the criteria. For example, West Hunter Lake has a 10-year average TP concentration of 65 ug/L, while Francis Lake and North Stanchfield Lake have an average TP concentration of 200ug/L. The criteria for these lakes is 60 ug/L.

Pollutants of Concern:
The pollutants of concern are *E. coli*, TP, and DO substances. DO substances are defined by MPCA as Carbonaceous Biochemical Oxygen Demand (CBOD), Nitrogenous Biochemical Oxygen Demand (NBOD), and Sediment Oxygen Demand (SOD). Biological processing of these substances consumes oxygen, and reduces the amount of dissolved oxygen available for the biological communities.

Pollutants:
E. coli: Bacteria exceedances can negatively impact recreational uses (fishing, swimming, wading, boating, 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.

Total phosphorus: While TP is an essential nutrient for aquatic life, elevated concentrations of TP can lead to nuisance algal blooms that negatively impact aquatic life and recreation (swimming, boating, fishing, etc.). Algal decomposition depletes oxygen levels which stresses benthic macroinvertebrates and fish. Excess algae can shade the water column which limits the distribution of aquatic vegetation. Aquatic vegetation stabilizes bottom sediments, and also is an important habitat for macroinvertebrates and fish. Furthermore, depletion of oxygen can cause phosphorus release from bottom sediments (i.e. internal loading).

Degradations in aquatic habitats or water quality (ex. low dissolved oxygen) can negatively impact aquatic life use. Increased algal growth, brought on by elevated levels of nutrients within the water column, can reduce dissolved oxygen in the water column, and cause large shifts in dissolved oxygen and pH throughout the day. Shifting chemical conditions within the water column may stress aquatic biota (fish and macroinvertebrate species). In some instances, degradations in aquatic habitats or water quality have reduced fish populations or altered fish communities from those communities supporting sport fish species to communities which support more tolerant rough fish species.

Low DO: Dissolved oxygen (DO) is an important water quality parameter for the protection and management of aquatic life. All higher life forms, including fish and aquatic macroinvertebrates, are dependent on minimum levels of oxygen for critical life cycle functions such as growth, maintenance, and reproduction. DO concentrations go through a diurnal cycle in most rivers and streams with concentrations reaching their daily maximum levels in late afternoon when photosynthesis by aquatic plants is highest. Minimum DO concentrations typically occur early in the morning around sunrise when respiration rates exceed photosynthesis and oxygen is being consumed by aquatic organisms faster than it is replaced. Problems with low dissolved oxygen in river systems are often the result of excessive loadings of oxygen demanding substances, particularly in combination with high temperatures and low flow conditions.

Priority Ranking:
The watersheds were given priority for TMDL development due to the impairment impacts on public health, 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 and 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.

Source Identification (point and nonpoint sources):
Bacteria:
Point Source Identification**:** MPCA determined that three watersheds (Cedar Creek, Seelye Creek, and West Branch Rum River) have Waste Water Treatment Facilities (WWTF) discharging to the waterbodies. MPCA also identified several Municipal Separate Storm Sewer Systems (MS4) in the 5 watersheds. Table 6 of this Decision Document identifies the MS4 permittees in the watersheds. Stormwater from MS4s can transport bacteria to surface water bodies during or shortly after storm events.

Table 6: Regulated MS4 Permittees in the Rum River pathogen-impaired watersheds

Permittee	NPDES Permit ID	MS4 area (acres)	MS4 Area (%)	Watershed
Oak Grove City	MS400110	889	3.4	Seelye Brook
Nowthen City	MS400069	760	2.9	Seelye Brook
St. Francis City	MS400296	6461	25.0	Seelye Brook
Oak Grove City	MS400110	9358	18.0	Cedar Creek
East Bethel	MS400087	18649	35.9	Cedar Creek
Ham Lake City	MS400092	1032	2.0	Cedar Creek
Andover City	MS400073	4411	8.5	Cedar Creek
St. Francis City	MS400296	618	1.2	Cedar Creek
Isanti City	MS400287	260	0.5	Cedar Creek
Anoka County	MS400066	16	<0.5	Cedar Creek
MnDOT	MS400170	14	<0.5	Cedar Creek

Permitted Construction and Industrial Areas: Construction and industrial sites may contribute phosphorus via sediment runoff during stormwater events. These areas within the watersheds must comply with the requirements of the MPCA's NPDES Stormwater Program. The NPDES program requires construction and industrial sites to create Stormwater Pollution Prevention Plans (SWPPPs) which summarize how stormwater pollutant discharges will be minimized from construction and industrial sites.

Combined Sewer Overflows (CSOs): There are no CSO communities in the Rum River watersheds.

Concentrated Animal Feeding Operations (CAFOs): There are no CAFOs within the five *E. coli*-impaired watersheds.

Nonpoint Source Identification*:* The potential nonpoint sources for the Rum River watershed bacteria TMDLs are:

Non-regulated stormwater runoff: Non-regulated stormwater runoff can add bacteria to the waterbodies. Runoff from urban areas (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 Rum River watersheds. 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 watersheds. 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.

Wildlife: Wildlife is a known source of bacteria and phosphorus 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 park areas, forest, and rural areas.

Failing septic systems: MPCA noted that failing septic systems, where waste material can pond at the surface and eventually flow into the waterbodies or be washed in during precipitation events, are potential sources of *E. coli*. MPCA contacted the local county health departments, who provided data on septic systems in the watersheds. MPCA determined that there are septic systems in use in the watersheds (particularly the Cedar Creek watershed), and that failing septic systems are a source of bacteria in the watersheds.

Phosphorus:

Point Source Identification: MPCA determined that no WWTFs discharge to the impaired lakes (Section 4.3.3 of the TMDL). MPCA identified one MS4 that discharges to Fannie Lake, and is regulated by NPDES permit (MNR040000). No other MS4s are present in any of the impaired lake watersheds. MPCA identified one Concentrated Animal Feeding Operation (CAFO), permit number MN0066184, that is located in the Green Lake watershed.

Non-Point Source Identification: The potential nonpoint sources for the Rum River watershed phosphorus TMDLs are:

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

Failing septic systems: MPCA noted that failing septic systems, where waste material can pond at the surface and eventually flow into the waterbodies or be washed in during precipitation events, are potential sources of phosphorus. MPCA contacted the local county health departments, who provided data on septic systems in the watersheds.

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

Internal loading: The release of phosphorus from lake sediments via physical disturbance from benthic fish (rough fish, ex. carp) and from wind mixing the water column may all contribute internal phosphorus loading to the lakes. Phosphorus may build up in the bottom waters of the lake and may be resuspended or mixed into the water column when the thermocline decreases and the lake water mixes. MPCA gathered sediment cores from several of the lakes to determine internal loading (Section 3.7.3.2 of the TMDL).

DO substances:
Point Source Identification: MPCA determined that no WWTFs discharge to Trott Brook (Section 3.7.2.1 of the TMDL). MPCA identified six MS4s that discharge to Trott Brook, and cover 91% of the watershed. The systems are Elk River City MS4, Nowthen City MS4, Saint Francis City MS4, Ramsey City MS4, Sherburne County MS4, and Anoka County MS4. MS4s can contribute oxygen-demanding substances from a variety of urban sources, such as decaying yard waste and soil erosion. Construction stormwater and industrial stormwater also have the potential to contribute to oxygen-demanding substances.

