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

MAR 13 2020

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 completed its review of the final Total Maximum Daily Loads (TMDL) for segments within the Lower Minnesota River Watershed (LMRW), including supporting documentation. The LMRW encompasses parts of eleven counties in southern Minnesota. The LMRW TMDLs address impaired aquatic recreation due to excessive nutrients and bacteria and impaired aquatic life use due to excessive sediment and chloride.

The LMRW TMDLs meet the requirements of Section 303(d) of the Clean Water Act and EPA's implementing regulations set forth at 40 C.F.R. Part 130. Therefore, EPA approves Minnesota's thirty-nine bacteria TMDLs, forty-three phosphorus TMDLs, fifteen sediment TMDLs and one chloride TMDL. EPA describes Minnesota's compliance with the statutory and regulatory requirements in the enclosed decision document. EPA also agrees that the protection measures outlined in the TMDL document for Lake Lucy are sufficient to maintain the existing water quality. EPA agrees these measures are appropriate for consideration as a "protection strategy" as described in "A Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program".

EPA acknowledges Minnesota's efforts in submitting these TMDLs and look forward to future TMDL submissions by the State of Minnesota. If you have any questions, please contact Mr. Paul Proto at 312-353-8657 or proto.paul@epa.gov.

Sincerely,

Thomas R. Short Jr.
Acting Director, Water Division

Enclosure

wq-iw7-49g

TMDL: Lower Minnesota River Watershed (Parts 1, 2 and 3) bacteria, nutrient, sediment and chloride TMDLs in portions of 11 counties in southern, Minnesota
Date: March 13, 2020

DECISION DOCUMENT
FOR THE LOWER MINNESOTA RIVER WATERSHED TMDLS (PARTS 1, 2 & 3), IN PORTIONS OF 11 COUNTIES IN SOUTHERN, MINNESOTA

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

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

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

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

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

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

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

Comment:

Location Description/Spatial Extent:

The Minnesota River Watershed (MRW) in southern Minnesota is a main tributary to the Mississippi River and drains approximately 1,865 square miles (553,600 acres). The Minnesota River starts near the Minnesota-South Dakota border and flows generally in a southeastern direction for 335 miles before joining the Mississippi River near St. Paul, Minnesota. The contributing areas addressed by the lower portion of the MRW (i.e., the Lower Minnesota River Watershed (LMRW)) occupy portions of Carver, Dakota, Hennepin, Le Sueur, McLeod, Nicollet, Ramsey, Rice, Scott and Sibley counties.

The LMRW Total Maximum Daily Loads (TMDLs) were split into three reports (i.e., TMDL Parts 1, 2 & 3). This Decision Document addresses the water bodies in all three parts of LMRW TMDL project. Part 1 of the LMRW TMDL project focuses on impaired waters in the southern and western portion of the LMRW. Part 2 of the LMRW TMDL project focuses on impaired waters in the northern watersheds, specifically the Riley-Purgatory-Bluff Creek and Nine Mile Creek watersheds. Part 3 of the LMRW TMDL project addresses impaired waters in the northern watersheds, specifically the Carver County Six Lakes area of the LMRW. Parts 1 through 3 focus on segments impaired due to excessive bacteria, excessive nutrients (phosphorus), excessive sediment and excessive chloride (Tables 1, 2 and 3 of this Decision Document).

Table 1: Impaired segments addressed by the Lower Minnesota River Watershed TMDL Part 1

Water body name	Assessment Unit ID	Affected Use	Pollutant or stressor	TMDL
Rush River North Branch (Judicial Ditch 18)	07020012-555	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Unnamed Ditch	07020012-713	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
County Ditch 18	07020012-714	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Rush River North Branch (County Ditch 55)	07020012-558	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Rush River Middle Branch (County Ditch 23 and 24)	07020012-550	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Judicial Ditch 1A	07020012-509	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Judicial Ditch 22	07020012-629	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Unnamed Ditch	07020012-533	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Unnamed Creek (Goose Lake Inlet)	07020012-907	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Unnamed Creek	07020012-618	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Unnamed Creek (Lake Waconia Inlet)	07020012-619	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Unnamed Ditch	07020012-527	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Unnamed Creek	07020012-621	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL

Unnamed Creek	07020012-568	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Unnamed Creek	07020012-526	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Unnamed Creek	07020012-528	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Chaska Creek	07020012-804	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Unnamed Ditch	07020012-565	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Unnamed Creek	07020012-581	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Barney Fry Creek	07020012-602	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Le Sueur Creek	07020012-824	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Forest Prairie Creek	07020012-725	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Unnamed Creek	07020012-761	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Unnamed Creek	07020012-756	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Unnamed Creek	07020012-753	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Big Possum Creek	07020012-749	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Robert Creek	07020012-575	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Unnamed Creek (Brewery Creek)	07020012-830	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Unnamed Creek	07020012-746	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
County Ditch 10	07020012-628	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Raven Stream West Branch	07020012-842	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Raven Stream	07020012-716	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Porter Creek	07020012-817	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Sand Creek	07020012-513	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Eagle Creek	07020012-519	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Credit River	07020012-811	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
			TOTAL bacteria TMDLs	**36**
High Island Lake	72-0050-01	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Silver Lake	72-0013-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Lake Titlow	72-0042-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Clear Lake (Sibley)	72-0089-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Rutz Lake	10-0080-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Greenleaf Lake	40-0020-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Clear Lake (Le Sueur)	40-0079-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Hatch Lake	66-0063-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Cody Lake	66-0061-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Phelps Lake	66-0062-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Pepin Lake	40-0028-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Lake Sanborn	40-0027-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Pleasant lake	70-0098-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
St. Catherine Lake	70-0029-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Cynthia Lake	70-0052-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Thole Lake	70-0120-01	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Clearly Lake	70-0022-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Fish lake	70-0069-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Pike Lake	70-0076-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Bevens Creek	07020012-843	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Carver Creek	07020012-806	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL

Sand Creek	07020012-839	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Sand Creek	07020012-840	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Sand Creek	07020012-513	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
			TOTAL nutrient TMDLs	**24**
Rush River	07020012-548	Aquatic Life	Sediment/TSS	TSS TMDL
Rush River	07020012-521	Aquatic Life	Sediment/TSS	TSS TMDL
High Island Creek	07020012-653	Aquatic Life	Sediment/TSS	TSS TMDL
High Island Ditch 2	07020012-588	Aquatic Life	Sediment/TSS	TSS TMDL
Buffalo Creek	07020012-832	Aquatic Life	Sediment/TSS	TSS TMDL
High Island Creek	07020012-834	Aquatic Life	Sediment/TSS	TSS TMDL
Unnamed Creek	07020012-581	Aquatic Life	Sediment/TSS	TSS TMDL
Robert Creek	07020012-575	Aquatic Life	Sediment/TSS	TSS TMDL
Sand Creek	07020012-839	Aquatic Life	Sediment/TSS	TSS TMDL
Sand Creek	07020012-840	Aquatic Life	Sediment/TSS	TSS TMDL
Sand Creek	07020012-538	Aquatic Life	Sediment/TSS	TSS TMDL
Porter Creek	07020012-815	Aquatic Life	Sediment/TSS	TSS TMDL
Porter Creek	07020012-817	Aquatic Life	Sediment/TSS	TSS TMDL
Sand Creek	07020012-513	Aquatic Life	Sediment/TSS	TSS TMDL
			TOTAL TSS TMDLs	**14**
Credit River	07020012-811	Aquatic Life	chloride	chloride TMDL
			TOTAL chloride TMDLs	**1**

Table 2: Impaired segments addressed by the Lower Minnesota River Watershed TMDL Part 2

Water body name	Assessment Unit ID	Affected Use	Pollutant or stressor	TMDL
Nine Mile Creek	07020012-809	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Purgatory Creek	07020012-828	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
Riley Creek	07020012-511	Aquatic Recreation	Bacteria (*E. coli*)	*E. coli* TMDL
			TOTAL bacteria TMDLs	**3**
Silver Lake	27-0136-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Lotus Lake	10-0006-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Staring Lake	27-0078-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Lake Susan	10-0013-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Rice Marsh Lake	10-0001-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Lake Riley	10-0002-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Hyland Lake	27-0048-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Wing Lake	27-0091-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Lake Rose	27-0092-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
North Cornelia Lake	27-0028-01	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
South Cornelia Lake	27-0028-02	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Edina Lake	27-0029-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Penn Lake	27-0004-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
			TOTAL nutrient TMDLs	**13**
Riley Creek	07020012-511	Aquatic Life	Sediment/TSS	TSS TMDL
			TOTAL TSS TMDLs	**1**

Table 3: Impaired segments addressed by the Lower Minnesota River Watershed TMDL Part 3

Water body name	Assessment Unit ID	Affected Use	Pollutant or stressor	TMDL
Gaystock	10-0031-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Maria	10-0058-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Hazeltine	10-0014-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
McKnight	10-0216-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Jonathan	10-0217-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
Unnamed (Grace)	10-0218-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Nutrient TMDL
			TOTAL nutrient TMDLs	**6**

Part 2 of the LMRW TMDLs included a protection strategy for Lake Lucy (10-0007-00) for total phosphorus. Lake Lucy is not currently impaired due to excessive nutrients (total phosphorus) but MPCA calculated allocations for Lake Lucy (Table 11 of this Decision Document) with the aim of preventing an impairment, protecting its existing uses and maintaining Lake Lucy's current water quality levels. MPCA consulted EPA's guidance on protection approaches as described in "*A Long-Term Vision for Assessment, Restoration and Protection under the Clean Water Act Section 303(d) Program*" (December 2013).[1]

Summing the individual impairments across Parts 1, 2 and 3 of the LMRW TMDLs yields, thirty-nine (39) bacteria TMDLs, thirty-eight (38) nutrient TMDLs for lakes in the LMRW, five (5) nutrient TMDLs for stream segments in the LMRW, fifteen (15) sediment TMDLs and one chloride TMDL. TMDL tables for all of these segments are found in Tables 7 to 16 of this Decision Document.

The Lower Minnesota River Watershed includes tribal lands for the Lower Sioux Indian Community and the Shakopee Mdewakanton Sioux Community. The LMRW TMDLs to not allocate any loading to tribal lands of the Lower Sioux Indian Community nor the Shakopee Mdewakanton Sioux Community.

Land Use:
Land use in the LMRW is predominantly agricultural land in the western part of the watershed with smaller areas of developed areas, wetlands, forests and shrublands. As one moves eastward in the LMRW the land use changes to a more suburbanized and urbanized landscape with greater percentages of developed areas as the watershed nears and eventually becomes part of the Twin Cities Metro Area (TCMA). MPCA provides land use information for each impaired segment in Section 3.4 of Part 1, Section 3.6 of Part 2 and Section 3.3 of Part 3.

Problem Identification:
Bacteria TMDLs: Bacteria impaired segments identified in Tables 1 and 2 of this Decision Document were included on the final 2018 Minnesota 303(d) list due to excessive bacteria. Water quality monitoring within the LMRW indicated that these segments were not attaining their designated aquatic recreation uses due to exceedances of the bacteria criteria. Excessive bacteria can negatively impact recreational uses (e.g., swimming, wading, boating, fishing, etc.) and public health. At elevated levels, bacteria may cause illness within humans who have contact with or ingest bacteria laden water. Recreation-based contact can lead to ear, nose, and throat infections, and stomach illness.

[1] EPA website, https://www.epa.gov/sites/production/files/2015-07/documents/vision_303d_program_dec_2013.pdf (last accessed 2/28/20)

Phosphorus TMDLs: Lakes and stream segments identified in Tables 1, 2 and 3 of this Decision Document were included on the final 2018 Minnesota 303(d) list due to excessive nutrients (phosphorus). For the lake segments, total phosphorus (TP), chlorophyll-*a* (chl-*a*) and Secchi depth (SD) measurements in the LMRW indicated that these waters were not attaining their designated aquatic recreation uses due to exceedances of nutrient criteria (Table 5 of this Decision Document). For the stream segments, TP and at least one response variable (e.g., chl-*a* (sestonic), dissolved oxygen flux (DO_{FLUX}), 5-day biochemical oxygen demand (BOD_5) and pH) demonstrated exceedances of river eutrophication water quality standards (Table 6 of this Decision Document). Water quality monitoring was completed throughout the LMRW and that data formed the foundation for TP TMDL modeling efforts.

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

Sediment (Total Suspended Solids) TMDLs: Sediment (turbidity) impaired segments identified in Tables 1 and 2 of this Decision Document were included on the final 2018 Minnesota 303(d) list due to excessive sediment within the water column. Water quality monitoring within the LMRW indicated that these segments were not attaining their designated aquatic life uses due to excessive turbidity or total suspended solids (TSS) measurements and the negative impact of those conditions on fish and macroinvertebrate communities.

TSS is a measurement of the sediment and organic material that inhibits natural light from penetrating the surface water column. When in suspension, sediment can limit visibility and light penetration which may impair foraging and predation activities by certain species. Excess sediment and organic material may create turbid conditions within the water column and may increase the costs of treating surface waters used for drinking water or other industrial purposes (e.g., food processing).

Excessive sediment and organic material within the water column can negatively impact fish and macroinvertebrates within the ecosystem via reducing spawning and rearing areas for certain fish species, clogging gills and abrading fish tissue and subjecting sensitive species to unnecessary stress . Excessive amounts of fine sediment in stream environments can degrade aquatic communities.

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

Degradations in aquatic habitats or water quality (e.g., low dissolved oxygen) can negatively impact aquatic life use. Increased turbidity, 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 (i.e., fish and macroinvertebrate species). In some instances, degradations in aquatic habitats or water quality have reduced fish populations or altered fish communities from those communities supporting sport fish species to communities which support more tolerant rough fish species.

Excess siltation and flow alteration in streams can negatively impact aquatic life by altering habitats. Excess sediment can fill pools, embed substrates, and reduce connectivity between different stream habitats. The result is a decline in habitat types that, in healthy streams, support diverse macroinvertebrate communities. Excess sediment can reduce spawning and rearing habitats for certain fish species. Flow alterations in the LMRW have resulted from drainage improvements on or near agricultural lands. Specifically, tile drains and land smoothing have increased surface and subsurface flow to streams. This results in higher peak flows during storm events and flashier flows which carry sediment loads to streams and erode streambanks.

Chloride TMDL: The chloride impaired segment identified in Table 1 of this Decision Document was included on the final 2018 Minnesota 303(d) list due to excessive chloride. Water quality monitoring within the LMRW indicated that this segment was not attaining its designated aquatic life uses due to high chloride measurements and the negative impact of those conditions on aquatic life (i.e., fish and macroinvertebrate communities).

Low levels of chloride can be found naturally in the LMRW lakes and streams. Chloride is essential for aquatic life to carry out a range of biological functions. However, high concentrations of chloride in the surrounding water can harm cellular osmotic processes in aquatic life. Excessive dissolved chlorides in water may stress aquatic species and prohibit the transport of needed molecules into the cell. If elevated concentrations of chloride persist in the water, aquatic life such as fish, invertebrates and even some plant species may become stressed and/or die.

Excessive dissolved chloride can also alter the density of water in lake environments. Density changes can impact seasonal mixing patterns of lake waters, especially in deeper lakes. Seasonal mixing in lake environments distributes oxygen and nutrients throughout the water column and is necessary for healthy aquatic communities. Disruptions to lake mixing processes can also impact nutrient cycling, phytoplankton and zooplankton community composition and productivity and fish and macroinvertebrate health.

High levels of salt can also negatively affect infrastructure, vehicles, plants, soils, pets, wildlife and groundwater and drinking water supplies.

Priority Ranking:
MPCA's schedule for TMDL completions, as indicated on the 303(d) impaired waters list, reflects Minnesota's priority ranking of this TMDL. MPCA has aligned TMDL priorities with the watershed approach and Watershed Restoration and Protection Strategy (WRAPS) cycle. The schedule for TMDL completion corresponds to the WRAPS report completion on the 10-year cycle. Mainstem river TMDLs, which are not contained in major watersheds and thus not addressed in WRAPS, must also be

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

Pollutants of Concern:
The pollutants of concern are bacteria, TP (nutrients), TSS (sediment) and chloride.

Source Identification (point and nonpoint sources):

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

LMRW bacteria TMDLs:
National Pollutant Discharge Elimination Systems (NPDES) permitted facilities: NPDES permitted facilities may contribute bacteria loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge wastewater according to their NPDES permit. MPCA determined that there are wastewater treatment facilities/plants (WWTFs/WWTPs) in the LMRW which contribute bacteria from treated wastewater releases. MPCA assigned each of these facilities a portion of the bacteria wasteload allocation (WLA). For details of regarding WLAs assigned to individual facilities, see Tables 7 and 8 of this Decision Document.

Municipal Separate Storm Sewer System (MS4) communities: Stormwater from MS4s can transport bacteria to surface water bodies during or shortly after storm events. MPCA identified MS4 permittees which were assigned a portion of the WLA for the bacteria TMDLs. For details of regarding WLAs assigned to individual MS4 communities, see Tables 7 and 8 of this Decision Document.

Concentrated Animal Feedlot Operations (CAFOs): MPCA acknowledged the presence of CAFOs in the LMRW (Appendix E of Part 1 of the LMRW TMDL). CAFO facilities must be designed to contain all surface water runoff (i.e., have zero discharge from their facilities) and have a current manure management plan. MPCA explained that these facilities do not discharge effluent and therefore were not assigned a portion of the WLA (WLA = 0).

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

LMRW phosphorus TMDLs:
NPDES permitted facilities: NPDES permitted facilities may contribute nutrient loads to surface waters through discharges of wastewater. Permitted facilities must discharge treated wastewater according to their NPDES permit. MPCA determined that there are several WWTFs/WWTPs in the LMRW which contribute nutrients (TP) from treated wastewater releases. MPCA assigned each of these facilities a portion of the TP WLA. For details of regarding WLAs assigned to individual facilities, see Tables 9 through 13 of this Decision Document.

MS4 communities: Stormwater from MS4s can transport nutrients to surface water bodies during or shortly after storm events. MPCA identified MS4 permittees which were assigned a portion of the WLA for the phosphorus TMDLs. For details of regarding WLAs assigned to individual MS4 communities, see Tables 9 through 13 of this Decision Document.

Stormwater runoff from permitted construction and industrial areas: Construction and industrial sites may contribute phosphorus via sediment runoff during stormwater events. These areas within the LMRW must comply with the requirements of the MPCA's NPDES Stormwater Program and create a Stormwater Pollution Prevention Plan (SWPPP) that summarizes how stormwater will be minimized from the site.

LMRW sediment (TSS) TMDLs:
NPDES permitted facilities: NPDES permitted facilities may contribute sediment loads to surface waters through discharges of wastewater. Permitted facilities must discharge wastewater according to their NPDES permit. MPCA determined that there are facilities which contribute sediment from treated wastewater releases. MPCA assigned each of these facilities a portion of the sediment WLA. For details of regarding WLAs assigned to individual facilities, see Tables 14 and 15 of this Decision Document.