Non-Point Source Identification: The potential nonpoint sources for the Trott Brook DO TMDLs are:

Stormwater runoff from agricultural land use practices. Runoff from agricultural lands may contain significant amounts of nutrients, organic material and organic-rich sediment which may lead to impairments in the Trott Brook watershed. Manure spread onto fields is often a source of DO-scavenging materials, and can be exacerbated by tile drainage lines, which channelize the stormwater. Tile lined fields and channelized ditches enable particles to move more efficiently into surface waters. Organic material and organic-rich sediment may be added via surface runoff from upland areas which are being used for Conservation Reserve Program (CRP) lands, grasslands, and agricultural lands used for growing hay or other crops. Stormwater runoff may contribute nutrients and organic-rich sediment to surfacew aters from livestock manure, fertilizers, vegetation and erodible soils. MPCA noted that less than 9% of the watershed is not covered under a MS4 permit.

Future Growth:
MPCA expects little change in the allocations between point and nonpoint sources. There may be changes in allocations as land is annexed. These changes will be addressed in the MS4 permit, and any changes in allocations will need to comply with the respective WLA and LA values calculated in the TMDLs.

The EPA finds that the TMDL document submitted by the 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 waterbody, 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:

Minnesota Rule Chapter 7050 designates uses for waters of the state. As noted in Table 1 of this Decision document, all the impaired waters addressed by this TMDL are designated as Class 2B water for aquatic life and recreation use (boating, swimming, fishing, etc.). Class 2B is the most restrictive use. The Class 2B aquatic life and recreation designated use is described in Minnesota Rule 7050.0140 (3):

> *"The quality of Class 2B surface waters shall be such as to permit the propagation and maintenance of a healthy community of cool or warm water sport or commercial fish and associated aquatic life, and their habitats. These waters shall be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable. "*

Numeric bacteria criteria:

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. The bacteria water quality standards which apply to the *E. coli* impaired waters are:

Table 7: Bacteria Water Quality Standards Applicable in the Rum River TMDL

Parameter	Units	Water Quality Standard
E. coli [1]	# / 100 mL	1,260 in < 10% of samples [2]
		Geometric Mean < 126 [3]

1 = *E. coli* standards apply only between April 1 and October 31

2 = Standard shall not be exceeded by more than 10% of the samples taken within any calendar month

3 = Geometric mean based on minimum of 5 samples taken within any calendar month

Target:

The target is the standard as stated above, for both the geometric mean portion and the daily maximum portion, which is applicable from April 1st through October 31st. However, the focus of these TMDLs is on the "chronic" geometric mean standard of 126 cfu/100ml. MPCA determined that utilizing the 126 cfu/100 mL portion of the water quality standard will result in the greatest bacteria reductions within the impaired watersheds, and that the geometric mean is the more relevant value in determining water quality. MPCA stated that while the TMDL will focus on the geometric mean portion of the water quality standard, both parts of the water quality standard must be met.

Numeric phosphorus criteria:

Numeric criteria for total phosphorus, chlorophyll-a (chl-a), and Secchi Disk (SD) depth are set forth in Minnesota Rules 7050.0222. These three parameters are the eutrophication standards that must be achieved to attain the aquatic recreation designated use. The numeric eutrophication standards which are applicable to the impaired lakes are those set forth for Class 2B shallow and deep lakes in the North Central Hardwood Forest (NCHF) Ecoregion (Table 8 of this Decision Document). In developing the lake nutrient standards for Minnesota lakes, the MPCA evaluated data from a large cross-section of lakes within each of the State's ecoregions. Clear relationships were established between the causal factor, TP, and the response variables, chl-a and SD (Section 2.2 of the TMDL).

Table 8: MPCA Eutrophication Criteria for Lakes in the NCHF Ecoregion

Parameter	Eutrophication Standard Shallow Lakes	Eutrophication Standard Deep Lakes
Total Phosphorus (μg/L)	TP ≤ 60	TP ≤ 40
Chlorophyll-a (μg/L)	chl-a ≤ 20	chl-a ≤ 14
Secchi Depth (m)	SD ≥ 1.0	SD ≥ 1.4
Lakes	Baxter, East Hunter, Francis, Green, Long, North Stanchfield, South Stanchfield, West Hunter	Fannie, Green, Skogman

Target:

MPCA selected a target of 60 μg/L of TP for the shallow lakes and 40 μg/L for deep lakes to develop the lake nutrient TMDLs. MPCA selected total phosphorus as the appropriate parameter to address eutrophication problems in the lakes because of the interrelationships between TP and chl-a, as well as SD. Algal abundance is measured by chl-a, which is a pigment found in algal cells. As more phosphorus becomes available, algae growth can increase. Increased algae in the water column will decrease water clarity that is measured by SD.

Numeric DO criteria:

Numeric criteria for DO are set forth in Minn. R. 7050.0220, subp. 7, states that the minimum DO standard is 5.0 mg/L. Compliance with this standard is required 50% of days at which the flow of the receiving water is equal to the 7Q10 (lowest 7 day flow over a 10 year period).

Target:

MPCA utilized a computer model to determine the amount of DO-utilizing substances that would meet the DO criteria of 5 mg/L. As further discussed in Section 3 of this Decision Document, the model summed the CBOD, NBOD, and SOD loads to determine the overall Biological Oxygen Demand (BOD) needed to attain and maintain the WQS.

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

3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a waterbody 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:

Functionally a TMDL is represented by the equation:

$$TMDL = LC = \Sigma WLA + \Sigma LA + MOS + RC,$$

where: LC is the loading capacity; WLA is the wasteload allocation; LA is the load allocation; MOS is the margin of safety; and (pursuant to MPCA rules) RC is any reserve capacity set aside for future growth. MPCA used two approaches for TMDLs in the Rum River watershed, both of which used a Hydrologic Simulation Program FORTRAN (HSPF) model to determine flow: (1) A load duration curve (LDC) for the stream segment TMDLs (to determine *E. coli* loads); (2) the HSPF model to determine the load of DO-demanding substances; and (3) a conventional daily load mass balance for the lakes (TP) TMDLs. These lake TMDLs apply the BATHTUB model approach using the HSPF spatially relevant hydrologic response unit (HRU) model output as the inflow values. Details on these models, the LDC process, and specifics related to pollutants of concern (including the TMDL tables) can be found in the Decision Document sections below and in Section 4 and Appendices A-L of the TMDL.

HSPF

HSPF is a comprehensive modeling package used to simulate watershed hydrology and water quality on a basin scale. The package includes both an Agricultural Runoff Model and a more general nonpoint source model. HSPF parametrizes numerous hydrologic and hydrodynamic processes to determine flow rate, sediment, and nutrient loads. HSPF uses continuous meteorological records to create hydrographs and to estimate time series pollution concentrations.[1,2] The output of the HSPF process is a model of multiple HRUs, or subwatersheds of the overall Rum River watershed. The flow from these HRUs were calibrated to eight different gage sites with up to twelve years of data (1995 through 2015).

***E. coli*:**
The approach utilized by the MPCA to calculate the loading capacity for the *E. coli* TMDLs are described in Section 4.1 of the final TMDL document.

For the five *E. coli* TMDLs, a geometric mean of 126 cfu/100 ml *E. coli* for five samples equally spaced over a 30-day period was used to calculate the loading capacity of the TMDLs. MPCA determined that the geometric mean portion of the WQS provides the best overall characterization of the status of the watershed. The 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 while the bacteria TMDL will focus on the geometric mean portion of the water quality standard (i.e., the chronic WQS of 126 cfu/100mL), attainment of the WQS involves the water body meeting both the chronic (126 cfu/100 mL) and acute (1,260 cfu/100 mL) portions of the water quality standard. 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 Rum River watershed bacteria TMDLs, MPCA used Minnesota's water quality standards for *E. coli* (126 cfu/100 mL). A loading capacity is, "the greatest amount of loading that a water can receive without violating water quality standards." (40 CFR §130.2). Therefore, a loading capacity set at the WQS will assure that the water does not violate WQS. MPCA's *E. coli* TMDL approach is based upon the premise that all discharges (point and nonpoint) must meet the WQS when entering the water body. If all sources meet the WQS at discharge, then the water body should meet the WQS and the designated use.

A flow duration curve (FDC) was created for five waterbodies (Figures 4-1 to 4-5 of the TMDL). The FDC was developed from flow data from several monitoring sites in the Rum River watershed (Table 3-10 of the TMDL). Daily stream flows were necessary to implement the load duration curve (LDC) approach. MPCA utilized the flow results from the HSPF model to provide additional input into the LDCs.

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

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

E. coli values from the monitoring sites were converted to individual sampling loads by multiplying the sample concentration by the instantaneous flow measurement observed/estimated at the time of sample collection. The individual sampling loads were plotted on the same figure with the LDC (Figures 4-1 to 4-5 of the TMDL).

The LDC plots were subdivided into five flow regimes; very high flows (exceeded 0–10% of the time), high conditions (exceeded 10–40% of the time), mid-range flows (exceeded 40–60% of the time), low conditions (exceeded 60–90% of the time), and very low flows (exceeded 90–100% of the time). LDC plots can be organized to display individual sampling loads and the calculated LDC. Watershed managers can interpret these plots (individual sampling points plotted with 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.

TMDLs for the five waterbodies were calculated as appropriate. The regulated permittees discharging *E. coli* have allocations determined for them (Tables 9-13 and 25 of this Decision Document). The load allocation was calculated after the determination of the Margin of Safety (10% of the loading capacity). Other load allocations (ex. non-regulated stormwater runoff, wildlife inputs, etc.) were not split amongst individual nonpoint contributors. Instead, load allocations were combined together into a generalized loading. Review of the LDCs indicate that exceedences are occurring under all flow conditions, and therefore control of several source types will be needed. The LDC demonstrates that reductions ranging from 0%-86% are needed to attain standards.

Tables 9-13 of this Decision Document calculate five points (the midpoints of the designated flow regime) on the loading capacity curves. 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 load duration curve 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. Although there are numeric loads for each flow regime, the LDC is what is being approved for these TMDLs.

Table 9: Summary of the Bogus Brook *E. coli* TMDL

		Load Duration Curve Zone				
		High	***Moist***	***Mid***	***Dry***	***Low***
		(billion - organisms per day)				
TMDL		**270.25**	**83.92**	**26.61**	**6.81**	**3.23**
MOS *(explicit 10%)*		27.02	8.39	2.66	0.68	0.32
WLA	Wastewater Discharge	-	-	-	-	-
	MS4	-	-	-	-	-
LA		243.23	75.53	23.95	6.13	2.91
Total Current Load		1989.56	204.07	27.26	13.95	*
Reduction %		86%	59%	2%	51%	*
Overall Reduction		78%				

* - no data for this flow regime

Table 10: Summary of the Cedar Creek *E. coli* TMDL

		Load Duration Curve Zone				
		High	***Moist***	***Mid***	***Dry***	***Low***
		(billion - organisms per day)				
TMDL		**335.79**	**175.45**	**108.95**	**76.46**	**40.56**
MOS *(explicit 10%)*		33.58	17.55	10.89	7.65	4.06
WLA	Wastewater Discharge**	0.10	0.10	0.10	0.10	0.10
	Andover City MS4	25.64	13.39	8.31	5.83	3.09
	East Bethel City MS4	108.39	56.62	35.14	24.65	13.06
	Ham Lake City MS4	6.00	3.13	1.95	1.36	0.72
	Oak Grove City MS4	54.39	28.41	17.64	12.37	6.56
	Isanti City MS4	1.51	0.79	0.49	0.34	0.18
	St. Francis City MS4	3.59	1.88	1.16	0.82	0.43
	MnDOT MS4	0.08	0.04	0.03	0.02	0.01
	Anoka County MS4	0.10	0.05	0.03	0.02	0.01
LA		102.41	53.49	33.21	23.30	12.34
Total Current Load		1,798.35	101.49	348.82	104.66	*
Reduction %		81%	0%	69%	27%	*

Overall Reduction	58%

* - no data for this flow regime

** - See Table 25 of this Decision document for the permit information

Table 11: Summary of the Estes Brook *E. coli* TMDL

		Load Duration Curve Zone				
		High	***Moist***	***Mid***	***Dry***	***Low***
		(billion - organisms per day)				
TMDL		211.51	50.35	15.26	6.76	1.87
MOS *(explicit 10%)*		21.15	5.03	1.53	0.68	0.19
WLA	Wastewater Discharge	-	-	-	-	-
	MS4	-	-	-	-	-
LA		190.36	45.32	13.73	6.08	1.68
Total Current Load		893.52	30.94	226.87	35.41	*
Reduction %		76%	0%	93%	81%	*
Overall Reduction		73				

* - no data for this flow regime

Table 12: Summary of the Seelye Brook *E. coli* TMDL

		Load Duration Curve Zone				
		High	***Moist***	***Mid***	***Dry***	***Low***
		(billion - organisms per day)				
TMDL		**470.22**	**208.24**	**120.44**	**69.50**	**36.34**
MOS *(explicit 10%)*		47.02	20.82	12.04	6.95	3.63
WLA	Wastewater Discharge	3.88	3.88	3.88	3.88	3.88
	Oak Grove City MS4	12.27	5.37	3.06	1.72	0.84
	Nowthen City MS4	14.35	6.28	3.58	2.01	0.99
	St. Francis City MS4	104.73	45.84	26.10	14.65	7.20
LA		287.95	126.04	71.78	40.29	19.80
Total Current Load		3,331.95	186.66	248.29	58.37	*
Reduction %		86%	0%	51%	0%	*
Overall Reduction		66%				

* - no data for this flow regime

Table 13: Summary of the West Branch Rum River *E. coli* TMDL

		Load Duration Curve Zone				
		High	***Moist***	***Mid***	***Dry***	***Low***
		(billion - organisms per day)				
TMDL		**1,343.33**	**398.83**	**103.10**	**29.46**	**11.85**
Upstream Load (Estes Brook)		211.51	50.35	15.26	6.76	1.87
Adjusted load		1,131.82	348.49	87.84	22.70	9.97
MOS *(explicit 10%)*		113.18	34.85	8.78	2.27	1.00
WLA	Wastewater Discharge	3.22	3.22	3.22	3.22	3.22
	MS4	-	-	-	-	-
LA		1,015.42	310.42	75.84	17.21	5.75
Total Current Load		1,111.11	497.92	128.98	45.19	13.93
Reduction %		0%	20%	20%	35%	15%
Overall Reduction		6%				

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 five bacteria TMDLs. The methods used for determining the TMDL are consistent with U.S. EPA technical memos.[3]

DO substances:
To determine the TMDL for Trott Brook, MPCA used the HSPF model for Rum River. As discussed above, HSPF was used to determine the effects that DO-scavenging substances would have on the DO levels in the brook. The model inputs were varied to determine when the WQS for DO was attained (Appendices A-D of the WRAPS report, 2017).