MS4 communities: Stormwater from MS4s can transport sediment to surface water bodies during or shortly after storm events. MPCA identified MS4 permittees which were assigned a portion of the WLA for the TSS TMDLs. For details of regarding WLAs assigned to individual MS4 communities, see Tables 14 and 15 of this Decision Document.

Stormwater runoff from permitted construction and industrial areas: Construction and industrial sites may contribute sediment via stormwater runoff during precipitation events. These areas within the LMRW must comply with the requirements of the MPCA's NPDES Stormwater Program and create a SWPPP that summarizes how stormwater will be minimized from the site.

LMRW chloride TMDL:
MS4 communities: Stormwater from MS4s can transport chloride to surface water bodies during or shortly after storm events. MPCA identified MS4 permittees which were assigned a portion of the WLA for the chloride TMDL. For details of regarding WLAs assigned to individual MS4 communities, see Table 16 of this Decision Document.

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

LMRW bacteria TMDLs:
Non-regulated urban runoff: 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 LMRW. 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 LMRW. Feedlots generate manure which may be spread onto fields. Runoff from fields with spread manure can be exacerbated by tile drainage lines, which channelize the stormwater flows and reduce the time available for bacteria to die-off.

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

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

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

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

LMRW phosphorus TMDLs:

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

Urban/residential sources: Nutrients, organic material and organic-rich sediment may be added via runoff from urban/developed areas near the impaired lakes in the LMRW. Runoff from urban/developed areas can include phosphorus derived from fertilizers, leaf and grass litter, pet wastes, and other sources of anthropogenic derived nutrients.

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 LMRW. 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.

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

Stream channelization and stream erosion: Eroding streambanks and channelization efforts may add nutrients, organic material and organic-rich sediment to local surface waters. Nutrients may be added if there is particulate phosphorus bound with eroding soils. Eroding riparian areas may be linked to soil inputs within the water column and potentially to changes in flow patterns. Changes in flow patterns may also encourage down-cutting of the streambed and streambanks. Stream channelization efforts can increase the velocity of flow (via the removal of the sinuosity of a natural channel) and disturb the natural sedimentation processes of the streambed.

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

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

Wetland and Forest Sources: Phosphorus, organic material and organic-rich sediment may be added to surface waters by stormwater flows through wetland and forested areas in the LMRW. Storm events may mobilize phosphorus through the transport of suspended solids and other organic debris.

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

LMRW sediment (TSS) TMDLs:

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

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

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

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

LMRW chloride TMDL:

Natural background chloride load: Chloride is present in soils and minerals and is added to groundwater due to natural weathering processes of minerals and rock.

Snow/ice removal: Chloride may be added to waters of the LMRW via the application of deicing compounds from state, county and local entities. Deicing compounds may be mobilized and transported to surface waters during stormwater runoff events (e.g., winter rain events, spring melt, etc.).

Stormwater from areas not covered under a MS4 NPDES permit: Stormwater runoff from areas outside the boundaries of MS4 areas, such as non-permitted urban, residential, commercial or industrial areas, can contribute chloride to surface waters of the LMRW. Non-regulated stormwater may drain impervious surfaces and add any residual chlorides from those surfaces to surface waters.

Discharges from SSTS or unsewered communities: Septic systems are a potential source of chloride within the LMRW. Septic systems generally do not discharge directly into a water body, but effluents from SSTS may leach into groundwater or pond at the surface where they can be washed into surface waters via stormwater runoff events. Age, construction and use of SSTS can vary throughout a watershed and influence the chloride contribution from these systems. Water softening systems which are in areas not connected to municipal sewer lines likely discharge to septic fields and chloride contributions from those septic systems may ultimately mix with groundwater or surface water near the septic field.

Chloride contributions from agricultural lands: Chloride may be added via use of fertilizers containing chloride anions (e.g., potassium chloride (KCl)) and biosolids which are spread onto agricultural areas. Chloride may be liberated from farm fields within stormwater runoff which can be exacerbated by tile drainage lines, which channelize the stormwater flows.

Other nonpoint sources: MPCA cited chloride as a component of dust suppressants on gravel roads and parking areas, as a portion of landfill leachate and as a chemical byproduct of alum chloride treatments for lake sediments or ferric chloride treatments for stormwater.

Future Growth:

MPCA anticipates that there will be growth in the areas near the TCMA as outlying agricultural areas transition to developed areas. In the western portion of the LMRW, where the land use is mostly agricultural MPCA explained that it is unlikely that these agricultural areas will see significant change in the near future. The exception being agricultural areas near larger towns and cities which may be annexing surrounding agricultural areas as their population grows over time. The WLA and load allocations (LA) for the LMRW TMDLs were calculated for all current and future sources. Any expansion of point or nonpoint sources will need to comply with the respective WLA and LA values calculated in the LMRW TMDLs.

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

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

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

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

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

Minnesota Rule Chapter 7050 designates uses for waters of the state. The segments addressed by the LMRW TMDLs are designated as Class 2 waters for aquatic recreation use (fishing, swimming, boating, etc.) and aquatic life use (*E. coli*, phosphorus, TSS and chloride). The Class 2 designated use is described in Minnesota Rule 7050.0140 (3):

> *"Aquatic life and recreation includes all waters of the state that support or may support fish, other aquatic life, bathing, boating, or other recreational purposes and for which quality control*

is or may be necessary to protect aquatic or terrestrial life or their habitats or the public health, safety, or welfare."

Standards:
<u>Narrative Criteria:</u>
Minnesota Rule 7050.0150 (3) set forth narrative criteria for Class 2 waters of the State:

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

<u>Numeric criteria:</u>

<u>Bacteria TMDLs:</u> The bacteria water quality standards which apply to LMRW TMDLs are:

Table 4: Bacteria Water Quality Standards Applicable to the LMRW TMDLs

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

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

<u>Bacteria TMDL Targets:</u> The bacteria TMDL targets employed for the LMRW bacteria TMDLs are the *E. coli* standards as stated in Table 4 of this Decision Document. The focus of this TMDL is on the **<u>126 organisms (orgs) per 100 mL</u>** (126 orgs/100 mL) portion of the standard. MPCA believes that using the 126 orgs/100 mL portion of the standard for TMDL calculations will result in the greatest bacteria reductions within the LMRW and will result in the attainment of the 1,260 orgs/100 mL portion of the standard. While the bacteria TMDLs will focus on the geometric mean portion of the water quality standard, attainment of both parts of the water quality standard is required.

<u>Phosphorus TMDLs (lakes impaired due to excessive nutrients):</u> Numeric criteria for TP, chlorophyll-*a*, and Secchi Disk depth are set forth in Minnesota Rules 7050.0222. These three parameters form the MPCA eutrophication standard that must be achieved to attain the aquatic recreation designated use. The numeric eutrophication standards which are applicable to the LMRW lake TMDLs are found in Table 5 of this Decision Document.

Table 5: Minnesota Eutrophication Standards for Deep and Shallow lakes within the North Central Hardwood Forest (NCHF) and Western Cornbelt Plan (WCBP) ecoregions

Parameter	Total Phosphorus	Chlorophyll-a	Secchi Depth
	(µg/L)	*(µg/L)*	*(m)*
NCHF Eutrophication Standard (shallow lakes)[1]	TP < 60	chl-a < 20	SD > 1.0
NCHF Eutrophication Standard (lakes and reservoirs)	TP < 40	chl-a < 14	SD > 1.4
WCBP Eutrophication Standard (shallow lakes)[1]	TP < 90	chl-a < 30	SD > 0.7

[1] = Shallow lakes are defined as lakes with a maximum depth less than 15-feet, or with more than 80% of the lake area shallow enough to support emergent and submerged rooted aquatic plants (littoral zone).

In developing the lake nutrient standards for Minnesota lakes, MPCA evaluated data from a large cross-section of lakes within each of the State's ecoregions. Clear relationships were established between the causal factor, TP, and the response variables, chl-*a* and SD depth. MPCA anticipates that by meeting the TP concentrations of NCHF and WCBP WQS the response variables chl-*a* and SD will be attained and the lakes of the LMRW TMDL will achieve their designated beneficial uses. For lakes to achieve their designated beneficial use, the lake must not exhibit signs of eutrophication and must allow water-related recreation, fishing and aesthetic enjoyment. MPCA views the control of eutrophication as the lake enduring minimal nuisance algal blooms and exhibiting desirable water clarity.

Nutrient TMDL Targets (lakes impaired due to excessive nutrients): MPCA selected TP targets of **40 µg/L**, **60 µg/L** and **90 µg/L** for lakes identified in Tables 1, 2 and 3 of this Decision Document. MPCA selected TP as the appropriate target parameter to address eutrophication problems because of the interrelationships between TP and chl-*a*, and TP and SD depth. Algal abundance is measured by chl-*a*, which is a pigment found in algal cells. As more phosphorus becomes available, algae growth can increase. Increased algae in the water column will decrease water clarity that is measured by SD depth. EPA finds the nutrient targets employed for the LMRW TP TMDLs to be reasonable.

Phosphorus TMDLs (streams impaired due to excessive nutrients): The total phosphorus and response variable (i.e., chl-*a* (sestonic), DO_{FLUX}, BOD_5 and pH) values in Table 6 are the EPA approved water quality standards for the South River Nutrient Region. These standards apply June 1 to September 30.

Table 6: River Eutrophication Water Quality Standards Applicable in the Lower Minnesota River Watershed TMDLs (Part 1)

Parameter	Units	Water Quality Standard
TP	µg/L	≤ 150
chl-*a* (sestonic chl-*a*)	µg/L	≤ 35
DO_{FLUX}	mg/L	≤ 4.5
BOD_5	mg/L	≤ 3.0
pH	pH units	6.5 ≤ [ ] ≤ 9.0

Nutrient TMDL Targets (streams impaired due to excessive nutrients): MPCA employed the TP target of **150 µg/L** for the South River Nutrient Region to streams in the LMRW.

Sediment (TSS) TMDLs: On January 23, 2015, EPA approved MPCA's regionally-based TSS criteria for rivers and streams. The TSS criteria replaced Minnesota's statewide turbidity criterion (measured in Nephelometric Turbidity Units (NTU)). The TSS criteria provide water clarity targets for measuring suspended particles in rivers and streams.

Sediment (TSS) TMDL Targets: MPCA employed the **65 mg/L TSS** target applicable to Class 2B (coldwater or warmwater streams) of the Southern River Nutrient Region (SRNR) to streams in the LMRW.

Chloride TMDL: The chronic standard for chloride to protect for Class 2B uses is 230 mg/L. The chronic standard is defined in Minn. R. 7050.0218, subp. 3.l., as '*the highest water concentration of a toxicant to which organisms can be exposed indefinitely without causing chronic toxicity*.'

The 230 mg/L value is based on a 4-day exposure of aquatic organisms to chloride. The maximum (acute) standard to protect for 2B uses is 860 mg/L. The maximum standard is defined in Minn. R. 7050.0218, subp. 3.T., as '*the highest concentration of a toxicant in water to which organisms can be exposed for a brief time with zero to slight mortality*.' The 860 mg/L value is based on a 24-hour exposure of aquatic organisms to chloride. These criteria are adopted from the EPA's recommended water quality criteria for chloride. EPA believes it is reasonable to believe that by MPCA meeting its chronic chloride water quality standard (230 mg/L) the acute chloride water quality standard (860 mg/L) will also be attained.

Chloride TMDL Target: The chloride TMDL target for the LMRW TMDL is the chronic standard of **230 mg/L**.

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

3. Loading Capacity - Linking Water Quality and Pollutant Sources

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

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

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

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

Comment:

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

Typically loading capacities are expressed as a mass per time (e.g., pounds per day). However, for *E. coli* loading capacity calculations, mass is not always an appropriate measure because *E. coli* is expressed in terms of organism counts. This approach is consistent with the EPA's regulations which define "load" as "an amount of matter that is introduced into a receiving water" (40 CFR §130.2). To establish the loading capacities for the LMRW bacteria TMDLs, MPCA used Minnesota's WQS for *E. coli* (126 orgs/100 mL). A loading capacity is, "the greatest amount of loading that a water can receive without violating water quality standards." (40 CFR §130.2). Therefore, a loading capacity set at the WQS will assure that the water does not violate WQS. MPCA's *E. coli* TMDL approach is based upon the premise that all discharges (point and nonpoint) must meet the WQS when entering the water body. If all sources meet the WQS at discharge, then the water body should meet the WQS and the designated use.

Separate flow duration curves (FDCs) were created for the each of the bacteria TMDLs in the LMRW. MPCA compiled flow data from a variety of sources; the USGS gage at Henderson, Minnesota (USGS Gage #05327000), MPCA stream gages, Minnesota Department of Natural Resources (MDNR) stream gages, Metropolitan Council Environmental Services (MCES) monitoring stations in the Minneapolis/St. Paul metro area, Carver County and Scott County's Watershed Management Organization (WMO) monitoring stations and simulated flow estimates from Hydrologic Simulation Program-Fortran (HSPF) modeling efforts. MPCA focused on daily modeled flows from 1995-2012 during the recreation season (April 1 to October 31). For LMRW subwatersheds without measured stream flow data, MPCA employed HSPF hydrologic models to estimate daily flow characteristics. Measured or simulated daily stream flows were used to develop load duration curves (LDC) and calculate TMDLs.

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

Water quality monitoring was completed in the LMRW and measured *E. coli* concentrations were converted to individual sampling loads by multiplying the sample concentration by the instantaneous flow measurement observed/estimated at the time of sample collection and then by a conversion factor which allows the individual samples to be plotted on the same figure as the LDCs (e.g., Figure 62 of the LMRW Part 1 final TMDL document).

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

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

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

Bacteria TMDLs for the LMRW were calculated and those results are found in Tables 7 and 8 of this Decision Document. The load allocations were calculated after the determination of the WLA, and the Margin of Safety (MOS) (5% of the loading capacity). Load allocations (e.g., stormwater runoff from agricultural land use practices and feedlots, SSTS, wildlife inputs etc.) were not split among individual nonpoint contributors. Instead, load allocations were combined together into a categorical LA to cover all nonpoint source contributions.

MPCA also included calculations for unallocated load as part of their LMRW TMDLs. Some TMDLs include this unallocated load as part of their LA calculation, but for the LMRW TMDLs, MPCA chose to give this load its own line item in the TMDL equation. Unallocated loads were calculated by MPCA for those flow regimes where the geometric mean of the measured water quality data for that flow regime is less than the standard (i.e., the LDC). In Figure 65 of Part 1 of the final LMRW TMDL document (p. 201), the blue circles of this figure represent the observed geometric mean load calculated from water quality samples recorded during the flow conditions of that flow regime. If the blue circles are below the LDC, then that flow regime included an unallocated flow calculation (see Table 88 and Figure 65 of the final TMDL document). The unallocated load calculation for an individual flow regime is completed by subtracting the MOS and the geometric mean of measured water quality data (i.e., the existing load of that flow regime) from the loading capacity value for that flow regime

Unallocated loads can be included in TMDL equations as antidegradation provisions which discourage current dischargers from increasing their pollutant loading in that flow regime. The idea being that if the segment/flow regime is estimated to be below the WQS established in the LDC, dischargers to that segment cannot, without due consideration to antidegradation requirements, increase their contributions up to the LDC/WQS.

Tables 7 and 8 of this Decision Document reports five points (the midpoints of the designated flow regime) on the loading capacity curve. However, it should be understood that the components of the TMDL equation could be illustrated for any point on the entire loading capacity curve. The LDC method can be used to display collected bacteria monitoring data and allows for the estimation of load reductions necessary for attainment of the bacteria water quality standard. Using this method, daily loads were developed based upon the flow in the water body. Loading capacities were determined for the segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Tables 7 and 8 of this Decision Document identifies the loading capacity for the water body at each flow regime. Although there are numeric loads for each flow regime, the LDC is what is being approved for this TMDL.

Table 7: Bacteria (*E. coli*) TMDLs from Part 1 of the Lower Minnesota River Watershed

Table 8: Bacteria (*E. coli*) TMDLs from Part 2 of the Lower Minnesota River Watershed

MPCA explained that estimated current conditions and segment reduction calculations are included within the LMRW's Watershed Restoration and Protection Strategies (WRAPS) document. Tables within the LMRW WRAPS document outline broad goals for bacteria reductions in the LMRW which are aimed at ultimately attaining the TMDL goals outlined in Tables 7 and 8 of this Decision Document.

EPA concurs with the data analysis and LDC approach utilized by MPCA in its calculation of loading capacities, wasteload allocations, load allocations and the margin of safety for the LMRW bacteria TMDLs. The methods used for determining the TMDL are consistent with U.S. EPA technical memos.[2]

<u>LMRW lake phosphorus TMDLs (BATHTUB):</u> For the Part 1 and Part 3 lake TMDLs which addressed nutrient impairments, MPCA used the U.S. Army Corps of Engineers (USACE) BATHTUB model to calculate loading capacities for these lake segments. The BATHTUB model was utilized to link observed phosphorus water quality conditions and estimated phosphorus loads to in-lake water quality estimates. MPCA has previously employed BATHTUB successfully in many lake studies in Minnesota. BATHTUB is a steady-state annual or seasonal model that predicts a lake's growing season

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

(June 1 to September 30) average surface water quality. BATHTUB utilizes annual or seasonal time-scales which are appropriate because watershed TP loads are normally impacted by seasonal conditions.

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

The loading capacity of the lake was determined through the use of BATHTUB and the Canfield-Bachmann subroutine and then allocated to the WLA, LA, and MOS. To simulate the load reductions needed to achieve the WQS, a series of model simulations were performed. Each simulation reduced the total amount of TP entering each of the water bodies during the growing season (or summer season, June 1 through September 30) and computed the anticipated water quality response within the lake. The goal of the modeling simulations was to identify the loading capacity appropriate (i.e., the maximum allowable load to the system, while allowing it to meet WQS) from June 1 to September 30. The modeling simulations focused on reducing the TP to the system.

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 water bodies can receive over an annual period and still meet the shallow and general lake nutrient WQS (Tables 9 and 12 of this Decision Document). Loading capacities on the annual scale (pounds per year (lbs/year)) were calculated to meet the WQS during the growing season (June 1 through September 30). The time period of June to September was chosen by MPCA as the growing season because it corresponds to the eutrophication criteria, contains the months that the general public typically uses lakes in the LMRW for aquatic recreation, and is the time of the year when water quality is likely to be impaired by excessive nutrient loading. Loading capacities were divided by 365 to calculate the daily loading capacities.

Loading capacities were determined using Canfield-Bachmann equations from BATHTUB. The model equations were originally developed from data taken from over 704 lakes. 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, each time reducing current loads to the lake until the model result shows that in-lake total phosphorus would meet the applicable water quality standards.