Results of the modeling effort calculated that the loading capacity of Trott Brook was 332 lbs/day of DO-demanding substances. Table 14 of this Decision Document contains the TMDL summary for Trott Brook. Almost all of the watershed (91%) is located within an MS4 (Section 4.2 of the TMDL). MPCA allocated loads to the MS4s based upon areal extent, and reserved a small (0.01%) to construction and industrial sources. The remaining load was allocated to Margin of Safety (MOS) and load allocation (LA).

Table 14: TMDL Summary for Trott Brook

		Oxygen Demand Load (lb/day)
Total Loading Capacity		332
Margin of Safety		33
WLA	Wastewater Discharge	-
	MS4s	272
	Construction/Industrial Stormwater	3
Load Allocation		24
Current Load		661
Required reduction		50%

Total Phosphorus:
MPCA used the U.S. Army Corps of Engineers (USACE) BATHTUB model to calculate the loading capacities for the ten lake TMDLs. BATHTUB is a model for lakes and reservoirs to determine steady-state water and nutrient mass balances in a spatially segmented hydraulic network. BATHTUB uses empirical relationships to determine "eutrophication-related water quality conditions".[4] These TMDLs use the BATHTUB model to link observed phosphorus water quality conditions and modeled phosphorus loading to in-lake water quality estimates. BATHTUB can be a steady-state annual or seasonal model that predicts a lake's water quality. BATHTUB utilizes annual or seasonal time-scales which are appropriate because watershed TP loads are normally impacted by seasonal conditions.

The model estimates in-lake phosphorus concentration by calculating net phosphorus loss (phosphorus sedimentation) from annual phosphorus loads as functions of inflows to the lake, lake depth, and hydraulic flushing rate. To estimate loading capacity the model is rerun, reducing current loading to the lake until the modeled result shows that in-lake total phosphorus would

[3] U.S. Environmental Protection Agency. August 2007. *An Approach for Using Load Duration Curves in the Development of TMDLs*. Office of Water. EPA-841-B-07-006. Washington, D.C.
[4] BATHTUB Manual - http://www.wwwalker.net/bathtub/help/bathtubWebMain.html

meet the applicable WQS.[5] The BATHTUB model also allows MPCA to assess impacts of changes in nutrient loading from the various sources.
For the Rum River watershed lakes, the BATHTUB modeling efforts were used to calculate the loading capacity for each lake. The loading capacity is the maximum phosphorus load which each of these waterbodies can receive over an annual period and still meet the shallow and general lake nutrient WQS. Loading capacities were calculated to meet the WQS during the growing season (June 1 through September 30). This time period contains the months that the general public typically use lakes in the Rum River watershed for aquatic recreation. This time of the year also corresponds to the growing season when water quality is likely to be impaired by excessive nutrient loading.

Four of the lakes (Francis, Long, North Stanchfield, and East Hunter) had higher internal loading of TP incorporated in the models. Modeling results indicated that these lakes did not respond to reductions in watershed run-off reductions. For these four lakes, reductions in internal loading will be needed to attain WQS. More detail on the BATHTUB modeling is in Appendix L of the TMDL, and in the lake-specific Appendices A-J of the TMDL. Tables 15-24 contain the TMDL summaries for each of the lakes.

Table 15: West Hunter Lake TMDL Summary

West Hunter Lake Load Allocation		Existing TP Load		Allowable TP Load		Estimated Load Reduction	
		lbs/yr	lbs/day	lbs/yr	lbs/day	lbs/yr	%
Margin of Safety 10%				**17.86**	**0.05**		
Wasteload	Construction Stormwater	0.40	< 0.01	0.40	< 0.01	0.00	—
	Industrial Stormwater	1.56	< 0.01	1.56	< 0.01	0.00	—
	Total WLA	**1.96**	**0.01**	**1.96**	**0.01**	**0.00**	—
Load	Lakeshed	181.99	0.5	144.46	0.39	37.53	21
	SSTS	8.82	0.02	0.00	0.00	8.82	100
	Atmospheric Deposition	14.30	0.04	14.30	0.04	0.00	—
	Total LA	**205.11**	**0.56**	**158.76**	**0.43**	**46.35**	**23**
Total Load (WLA + LA)		**207.07**	**0.57**	**160.72**	**0.44**	**46.35**	**22**
Loading Capacity (WLA + LA + MOS)				**178.57**	**0.49**		

[5] BATHTUB Manual - http://www.wwwalker.net/bathtub/help/bathtubWebMain.html

Table 16: East Hunter Lake TMDL Summary

East Hunter Lake Load Allocation		Existing TP Load		Allowable TP Load		Estimated Load Reduction	
		lbs/yr	lbs/day	lbs/yr	lbs/day	lbs/yr	%
Margin of Safety 10%				**15.95**	**0.04**		
Wasteload	Construction Stormwater	0.40	< 0.01	0.40	<0.01	0.00	—
	Industrial Stormwater	1.59	< 0.01	1.59	< 0.01	0.00	—
	Total WLA	**1.99**	**0.01**	**1.99**	**0.01**	**0.00**	—
Load	West Hunter Discharge	80.33	0.22	62.21	0.17	18.12	23
	Lakeshed	11.16	0.03	10.57	0.02	0.59	5
	Internal Load	97.45	0.26	55.81	0.15	41.64	43
	SSTS	6.62	0.02	0.00	0.00	6.62	100
	Atmospheric Depositional	13.00	0.04	13.00	0.04	0.00	—
	Total LA	**208.56**	**0.57**	**141.59**	**0.38**	**66.97**	**32**
Total Load (WLA + LA)		**210.55**	**0.58**	**143.58**	**0.39**	**66.97**	**32**
Loading Capacity (WLA + LA + MOS)				**159.53**	**0.44**		

Table 17: South Stanchfield Lake TMDL Summary

South Stanchfield Lake Load Allocation		Existing TP Load		Allowable TP Load		Estimated Load Reduction	
		lbs/yr	lbs/day	lbs/yr	lbs/day	lbs/yr	%
Margin of Safety 10%				**158.34**	**0.43**		
Wasteload	Construction Stormwater	0.43	< 0.01	0.43	< 0.01	0.00	—
	Industrial Stormwater	2.08	0.01	2.08	0.01	0.00	—
	Total WLA	**2.51**	**0.01**	**2.51**	**0.01**		—
Load	Lakeshed	2,431.28	6.66	1,327.42	3.63	1,103.86	45
	SSTS	6.62	0.02	0.00	0.00	6.62	100
	Atmospheric Deposition	95.14	0.26	95.14	0.26	0.00	—
	Total LA	**2,533.04**	**6.94**	**1,422.56**	**3.89**	**1,110.48**	**44**
Total Load (WLA + LA)		**2,535.55**	**6.95**	**1,425.07**	**3.90**	**1,110.48**	**44**
Loading Capacity (WLA + LA + MOS)				**1,583.41**	**4.34**		

Table 18: North Stanchfield Lake TMDL Summary

North Stanchfield Lake Load Allocation		Existing TP Load		Allowable TP Load		Estimated Load Reduction	
		lbs/yr	lbs/day	lbs/yr	lbs/day	lbs/yr	%
Margin of Safety 5%				**116.06**	**0.32**		
Wasteload	Construction Stormwater	1.58	<0.01	1.58	<0.01	0.00	—
	Industrial Stormwater	8.32	0.02	8.32	0.02	0.00	—
	Total WLA	**9.90**	**0.02**	**9.90**	**0.02**	**0.00**	—
Load	South Stanchfield Outlet	1,443.83	3.96	734.40	2.01	709.43	49
	North Stanchfield Trib 315	1,861.82	5.10	1,171.30	3.21	690.52	37
	Lakeshed	727.45	2.00	255.24	0.71	472.21	65
	SSTS	4.41	0.01	0.00	-	4.41	100
	Internal Load	4,671.18	12.80	0.00	0.00	4,671.18	100
	Atmospheric Deposition	34.30	0.09	34.30	0.09	0.00	—
	Total LA	**8,742.99**	**23.96**	**2,195.24**	**6.02**	**6,547.75**	**75**
Total Load (WLA + LA)		**8,752.89**	**23.98**	**2,205.14**	**6.04**	**6,547.75**	**75**
Loading Capacity (WLA + LA + MOS)				**2,321.20**	**6.36**		

Table 19: Long Lake TMDL Summary

Long Lake Load Allocation		Existing TP Load		Allowable TP Load		Estimated Load Reduction	
		lbs/yr	lbs/day	lbs/yr	lbs/day	lbs/yr	%
Margin of Safety 5%				**63.59**	**0.17**		
Wasteload	Construction Stormwater	0.59	< 0.01	0.59	< 0.01	0.00	—
	Industrial Stormwater	3.41	0.01	3.41	0.01	0.00	—
	Total WLA	**4.00**	**0.01**	**4.00**	**0.01**	**0.00**	—
Load	Tributary 367	851.38	2.33	544.84	1.49	306.54	36
	Lakeshed	821.23	2.25	457.62	1.26	363.61	44
	Internal Loading	1248.23	3.42	110.13	0.30	1138.10	91
	SSTS	108.05	0.30	0.00	0.00	108.05	100
	Atmospheric Deposition	91.60	0.25	91.60	0.25	0.00	—
	Total LA	**3,120.49**	**8.55**	**1,204.19**	**3.3**	**1,916.30**	**61**
Total Load (WLA + LA)		**3,124.49**	**8.56**	**1,208.19**	**3.31**	**1,916.30**	**61**
Loading Capacity (WLA + LA + MOS)				**1,271.78**	**3.48**		

Table 20: Lake Francis TMDL Summary

Lake Francis Load Allocation		Existing TP Load		Allowable TP Load		Estimated Load Reduction	
		lbs/yr	lbs/day	lbs/yr	lbs/day	lbs/yr	%
Margin of Safety 10%				**94.77**	**0.26**		
Wasteload	Construction Stormwater	1.17	< 0.01	1.17	< 0.01	0.00	—
	Industrial Stormwater	6.69	0.02	6.69	0.02	0.00	—
	Total WLA	**7.86**	**0.02**	**7.86**	**0.02**	**0.00**	—
Load	Tributary 359	1,120.04	3.07	700.7	1.92	419.34	37
	Local Watershed	123.06	0.34	81.15	0.23	41.91	34
	SSTS	82.11	0.22	0.00	0.00	82.11	100
	Atmospheric Deposition	63.23	0.17	63.23	0.17	0.00	—
	Internal load	4,739.64	12.99	0.00	0.00	4,739.64	100
	Total LA	**6,128.08**	**16.79**	**845.08**	**2.32**	**5,283.00**	**86**
Total Load (WLA + LA)		**6,135.94**	**16.81**	**852.94**	**2.34**	**5,283.00**	**86**
Loading Capacity (WLA + LA + MOS)				**947.71**	**2.60**		

Table 21: Baxter Lake TMDL Summary

Baxter Lake Load Allocation		Existing TP Load		Allowable TP Load		Estimated Load Reduction	
		lbs/yr	lbs/day	lbs/yr	lbs/day	lbs/yr	%
Margin of Safety 5%				**61.38**	**0.17**		
Wasteload	Baldwin MS4	227.56	0.62	170.93	0.47	56.63	25
	Construction Stormwater	1.08	<0.01	1.08	< 0.01	0.00	—
	Industrial Stormwater	4.59	0.01	4.59	0.01	0.00	—
	Total WLA	**233.23**	**0.63**	**176.60**	**0.48**	**56.63**	**24**
Load	Tributary 272	941.40	2.58	833.91	2.28	107.54	11
	Lakeshed	171.20	0.48	107.24	0.31	63.93	37
	SSTS	4.41	0.01	0.00	-	4.41	100
	Atmospheric Deposition	21.19	0.06	21.19	0.06	0.00	—
	Internal load	788.46	2.16	27.24	0.07	761.23	97
	Total LA	**1,926.66**	**5.29**	**989.58**	**2.72**	**937.08**	**49**
Total Load (WLA + LA)		**2,159.89**	**5.92**	**1,166.18**	**3.20**	**993.71**	**46**
Loading Capacity (WLA + LA + MOS)				**1,227.56**	**3.37**		

Table 22: Skogman Lake TMDL Summary

Skogman Lake Load Allocation		Existing TP Load		Allowable TP Load		Estimated Load Reduction	
		lbs/yr	lbs/day	lbs/yr	lbs/day	lbs/yr	%
Margin of Safety 10%				**84.32**	**0.23**		
Wasteload	Construction Stormwater	0.23	< 0.01	0.23	< 0.01	0.00	—
	Industrial Stormwater	0.66	< 0.01	0.66	< 0.01	0.00	—
	Total WLA	**0.89**	**< 0.01**	**0.89**	**< 0.01**	**0.00**	—
Load	Local Watershed	868.00	2.38	704.81	1.93	163.19	19
	SSTS	41.90	0.11	0.00	0.00	41.90	100.00
	Atmospheric Deposition	53.18	0.15	53.18	0.15	0.00	—
	Total LA	**963.08**	**2.64**	**757.99**	**2.08**	**205.09**	**21**
Total Load (WLA + LA)		**963.97**	**2.64**	**758.88**	**2.08**	**205.09**	**21**
Loading Capacity (WLA + LA + MOS)				**843.20**	**2.31**		

Table 23: Fannie Lake TMDL Summary

Fannie Lake Load Allocation		Existing TP Load		Allowable TP Load		Estimated Load Reduction	
		lbs/yr	lbs/day	lbs/yr	lbs/day	lbs/yr	%
Margin of Safety 10%				**135.85**	**0.37**		
Wasteload	Cambridge MS4	143.06	0.39	123.04	0.34	20.02	14
	Construction Stormwater	0.36	< 0.01	0.36	< 0.01	0.00	—
	Industrial Stormwater	1.49	< 0.01	1.49	< 0.01	0.00	—
	Total WLA	**144.91**	**0.40**	**124.89**	**0.35**	**20.02**	**14**
Load	Tributary 352	272.32	0.75	196.07	0.54	76.25	28
	Lakeshed	1,046.49	2.86	826.06	2.25	220.43	21
	SSTS	30.87	0.08	0.00	0.00	30.87	100
	Atmospheric Deposition	75.64	0.21	75.64	0.21	0.00	—
	Total LA	**1,425.32**	**3.9**	**1,097.77**	**3.00**	**327.55**	**23**
Total Load (WLA + LA)		**1,570.23**	**4.30**	**1,222.66**	**3.35**	**347.57**	**22**
Loading Capacity (WLA + LA + MOS)				**1,358.51**	**3.72**		