MPCA subdivided the loading capacity among the WLA, LA, and MOS components of the TMDL (Tables 9 and 12 of this Decision Document). These calculations were based on the critical condition, the summer growing season, which is typically when the water quality in each lake is typically degraded and phosphorus loading inputs are the greatest. TMDL allocations assigned during the summer growing season will protect the LMRW lakes during the worst water quality conditions of the year. MPCA assumed that the loading capacities established by the TMDL will be protective of water quality during the remainder of the calendar year (October through May).

Table 9: Total Phosphorus (TP) TMDLs for lakes from Part 1 of the Lower Minnesota River Watershed

Table 12: Total Phosphorus (TP) TMDLs for lakes from Part 3 of the Lower Minnesota River Watershed

Tables 9 and 12 of this Decision Document communicate MPCA's estimates of the reductions required for the lakes of Part 1 and Part 3 of the LMRW TMDL to meet their water quality targets. These loading reductions (i.e., the percentage column) were estimated from existing and TMDL load calculations. MPCA expects that these reductions will result in the attainment of the water quality targets and the lake water quality will return to a level where the designated uses are no longer considered impaired.

LMRW lake phosphorus TMDLs (in-lake mass balance): The approach used to calculate the TP TMDLs for the lake segments in Part 2 of the LMRW TMDL applies solely to the lake phosphorus TMDLs of Part 2 (Table 10 of this Decision Document). For this grouping of TP lake TMDLs, MPCA utilized a daily time step, in-lake, TP mass balance model to quantify the existing load and the loading capacity. The in-lake model tracked both water volume and phosphorus concentrations in the lake on a daily time step. The model was calibrated to both lake level data (to balance the water budget) and in-lake average TP concentrations for the TP budget (Section 4.2.1 of Part 2 of the LMRW final TMDL document).

MPCA explained that after calculating the loading capacity for each lake it assigned the remaining allocations to upstream lakes, streambank erosional sources, MS4 contributions and internal load. The allocations assigned to upstream lake were assumed to meeting WQS and therefore, allocations were set at those values. Streambank erosional sources were prioritized based on their expected contributions to lake nutrient and TSS impairments (Section 3.8.1.2 of Part 2 of the LMRW final TMDL document). MS4 allocations, based on P8-modeled phosphorus removal efficiencies, demonstrated that moderate levels of stormwater management are necessary from MS4 communities to prevent the introduction of additional phosphorus and sediments into the lakes and aid in maintaining long-term water quality. Internal load was considered and, in some cases, MPCA determined that significant reductions in internal load may be needed depending on the loading profile of the other sources contributing to the impaired lake water body.

Table 10: Total Phosphorus (TP) TMDLs for lakes from Part 2 of the Lower Minnesota River Watershed

Table 10 of this Decision Document communicate MPCA's estimates of the reductions required for the lakes of Part 2 of the LMRW TMDL to meet their water quality targets. These loading reductions (i.e., the percentage column) were estimated from existing and TMDL load calculations. MPCA expects that these reductions will result in the attainment of the water quality targets and the lake water quality will return to a level where the designated uses are no longer considered impaired.

LMRW total phosphorus protection strategy for Lake Lucy (10-0007-00): MPCA calculated total phosphorus allocations for Lake Lucy (Table 11 of this Decision Document). EPA reviewed the allocations and considers these calculations appropriate to be considered as a protection strategy as described in “A Long-Term Vision for Assessment, Restoration and Protection under the Clean Water Act Section 303(d) Program” (December 2013).

Table 11: Total Phosphorus (TP) lake protection strategy for Lake Lucy (10-0007-00) of the Lower Minnesota River Watershed (Part 2)

LMRW stream phosphorus TMDLs (seasonal average): The language of the river eutrophication standard (RES) explains that the RES must be maintained for the long-term summer concentration of TP, when averaged over all flows. MPCA explained that to align with the language of the RES the loading capacity value was based on the seasonal (June 1 to September 30) average of midpoint flows of five equally spaced flow regimes (0% to 20%, 20% to 40%, 40% to 60%, 60% to 80% and 80% to 100%). Selecting the midpoint flow values from these equally spaced flow regimes avoids weighting certain flow regimes more than other flow regimes when calculating the average flow across all flow regimes. The loading capacity was calculated as the average seasonal flow multiplied by the river eutrophication target of 150 µg/L. Upstream water bodies with completed phosphorus TMDLs were factored into certain TMDL calculations as upstream water body contributions (Table 13 of this Decision Document).

MPCA estimated the allocations for each of the permitted facilities, the MOS set at 5% of the loading capacity, the upstream contributions (if appropriate) and the remainder of the load was attributed to the LA. Load allocations (e.g., stormwater runoff from agricultural land use practices and feedlots, SSTS, wildlife inputs etc.) were not split among individual nonpoint contributors. Instead, load allocations were combined together into a categorical LA to cover all nonpoint source contributions.

Table 13: Total Phosphorus (TP) TMDLs for streams from Part 1 of the Lower Minnesota River Watershed

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

LMRW sediment (TSS) TMDLs: MPCA developed LDCs to calculate sediment TMDLs for the impaired segments in Tables 1 and 2 of this Decision Document. The LDC development strategies employed for the bacteria TMDLs were also used to develop sediment TMDLs (e.g., the incorporation of HSPF model simulated flows to develop FDCs, water quality monitoring information collected within the LMRW informing the LDC, etc.). The FDC were transformed into LDC by multiplying individual flow values by the TSS target of 65 mg/L and then multiplying that value by a conversion factor.

Sediment (TSS) TMDLs were calculated (Tables 14 and 15 of this Decision Document). The load allocation was calculated after the determination of the WLA, and the MOS. Load allocations (e.g., stormwater runoff from agricultural land use practices) was not split among individual nonpoint contributors. Instead, load allocations were combined together into one value to cover all nonpoint source contributions. Tables 14 and 15 of this Decision Document reports five points (the midpoints of the designated flow regime) on the loading capacity curve. However, it should be understood that the components of the TMDL equation could be illustrated for any point on the entire loading capacity curve.

The LDC method can be used to display collected sediment monitoring data and allows for the estimation of load reductions necessary for attainment of the TSS water quality standard. Using this method, daily loads were developed based upon the flow in the water body. Loading capacities were determined for each segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Tables 14 and 15 of this Decision Document identify the loading capacity for each segment at each flow regime. Although there are numeric loads for each flow regime, the LDC is what is being approved for this TMDL.

Table 14: Total Suspended Solid (TSS) TMDLs from Part 1 of the Lower Minnesota River Watershed

Table 15: Total Suspended Solid (TSS) TMDLs from Part 2 of the Lower Minnesota River Watershed

MPCA explained that estimated current conditions and segment reduction calculations are included within the LMRW's WRAPS document. Tables within the LMRW WRAPS document outline broad goals for sediment (TSS) reductions in the LMRW which are aimed at ultimately attaining the TMDL goals outlined in Tables 14 and 15 of this Decision Document.

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

LMRW chloride TMDLs: MPCA calculated a chloride TMDL for the Credit River (07020012-806) segment. This chloride TMDL was calculated to meet the chloride water quality target of 230 mg/L (i.e., the chronic water quality criterion). MPCA developed the Credit River chloride TMDL via a holistic watershed approach which employed a zero-dimensional, steady-state model. MPCA explained that its chloride TMDL development approach assumed that chloride contributions from winter maintenance activities are added to surface waters via runoff from MS4 and rural/non-permitted urban areas. Any chloride inputs to groundwater via septic systems are addressed as part of the nonpoint natural background allocation.

MPCA determined that a zero-dimensional[3], steady-state model was appropriate for the Credit River chloride TMDL based on the approach used in the Twin Cities Metro Area chloride TMDL of 2016. MPCA's rationale in 2016 for selecting this approach was based on the following justifications;

- Dissolved chloride is a conservative substance; therefore, a complex fate and transport assessment was deemed to be unnecessary.
- All areas are potential contributors to chloride inputs and there is limited data/tracking of existing winter-deicing loading practices (i.e., precise locations for salt usage, timing of salt usage, amounts of salt applied etc.); and

[3] A 'zero-dimensional model' is a simple model designed to have basic input (precipitation) and output (runoff) terms

- The large number of lakes and streams needing a TMDL and the limited data available for a significant portion of them prohibited a more complex approach.

Additionally, MPCA explained that there are still uncertainties regarding the length of time which chloride remains in different aquatic systems and regarding the interaction of surface water and groundwater with respect to chloride transport in the TCMA. To prevent delaying TMDL and implementation efforts, MPCA and the local stakeholders chose to employ a more simplified modeling effort to quantify TMDLs.

The zero-dimensional, steady-state modeling approach did not employ a calibration nor a validation step due to the simplicity of the model and the application of the chloride water quality target (230 mg/L) directly to each water body's water inflows to generate loading estimates. MPCA also explained that calculating reliable estimates of current chloride loading conditions to individual waters of the Metro Area is challenging due to the variation of spatial and temporal distribution of salt usage from public road authorities, private applicators, homeowners and municipal partners. Therefore, consistent with MPCA and the local partner's implementation strategy that chloride management needs to be conducted on an area-wide basis for both protection and restoration, a more simplified modeling approach was adopted that circumvents the estimation of existing chloride loadings.

Similar to the TCMA chloride TMDLs, the Credit River chloride TMDL was calculated based on total tributary watershed area, percentage of impervious surface within the watershed area, and average annual precipitation.

$$\textbf{TMDL} = \textbf{WLA}_{\textbf{MS4}} + \textbf{WLA}_{\textbf{WWTP}} + \textbf{LA}_{\textbf{non-permitted}} + \textbf{LA}_{\textbf{natural background}} + \textbf{MOS}$$

Where;
WQT = The chloride TMDL Water Quality Target = 230 mg/L

TMDL = Total allowable runoff load = runoff volume $_{TOTAL}$ * WQT
WLA $_{MS4}$ = WLA for MS4 Areas = runoff volume $_{MS4}$ * WQT – LA_{NB} - MOS
WLA $_{WWTP}$ = WLA for WWTPs = WWTP design flow * WQT
LA $_{non\text{-}permitted}$ = LA for runoff from non-permitted areas = runoff volume $_{non\text{-}permitted}$ * WQT – LA_{NB} - MOS
LA $_{natural\ background}$ = LA for natural background sources (LA_{NB}) = runoff volume $_{TOTAL}$ * natural background

- LA_{NB} = The calculated natural background of chloride in the TCMA = 18.7 mg/L

MOS = 10% of the total allowable runoff load (both MS4 and non-permitted areas) = 10% * total allowable runoff load

And the allowable runoff load is based on

$$\textbf{Allowable runoff load} = \textbf{P} * \textbf{R}\boldsymbol{v} * \textbf{A} * \textbf{WQS}$$

P = Seasonable (winter) precipitation = 6.29 inches
R*v* = runoff coefficient for frozen ground conditions = 0.98
A = watershed area (including regulated and unregulated areas)

WQS = 230 mg/L

Table 16: Chloride TMDL for the LMRW is located at the end of this Decision Document

MPCA explained that estimated current conditions and segment reduction calculations are included within the LMRW's WRAPS document. Tables within the LMRW WRAPS document outline the necessary practices and goals for chloride reductions in the LMRW which are aimed at ultimately attaining the TMDL goals outlined in Table 16 of this Decision Document.

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

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

4. Load Allocations (LA)

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

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

LMRW bacteria TMDLs: The calculated LA values for the bacteria TMDLs are applicable across all flow conditions in the LMRW (Tables 7 and 8 of this Decision Document). MPCA identified several nonpoint sources which contribute bacteria loads to the surface waters of the LMRW, including; non-regulated urban (i.e., non-MS4) stormwater runoff, stormwater from agricultural and feedlot areas, failing septic systems, wildlife (e.g., deer, geese, ducks, raccoons, turkeys and other animals). MPCA did not determine individual load allocation values for each of these potential nonpoint source considerations but aggregated the nonpoint sources into a categorical LA value.

LMRW phosphorus TMDLs: MPCA identified several nonpoint sources which contribute nutrient loading to the lakes of the LMRW (Tables 9, 10 and 12 of this Decision Document) and the stream segments of Part 1 (Table 13 of this Decision Document). These nonpoint sources included: watershed contributions from each lake or streams' direct watershed, watershed contributions from upstream watersheds, non-regulated urban (i.e., non-MS4) stormwater runoff, internal loading and atmospheric deposition. For the lake nutrient TMDLs of Parts 1, 2 and 3, MPCA, calculated individual load allocation values for each of these potential nonpoint source considerations (Tables 9, 10 and 12 of this

Decision Document). For the stream segments nutrient TMDLs, MPCA combined the LA contributions into one 'watershed load' line item of the TMDL calculation (Table 13 of this Decision Document).

LMRW sediment (TSS) TMDLs: The calculated LA values for the sediment (TSS) TMDLs are applicable across all flow conditions. MPCA identified several nonpoint sources which contribute sediment loads to the surface waters in the LMRW (Tables 14 and 15 of this Decision Document). Load allocations were recognized as originating from many diverse nonpoint sources including; stormwater contributions from agricultural lands, stream channelization and streambank erosion, wetland and forest sources, and atmospheric deposition. MPCA did not determine individual load allocation values for each of these potential nonpoint source considerations but aggregated the nonpoint sources into one LA value ('Watershed Load').

LMRW chloride TMDLs: The calculated LA values for the chloride TMDL are applicable across all flow conditions. MPCA identified several nonpoint sources which contribute chloride nonpoint source loads to the surface waters in the LMRW (Table 16 of this Decision Document). Load allocations were recognized as originating from many diverse nonpoint sources including; stormwater contributions from agricultural lands, discharges from SSTS, and stormwater runoff liberating salt from roads, parking lots, commercial/industrial areas and or sidewalks. MPCA did not determine individual load allocation values for each of these potential nonpoint source considerations but aggregated the nonpoint sources into one LA value ('Unregulated Runoff').

MPCA calculated LA for natural background and, where appropriate, for rural/non-permitted urban areas. Individual nonpoint source load allocations were aggregated to the LA natural background or the LA non-permitted portions of the TMDL. These allocations addressed nonpoint source loading attributed to winter maintenance activities in these rural/non-permitted urban areas, potential runoff from agricultural lands where fertilizer containing chloride may be applied, and the impact of septic systems on shallow groundwater and recharge.

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

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

5. Wasteload Allocations (WLAs)

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

The individual WLAs may take the form of uniform percentage reductions or individual mass based limitations for dischargers where it can be shown that this solution meets WQSs and does not result in localized impairments. These individual WLAs may be adjusted during the NPDES permitting process. If the WLAs are adjusted, the individual effluent limits for each permit issued to a discharger on the impaired water must be consistent with the assumptions and requirements of the adjusted WLAs in the

TMDL. If the WLAs are not adjusted, effluent limits contained in the permit must be consistent with the individual WLAs specified in the TMDL. If a draft permit provides for a higher load for a discharger than the corresponding individual WLA in the TMDL, the State/Tribe must demonstrate that the total WLA in the TMDL will be achieved through reductions in the remaining individual WLAs and that localized impairments will not result. All permittees should be notified of any deviations from the initial individual WLAs contained in the TMDL. EPA does not require the establishment of a new TMDL to reflect these revised allocations as long as the total WLA, as expressed in the TMDL, remains the same or decreases, and there is no reallocation between the total WLA and the total LA.

Comment:
LMRW bacteria TMDLs: MPCA identified NPDES permitted facilities within the LMRW and assigned those facilities a portion of the WLA (Tables 7 and 8 of this Decision Document). The WLAs for most of these individual facilities were calculated based on the facility's average wet weather design flow and the *E. coli* WQS (126 orgs /100 mL). For WWTFs with controlled discharge, MPCA employed the facility's maximum daily discharge volume multiplied by the *E. coli* WQS (Section 4.5.1 of Part 1 of the LMRW final TMDL document). MPCA explained that loading capacity values in the low or very low flow regimes for certain segments were less than permitted WWTF's design flows. To account for these circumstances, WLAs and LAs in these low flow regimes were expressed as an equation rather than a number. The equation was,

$$\text{Allocation} = \text{flow contribution from a given source} * 126 \text{ orgs} / 100 \text{ mL}$$

MPCA explained that the WLA for each individual WWTP was calculated based on the *E. coli* WQS but WWTF permits are regulated for the fecal coliform WQS (200 orgs /100 mL) and that if a facility is meeting its fecal coliform limits, which are set in the facility's discharge permit, MPCA assumes the facility is also meeting the calculated *E. coli* WLA from the LMRW TMDLs. The WLA was therefore calculated using the assumption that the *E. coli* standard of 126 orgs/100 mL provides equivalent protection from illness due to primary contact recreation as the fecal coliform WQS of 200 orgs/100 mL.

MS4 allocations were calculated for the LMRW bacteria TMDLs based on the following equation:

$$\text{MS4 bacteria WLA} = \% \text{ MS4 Area} * (\text{TLC} - \text{MOS} - \text{WLA}_{\text{NPDES Facilities}})$$

Where:
***% MS4 Area**:* The ratio of the total MS4 area to the total drainage area for the given AUID.
TLC: Total loading capacity for the individual segment
MOS: Margin of safety calculation (10% of the TLC)
WLA (NPDES Facilities): The total WLA for all permitted industrial and municipal NPDES facilities that discharge into the AUID's drainage area

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

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

LMRW lake phosphorus TMDLs: MPCA identified NPDES permitted facilities within the lakes addressed in Part 3 of the LMRW TMDL and assigned those facilities a portion of the WLA (Table 12 of this Decision Document). The WLAs for each of these individual facilities were calculated based on the described approaches in Section 4.3 of the Part 3 LMRW final TMDL document.

MS4 allocations for the LMRW phosphorus TMDLs were calculated in the same manner as the MS4 allocations for the LMRW bacteria (i.e., see calculative method in ***Section 5 - LMRW bacteria TMDLs***, within this Decision Document).

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

MPCA's calculation of construction and industrial stormwater WLAs was based on their review of the *Minnesota Stormwater Manual's* estimate of average construction activity within the counties of the LMRW (e.g., Carver, Dakota, Hennepin, Le Sueur, McLeod, Nicollet, Rice, Scott, Sibley and Scott Counties) (https://stormwater.pca.state.mn.us/index.php/Construction_activity_by_county). This estimate was area weighted for each impaired watershed. For each lake TMDL, the construction stormwater WLA was calculated as the construction stormwater percent area multiplied by the existing watershed load. It is assumed that loads from permitted construction stormwater sites that operate in compliance with their permits are meeting the WLA.