Table 24: Green Lake TMDL Summary

Green Lake Load Allocation		Existing TP Load		Allowable TP Load		Estimated Load Reduction	
		lbs/yr	lbs/day	lbs/yr	lbs/day	lbs/yr	%
Margin of Safety 10%				**319.17**	**0.87**		
Wasteload	Construction Stormwater	0.90	< 0.01	0.90	< 0.01	0.00	—
	Industrial Stormwater	5.04	0.01	5.04	0.01	0.00	—
	Total WLA	**5.94**	**0.01**	**5.94**	**0.01**	**0.00**	—
Load	Tributary 281	1,820.84	4.99	1,085.74	2.97	735.10	40
	Tributary 283	1,290.18	3.53	809.92	2.22	480.26	37
	Local Watershed	1,286.36	3.53	771.81	2.12	514.55	40
	SSTS	110.25	0.30	0.00	0.00	110.25	100
	Atmospheric Deposition	199.15	0.55	199.15	0.55	0.00	—
	Total LA	**4,706.78**	**12.90**	**2,866.62**	**7.86**	**1,840.16**	**39**
Total Load (WLA + LA)		**4,712.72**	**12.91**	**2,872.56**	**7.87**	**1,840.16**	**39**
Loading Capacity (WLA + LA + MOS)				**3,191.73**	**8.74**		

The EPA finds that the TMDL document submitted by the 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:

Load allocations are addressed in Section 4 of the final TMDL document. The *E. coli* LAs for the five *E. coli* TMDLs are in Tables 9-13 of this Decision Document. Review of the LDCs show that the exceedences occur under all flow conditions, indicating there are both wet and dry-weather sources contributing to the impairments. The LA for DO-substances for the DO TMDL is in Table 14 of this Decision Document. As noted earlier, 91% of the watershed for Trott Brook is covered under an MS4 permit, so the LA is relatively small for this waterbody.

The LAs for the ten lake TP TMDLs are in Tables 15-24 of this Decision Document. MPCA noted that only a small portion of one lake (Fannie Lake) was covered by an MS4 permit, so the vast majority of loading to the lakes is LA. For the lake TP TMDLs, MPCA divided the LA into several subcategories, including upstream load, lakeshed, SSTS, internal load and atmospheric deposition.

The EPA finds that the TMDL document submitted by the 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:

***E. coli*:**

MPCA identified three WWTF discharging to *E. coli*-impaired streams (Section 4.1.2 of the TMDL). These facilities were given an individual WLA based upon the maximum daily flow times the *E. coli* geometric mean criteria of 126 org/100 mL (Table 4-1 of the TMDL and Table 25 of this Decision Document).

Table 25: *E. coli* TMDL WLAs

Impairment	Facility	Permit ID	Design Flow (mgd)	Effluent Concentration Limit (org/100 mL)	*E. coli* WLA (org/day)
West Branch of the Rum	Foreston WWTF	MNG580017	0.675	126	3.22E+09
Seelye Brook	Saint Francis WWTF	MN0021407	0.814	126	3.88E+09
Cedar Creek	Isanti Estates LLC	MN0054518	0.02	126	9.54E+07

MPCA determined individual WLAs for the MS4 permittees in the *E. coli*-impaired watersheds (Table 4-2 of the TMDL and Table 26 of this Decision Document). The MS4 WLAs were based upon the land area under the jurisdiction of the MS4 permit as discussed in Section 4.1.1.2 of the

TMDL. There are no CSOs or CAFOs within the watersheds, therefore, they were not given an allocation (WLA = 0).

Table 26: MS4 WLAs for the *E. coli* TMDLs

Reach	**MS4**	**Permit No.**	**Contributing area (acres)**	***E. coli* Allocation (% of Allowable Load)**
Seelye Brook	Oak Grove City	MS400110	8[illegible]0	3.4
	Nowthen City	MS400069	760	2.9
	St. Francis City	MS400296	6481	25
Cedar Creek	Oak Grove City	MS400110	9,358	18.0
	East Bethel City	MS400087	18,649	35.9
	Ham Lake City	MS400092	1,032	2.0
	Andover City	MS400073	4,411	8.5
	Saint Francis City	MS400296	618	1.2
	Isanti City	MS400287	260	0.5
	Anoka County	MS400066	16	<0.5
	MnDOT	MS400170	14	<0.5

DO:

MPCA determined that the only point sources in the Trott Brook watershed are MS4 discharges. No WWTF, CSOs, or CAFOs are present in the watershed (Section 4.2.2 of the TMDL). Table 27 of this Decision Document lists the MS4 permittees in the watershed. The WLA was calculated based upon the areal extent delineated in each permit.

Table 27: MS4 WLAs for Trott Brook

MS4	Permit No.	Contributing Area (acres)	Percent of MS4 Load	Allowable Oxygen Demand* (lb/day)
Elk River City	MS400089	10479	63	171
Nowthen City	MS400069	1,610	10	26
Ramsey City	MS400115	4,440	27	72
Saint Francis City	MS400296	47	< 1	1
Sherburne County	MS400155	53	< 1	1
Anoka County	MS400066	36	< 1	1

* - Oxygen demand accounts for the combination of SOD, NOD, and BOD

MPCA set aside 0.25% and 0.65% of the total WLA to account for DO-substance loading from construction stormwater and from industrial stormwater, respectively (Section 4.2.2 of the TMDL). MPCA reviewed the areal coverage of construction permits issued in the counties from 2006-2016, and calculated coverage to be 0.22%. This was rounded up to 0.25%. For industrial stormwater, MPCA reviewed the state-wide industrial stormwater permit data, and calculated that 0.60% of the watersheds have coverage under the permit. MPCA rounded the value up to 0.65% to ensure coverage.

MPCA explained that BMPs and other stormwater control measures should be implemented at active construction sites to limit the discharge of pollutants of concern. BMPs and other stormwater control measures which should be implemented at construction sites are defined in the State's NPDES/State Disposal System (SDS) General Stormwater Permit for Construction Activity (MNR100001). If a construction site owner/operator obtains coverage under the NPDES/SDS General Stormwater Permit and properly selects, installs and maintains all BMPs required under the permit, 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.

The WLA for stormwater discharges from sites where there is industrial activity reflects the number of sites in the watershed for which NPDES industrial stormwater permit coverage is required, and the BMPs and other stormwater control measures that should be implemented at the sites to limit the discharge of pollutants of concern. BMPs and other stormwater control measures which should be implemented at the industrial sites are defined in 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). 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.

TP:
MPCA determined that there are no WWTF, CSOs, or CAFOs in the ten lake TP TMDLs. A small portion of the Fannie Lake watershed (430 acres) is covered under a MS4 permit for the City of Cambridge (MNR040000). MPCA determined a WLA for the MS4 based upon the areal extent of coverage in the watershed.