Attaining the construction stormwater and industrial stormwater loads described in the LMRW TP TMDLs is the responsibility of construction and industrial site managers. For example, for the Catherine Lake (70-0029-00) TP TMDL, the Elko New Market City MS4 (MS400237) program is responsible for overseeing construction stormwater loads from Elko New Market City MS4 jurisdictional area which impact water quality in Catherine Lake. Elko New Market City is required to have a construction stormwater ordinance at least as stringent as the State's NPDES/SDS General Stormwater Permit for Construction Activity (MNR100001). In the final TMDL document MPCA explained that if a construction site owner/operator obtains coverage under the NPDES/SDS General Stormwater Permit (MNR100001) and properly selects, installs and maintains all BMPs required under MNR100001 and applicable local construction stormwater ordinances, including those related to impaired waters discharges and any applicable additional requirements found in Appendix A of the Construction General Permit, the stormwater discharges would be expected to be consistent with the WLA in this TMDL. BMPs and other stormwater control measures which act to limit the discharge of the pollutant of concern (phosphorus) are defined in MNR100001.

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

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

LMRW stream phosphorus TMDLs: MPCA identified NPDES permitted facilities in the contributing watersheds for the LMRW stream phosphorus TMDLs. MPCA calculated WLAs for individual permittees based on the mass balance approach outlined in *Procedures for implementing river eutrophication standards in NPDES wastewater permits in Minnesota (MPCA 2015b)* (Section 4.3.1 of Part 1 of the LMRW final TMDL document).

MS4 allocations for the LMRW stream phosphorus TMDLs were calculated in the same manner as the MS4 allocations for the LMRW lake phosphorus and LMRW bacteria TMDLs (i.e., see calculative method in ***Section 5 - LMRW bacteria TMDLs***, within this Decision Document).

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

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

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

LMRW sediment (TSS) TMDLs: MPCA identified NPDES permitted facilities within the LMRW and assigned those facilities a portion of the WLA (Tables 14 and 15 of this Decision Document). Individual WLAs were calculated for each of these individual facilities were calculated based on the information in the facilities NPDES permit:

- **Load Limit:** When a permit defined a calendar monthly average TSS load limit, that limit was used as the WLA.
- **Design flow and concentration limits:** When a permit did not define a TSS load limit but did define one or more design flows and TSS concentration limits, the WLA was calculated using a design flow and a concentration limit. If an average wet weather design flow was defined, it was used to calculate the WLA; if the average wet weather design flow was not defined, then the maximum design flow was used to calculate the WLA. If a monthly average TSS concentration limit was defined, then that limit was used to calculate the WLA; if only a daily maximum concentration limit was defined, then that limit was used to calculate the WLA.
- **No design flow and concentration limits:** If a permit did not define a design flow, the WLA was calculated using an estimated design flow and the TSS concentration limit. The design flow was estimated as the average reported flows for similar sites in the vicinity of the project area.

All the WLAs were based on TSS concentration limits less than or equal to the TSS standard of 65 mg/L. Therefore, facilities that discharge consistent with their WLAs are not a cause for in-stream exceedances of the TSS standard within their receiving water bodies.

In some instances, the loading capacity in the low flow zone for some reaches is less than the permitted wastewater treatment facility design flows. This is an artifact of using design flows for allocation setting and results in these point sources appearing to use all (or more than) the available loading capacity. To account for these unique situations, the WLAs and LAs in these flow zones where needed are expressed as an equation rather than an absolute number:

Allocation = flow contribution from a given source * 65 mg/L (or NPDES permit concentration)

This amounts to assigning a concentration-based limit to these sources for the lower flow zones. By definition rainfall and thus runoff is very limited if not absent during low flow. Thus, runoff sources would need little-to-no allocation for these flow zones.

MS4 allocations for the LMRW TSS TMDLs were calculated in the same manner as the MS4 allocations for the LMRW bacteria TMDLs (i.e., see calculative method in ***Section 5 - LMRW bacteria TMDLs***, within this Decision Document).

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

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

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

LMRW chloride TMDLs: MPCA calculated one categorical WLA for those permitted MS4 communities with jurisdictional areas in the Credit River watershed. MPCA did not determine individual WLA values for each MS4 community per segment and instead aggregated the chloride contributions from MS4 sources into a categorical WLA value. The list of MS4 entities which received a portion of the categorical chloride WLA for the Credit River chloride TMDLs is found in Table 16 of this Decision Document.

EPA finds the MPCA's approach for calculating the WLA for the LMRW chloride TMDL to be reasonable and consistent with EPA guidance.

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

6. Margin of Safety (MOS)

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

Comment:

The three Parts of the final LMRW TMDLs all had slight deviations in the Margin of Safety employed for the bacteria, nutrient, sediment (TSS) and chloride TMDLs. For the bacteria, nutrient and TSS TMDLs calculated in Parts 1 and 2, MPCA used a MOS of 5% of the loading capacity. For the chloride TMDL in Part 1, MPCA employed a MOS of 10% of the loading capacity. In the Part 3 nutrient TMDLs, MPCA used an implicit MOS for the 6 lake TP TMDLs of Part 3.

LMRW bacteria, phosphorus and sediment (TSS) TMDLs of Parts 1 and 2: The bacteria, phosphorus and sediment (TSS) TMDLs in Parts 1 and 2 incorporated an explicit MOS of 5% which was applied to the loading capacity. Five percent of the total loading capacity was reserved for MOS with the remaining load allocated to point and nonpoint sources (Tables 7, 8, 9, 10, 13, 14 and 15 of this Decision Document). MPCA explained that the explicit MOS was set at 5% due to the following factors discovered during TMDL development for these pollutants:

- Environmental variability in pollutant loading;
- Variability in water quality data (i.e., collected water quality monitoring data, field sampling error, etc.);
- Calibration and validation processes of LDC/BATHTUB modeling efforts, uncertainty in modeling outputs;
- Conservative assumptions made during the modeling efforts; and
- MPCA's confidence in the BATHTUB model's performance during the development of TP TMDLs.

Challenges associated with quantifying *E. coli* loads include the dynamics and complexity of bacteria in stream environments. Factors such as die-off and re-growth contribute to general uncertainty that makes quantifying stormwater bacteria loads particularly difficult. The MOS for the LMRW bacteria TMDLs also incorporated certain conservative assumptions in the calculation of the TMDLs. No rate of decay, or die-off rate of pathogen species, was used in the TMDL calculations or in the creation of load duration curves for *E. coli*. Bacteria have a limited capability of surviving outside their hosts, and normally a rate of decay would be incorporated. MPCA determined that it was more conservative to use the WQS (126 orgs/100 mL) and not to apply a rate of decay, which could result in a discharge limit greater than the WQS.

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

LMRW chloride TMDL of Part 1: The LMRW chloride TMDL of Part 1 employed an explicit MOS of 10%. MPCA explained that the methodology used to calculate the chloride TMDL was the same methodology used to develop chloride TMDLs for the TCMA chloride TMDLs. MPCA's goal was to maintain consistency across the LMRW chloride TMDL and the TCMA chloride TMDLs. MPCA explained that the explicit MOS was set at 10% due to the following factors:

- The potential variability of the monitored parameters from spatial, temporal and seasonal changes observed in the stream segment;
- Variability in water quality data (i.e., field sampling error);
- Environmental variability in chloride loading to the stream segment; and
- MPCA's record of using an explicit 10% MOS for zero-dimensional models in previously completed chloride TMDLs (e.g., the TCMA chloride TMDLs of 2016).

LMRW phosphorus TMDLs of Part 3: MPCA explained that for the lake nutrient TMDLs of Part 3 it utilized an implicit MOS due to conservative modeling assumptions made in the TMDL development process. The conservative assumptions were pursued to account for an inherently imperfect understanding of the lakes' systems, and to ensure that the nutrient reductions called for in the TMDL calculations will be protective of the nutrient WQS. Conservative modeling assumptions included;

- Using the summer average (June through September) of in-lake samples to account for the highest algal growth potential of the lake. During this time period, average air temperatures and water temperatures are in the optimal range for high productivity of the lake.
- Setting allocations for the turbid water state of the lake, the idea being that as nutrient loading is reduced in the lake and other internal load management efforts (e.g., fish community management actions) occur, shallow lakes will 'flip' to clear water conditions. Upon flipping to a clear water state, increased light penetration will allow rooted aquatic vegetation to grow and stabilize the sediments, and zooplankton to thrive and graze on algae at a much higher rate than is experienced in turbid waters. MPCA explained, that in a clear water state, it is likely that more phosphorus will be removed from the water column (see Section 4.4 of Part 3 of the LMRW TMDL document).

The EPA finds that the TMDL document submitted by MPCA contains an appropriate MOS satisfying the requirements of the sixth criterion.

7. Seasonal Variation

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

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

Critical conditions for *E. coli* loading occur in the dry summer months. This is typically when stream flows are lowest, and bacterial growth rates can be high. By meeting the water quality targets during the summer months, it can reasonably be assumed that the loading capacity values will be protective of water quality during the remainder of the calendar year (November through March).

LMRW phosphorus TMDLs: Seasonal variation was considered for the LMRW TP TMDLs via the nutrient targets which were based on the average nutrient values collected during the growing season (June 1 to September 30). The water quality targets were designed to meet the NCHF and WCBP eutrophication WQS during the period of the year where the frequency and severity of algal growth is the greatest.

The Minnesota eutrophication standards state that total phosphorus WQS are defined as the mean concentration of phosphorus values measured during the growing season. In the LMRW nutrient TMDL efforts, the LA and WLA estimates were calculated from modeling efforts which incorporated mean growing season total phosphorus values. Nutrient loading capacities were set in the TMDL development process to meet the WQS during the most critical period. The mid to late summer time period is typically when eutrophication standards are exceeded and water quality within the LMRW is deficient. By calibrating the modeling efforts to protect these water bodies during the worst water quality conditions of the year, it is assumed that the loading capacities established by the TMDLs will be protective of water quality during the remainder of the calendar year (October through May).

LMRW sediment (TSS) TMDLs: The TSS WQS applies from April to September which is also the time period when high concentrations of sediment are expected in the surface waters of the LMRW (Section 4.6.5 of the final TMDL document). Sediment loading in the LMRW varies depending on surface water flow, land cover and climate/season. Spring is typically associated with large flows from snowmelt, the summer is associated with the growing season as well as periodic storm events and receding streamflows, and the fall brings increasing precipitation and rapidly changing agricultural landscapes. In all season's sediment inputs to surface waters typically occur primarily through wet weather events. Critical conditions that impact the response of LMRW water bodies to sediment inputs may typically occur during periods of low flow. During low flow periods, sediment can accumulate within the impacted water bodies, there is less assimilative capacity within the water body, and generally sediment is not transported through the water body at the same rate it is under normal flow conditions.

Critical conditions that impact loading, or the rate that sediment is delivered to the water body, were identified as those periods where large precipitation events coincide with periods of minimal vegetative cover on fields. Large precipitation events and minimally covered land surfaces can lead to large runoff volumes, especially to those areas which drain agricultural fields. The conditions generally occur in the spring and early summer seasons.

LMRW chloride TMDL: MPCA explained that the LMRW chloride TMDL considered chloride sources across all seasons since chloride is added to the system on a seasonal basis as well as an annual basis. Spring snowmelt and subsequent runoff contribute chloride to local waterbodies during the spring time period, summer storms may contribute chlorides via stormwater runoff and continuous year-round sources of chloride are present in the LMRW due to contributions from WWTPs and water softening systems in areas which are not tied into municipal sanitary sewer systems. Chloride loadings to streams vary seasonally. Stream water quality responds to loadings on a seasonal basis and the highest chloride concentrations tend to occur during the spring snowmelt.

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

8. Reasonable Assurance

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

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

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

Comment:
The LMRW bacteria, nutrient, sediment (TSS) and chloride TMDLs provide reasonable assurance that actions identified in the implementation section of the final TMDL (i.e., Sections 6 and 8 of the final TMDL document), will be applied to attain the loading capacities and allocations calculated for the impaired reaches within the LMRW. The recommendations made by MPCA will be successful at improving water quality if the appropriate local groups work to implement these recommendations. Those mitigation suggestions, which fall outside of regulatory authority, will require commitment from state agencies and local stakeholders to carry out the suggested actions.

MPCA has identified several local partners which have expressed interest in working to improve water quality within the LMRW. Watershed districts (WD) and watershed management organizations (WMO) have a significant role in the LMRW in terms of monitoring, planning and implementation efforts (p. 3 of the LMRW WRAPS document, February 2020). It is anticipated that WDs, WMOs and other local watershed groups will work together to reduce pollutant inputs to the LMRW. MPCA has authored a LMRW WRAPS document (February 2020) which provides information on the development of scientifically-supported restoration and protection strategies for implementation planning and action. MPCA sees the WRAPS document as a starting point for which MPCA and local partners can develop tools that will help local governments, land owners, and special interest groups determine (1) the best strategies for making improvements and protecting resources that are already in good condition, and (2) focus those strategies in the best places to do work.

EPA understands that there are several existing TMDLs in the Minnesota River Watershed and other TMDL projects which have been finalized (e.g., Minnesota River-Mankato TMDL) or are in final stages of development by MPCA, e.g., the Watonwan River TMDL (https://www.pca.state.mn.us/water/total-maximum-daily-load-tmdl-projects). The LMRW has existing TMDLs which have been approved for several years, and thus implementation activities are underway via the efforts of WDs and/or WMOs. MPCA also noted that several TMDLs addressing bacteria and nutrients in the Minnesota River Basin will also reduce sediment loads, as many sources of bacteria and nutrients are linked with sediment, such as row-crop runoff.

Continued water quality monitoring within the basin is supported by MPCA. Additional water quality monitoring results could provide insight into the success or failure of BMP systems designed to reduce bacteria, nutrient, sediment and chloride loading into the surface waters of the watershed. Local watershed managers would be able to reflect on the progress of the various pollutant removal strategies and would have the opportunity to change course if observed progress is unsatisfactory.

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

Reasonable assurance that the WLA set forth will be implemented is provided by regulatory actions. According to 40 CFR 122.44(d)(1)(vii)(B), NPDES permit effluent limits must be consistent with assumptions and requirements of all WLAs in an approved TMDL. MPCA's stormwater program and the NPDES permit program are the implementing programs for ensuring WLA are consistent with the TMDL. The NPDES program requires construction and industrial sites to create SWPPPs which summarize how stormwater will be minimized from construction and industrial sites. Under the MPCA's Stormwater General Permit, managers of sites under construction or industrial stormwater permits must review the adequacy of local SWPPPs to ensure that each plan meets WLA set in the LMRW TMDLs. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified. This applies to sites under the MPCA's General Stormwater Permit for Construction Activity (MNR100001) and its NPDES/SDS Industrial Stormwater Multi-Sector General Permit (MNR050000) or NPDES/SDS General Permit for Construction Sand & Gravel, Rock Quarrying and Hot Mix Asphalt Production facilities (MNG490000).

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

All regulated MS4 communities are required to satisfy the requirements of the MS4 general permit which requires the permittee to develop a 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.

The MS4 General Permit, which became effective August 1, 2013, requires permittees to develop compliance schedules for any TMDL that received U.S. EPA-approval prior to the effective date of the General Permit. This schedule must identify BMPs that will be implemented over the five-year permit term, timelines for their implementation, an assessment of progress, and a long term strategy for continued progress toward ultimately achieving those WLAs. Because this TMDL will be approved after the effective date of the General Permit, MS4s will not be required to report on WLAs contained in this TMDL until the effective date of the next General Permit.

MPCA requires MS4 applicants to submit their application materials and SWPPP documentation to MPCA for review. Prior to extension of coverage under the general permit, all application materials are placed on 30-day public notice by the MPCA, to ensure adequate opportunity for the public to comment on each permittee's stormwater management program. Upon extension of coverage by the MPCA, the permittees are to implement the activities described within their SWPPP and submit annual reports to MPCA by June 30 of each year. These reports document the implementation activities which have been completed within the previous year, analyze implementation activities already undertaken, and outline any changes within the SWPPP from the previous year.

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

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

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

The EPA finds that this criterion has been adequately addressed.

9. Monitoring Plan to Track TMDL Effectiveness

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

<u>Comment:</u>
The final TMDL document outlines the water monitoring efforts in the LMRW. Progress of TMDL implementation will be measured through regular monitoring efforts of water quality and total BMPs completed. MPCA anticipates that monitoring will be completed by local groups (e.g., WDs and WMOs) and volunteers, as long as there is sufficient funding to support the efforts of these local entities. At a minimum, the LMRW will be monitored once every 10 years as part of the MPCA's Intensive Watershed Monitoring cycle.

Water quality monitoring is a critical component of the adaptive management strategy employed as part of the implementation efforts utilized in the LMRW. Water quality information will aid watershed managers in understanding how BMP pollutant removal efforts are impacting water quality. Water quality monitoring combined with an annual review of BMP efficiency will provide information on the success or failure of BMP systems designed to reduce pollutant loading into water bodies of the LMRW. Watershed managers will have the opportunity to reflect on the progress or lack of progress and will have the opportunity to change course if progress is unsatisfactory. Review of BMP efficiency is expected to be completed by the local and county partners.

<u>Stream Monitoring:</u>
River and stream monitoring in the LMRW, has been completed by a variety of organizations (i.e., WDs and WMOs) and funded by Clean Water Partnership Grants, and other available local funds. MPCA anticipates that stream monitoring in the LMRW should continue in order to build on the current water quality dataset and track changes based on implementation progress. Continuing to monitor water quality and biota scores in the listed segments will determine whether or not stream habitat restoration measures are required to bring the watershed into attainment with water quality standards. At a

minimum, fish and macroinvertebrate sampling should be conducted by the MPCA, Minnesota Department of Natural Resources (MN-DNR), or other agencies every five to ten years during the summer season.

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

The EPA finds that this criterion has been adequately addressed.

10. Implementation

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

Comment:
The findings from the LMRW TMDLs will be used to inform the selection of implementation activities as part of the Lower Minnesota River watershed WRAPS process. The purpose of the WRAPS report is to support local working groups and jointly develop scientifically-supported restoration and protection strategies to be used for subsequent implementation planning.

MPCA outlined the importance of prioritizing areas within the LMRW, education and outreach efforts with local partners, and partnering with local stakeholders to improve water quality within the watershed. The LMRW WRAPS document includes additional detail regarding specific recommendations from MPCA to aid in the reduction of bacteria, nutrients, sediment (TSS) and chloride to surface waters of the LMRW.

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

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

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

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

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

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

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

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

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

LMRW phosphorus TMDLs:

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

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

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

Urban/Residential Nutrient Reduction Strategies: These strategies involve reducing stormwater runoff from lakeshore homes and other residences within the LMRW. These practices would include; rain gardens, lawn fertilizer reduction, lake shore buffer strips, vegetation management and replacement of failing septic systems. Water quality educational programs could also be utilized to inform the general public on nutrient reduction efforts and their impact on water quality.

Municipal activities: Municipal programs, such as street sweeping, can also aid in the reduction of nutrients to surface water bodies within the LMRW. Municipal partners can team with local watershed groups or water district partners to assess how best to utilize their monetary resources for installing new stormwater BMPs (e.g., vegetated swales) or retro-fitting existing stormwater BMPs.

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

- *Management of fish populations:* Monitor and manage fish populations to maintain healthy game fish populations and reduce rough fish (i.e. carp, bullheads, fathead minnows) populations.

- *Vegetation management:* Improved management of in-lake vegetation in order to limit phosphorus loading and to increase water clarity. Controlling the vitality of curly-leaf pondweeds via chemical treatments (herbicide applications) will reduce one of the significant sources of internal loading, the senescence of curly-leaf plants in the summer months.
- *Chemical treatment:* The addition of chemical reactants (e.g., aluminum sulfate) to lakes of the LMRW in order for those reactants to permanently bind phosphorus into the lake bottom sediments. This effort could decrease phosphorus releases from sediment into the lake water column during anoxic conditions.

Public Education Efforts: Public programs will be developed to provide guidance to the general public on nutrient 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 lakes in the LMRW.

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

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

Identification of Stream, River, and Lakeshore Erosional Areas: An assessment of stream channel, river channel, and lakeshore erosional areas should be completed to evaluate areas where erosion control strategies could be implemented in the LMRW. Implementation actions (e.g., planting deep-rooted vegetation near water bodies to stabilize streambanks) could be prioritized to target areas which are actively eroding. This strategy could prevent additional sediment inputs into surface waters of the LMRW and minimize or eliminate degradation of habitat.

LMRW chloride TMDLs:
The potential BMPs which, if installed and maintained, would likely result in decreases in chloride to surface waters of the LMRW involve more efficient uses of salt resources. Improving winter maintenance practices (i.e., reducing the amount of salt used) of municipal and private applicators for smarter and more efficient use of salt resources. The key challenge in reducing salt usage is balancing the need for public safety with the growing expectation for clear, dry roads, parking lots, and sidewalks throughout the mix, severity, and duration of winter conditions in the LMRW.

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

11. Public Participation

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

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

Comment:
Throughout the development of the LMRW TMDLs the public was given various opportunities to participate. As part of the strategy to communicate the goals of the TMDL project and to engage with members of the public, MPCA worked with county and WD, WMO and SWCD staff from the counties in the LMRW to promote water quality, to gain input from landowners via surveys and interviews and to better understand the social dynamics of stakeholders in the LMRW. MPCA's goal was to create civic engagement and discussion which would enhance the content of the TMDL and WRAPS documents. A full description of civic engagement activities associated with the TMDL process is available within in the LMRW WRAPS report (February 2020).

MPCA posted the draft TMDL online at (http://www.pca.state.mn.us/water/tmdl) for a public comment period. The public comment period was started on July 22, 2019 and ended on September 20, 2019. MPCA received fifteen (15) public comments during the public comment period. Comments were submitted by landowners and special interest groups regarding the TMDL document and the WRAPS document. A summary of some of the main topics expressed in the public comments and MPCA's responses to those topics is expressed below.

Commenters provided feedback to MPCA on specific language used in the TMDL and the WRAPS document and requested clarification on language and supporting arguments expressed in these documents. MPCA reviewed the highlighted language from the various commenters and revised the TMDL and WRAPS documents where appropriate. An example of this was one commenter highlighted certain local programming which they felt had been overlooked by the MPCA. In response, the MPCA agreed with the commenter and added information to its reasonable assurance and implementation discussions of the TMDL document.

In those instances where MPCA needed to provide further clarification regarding certain statements or arguments made in the TMDL or WRAPS document, it did so within its response to the individual commenter. In some cases, MPCA requested additional discussion(s) with the commenter to further communication and potentially improve partnering opportunities during future implementation activities in the LMRW.

Some commenters disagreed with MPCA that agricultural drain tiles are a significant source of flow and associated sediment into water bodies in the LMRW. They explained that groundwater seepage and freeze-thaw cycles are leading to destabilized bluffs and gullies, causing them to fail and slump into the Minnesota River and its tributaries, rather than increased streamflow from agricultural tiles causing increased undercutting of streambanks and bluffs. MPCA explained that the causes of sediment loading in the LMRW vary in type and amount across the watershed. In some locations, bluff erosion is a significant source, while in others, there is clear evidence that agricultural tiles are contributing to increased in-stream flows and related streambank erosion. MPCA agreed that detailed analyses (such as in the WRAPS and other implementation plans) are needed to determine the specific causes and locations of sediment loading, and that a suite of BMPs are best suited to reducing the loads. The State welcomed further study of sediment sources in the TMDL watershed to better understand sources and impacts.

Commenters voiced concern regarding the recommendation to reduce high flows in the various water bodies of the LMRW. MPCA noted that precipitation and related runoff levels have increased in the Minnesota River watershed, since the mid-20th century. Some commenters requested that MPCA focus on additional stormwater controls (e.g., ponds, detention structures and constructed/restored wetland areas) to increase water storage in the LMRW and reduce stormwater inputs to local steam and river environments. MPCA explained that the strategies discussed in the TMDL and WRAPS documents are focused on slowing down and holding the release of stormwater to streams, ditches and lakes. MPCA affirmed its interest in BMPs which retain water on the land surface and minimize storm event driven flows to local surface waters.

Comments were also raised regarding the prioritization of CWLA funding. Several commenters requested that MPCA allocate a greater percentage of CWLA funds toward implementation and decrease the current amount of funding allocated to watershed monitoring and assessment efforts. MPCA explained since the inception of the CWLA fund in July of 2009, approximately 81% of CWLA funds had been spent on implementation. MPCA also added that it has been exploring ways to reduce the costs of TMDL and WRAPS development to free up additional funding for implementation efforts.

One commenter expressed concerns related to the sources of phosphorus as outlined by the TMDL, the cost of mitigation for small municipalities and potential reductions assigned to individual facilities as a result of the WLAs calculated in the TMDL. MPCA provided detailed responses to each of the concerns raised by the commenter and expressed the willingness of MPCA NPDES staff to work with municipal wastewater partners to explore how compliance schedules, water quality trading and/or adaptive management in order reduce costs and meet implementation expectations.

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

The Lower Minnesota River Watershed includes tribal lands for the Lower Sioux Indian Community and the Shakopee Mdewakanton Sioux Community. EPA invited representatives of the Lower Sioux

Indian Community[4] and the Shakopee Mdewakanton Sioux Community[5] to consult with EPA regarding EPA's review of the final LMRW TMDLs. Representatives from the Lower Sioux Indian Community and the Shakopee Mdewakanton Sioux Community did not respond to EPA's invitation to consult on EPA's review and decision of the LMRW TMDLs. EPA understood this as the Lower Sioux Indian Community and the Shakopee Mdewakanton Sioux Community deferring on EPA's invitation to consult. Therefore, EPA closed out the tribal consultation invitation via a follow-up letter to the President of the Lower Sioux Indian Community[6] and the Chairman of the Shakopee Mdewakanton Sioux Community[7].

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

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

12. Submittal Letter

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

Comment:

The EPA received the final Lower Minnesota River Watershed TMDLs Parts 1, 2 & 3, the submittal letter and accompanying documentation from MPCA on February 28, 2020. The transmittal letter explicitly stated that the final TMDLs referenced in Tables 1, 2 and 3 of this Decision Document were being submitted to EPA pursuant to Section 303(d) of the Clean Water Act for EPA review and approval.

The letter clearly stated that this was a final TMDL submittal under Section 303(d) of CWA. The letter also contained the name of the watershed as it appears on Minnesota's 303(d) list, and the

[4] EPA Letter from Thomas R. Short Jr., Acting Director Water Division, Region 5, U.S. EPA to Robert Larsen, President of the Lower Sioux Indian Community, *Invitation for Consultation on EPA's Final Review for the Lower Minnesota River Watershed Total Maximum Daily Load Study Parts 1, 2 & 3*, March 2, 2020.

[5] EPA Letter from Thomas R. Short Jr., Acting Director Water Division, Region 5, U.S. EPA to Keith Anderson, Chairman of the Shakopee Mdewakanton Sioux Community, *Invitation for Consultation on EPA's Final Review for the Lower Minnesota River Watershed Total Maximum Daily Load Study Parts 1, 2 & 3,* March 2, 2020.

[6] EPA Letter from Thomas R. Short Jr., Acting Director Water Division, Region 5, U.S. EPA to Robert Larsen, President of the Lower Sioux Indian Community, *Closeout of EPA's consultation invitation and final review of the Lower Minnesota River Watershed Total Maximum Daily Load Study Parts 1, 2 & 3*, March 13, 2020.

[7] EPA Letter from Thomas R. Short Jr., Acting Director Water Division, Region 5, U.S. EPA to Keith Anderson, Chairman of the Shakopee Mdewakanton Sioux Community, *Closeout of EPA's consultation invitation and final review of the Lower Minnesota River Watershed Total Maximum Daily Load Study Parts 1, 2 & 3*, March 13, 2020.

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 Lower Minnesota River Watershed TMDLs Parts 1, 2 & 3 by MPCA satisfies the requirements of this twelfth element.

13. Conclusion

After a full and complete review, the EPA finds that the 39 bacteria TMDLs, the 43 TP TMDLs, the 15 sediment (TSS) TMDLs and the 1 chloride TMDL satisfy all elements for approvable TMDLs. This TMDL approval is for **ninety-eight TMDLs**, addressing segments for aquatic recreational, aquatic life use impairments (Tables 1, 2 and 3 of this Decision Document).

EPA also agrees that the protection measures outlined in Part 2 of the LMRW TMDL for Lake Lucy are sufficient to maintain the existing water quality in the lake. EPA agrees these measures are appropriate for consideration as a protection strategy as described in "*A Long-Term Vision for Assessment, Restoration and Protection under the Clean Water Act Section 303(d) Program*" (December 2013).

The EPA's approval of these TMDLs extends to the water bodies which are identified above with the exception of any portions of the water bodies that are within Indian Country, as defined in 18 U.S.C. Section 1151. The EPA is taking no action to approve or disapprove TMDLs for those waters at this time. The EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under the CWA Section 303(d) for those waters.

ATTACHMENTS

Attachment #1: Table 7: Bacteria (*E. coli*) TMDLs from Part 1 of the Lower Minnesota River Watershed TMDL Report

Attachment #2: Table 8: Bacteria (*E. coli*) TMDLs from Part 2 of the Lower Minnesota River Watershed TMDL Report

Attachment #3: Table 9: Total Phosphorus (TP) TMDLs for lakes from Part 1 of the Lower Minnesota River Watershed TMDL Report

Attachment #4: Table 10: Total Phosphorus (TP) TMDLs for lakes from Part 2 of the Lower Minnesota River Watershed TMDL Report

Attachment #5: Table 11 Total Phosphorus (TP) Protection Strategy for Lake Lucy (10-0007-00) from Part 2 of the Lower Minnesota River Watershed TMDL Report

Attachment #6: Table 12: Total Phosphorus (TP) TMDLs for lakes from Part 3 of the Lower Minnesota River Watershed TMDL Report

Attachment #7: Table 13: Total Phosphorus (TP) TMDLs for streams from Part 1 of the Lower Minnesota River Watershed TMDL Report

Attachment #8: Table 14: Total Suspended Solid (TSS) TMDLs from Part 1 of the Lower Minnesota River Watershed TMDL Report

Attachment #9: Table 15: Total Suspended Solid (TSS) TMDLs from Part 2 of the Lower Minnesota River Watershed TMDL Report

Attachment #10: Table 16: Chloride TMDL from Part 1 of the Lower Minnesota River Watershed TMDL Report

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Table 7: Bacteria (*E. coli*) TMDLs for the Lower Minnesota River Watershed (Part 1)

Allocation	Source	Very High	High	Mid-range	Low	Very Low
		0-10%	10-40%	40-60%	60-90%	90-100%
		E. coli (billions of bacteria/day)				
TMDL for Rush River North Branch (Judicial Ditch 18) (07020012-555)						
Wasteload Allocation	***WLA Totals***	0.00	0.00	0.00	0.00	0.00
Load Allocation	***LA Totals***	161.00	37.00	10.00	3.10	0.76
Margin Of Safety (5%)		8.50	2.00	0.57	0.16	0.04
Loading Capacity (TMDL)		**169.50**	**39.00**	**10.57**	**3.26**	**0.80**
Estimated Load Reduction (%)		**90%**				
TMDL for Unnamed Ditch (07020012-713)						
Wasteload Allocation	***WLA Totals***	0.00	0.00	0.00	0.00	0.00
Load Allocation	***LA Totals***	8.80	2.00	0.54	0.16	0.03
Margin Of Safety (5%)		0.47	0.10	0.028	0.0084	0.0016
Loading Capacity (TMDL)		**9.27**	**2.10**	**0.57**	**0.17**	**0.0326**
Estimated Load Reduction (%)		**89%**				
TMDL for County Ditch 18 (07020012-714)						
Wasteload Allocation	***WLA Totals***	0.00	0.00	0.00	0.00	0.00
Load Allocation	***LA Totals***	71.00	17.00	5.20	1.90	0.49
Margin Of Safety (5%)		3.70	0.91	0.27	0.10	0.026
Loading Capacity (TMDL)		**74.70**	**17.91**	**5.47**	**2.00**	**0.52**
Estimated Load Reduction (%)		**89%**				
TMDL for Rush River North Branch (County Ditch 55) (07020012-558)						
Wasteload Allocation	Gaylord WWTP (MNG580204)	21.00	21.00	21.00	21.00	--[a]
	MG Waldbaum Co. (MN0060798)	2.90	2.90	2.90	2.90	--[a]
	WLA Totals	23.90	23.90	23.90	23.90	0.00
Load Allocation	***LA Totals***	1485.00	375.00	9.00	7.00	--[a]
Unallocated Load		764.00	135.00	131.00	17.00	--[a]
Margin Of Safety (5%)		120.00	28.00	8.70	2.60	0.53
Loading Capacity (TMDL)		**2392.90**	**561.90**	**172.60**	**50.50**	**11.00**
Estimated Load Reduction (%)		**17%**				
TMDL for Rush River Middle Branch (County Ditch 23 & 24) (07020012-550)						
Wasteload Allocation	Starland Hutterian Brethren Inc. (MN0067334)	0.75	0.75	0.75	0.75	0.75
	Winthrop WWTP (MN0051098)	10.00	10.00	10.00	10.00	10.00
	WLA Totals	10.75	10.75	10.75	10.75	10.75
Load Allocation	***LA Totals***	1023.00	392.00	20.00	33.00	1.40
Unallocated Load		789.00	0.00	97.00	0.00	0.00
Margin Of Safety (5%)		96.00	21.00	6.70	2.30	0.64
Loading Capacity (TMDL)		**1918.75**	**423.75**	**134.45**	**46.05**	**12.79**
Estimated Load Reduction (%)		**21%**				

TMDL for Judicial Ditch 1A (07020012-509)						
Wasteload Allocation	Lafayette WWTP (MN0023876)	0.45	0.45	0.45	0.45	0.45
	WLA Totals	0.45	0.45	0.45	0.45	0.45
Load Allocation	***LA Totals***	514.00	223.00	61.00	14.00	4.70
Unallocated Load		1234.00	185.00	45.00	12.00	0.00
Margin Of Safety (5%)		92.00	21.00	5.60	1.40	0.27
Loading Capacity (TMDL)		**1840.45**	**429.45**	**112.05**	**27.85**	**5.42**
Estimated Load Reduction (%)		**32%**				
TMDL for Judicial Ditch 22 (07020012-629)						
Wasteload Allocation	***WLA Totals***	0.00	0.00	0.00	0.00	0.00
Load Allocation	***LA Totals***	82.00	24.00	9.50	4.00	1.30
Margin Of Safety (5%)		4.30	1.30	0.50	0.21	0.069
Loading Capacity (TMDL)		**86.30**	**25.30**	**10.00**	**4.21**	**1.37**
Estimated Load Reduction (%)		**90%**				
TMDL for Unnamed Ditch (07020012-533)						
Wasteload Allocation	Norwood Young American WWTP (MN0024392)	4.30	4.30	4.30	--[a]	--[a]
	WLA Totals	4.30	4.30	4.30	0.00	0.00
Load Allocation	***LA Totals***	58.00	11.00	2.10	--[a]	--[a]
Unallocated Load		28.00	11.00	5.50	--[a]	--[a]
Margin Of Safety (5%)		4.80	1.40	0.63	0.30	0.15
Loading Capacity (TMDL)		**95.10**	**27.70**	**12.53**	**6.00**	**2.90**
Estimated Load Reduction (%)		**48%**				
TMDL for Unnamed Creek (Goose Lake Inlet) (07020012-907)						
Wasteload Allocation	***WLA Totals***	0.00	0.00	0.00	0.00	0.00
Load Allocation	***LA Totals***	13.00	2.10	1.80	0.37	0.23
Unallocated Load		6.40	2.90	0.00	0.40	0.00
Margin Of Safety (5%)		0.98	0.26	0.10	0.04	0.01
Loading Capacity (TMDL)		**20.38**	**5.26**	**1.90**	**0.81**	**0.24**
Estimated Load Reduction (%)		**82%**				
TMDL for Unnamed Creek (07020012-618)						
Wasteload Allocation	***WLA Totals***	0.00	0.00	0.00	0.00	0.00
Load Allocation	***LA Totals***	27.00	2.00	2.80	0.38	0.10
Unallocated Load		8.70	7.00	0.00	0.00	0.00
Margin Of Safety (5%)		1.90	0.47	0.15	0.02	0.01
Loading Capacity (TMDL)		**37.60**	**9.47**	**2.95**	**0.40**	**0.10**
Estimated Load Reduction (%)		**54%**				
TMDL for Unnamed Creek (Lake Waconia Inlet) (07020012-619)						
Wasteload Allocation	Minnetrista City MS4 (MS400106)	0.56	0.13	0.02	0.00	0.00
	WLA Totals	0.56	0.13	0.02	0.00	0.00