MPCA set aside a portion of the total WLA to account for TP loading from construction stormwater and from industrial stormwater. MPCA reviewed the areal coverage of construction permits issued in the counties from 2006-1016, and calculated coverage based upon the areal extent. For industrial stormwater, MPCA reviewed the state-wide industrial stormwater permit data, and calculated the extent of each watershed based upon permit coverage. Each watershed has a WLA calculated for construction and industrial stormwater.

MPCA explained that BMPs and other stormwater control measures should be implemented at active construction sites to limit the discharge of pollutants of concern. BMPs and other stormwater control measures which should be implemented at construction sites are defined in the State's NPDES/State Disposal System (SDS) General Stormwater Permit for Construction Activity (MNR100001). If a construction site owner/operator obtains coverage under the NPDES/SDS General Stormwater Permit and properly selects, installs and maintains all BMPs required under the permit, 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.

The WLA for stormwater discharges from sites where there is industrial activity reflects the number of sites in the watershed for which NPDES industrial stormwater permit coverage is required, and the BMPs and other stormwater control measures that should be implemented at the sites to limit the discharge of pollutants of concern. BMPs and other stormwater control measures which should be implemented at the industrial sites are defined in 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). 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.

The EPA finds that the TMDL document submitted by the 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:

E. coli:

The *E. coli* TMDLs incorporated an explicit MOS of 10% of the total loading capacity. The MOS reserved 10% of the loading capacity and allocated the remaining loads to point (WLA) and nonpoint sources (LA) (Tables 9-13 of this Decision Document). The use of the LDC approach minimized variability associated with the development of the bacteria TMDLs because the calculation of the loading capacity was a function of flow multiplied by the target value. The MOS was set at 10% to account for uncertainty due to field sampling error and assumptions made during the TMDL development process.

The MOS 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 cfu/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 enough to meet the WQS of 126 cfu/100 mL. Thus, it is more conservative to apply the State's WQS as the MOS, because this standard must be met at all times under all environmental conditions.

DO-substances:

The DO TMDL for Trott Brook incorporated an explicit MOS of 10% of the total loading capacity (Table 14 of this Decision Document). MPCA determined this is sufficient based upon the modeling results. MPCA also noted that the TMDL was calculated to predict the stream meeting the DO standard 95% of the time; whereas, the standard only requires meeting the DO standard 50% of the time at the lowest 7-day average flow that occurs on average once every 10 years (7Q10). Because the delivery of oxygen-demanding materials that impact DO at the 7Q10 occurs during all flows, this TMDL was written for all flows and, therefore, is protective at the 7Q10. As such, an implicit MOS is also included.

TP:
The lake TP TMDLs incorporated an explicit MOS of 10% of the TMDL for six of the lakes, and 5% of the TMDL for the remaining four lakes (Tables 15-24 of this Decision Document). MPCA noted that the MOS is reasonable due to the generally good calibration of the HSPF and BATHTUB models for hydrology and pollutant loading (Section 4.3.4 of the TMDL). The calibration results indicate the model adequately characterize the lakes, and therefore additional MOS is not needed.

Lakes that are joined or in close proximity include West Hunter/East Hunter, South/North Stanchfield, and Skogman/Fannie Lakes. The TMDL allocations for the upgradient lakes were determined separately and assume future compliance with lake water quality standards and were incorporated into the downstream lake TMDL allocations. Hence, including an explicit MOS in the upstream lake offers an implicit MOS for the downstream lake. Lastly, the endpoint targets for each lake are 1 μg/L below the lake eutrophication P standards and offers a slight implicit MOS for each lake.

The EPA finds that the TMDL document submitted by the 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:
Bacterial loads vary by season, typically reaching higher numbers in the dry summer months when low flows and warm water contribute to their abundance, and reaching relatively lower values in colder months when bacterial growth rates attenuate. Bacterial WQS need to be met between April 1st to October 31st, regardless of the flow condition. The development of the LDC utilized flow measurements from local flow gages. These flow measurements were collected over a variety of flow conditions observed during the recreation season. The LDC developed from these flow records represents a range of flow conditions within the *E. coli* – impaired watersheds and thereby accounted for seasonal variability over the recreation season.

Nutrient influxes to the TP-impaired lakes and DO-impaired brook typically occur during wet weather events. Critical conditions that impact the response of the lake to nutrient inputs occur during periods of low flow in the summer. During low flow periods, nutrients accumulate, there is less assimilative capacity within the water body, water temperatures increase, and algae thrives. Increased algal growth during low flow periods can deplete dissolved oxygen within the water column.

The nutrient targets employed in the lake nutrient and DO TMDLs were based on the average nutrient and DO values collected during the growing season (June 1 to September 30). The water quality criteria were designed to meet the period of the year where the frequency and severity of algal growth and low DO is the greatest, the mid-late summer. The mid-late summer time period is typically when eutrophication standards are exceeded and water quality in the lakes is deficient. By calibrating the TMDL development efforts to protect water bodies during the worst water quality conditions of the year, MPCA assumes that the loading capacity established by the TMDL will be protective of water quality during the remainder of the calendar year (October through May).

The EPA finds that the TMDL document submitted by the 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:
Sections 7 and 9 of the TMDL that provide information on actions and activities to reduce pollutant loading in the watershed. The main entities responsible for overseeing the pollutant reduction activities will be the MPCA, Benton, Isanti, Anoka and Mille Lacs Counties, and several Soil and Water Conservation Districts (SWCD).

The Lower Rum River Watershed Management Organization (LRRWMO) and the Upper Rum River Watershed Management Organization (URRWMO) have been active in the Anoka County portion of the watershed. Both organizations have spent considerable time and money on implementation activities such as stream bank restoration and stormwater controls in the last decade. The URRWMO is in the process of updating the Watershed Plan, which includes coordination with the TMDL activities and Watershed Restoration And Protection Strategy

(WRAPS) plan. The LRRWMO plan was most recently approved in 2015, and issues an annual report documenting actions in the watershed to control pollutants.

The Isanti County Soil and Water Conservation District has been implementing various actions designed to reduce pollutants in the Rum River watershed. The District has been working on a program to help implement the new buffer rule recently promulgated in Minnesota. The District has also implemented shoreline restoration work and stormwater retrofits in the Rum River Watershed.

The Mille Lacs County Soil and Water Conservation District has a Local Water Resource Watershed Plan that identifies efforts to protect the waters of the county. The Plan contains implementation actions (some specifically targeting TMDL waters) designed to reduce pollutants.

Reasonable assurance that the WLA set forth in the TMDLs 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 NPDES permit program is the implementing program for ensuring effluent limits are consistent with the TMDL.

All regulated MS4 communities are required to satisfy the requirements of the MS4 general permit. The MS4 general permit requires the permittee to develop a Stormwater Pollution Prevention Plan (SWPPP) which addresses all permit requirements, including the following six minimum control measures:

- Public education and outreach;
- Public participation;
- Illicit Discharge Detection and Elimination (IDDE) Program;
- Construction-site runoff controls;
- Post-construction runoff controls; and
- Pollution prevention and municipal good housekeeping measures.