Load Allocation	***LA Totals***	52.00	2.50	1.90	0.41	0.39
Unallocated Load		0.00	9.40	0.00	0.00	0.00
Margin Of Safety (5%)		2.80	0.64	0.10	0.02	0.02
Loading Capacity (TMDL)		**55.36**	**12.67**	**2.02**	**0.44**	**0.41**
Estimated Load Reduction (%)		**--**				
TMDL for Unnamed Ditch (07020012-527)						
Wasteload Allocation	Laketown Township MS4 (MS400142)	0.82	0.42	0.12	0.03	0.01
	Minnetrista City MS4 (MS400106)	0.61	0.31	0.09	0.02	0.01
	Waconia City MS4 (MS400232)	7.50	3.80	1.10	0.27	0.07
	WLA Totals	8.93	4.53	1.31	0.32	0.08
Load Allocation	***LA Totals***	46.00	23.00	6.80	1.70	0.42
Unallocated Load		45.00	0.00	0.00	0.00	0.00
Margin Of Safety (5%)		5.30	1.50	0.42	0.10	0.03
Loading Capacity (TMDL)		**105.23**	**29.03**	**8.53**	**2.12**	**0.53**
Estimated Load Reduction (%)		**57%**				
TMDL for Unnamed Creek (07020012-621)						
Wasteload Allocation	Laketown Township MS4 (MS400142)	3.00	1.10	0.68	0.42	0.07
	Waconia City MS4 (MS400232)	0.83	0.30	0.19	0.12	0.02
	WLA Totals	3.83	1.40	0.87	0.54	0.09
Load Allocation	***LA Totals***	3.50	1.70	1.00	0.64	0.11
Unallocated Load		33.00	7.90	2.30	0.19	0.00
Margin Of Safety (5%)		2.20	0.58	0.22	0.07	0.01
Loading Capacity (TMDL)		**42.53**	**11.58**	**4.39**	**1.44**	**0.21**
Estimated Load Reduction (%)		**17%**				
TMDL for Unnamed Creek (07020012-568)						
Wasteload Allocation	Cologne WWTP (MN0023108)	1.60	1.60	1.60	--[a]	--[a]
	WLA Totals	1.60	1.60	1.60	0.00	0.00
Load Allocation	***LA Totals***	0.52	3.90	1.00	--[a]	--[a]
Unallocated Load		21.00	1.20	0.00	--[a]	--[a]
Margin Of Safety (5%)		1.20	0.36	0.14	0.06	0.0039
Loading Capacity (TMDL)		**24.32**	**7.06**	**2.74**	**1.10**	**0.08**
Estimated Load Reduction (%)		**20%**				
TMDL for Unnamed Creek (07020012-526)						
Wasteload Allocation	***WLA Totals***	0.00	0.00	0.00	0.00	0.00
Load Allocation	***LA Totals***	4.40	1.20	0.48	0.26	0.12
Margin Of Safety (5%)		0.23	0.06	0.03	0.01	0.0066
Loading Capacity (TMDL)		**4.63**	**1.26**	**0.51**	**0.27**	**0.13**
Estimated Load Reduction (%)		**90%**				
TMDL for Unnamed Creek (07020012-528)						

Wasteload Allocation	Carver City MS4 (MS400077)	1.20	1.60	0.69	0.35	0.16
	Carver County MS4 (MS400070)	0.07	0.10	0.04	0.02	0.01
	Chaska City MS4 (MS400080)	0.08	0.12	0.05	0.03	0.01
	WLA Totals	1.36	1.82	0.78	0.40	0.18
Load Allocation	***LA Totals***	0.97	1.40	0.58	0.29	0.14
Unallocated Load		9.50	0.09	0.00	0.00	0.00
Margin Of Safety (5%)		0.62	0.17	0.07	0.04	0.02
Loading Capacity (TMDL)		**12.45**	**3.48**	**1.44**	**0.72**	**0.34**
Estimated Load Reduction (%)		**26%**				
TMDL for Chaska Creek (07020012-804)						
Wasteload Allocation	Laketown Community WWTP (MN0054399)	0.03	0.03	0.03	0.03	0.03
	Carver City MS4 (MS400077)	0.0140	0.0039	0.0016	0.0008	0.0004
	Carver County MS4 (MS400070)	0.39	0.11	0.05	0.02	0.01
	Chaska City MS4 (MS400080)	6.90	1.90	0.80	0.40	0.17
	Laketown Township MS4 (MS400142)	9.90	2.80	1.20	0.58	0.25
	MnDOT Metro MS4 (MS400170)	0.52	0.15	0.06	0.03	0.01
	WLA Totals	17.75	4.99	2.14	1.06	0.47
Load Allocation	***LA Totals***	57.00	16.00	6.60	3.40	1.50
Margin Of Safety (5%)		3.90	1.10	0.46	0.23	0.10
Loading Capacity (TMDL)		**78.65**	**22.09**	**9.20**	**4.69**	**2.07**
Estimated Load Reduction (%)		**76%**				
TMDL for Unnamed Ditch (07020012-565)						
Wasteload Allocation	Bongards' Creameries Inc. (MN0002135)	9.50	9.50	9.50	9.50	--[a]
	WLA Totals	9.50	9.50	9.50	9.50	0.00
Load Allocation	***LA Totals***	327.00	19.00	28.00	7.30	--[a]
Unallocated Load		0.00	62.00	0.10	0.00	--[a]
Margin Of Safety (5%)		18.00	4.70	2.00	0.89	0.31
Loading Capacity (TMDL)		**354.50**	**95.20**	**39.60**	**17.69**	**6.10**
Estimated Load Reduction (%)		**--**				
TMDL for Unnamed Creek (07020012-581)						
Wasteload Allocation	Carver County MS4 (MS400070)	2.40	0.61	0.24	0.10	0.03
	Chanhassen City MS4 (MS400079)	1.10	0.28	0.11	0.05	0.02
	Chaska City MS4 (MS400080)	43.00	11.00	4.30	1.70	0.58
	Laketown Township MS4 (MS400142)	0.23	0.06	0.02	0.01	0.00
	MnDOT Metro MS4 (MS400170)	2.20	0.55	0.22	0.09	0.03
	Victoria City MS4 (MS400126)	2.00	0.52	0.21	0.08	0.03
	WLA Totals	50.93	13.02	5.10	2.02	0.69
Load Allocation	***LA Totals***	29.00	6.50	3.10	1.20	0.40

Margin Of Safety (5%)		4.20	1.10	0.43	0.17	0.06
	Loading Capacity (TMDL)	**84.13**	**20.62**	**8.63**	**3.39**	**1.15**
Estimated Load Reduction (%)		**66%**				
TMDL for Barney Fry Creek (07020012-602)						
Wasteload Allocation	***WLA Totals***	0.00	0.00	0.00	0.00	0.00
Load Allocation	***LA Totals***	130.00	30.00	9.30	1.80	1.30
Unallocated Load		0.00	0.00	0.00	1.70	0.00
Margin Of Safety (5%)		6.80	1.60	0.49	0.19	0.07
	Loading Capacity (TMDL)	**136.80**	**31.60**	**9.79**	**3.69**	**1.37**
Estimated Load Reduction (%)		**75%**				
TMDL for Le Sueur Creek (07020012-824)						
Wasteload Allocation	Le Center WWTP (MN0023931)	3.90	3.90	3.90	3.90	3.90
	Le Sueur City MS4[1]	0.0530	0.0120	0.0048	0.0015	0.0002
	WLA Totals	3.95	3.91	3.90	3.90	3.90
Load Allocation	***LA Totals***	342.00	80.00	31.00	9.90	1.40
Margin Of Safety (5%)		18.00	4.40	1.80	0.73	0.28
	Loading Capacity (TMDL)	**363.95**	**88.31**	**36.70**	**14.53**	**5.58**
Estimated Load Reduction (%)		**58%**				
TMDL for Forest Prairie Creek (07020012-725)						
Wasteload Allocation	***WLA Totals***	0.00	0.00	0.00	0.00	0.00
Load Allocation	***LA Totals***	335.00	74.00	28.00	10.00	3.20
Margin Of Safety (5%)		18.00	3.90	1.40	0.54	0.17
	Loading Capacity (TMDL)	**353.00**	**77.90**	**29.40**	**10.54**	**3.37**
Estimated Load Reduction (%)		**70%**				
TMDL for Unnamed Creek (07020012-761)						
Wasteload Allocation	Le Sueur City MS4[1]	0.52	0.02	0.01	0.00	0.00
	WLA Totals	0.52	0.02	0.01	0.00	0.00
Load Allocation	***LA Totals***	62.00	20.00	7.00	2.40	0.69
Margin Of Safety (5%)		3.30	1.00	0.37	0.12	0.04
	Loading Capacity (TMDL)	**65.82**	**21.02**	**7.38**	**2.52**	**0.73**
Estimated Load Reduction (%)		**72%**				
TMDL for Unnamed Creek (07020012-756)						
Wasteload Allocation	***WLA Totals***	0.00	0.00	0.00	0.00	0.00
Load Allocation	***LA Totals***	10.00	4.30	2.30	1.20	0.53
Margin Of Safety (5%)		0.57	0.23	0.12	0.07	0.03
	Loading Capacity (TMDL)	**10.57**	**4.53**	**2.42**	**1.27**	**0.56**
Estimated Load Reduction (%)		**71%**				
TMDL for Unnamed Creek (07020012-753)						
Wasteload Allocation	***WLA Totals***	0.00	0.00	0.00	0.00	0.00
Load Allocation	***LA Totals***	1.80	0.71	0.38	0.21	0.09
Margin Of Safety (5%)		0.10	0.04	0.02	0.01	0.0046

Loading Capacity (TMDL)		**1.90**	**0.75**	**0.40**	**0.22**	**0.09**
Estimated Load Reduction (%)		**85%**				
TMDL for Big Possum Creek (07020012-749)						
Wasteload Allocation	***WLA Totals***	0.00	0.00	0.00	0.00	0.00
Load Allocation	***LA Totals***	11.00	4.40	2.30	1.30	0.53
Margin Of Safety (5%)		0.58	0.23	0.12	0.07	0.03
Loading Capacity (TMDL)		**11.58**	**4.63**	**2.42**	**1.37**	**0.56**
Estimated Load Reduction (%)		**83%**				
TMDL for Robert Creek (07020012-575)						
Wasteload Allocation	Belle Plaine WWTP (MN0022772)	19.00	19.00	--[a]	--[a]	--[a]
	Belle Plain City MS4[1]	2.30	0.41	--[a]	--[a]	--[a]
	WLA Totals	21.30	19.41	0.00	0.00	0.00
Load Allocation	***LA Totals***	52.00	9.50	--[a]	--[a]	--[a]
Margin Of Safety (5%)		3.90	1.50	0.80	0.45	0.19
Loading Capacity (TMDL)		**77.20**	**30.41**	**16.00**	**9.10**	**3.70**
Estimated Load Reduction (%)		**78%**				
TMDL for Unnamed Creek (Brewery Creek) (07020012-830)						
Wasteload Allocation	Belle Plain City MS4[1]	3.60	1.40	0.74	0.42	0.17
	WLA Totals	3.60	1.40	0.74	0.42	0.17
Load Allocation	***LA Totals***	28.00	11.00	5.80	3.30	1.30
Margin Of Safety (5%)		1.70	0.65	0.34	0.19	0.08
Loading Capacity (TMDL)		**33.30**	**13.05**	**6.88**	**3.91**	**1.55**
Estimated Load Reduction (%)		**91%**				
TMDL for Unnamed Creek (07020012-746)						
Wasteload Allocation	***WLA Totals***	0.00	0.00	0.00	0.00	0.00
Load Allocation	***LA Totals***	19.00	9.60	5.10	2.40	1.10
Unallocated Load		5.90	0.00	0.00	0.44	0.00
Margin Of Safety (5%)		1.30	0.51	0.27	0.15	0.06
Loading Capacity (TMDL)		**26.20**	**10.11**	**5.37**	**2.99**	**1.16**
Estimated Load Reduction (%)		**18%**				
TMDL for County Ditch 10 (07020012-628)						
Wasteload Allocation	Belle Plain City MS4[1]	0.04	0.01	0.01	0.00	0.00
	WLA Totals	0.04	0.01	0.01	0.00	0.00
Load Allocation	***LA Totals***	90.00	28.00	12.00	5.70	2.60
Margin Of Safety (5%)		4.70	1.50	0.65	0.30	0.13
Loading Capacity (TMDL)		**94.74**	**29.51**	**12.66**	**6.00**	**2.73**
Estimated Load Reduction (%)		**65%**				
TMDL for Raven Stream, West Branch (07020012-842)						
Wasteload Allocation	Belle Plain City MS4[1]	0.05	0.02	0.01	0.00	0.00

	WLA Totals	0.05	0.02	0.01	0.00	0.00
Load Allocation	***LA Totals***	236.00	75.00	27.00	12.00	4.80
Margin Of Safety (5%)		12.00	3.90	1.50	0.65	0.26
Loading Capacity (TMDL)		**248.05**	**78.92**	**28.51**	**12.65**	**5.06**
Estimated Load Reduction (%)		**--**				
TMDL for Raven Stream (07020012-716)						
Wasteload Allocation	New Prague WWTP (MN0020150)	8.70	8.70	8.70	8.70	8.70
	Belle Plain City MS4[1]	0.05	0.02	0.01	0.00	0.00
	New Prague City MS4[1]	14.00	4.40	1.50	0.52	0.01
	WLA Totals	22.75	13.12	10.21	9.22	8.71
Load Allocation	***LA Totals***	398.00	122.00	42.00	15.00	0.35
Margin Of Safety (5%)		22.00	7.10	2.80	1.20	0.47
Loading Capacity (TMDL)		**442.75**	**142.22**	**55.01**	**25.42**	**9.53**
Estimated Load Reduction (%)		**77%**				
TMDL for Porter Creek (07020012-817)						
Wasteload Allocation	Elko New Market City MS4 (MS400237)	2.90	0.79	0.33	0.14	0.05
	WLA Totals	2.90	0.79	0.33	0.14	0.05
Load Allocation	***LA Totals***	299.00	83.00	35.00	15.00	5.60
Margin Of Safety (5%)		16.00	4.40	1.80	0.79	0.30
Loading Capacity (TMDL)		**317.90**	**88.19**	**37.13**	**15.93**	**5.95**
Estimated Load Reduction (%)		**70%**				
TMDL for Sand Creek (07020012-513)						
Wasteload Allocation	Jordan WWTP (MN0020869)	6.20	6.20	6.20	6.20	--[a]
	Montgomery WWTP (MN0024210)	4.60	4.60	4.60	4.60	--[a]
	New Prague WWTP (MN0020150)	8.70	8.70	8.70	8.70	--[a]
	Belle Plain City MS4[1]	0.06	0.01	0.00	0.00	--[a]
	Elko New Market City MS4 (MS400237)	4.50	1.00	0.32	0.03	--[a]
	Jordan City MS4[1]	21.00	4.90	1.50	0.16	--[a]
	Louisville Township MS4 (MS400144)	18.00	4.30	1.30	0.14	--[a]
	New Prague City MS4[1]	26.00	6.00	1.80	0.19	--[a]
	Prior Lake City MS4 (MS400113)	21.00	5.00	1.50	0.16	--[a]
	Shakopee City MS4 (MS400120)	0.91	0.21	0.06	0.01	--[a]
	WLA Totals	110.97	40.92	25.99	20.19	0.00
Load Allocation	***LA Totals***	1952.00	454.00	136.00	15.00	--[a]
Margin Of Safety (5%)		109.00	26.00	8.60	1.80	0.36
Loading Capacity (TMDL)		**2171.97**	**520.92**	**170.59**	**36.99**	**7.20**

Estimated Load Reduction (%)		**68%**				
TMDL for Eagle Creek (07020012-519)						
Wasteload Allocation	MnDOT Metro MS4 (MS400170)	2.40	1.70	1.70	1.00	0.52
	Prior Lake City MS4 (MS400113)	0.86	0.63	0.61	0.37	0.19
	Savage City MS4 (MS400119)	30.00	22.00	21.00	13.00	6.60
	Scott County MS4 (MS400154)	1.90	1.40	1.30	0.82	0.42
	Shakopee City MS4 (MS400120)	24.00	17.00	17.00	10.00	5.20
	WLA Totals	59.16	42.73	41.61	25.19	12.93
Load Allocation	***LA Totals***	5.20	4.50	5.40	2.70	1.40
Unallocated Load		23.00	24.00	16.00	28.00	35.00
Margin Of Safety (5%)		4.60	3.70	3.30	3.00	2.60
Loading Capacity (TMDL)		**91.96**	**74.93**	**66.31**	**58.89**	**51.93**
Estimated Load Reduction (%)		**8%**				
TMDL for Credit River (07020012-811)						
Wasteload Allocation	Burnsville City MS4 (MS400076)	5.40	1.30	0.75	0.20	0.15
	Credit River Township MS4 (MS400131)	29.00	7.00	4.10	1.10	0.81
	Dakota County MS4 (MS400132)	0.60	0.14	0.08	0.02	0.02
	Lakeville City MS4 (MS400099)	12.00	2.90	1.70	0.45	0.33
	MnDOT Metro MS4 (MS400170)	0.32	0.08	0.04	0.01	0.01
	Prior Lake City MS4 (MS400113)	9.50	2.30	1.30	0.35	0.26
	Savage City MS4 (MS400119)	37.00	8.90	5.10	1.40	1.00
	Scott County MS4 (MS400154)	2.50	0.60	0.35	0.09	0.07
	Spring Lake Township MS4 (MS400156)	1.10	0.26	0.15	0.04	0.03
	WLA Totals	97.42	23.48	13.58	3.67	2.67
Load Allocation	***LA Totals***	139.00	32.00	19.00	5.10	3.80
Unallocated Load		0.00	12.00	0.00	4.70	0.00
Margin Of Safety (5%)		12.00	3.60	1.70	0.70	0.34
Loading Capacity (TMDL)		**248.42**	**71.08**	**34.28**	**14.17**	**6.81**
Estimated Load Reduction (%)		**71%**				

1 = MPCA calculated a WLA for communities which are soon to be covered under MS4 permit

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

Table 8: Bacteria (*E. coli*) TMDLs for the Lower Minnesota River Watershed (Part 2)

Allocation	Source	Very High	High	Mid	Low	Very Low
		E. coli (billions of bacteria/day)				
TMDL for Nine Mile Creek (07020012-809)						
Wasteload Allocation	Bloomington City MS4 (MS400005)	241.20	30.40	23.70	7.80	2.80
	Hennepin County MS4 (MS400138)	5.20	0.70	0.50	0.20	0.10
	MnDOT Metro District MS4 (MS400170)	4.50	0.60	0.40	0.10	0.05
	WLA Totals	250.90	31.70	24.60	8.10	2.95
Load Allocation	Marsh Lake Boundary Condition	25.20	6.40	2.60	1.30	0.50
	Watershed LA	32.40	4.10	3.20	1.00	0.40
	Unallocated Load	0.00	36.60	1.10	5.00	1.80
	LA Totals	57.60	47.10	6.90	7.30	2.70
Margin Of Safety (5%)		16.20	4.10	1.70	0.80	0.30
Loading Capacity (TMDL)		**324.70**	**82.90**	**33.20**	**16.20**	**5.95**
Estimated Load Reduction (%)		**41%**				
TMDL for Purgatory Creek (07020012-828)						
Wasteload Allocation	Bloomington City MS4 (MS400005)	9.40	8.00	2.30	0.90	0.30
	Eden Prairie City MS4 (MS400015)	27.70	23.40	6.70	2.60	0.90
	Hennepin County MS4 (MS400138)	1.00	0.80	0.20	0.10	0.03
	Hennepin Technical College MS4 (MS400199)	0.60	0.50	0.10	0.10	0.02
	MnDOT Metro District MS4 (MS400170)	1.70	1.40	0.40	0.20	0.10
	WLA Totals	40.40	34.10	9.70	3.90	1.35
Load Allocation	Staring Lake Boundary Condition	13.50	4.70	1.30	0.60	0.20
	Watershed LA	14.20	12.00	3.50	1.30	0.50
	Unallocated Load	79.10	0.00	0.00	0.50	0.00
	LA Totals	106.80	16.70	4.80	2.40	0.70
Margin Of Safety (5%)		7.80	2.70	0.80	0.30	0.10
Loading Capacity (TMDL)		**155.00**	**53.50**	**15.30**	**6.60**	**2.15**
Estimated Load Reduction (%)		**68%**				
TMDL for Riley Creek (07020012-511)						
Wasteload Allocation	Eden Prairie City MS4 (MS400015)	6.00	4.90	1.80	1.30	1.00

	Hennepin County MS4 (MS400138)	0.20	0.10	0.10	0.04	0.03
	WLA Totals	6.20	5.00	1.90	1.34	1.03
Load Allocation	Riley Lake Boundary Condition	4.40	1.20	0.40	0.30	0.20
	Watershed LA	7.80	6.40	2.40	1.70	1.30
	Unallocated Load	29.70	0.00	0.00	0.00	0.00
	LA Totals	41.90	7.60	2.80	2.00	1.50
Margin Of Safety (5%)		2.50	0.70	0.20	0.20	0.10
Loading Capacity (TMDL)		**50.60**	**13.30**	**4.90**	**3.54**	**2.63**
Estimated Load Reduction (%)		**81%**				

Table 9: Total Phosphorus (TP) Lake TMDLs for the Lower Minnesota River Watershed (Part 1)

Allocation	Source	Existing TP Load		TMDL TP Load		Estimated Load Reduction	
		lbs/yr	lbs/day	lbs/yr	lbs/day	lbs/yr	%
TP TMDL for High Island Lake (72-0050-01)							
Wasteload Allocation	Construction Stormwater (MNR100001)	5.86	0.016	5.86	0.016	0.00	0%
	Industrial Stormwater (MNR050000)	5.86	0.016	5.86	0.016	0.00	0%
	WLA Totals	**11.72**	**0.032**	**11.72**	**0.032**	**0.00**	**0%**
Load Allocation	Watershed Load	5203.00	14.255	3016.00	8.263	2187.00	42%
	SSTS	9.00	0.025	5.00	0.014	4.00	44%
	Atmospheric Deposition	498.00	1.364	498.00	1.364	0.00	0%
	Internal Load	25297.00	69.307	1266.00	3.468	24031.00	95%
	LA Totals	**31007.00**	**84.951**	**4785.00**	**13.110**	**26222.00**	**85%**
Margin Of Safety (5%)		--	--	253.00	0.693	--	--
	Loading Capacity (TMDL)	**31018.72**	**84.983**	**5049.72**	**13.835**	**26222.00**	**85%**
TP TMDL for Silver Lake (72-0013-00)							
Wasteload Allocation	Construction Stormwater (MNR100001)	3.26	0.009	3.26	0.009	0.00	0%
	Industrial Stormwater (MNR050000)	3.26	0.009	3.26	0.009	0.00	0%
	WLA Totals	**6.52**	**0.018**	**6.52**	**0.018**	**0.00**	**0%**
Load Allocation	Watershed Load	2621.00	7.181	895.00	2.452	1726.00	66%
	SSTS	10.00	0.027	6.00	0.016	4.00	40%
	Atmospheric Deposition	242.00	0.663	242.00	0.663	0.00	0%
	Internal Load	7944.00	21.764	80.00	0.219	7864.00	99%
	LA Totals	**10817.00**	**29.636**	**1223.00**	**3.351**	**9594.00**	**89%**
Margin Of Safety (5%)		--	--	64.70	0.177	--	--
	Loading Capacity (TMDL)	**10823.52**	**29.653**	**1294.22**	**3.546**	**9594.00**	**89%**
TP TMDL for Lake Titlow (72-0042-00)							
Wasteload Allocation	Construction Stormwater (MNR100001)	4.86	0.013	4.86	0.013	0.00	0%
	Industrial Stormwater (MNR050000)	4.86	0.013	4.86	0.013	0.00	0%
	WLA Totals	**9.72**	**0.027**	**9.72**	**0.027**	**0.00**	**0%**
Load Allocation	Watershed Load	20226.00	55.414	4490.00	12.301	15736.00	78%
	Atmospheric Deposition	319.00	0.874	319.00	0.874	0.00	0%
	Internal Load	8751.00	23.975	438.00	1.200	8313.00	95%
	LA Totals	**29296.00**	**80.263**	**5247.00**	**14.375**	**24049.00**	**82%**
Margin Of Safety (5%)		--	--	276.00	0.756	--	--
	Loading Capacity (TMDL)	**29305.72**	**80.290**	**5532.72**	**15.158**	**24049.00**	**82%**
TP TMDL for Sibley Lake (72-0089-00)							
Wasteload Allocation	Construction Stormwater (MNR100001)	0.11	0.000	1.11	0.003	-1.00	-909%

	Industrial Stormwater (MNR050000)	1.11	0.003	1.11	0.003	0.00	0%
	WLA Totals	**1.22**	**0.003**	**2.22**	**0.006**	**-1.00**	**-82%**
Load Allocation	Watershed Load	1051.00	2.879	295.00	0.808	756.00	72%
	SSTS	9.00	0.025	6.00	0.016	3.00	33%
	Atmospheric Deposition	189.00	0.518	189.00	0.518	0.00	0%
	Internal Load	1741.00	4.770	1018.00	2.789	723.00	42%
	LA Totals	**2990.00**	**8.192**	**1508.00**	**4.132**	**1482.00**	**50%**
Margin Of Safety (5%)		--	--	79.50	0.218	--	--
Loading Capacity (TMDL)		**2991.22**	**8.195**	**1589.72**	**4.355**	**1481.00**	**50%**
TP TMDL for Rutz Lake (10-0080-00)							
Wasteload Allocation	Construction Stormwater (MNR100001)	0.42	0.001	0.42	0.001	0.00	0%
	Industrial Stormwater (MNR050000)	0.42	0.001	0.42	0.001	0.00	0%
	WLA Totals	**0.84**	**0.002**	**0.84**	**0.002**	**0.00**	**0%**
Load Allocation	Watershed Load	261.00	0.715	69.00	0.189	192.00	74%
	SSTS	8.00	0.022	4.00	0.011	4.00	50%
	Atmospheric Deposition	21.00	0.058	21.00	0.058	0.00	0%
	Internal Load	282.00	0.773	14.00	0.038	268.00	95%
	LA Totals	**572.00**	**1.567**	**108.00**	**0.296**	**464.00**	**81%**
Margin Of Safety (5%)		--	--	5.75	0.016	--	--
Loading Capacity (TMDL)		**572.84**	**1.569**	**114.59**	**0.314**	**464.00**	**81%**
TP TMDL for Greenleaf Lake (40-0020-00)							
Wasteload Allocation	Construction Stormwater (MNR100001)	0.24	0.001	0.24	0.001	0.00	0%
	Industrial Stormwater (MNR050000)	0.24	0.001	0.24	0.001	0.00	0%
	WLA Totals	**0.48**	**0.001**	**0.48**	**0.001**	**0.00**	**0%**
Load Allocation	Watershed Load	883.00	2.419	290.00	0.795	593.00	67%
	SSTS	10.00	0.027	8.00	0.022	2.00	20%
	Atmospheric Deposition	113.00	0.310	113.00	0.310	0.00	0%
	Internal Load	707.00	1.937	177.00	0.485	530.00	75%
	LA Totals	**1713.00**	**4.693**	**588.00**	**1.611**	**1125.00**	**66%**
Margin Of Safety (5%)		--	--	31.00	0.085	--	--
Loading Capacity (TMDL)		**1713.48**	**4.694**	**619.48**	**1.697**	**1125.00**	**66%**
TP TMDL for Le Sueur Lake (40-0079-00)							
Wasteload Allocation	Construction Stormwater (MNR100001)	0.74	0.002	0.74	0.002	0.00	0%
	Industrial Stormwater (MNR050000)	0.74	0.002	0.74	0.002	0.00	0%
	WLA Totals	**1.49**	**0.004**	**1.49**	**0.004**	**0.00**	**0%**
Load Allocation	Watershed Load	2753.00	7.542	395.00	1.082	2358.00	86%
	SSTS	13.00	0.036	10.00	0.027	3.00	23%
	Atmospheric Deposition	105.00	0.288	105.00	0.288	0.00	0%
	Internal Load	13012.00	35.649	130.00	0.356	12882.00	99%

	LA Totals	**15883.00**	**43.515**	**640.00**	**1.753**	**15243.00**	**96%**
Margin Of Safety (5%)		--	--	33.80	0.093	--	--
Loading Capacity (TMDL)		**15884.49**	**43.519**	**675.29**	**1.850**	**15243.00**	**96%**
TP TMDL for Hatch Lake (66-0063-00)							
Wasteload Allocation	Construction Stormwater (MNR100001)	0.08	0.000	0.08	0.000	0.00	0%
	Industrial Stormwater (MNR050000)	0.08	0.000	0.08	0.000	0.00	0%
	WLA Totals	**0.16**	**0.000**	**0.16**	**0.000**	**0.00**	**0%**
Load Allocation	Watershed Load	161.00	0.441	19.60	0.054	141.40	88%
	SSTS	1.00	0.003	1.00	0.003	0.00	0%
	Atmospheric Deposition	24.00	0.066	24.00	0.066	0.00	0%
	Internal Load	1302.00	3.567	13.00	0.036	1289.00	99%
	LA Totals	**1488.00**	**4.077**	**57.60**	**0.158**	**1430.40**	**96%**
Margin Of Safety (5%)		--	--	3.05	0.008	--	--
Loading Capacity (TMDL)		**1488.16**	**4.077**	**60.81**	**0.167**	**1430.40**	**96%**
TP TMDL for Cody Lake (66-0061-00)							
Wasteload Allocation	Construction Stormwater (MNR100001)	4.17	0.011	4.17	0.011	0.00	0%
	Industrial Stormwater (MNR050000)	4.17	0.011	4.17	0.011	0.00	0%
	WLA Totals	**8.34**	**0.023**	**8.34**	**0.023**	**0.00**	**0%**
Load Allocation	Hatch and Lemay Lakes	3385.00	9.274	551.00	1.510	2834.00	84%
	Watershed Load	8512.00	23.321	1115.00	3.055	7397.00	87%
	SSTS	17.00	0.047	11.00	0.030	6.00	35%
	Atmospheric Deposition	92.00	0.252	92.00	0.252	0.00	0%
	Internal Load	8064.00	22.093	81.00	0.222	7983.00	99%
	LA Totals	**20070.00**	**54.986**	**1850.00**	**5.068**	**18220.00**	**91%**
Margin Of Safety (5%)		--	--	97.80	0.268	--	--
Loading Capacity (TMDL)		**20078.34**	**55.009**	**1956.14**	**5.359**	**18220.00**	**91%**
TP TMDL for Phelps Lake (66-0062-00)							
Wasteload Allocation	Construction Stormwater (MNR100001)	0.62	0.002	0.62	0.002	0.00	0%
	Industrial Stormwater (MNR050000)	0.62	0.002	0.62	0.002	0.00	0%
	WLA Totals	**1.25**	**0.003**	**1.25**	**0.003**	**0.00**	**0%**
Load Allocation	Cody Lake	9196.00	25.195	1339.00	3.668	7857.00	85%
	Watershed Load	1271.00	3.482	433.00	1.186	838.00	66%
	SSTS	5.00	0.014	3.00	0.008	2.00	40%
	Atmospheric Deposition	109.00	0.299	109.00	0.299	0.00	0%
	Internal Load	8077.00	22.129	81.00	0.222	7996.00	99%
	LA Totals	**18658.00**	**51.118**	**1965.00**	**5.384**	**16693.00**	**89%**
Margin Of Safety (5%)		--	--	104.00	0.285	--	--
Loading Capacity (TMDL)		**18659.25**	**51.121**	**2070.25**	**5.672**	**16693.00**	**89%**
TP TMDL for Pepin Lake (40-0028-00)							

Wasteload Allocation	Construction Stormwater (MNR100001)	1.15	0.003	1.15	0.003	0.00	0%
	Industrial Stormwater (MNR050000)	1.15	0.003	1.15	0.003	0.00	0%
	WLA Totals	**2.30**	**0.006**	**2.30**	**0.006**	**0.00**	**0%**
Load Allocation	Watershed Load	4255.00	11.658	1027.00	2.814	3228.00	76%
	SSTS	20.00	0.055	16.00	0.044	4.00	20%
	Atmospheric Deposition	147.00	0.403	147.00	0.403	0.00	0%
	Internal Load	9987.00	27.362	100.00	0.274	9887.00	99%
	LA Totals	**14409.00**	**39.477**	**1290.00**	**3.534**	**13119.00**	**91%**
Margin Of Safety (5%)		--	--	68.00	0.186	--	--
Loading Capacity (TMDL)		**14411.30**	**39.483**	**1360.30**	**3.727**	**13119.00**	**91%**
TP TMDL for Lake Sanborn (40-0027-00)							
Wasteload Allocation	Construction Stormwater (MNR100001)	0.52	0.001	0.52	0.001	0.00	0%
	Industrial Stormwater (MNR050000)	0.52	0.001	0.52	0.001	0.00	0%
	WLA Totals	**1.05**	**0.003**	**1.05**	**0.003**	**0.00**	**0%**
Load Allocation	Watershed Load	1357.00	3.718	420.00	1.151	937.00	69%
	SSTS	5.00	0.014	4.00	0.011	1.00	20%
	Atmospheric Deposition	116.00	0.318	116.00	0.318	0.00	0%
	Internal Load	1248.00	3.419	12.00	0.033	1236.00	99%
	LA Totals	**2726.00**	**7.468**	**552.00**	**1.512**	**2174.00**	**80%**
Margin Of Safety (5%)		--	--	29.10	0.080	--	--
Loading Capacity (TMDL)		**2727.05**	**7.471**	**582.15**	**1.595**	**2174.00**	**80%**
TP TMDL for Pleasant Lake (70-0098-00)							
Wasteload Allocation	Construction Stormwater (MNR100001)	0.63	0.002	0.63	0.002	0.00	0%
	Industrial Stormwater (MNR050000)	0.63	0.002	0.63	0.002	0.00	0%
	WLA Totals	**1.27**	**0.003**	**1.27**	**0.003**	**0.00**	**0%**
Load Allocation	Watershed Load	227.00	0.622	46.00	0.126	181.00	80%
	SSTS	41.00	0.112	20.00	0.055	21.00	51%
	Atmospheric Deposition	119.00	0.326	119.00	0.326	0.00	0%
	Internal Load	651.00	1.784	165.00	0.452	486.00	75%
	LA Totals	**1038.00**	**2.844**	**350.00**	**0.959**	**688.00**	**66%**
Margin Of Safety (5%)		--	--	18.50	0.051	--	--
Loading Capacity (TMDL)		**1039.27**	**2.847**	**369.77**	**1.013**	**688.00**	**66%**
TP TMDL for Catherine Lake (70-0029-00)							
Wasteload Allocation	Elko New Market City MS4 (MS400237)	59.70	0.164	16.10	0.044	43.60	73%
	Construction Stormwater (MNR100001)	9.03	0.025	9.03	0.025	0.00	0%
	Industrial Stormwater (MNR050000)	9.03	0.025	9.03	0.025	0.00	0%
	WLA Totals	**77.76**	**0.213**	**34.16**	**0.094**	**43.60**	**56%**
Load Allocation	Watershed Load	3171.00	8.688	791.00	2.167	2380.00	75%

	SSTS	28.00	0.077	14.00	0.038	14.00	50%
	Atmospheric Deposition	51.00	0.140	51.00	0.140	0.00	0%
	Internal Load	6599.00	18.079	66.00	0.181	6533.00	99%
	LA Totals	**9849.00**	**26.984**	**922.00**	**2.526**	**8927.00**	**91%**
Margin Of Safety (5%)		--	--	50.40	0.138	--	--
Loading Capacity (TMDL)		**9926.76**	**27.197**	**1006.56**	**2.758**	**8970.60**	**90%**
TP TMDL for Cynthia Lake (70-0052-00)							
Wasteload Allocation	Construction Stormwater (MNR100001)	1.46	0.004	1.46	0.004	0.00	0%
	Industrial Stormwater (MNR050000)	1.46	0.004	1.46	0.004	0.00	0%
	WLA Totals	**2.92**	**0.008**	**2.92**	**0.008**	**0.00**	**0%**
Load Allocation	St. Catherine Lake	2800.00	7.671	583.00	1.597	2217.00	79%
	Watershed Load	523.00	1.433	456.00	1.249	67.00	13%
	SSTS	16.00	0.044	8.00	0.022	8.00	50%
	Atmospheric Deposition	74.00	0.203	74.00	0.203	0.00	0%
	Internal Load	17393.00	47.652	225.00	0.616	17168.00	99%
	LA Totals	**20806.00**	**57.003**	**1346.00**	**3.688**	**19460.00**	**94%**
Margin Of Safety (5%)		--	--	71.00	0.195	--	--
Loading Capacity (TMDL)		**20808.92**	**57.011**	**1419.92**	**3.890**	**19460.00**	**94%**
TP TMDL for Thole Lake (70-0120-01)							
Wasteload Allocation	Louisville Township MS4 (MS400144)	58.50	0.160	40.80	0.112	17.70	30%
	Construction Stormwater (MNR100001)	0.36	0.001	0.36	0.001	0.00	0%
	Industrial Stormwater (MNR050000)	0.36	0.001	0.36	0.001	0.00	0%
	WLA Totals	**59.21**	**0.162**	**41.51**	**0.114**	**17.70**	**30%**
Load Allocation	Upstream Boundary Condition - O'Dowd Lake	24.60	0.067	24.60	0.067	0.00	0%
	Schneider Lake	74.10	0.203	39.40	0.108	34.70	47%
	Watershed Load	8.80	0.024	6.14	0.017	2.66	30%
	SSTS	107.00	0.293	65.00	0.178	42.00	39%
	Atmospheric Deposition	44.40	0.122	44.40	0.122	0.00	0%
	Internal Load	886.00	2.427	158.00	0.433	728.00	82%
	LA Totals	**1144.90**	**3.137**	**337.54**	**0.925**	**807.36**	**71%**
Margin Of Safety (5%)		--	--	20.00	0.055	--	--
Loading Capacity (TMDL)		**1204.11**	**3.299**	**399.05**	**1.093**	**825.06**	**69%**
TP TMDL for Cleary Lake (70-0022-00)							
Wasteload Allocation	City of Prior Lake MS4 (MS400113)	119.00	0.326	29.30	0.080	89.70	75%
	Credit River Township MS4 (MS400131)	53.50	0.147	13.20	0.036	40.30	75%
	Spring Lake Township MS4 (MS400156)	35.70	0.098	8.78	0.024	26.92	75%
	Scott County MS4 (MS400154)	5.08	0.014	1.25	0.003	3.83	75%