A SWPPP is a management plan that describes the MS4 permittee's activities for managing stormwater within their jurisdiction or regulated area. In the event a TMDL study has been completed, approved by EPA prior to the effective date of the general permit, and assigned a wasteload allocation to an MS4 permittee, that permittee must document the WLA in its application and provide an outline of the best management practices to be implemented in the current permit term to address any needed reduction in loading from a MS4 community.

The stormwater program requires construction and industrial sites to create a SWPPP that summarizes how stormwater will be minimized from a site. Permittees are required to review the adequacy of local SWPPPs to ensure that each plan meets WLA set in the TMDL. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified prior to the effective date of the next General Permit. This applies to the MS4, Construction, and Industrial Stormwater General Permits.

<u>Clean Water Legacy Act:</u> The 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 WRAPS report for the Rum River watershed was finalized on July 10, 2017. Several of the implementation actions listed in the WRAPS report are already underway.

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 Rum River watershed (Section 8 of the TMDL). Water quality monitoring is a critical component of the adaptive management strategy employed as part of the implementation planning efforts for the these watersheds.

Follow-up monitoring is integral to the adaptive management approach. Monitoring addresses uncertainty in the efficacy of implementation actions and can provide assurance that implementation measures are succeeding in attaining water quality standards, as well as inform the ongoing TMDL implementation strategy. To assess progress toward meeting the TMDL targets, monitoring of the lakes will continue to be a part of the Soil and Water Conservation Districts monitoring programs. For example, the Anoka Conservation District (ACD) monitors waters in the Rum River watershed on a 1-3 year basis. The ACD comprehensive Plan (2015-2019) describes the ongoing monitoring efforts in the county, including waters addressed under the TMDL. The Upper Rum River Watershed Management Organization has developed a draft Watershed Management Plan (2017-2027) that contains monitoring goals and a draft monitoring plan for waters within the watershed. The Plan notes that coordination with teh Rum River WRAPS will be important in assessing on-going water quality.

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:
Implementation strategies are outlined in Section 9 of the final TMDL document. The MPCA presented a variety of possible implementation activities which could be undertaken within the watersheds. Most of these actions will address all three pollutants.

Urban/residential stormwater reduction strategies: Some of the watersheds have significant amounts of urban/suburban land. MPCA anticipates that controls on stormwater will be needed to attain and maintain WQS. As noted in Section 5 of this Decision Document, the SWPPPs will be reviewed and revised as needed.

Pasture and Manure Management BMPs: Controlling animal sources, especially manure from small farms in the watersheds, was identified as a significant implementation activity by MPCA. Livestock exclusion from streams, alternate watering facilities, adoption of rotational grazing, and manure management are expected to reduce pollutant loads entering the waterbodies.

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

Septic System Control: Counties within the Rum River watershed have developed ordinances to protect human health and the environment and need the public's support. Upgrades of noncompliance systems may be required to obtain building permits and upon property sale. County support via the Rum River WRAPS process may result in designating grants or loans to help in upgrading old and failing septic systems. Failing and noncompliant SSTSs adjacent to lakes, streams and associated drainages should receive the highest priority.

Public Education Efforts: Public programs will be developed to provide guidance to the general public on pollutant reduction efforts and their impact on water quality. These educational efforts could also be used to inform the general public on what they can do to protect the overall health of the waterbodies.

Internal TP reduction (Lakes): Several of the TP TMDLs for the lakes require a significant (over 90%) reduction in internal TP load. In Section 9.2.3 of the TMDL, MPCA discusses the options available to reduce internal TP loading. Alum treatment, ferric chloride treatment, aeration, and oxygenation are discussed. MPCA noted that no specific process is proposed for the lakes; further study is needed to determine which process is likely to be effective for each lake. MPCA also explained that TP loads from watershed runoff will need to be reduced or controlled before internal load options are implemented.

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 10 of the TMDL. Throughout the development of the Rum River watershed TMDLs the public was given various opportunities to participate in the TMDL process. The MPCA encouraged public participation through public meetings and small group discussions with stakeholders within the watershed.

A meeting was held with the city of Cambridge officials on July 26, 2016, to review the draft Fannie Lake modeling, TMDL allocations, and the city's urban stormwater ordinances and BMPs. A second MS4 meeting was held on September 22, 2016, to review the draft TMDL allocations, their development, and to receive comments and suggestions. Participating MS4 entities included officials from the cities of Ramsey, St. Francis, Andover, Isanti, Oak Grove, Ham Lake, and East Bethel and the counties of Anoka and Isanti. A public and stakeholder meeting was held on October 19, 2016 to present the draft TMDL report and allocations before public notice and receive public comments and concerns.

The draft TMDL was posted online by the MPCA at (http://www.pca.state.mn.us/water/tmdl). The 30-day public comment period began on May 1, 2017 and ended on May 31, 2017. The MPCA received three public comments and adequately addressed these comments. Comments were submitted by the Minnesota Department of Transportation (MnDOT), the Minnesota Department of Agriculture (MDA) and Ham Lake City.

The comments from the MDA focused on identification of various programs and efforts being implemented by MDA to reduce pollutant loads entering the impaired waters. MDA had several suggestions for changes to the TMDL and WRAPS. MPCA revised the TMDL in several locations to add additional information. MPCA added the MDA to the list of potential partners in the WRAPS as requested by MDA, and will coordinate with MDA to provide information as needed.

The comment from the MnDOT requested that a specific reduction percentage be calculated for the MnDOT loads. MPCA calculated WLAs based upon the land area regulated by MnDOT (0.033% of the watershed for Cedar Creek) (Table 10 of this Decision Document). MPCA noted that the MnDOT percent reduction in *E. coli* is aggregated together with the other MS4 permittees, to determine the most reasonable locations for BMPs.

Ham Lake City requested clarification on the type and specific locations of buffers within the watershed. MPCA explained that the TMDL and WRAPS documents were watershed-scale efforts, and specific locations of BMPs will be addressed in local plans. The City also questions what additional efforts would be required under the TMDL, including any additional modeling. MPCA stated that no additional modeling was needed at this time, but that the City could do additional work to further define actions that may affect water quality. MPCA also explained that although Ham Lake City is six miles from Cedar Creek, the City is within the contributing area for flow and pollutants, and therefore a WLA is needed.

The EPA finds that the TMDL document submitted by the 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 waterbody, and the pollutant(s) of concern.

Comment:
The EPA received the final Rum River watershed TMDL document, submittal letter and accompanying documentation from the MPCA on July 24, 2017. The transmittal letter explicitly

stated that the final Rum River watershed TMDL for *E. coli*, nutrients, and low DO were being submitted to EPA pursuant to Section 303(d) of the Clean Water Act for EPA review and approval. The letter clearly stated that this was a final TMDL submittal under Section 303(d) of CWA. The letter also contained the name of the watershed as it appears on Minnesota's 303(d) list, and the causes/pollutants of concern. This TMDL was submitted per the requirements under Section 303(d) of the Clean Water Act and 40 CFR 130.

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

13. Conclusion

After a full and complete review, the EPA finds that the TMDLs for the Rum River watershed satisfy all of the elements of approvable TMDLs. This approval is for 16 TMDLs, addressing aquatic recreational use impairments due to bacteria and phosphorus and aquatic life use due to low DO.

The EPA's approval of these TMDLs extends to the water bodies which are identified In Table 1 of this Decision Document 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.