	Construction Stormwater (MNR100001)	3.43	0.009	3.43	0.009	0.00	0%
	Industrial Stormwater (MNR050000)	3.43	0.009	3.43	0.009	0.00	0%
	WLA Totals	**220.14**	**0.603**	**59.39**	**0.163**	**160.75**	**73%**
Load Allocation	Watershed Load	1152.00	3.156	283.00	0.775	869.00	75%
	Atmospheric Deposition	59.00	0.162	59.00	0.162	0.00	0%
	Internal Load	666.00	1.825	33.30	0.091	632.70	95%
	LA Totals	**1877.00**	**5.142**	**375.30**	**1.028**	**1501.70**	**80%**
Margin Of Safety (5%)		--	--	22.90	0.063	--	--
Loading Capacity (TMDL)		**2097.14**	**5.746**	**457.59**	**1.254**	**1662.45**	**79%**
TP TMDL for Fish Lake (70-0069-00)							
Wasteload Allocation	Construction Stormwater (MNR100001)	1.09	0.003	1.09	0.003	0.00	0%
	Industrial Stormwater (MNR050000)	1.09	0.003	1.09	0.003	0.00	0%
	WLA Totals	**2.18**	**0.006**	**2.18**	**0.006**	**0.00**	**0%**
Load Allocation	Watershed and Internal Load	435.00	1.192	381.00	1.044	54.00	12%
	SSTS	81.40	0.223	56.10	0.154	25.30	31%
	Atmospheric Deposition	63.70	0.175	63.70	0.175	0.00	0%
	LA Totals	**580.10**	**1.589**	**500.80**	**1.372**	**79.30**	**14%**
Margin Of Safety (5%)		--	--	26.50	0.073	--	--
Loading Capacity (TMDL)		**582.28**	**1.595**	**529.48**	**1.451**	**79.30**	**14%**
TP TMDL for Pike Lake (70-0076-00)							
Wasteload Allocation	Prior Lake City MS4 (MS400113) - Watershed Runoff	750.00	2.055	553.00	1.515	197.00	26%
	Prior Lake City MS4 (MS400113) - Feedlots	556.00	1.523	0.00	0.000	556.00	100%
	Scott County MS4 (MS400154)	36.70	0.101	27.10	0.074	9.60	26%
	Prior Lake-Spring Lake Watershed District MS4 (MS400189)	1.36	0.004	1.36	0.004	0.00	0%
	Construction Stormwater (MNR100001)	2.00	0.005	2.00	0.005	0.00	0%
	Industrial Stormwater (MNR050000)	2.00	0.005	2.00	0.005	0.00	0%
	WLA Totals	**1348.06**	**3.693**	**585.46**	**1.604**	**762.60**	**57%**
Load Allocation	Upstream Boundary Condition - Lower Prior Lake	957.00	2.622	957.00	2.622	0.00	0%
	Watershed Load	5.94	0.016	4.38	0.012	1.56	26%
	Atmospheric Deposition	19.00	0.052	19.00	0.052	0.00	0%
	Internal Load (East Basin)	2631.00	7.208	17.00	0.047	2614.00	99%
	Internal Load (West Basin)	326.00	0.893	41.60	0.114	284.40	87%
	LA Totals	**3938.94**	**10.792**	**1038.98**	**2.847**	**2899.96**	**74%**
Margin Of Safety (5%)		--	--	85.50	0.234	--	--
Loading Capacity (TMDL)		**5287.00**	**14.485**	**1709.94**	**4.685**	**3662.56**	**69%**

Table 10: Total Phosphorus (TP) Lake TMDLs for the Lower Minnesota River Watershed (Part 2)

Allocation	Source	Existing TP Load		TMDL TP Load		Estimated Load Reduction	
		lbs/yr	lbs/day	lbs/yr	lbs/day	lbs/yr	%
TP TMDL for Silver Lake (27-0136-00)							
Wasteload Allocation	Chanhassen MS4 (MS400079)	27.00	0.074	21.00	0.058	6.00	22%
	Shorewood MS4 (MS400122)	87.00	0.238	70.00	0.192	17.00	20%
	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000)	1.00	0.003	1.00	0.003	0.00	0%
	WLA Totals	**115.00**	**0.315**	**92.00**	**0.252**	**23.00**	**20%**
Load Allocation	Atmospheric Deposition	26.00	0.071	26.00	0.071	0.00	0%
	Internal Load	58.00	0.159	37.00	0.101	21.00	36%
	Erosion Sources	20.00	0.055	16.00	0.044	4.00	20%
	Groundwater	5.00	0.014	5.00	0.014	0.00	0%
	LA Totals	**109.00**	**0.299**	**84.00**	**0.230**	**25.00**	**23%**
Margin Of Safety (5%)		--	--	9.00	0.025	--	--
Loading Capacity (TMDL)		**224.00**	**0.614**	**185.00**	**0.507**	**48.00**	**21%**
TP TMDL for Lotus Lake (10-0006-00)							
Wasteload Allocation	MnDOT Metro District MS4 (MS400170)	3.00	0.008	3.00	0.008	0.00	0%
	Carver County MS4 (MS400079)	2.00	0.005	2.00	0.005	0.00	0%
	Chanhassen MS4 (MS400079)	291.00	0.797	241.00	0.660	50.00	17%
	Eden Prairie City MS4 (MS400015)	7.00	0.019	7.00	0.019	0.00	0%
	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000)	3.00	0.008	3.00	0.008	0.00	0%
	WLA Totals	**306.00**	**0.838**	**256.00**	**0.701**	**50.00**	**16%**
Load Allocation	Atmospheric Deposition	88.00	0.241	88.00	0.241	0.00	0%
	Internal Load	732.00	2.005	247.00	0.677	485.00	66%
	Erosion Sources	7.00	0.019	1.00	0.003	6.00	86%
	Groundwater	7.00	0.019	7.00	0.019	0.00	0%
	LA Totals	**834.00**	**2.285**	**343.00**	**0.940**	**491.00**	**59%**
Margin Of Safety (5%)		--	--	32.00	0.088	--	--
Loading Capacity (TMDL)		**1140.00**	**3.123**	**631.00**	**1.729**	**541.00**	**47%**
TP TMDL for Staring Lake (27-0078-00)							
Wasteload Allocation	MnDOT Metro District MS4 (MS400170)	88.00	0.241	63.00	0.173	25.00	28%
	Hennepin County MS4 (MS400138)	19.00	0.052	19.00	0.052	0.00	0%
	Chanhassen MS4 (MS400079)	1.00	0.003	1.00	0.003	0.00	0%
	Eden Prairie City MS4 (MS400015)	627.00	1.718	449.00	1.230	178.00	28%
	Deephaven MS4 (MS400013)	21.00	0.058	21.00	0.058	0.00	0%
	Minnetonka MS4 (MS400035)	185.00	0.507	185.00	0.507	0.00	0%
	Shorewood MS4 (MS400122)	8.00	0.022	8.00	0.022	0.00	0%

	Hennepin Technical College MS4 (MS400199)	14.00	0.038	14.00	0.038	0.00	0%
	Eden Prairie Well Houses MS4 (MNG250084)	1.00	0.003	1.00	0.003	0.00	0%
	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000)	8.00	0.022	8.00	0.022	0.00	0%
	WLA Totals	**972.00**	**2.663**	**769.00**	**2.107**	**203.0000**	**21%**
Load Allocation	Atmospheric Deposition	61.00	0.167	61.00	0.167	0.00	0%
	Internal Load	920.00	2.521	447.00	1.225	473.00	51%
	Upstream Lakes	284.00	0.778	253.00	0.693	31.00	11%
	Erosion Sources	102.00	0.279	13.00	0.036	89.00	87%
	LA Totals	**1367.00**	**3.745**	**774.00**	**2.121**	**593.00**	**43%**
Margin Of Safety (5%)		--	--	81.00	0.222	--	--
Loading Capacity (TMDL)		**2339.00**	**6.408**	**1624.00**	**4.449**	**796.00**	**34%**
TP TMDL for Lake Susan (10-0013-00)							
Wasteload Allocation	MnDOT Metro District MS4 (MS400170)	27.00	0.074	27.00	0.074	0.00	0%
	Carver County MS4 (MS400079)	9.00	0.025	9.00	0.025	0.00	0%
	Chanhassen MS4 (MS400079)	241.00	0.660	191.00	0.523	50.00	21%
	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000)	2.00	0.005	2.00	0.005	0.00	0%
	WLA Totals	**279.00**	**0.764**	**229.00**	**0.627**	**50.00**	**18%**
Load Allocation	Atmospheric Deposition	33.00	0.090	33.00	0.090	0.00	0%
	Internal Load	496.00	1.359	496.00	1.359	0.00	0%
	Upstream Lakes	20.00	0.055	20.00	0.055	0.00	0%
	Erosion Sources	400.00	1.096	134.00	0.367	266.00	67%
	Groundwater	33.00	0.090	33.00	0.090	0.00	0%
	LA Totals	**982.00**	**2.690**	**716.00**	**1.962**	**266.00**	**27%**
Margin Of Safety (5%)		--	--	50.00	0.137	--	--
Loading Capacity (TMDL)		**1261.00**	**3.455**	**995.00**	**2.726**	**316.00**	**25%**
TP TMDL for Rice Marsh Lake (10-0001-00)							
Wasteload Allocation	MnDOT Metro District MS4 (MS400170)	97.00	0.266	68.00	0.186	29.00	30%
	Carver County MS4 (MS400079)	21.00	0.058	15.00	0.041	6.00	29%
	Chanhassen MS4 (MS400079)	504.00	1.381	353.00	0.967	151.00	30%
	Eden Prairie City MS4 (MS400015)	83.00	0.227	64.00	0.175	19.00	23%
	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000)	6.00	0.016	6.00	0.016	0.00	0%
	WLA Totals	**711.00**	**1.948**	**506.00**	**1.386**	**205.0000**	**29%**
Load Allocation	Atmospheric Deposition	69.00	0.189	69.00	0.189	0.00	0%
	Internal Load	539.00	1.477	108.00	0.296	431.00	80%
	Upstream Lakes	323.00	0.885	230.00	0.630	93.00	29%
	LA Totals	**931.00**	**2.551**	**407.00**	**1.115**	**524.00**	**56%**
Margin Of Safety (5%)		--	--	48.00	0.132	--	--

	Loading Capacity (TMDL)	**1642.00**	**4.499**	**961.00**	**2.633**	**729.00**	**44%**
TP TMDL for Lake Riley (10-0002-00)							
Wasteload Allocation	MnDOT Metro District MS4 (MS400170)	75.00	0.205	75.00	0.205	0.00	0%
	Chanhassen MS4 (MS400079)	384.00	1.052	328.00	0.899	56.00	15%
	Eden Prairie City MS4 (MS400015)	363.00	0.995	350.00	0.959	13.00	4%
	Carver County MS4 (MS400079)	8.00	0.022	8.00	0.022	0.00	0%
	Hennepin County MS4 (MS400138)	5.00	0.014	5.00	0.014	0.00	0%
	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000)	8.00	0.022	8.00	0.022	0.00	0%
	WLA Totals	**843.00**	**2.310**	**774.00**	**2.121**	**69.0000**	**8%**
Load Allocation	Atmospheric Deposition	110.00	0.301	110.00	0.301	0.00	0%
	Internal Load	1083.00	2.967	637.00	1.745	446.00	41%
	Upstream Lakes	665.00	1.822	366.00	1.003	299.00	45%
	LA Totals	**1858.00**	**5.090**	**1113.00**	**3.049**	**745.00**	**40%**
Margin Of Safety (5%)		--	--	99.00	0.27	--	--
	Loading Capacity (TMDL)	**2701.00**	**7.400**	**1986.00**	**5.441**	**814.00**	**30%**
TP TMDL for Hyland Lake (27-0048-00)							
Wasteload Allocation	Bloomington MS4 (MS400005)	90.00	0.247	90.00	0.247	0.00	0%
	Hennepin County MS4 (MS400138)	0.05	0.0001	0.05	0.000	0.00	0%
	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000)	0.40	0.001	0.40	0.001	0.00	0%
	WLA Totals	**90.45**	**0.248**	**90.45**	**0.248**	**0.0000**	**0%**
Load Allocation	Atmospheric Deposition	30.00	0.082	30.00	0.082	0.00	0%
	Internal Load	484.00	1.326	164.00	0.449	320.00	66%
	LA Totals	**514.00**	**1.408**	**194.00**	**0.532**	**320.00**	**62%**
Margin Of Safety (5%)		--	--	15.00	0.041	--	--
	Loading Capacity (TMDL)	**604.45**	**1.656**	**299.45**	**0.820**	**320.00**	**53%**
TP TMDL for Wing Lake (27-0091-00)							
Wasteload Allocation	Minnetonka MS4 (MS400035)	20.00	0.164	20.00	0.164	0.00	0%
	Hennepin County MS4 (MS400138)	0.40	0.003	0.50	0.004	0.00	0%
	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000)	0.20	0.002	0.20	0.002	0.00	0%
	WLA Totals	**20.60**	**0.169**	**20.70**	**0.170**	**0.0000**	**0%**
Load Allocation	Atmospheric Deposition	2.00	0.016	2.00	0.016	0.00	0%
	Internal Load	56.00	0.459	28.00	0.230	28.00	50%
	Upstream Lakes	25.00	0.205	13.00	0.107	12.00	48%
	Groundwater	1.00	0.008	1.00	0.008	0.00	0%
	LA Totals	**84.00**	**0.689**	**44.00**	**0.361**	**40.00**	**48%**
Margin Of Safety (5%)		--	--	3.00	0.025	--	--
	Loading Capacity (TMDL)	**104.60**	**0.857**	**67.70**	**0.555**	**40.00**	**38%**

TP TMDL for Lake Rose (27-0092-00)							
Wasteload Allocation	Minnetonka MS4 (MS400035)	27.00	0.221	20.00	0.164	7.00	26%
	Hennepin County MS4 (MS400138)	1.00	0.008	1.00	0.008	0.00	0%
	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000)	0.20	0.002	0.20	0.002	0.00	0%
	WLA Totals	**28.20**	**0.231**	**21.20**	**0.174**	**7.0000**	**25%**
Load Allocation	Atmospheric Deposition	2.00	0.016	2.00	0.016	0.00	0%
	Internal Load	19.00	0.156	4.00	0.033	15.00	79%
	Upstream Lakes	26.00	0.213	17.00	0.139	9.00	35%
	LA Totals	**47.00**	**0.385**	**23.00**	**0.189**	**24.00**	**51%**
Margin Of Safety (5%)		--	--	2.00	0.016	--	--
Loading Capacity (TMDL)		**75.20**	**0.616**	**46.20**	**0.379**	**31.00**	**41%**
TP TMDL for North Cornelia Lake (27-0028-01)							
Wasteload Allocation	Edina MS4 (MS400016)	182.00	1.492	93.00	0.762	89.00	49%
	Richfield MS4 (MS400045)	2.00	0.016	2.00	0.016	0.00	0%
	MnDOT Metro District MS4 (MS400170)	34.00	0.279	17.00	0.139	17.00	50%
	Hennepin County MS4 (MS400138)	8.00	0.066	4.00	0.033	4.00	50%
	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000)	1.00	0.008	1.00	0.008	0.00	0%
	WLA Totals	**227.00**	**1.861**	**117.00**	**0.959**	**110.00**	**48%**
Load Allocation	Atmospheric Deposition	3.00	0.025	3.00	0.025	0.00	0%
	Internal Load	130.00	1.066	26.00	0.213	104.00	80%
	LA Totals	**133.00**	**1.090**	**29.00**	**0.238**	**104.00**	**78%**
Margin Of Safety (5%)		--	--	8.00	0.066	--	--
Loading Capacity (TMDL)		**360.00**	**2.95**	**154.00**	**1.262**	**214.00**	**59%**
TP TMDL for South Cornelia Lake (27-0028-02)							
Wasteload Allocation	Edina MS4 (MS400016)	26.00	0.213	26.00	0.213	0.00	0%
	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000)	0.30	0.002	0.30	0.002	0.00	0%
	WLA Totals	**26.30**	**0.216**	**26.30**	**0.216**	**0.0000**	**0%**
Load Allocation	Atmospheric Deposition	4.00	0.033	4.00	0.033	0.00	0%
	Upstream Lakes	181.00	1.484	81.00	0.664	100.00	55%
	Internal Load	199.00	1.631	49.00	0.402	150.00	75%
	LA Totals	**384.00**	**3.148**	**134.00**	**1.098**	**250.00**	**65%**
Margin Of Safety (5%)		--	--	8.00	0.066	--	--
Loading Capacity (TMDL)		**410.30**	**3.36**	**168.30**	**1.380**	**250.00**	**61%**
TP TMDL for Edina Lake (27-0029-00)							
Wasteload Allocation	Edina MS4 (MS400016)	112.00	0.918	74.00	0.607	38.00	34%
	MnDOT Metro District MS4 (MS400170)	4.00	0.033	4.00	0.033	0.00	0%

	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000)	1.00	0.008	1.00	0.008	0.00	0%
	WLA Totals	**117.00**	**0.959**	**79.00**	**0.648**	**38.00**	**32%**
Load Allocation	Atmospheric Deposition	3.00	0.025	3.00	0.025	0.00	0%
	Upstream Lakes	116.00	0.951	64.00	0.525	52.00	45%
	Internal Load	25.00	0.205	25.00	0.205	0.00	0%
	LA Totals	**144.00**	**1.180**	**92.00**	**0.754**	**52.00**	**36%**
Margin Of Safety (5%)		--	--	9.00	0.074	--	--
Loading Capacity (TMDL)		**261.00**	**2.14**	**180.00**	**1.475**	**90.00**	**34%**
TP TMDL for Penn Lake (27-0004-00)							
Wasteload Allocation	Bloomington MS4 (MS400005)	260.00	2.131	150.00	1.230	110.00	42%
	Richfield MS4 (MS400045)	47.00	0.385	27.00	0.221	20.00	43%
	MnDOT Metro District MS4 (MS400170)	56.00	0.459	32.00	0.262	24.00	43%
	Hennepin County MS4 (MS400138)	6.00	0.049	6.00	0.049	0.00	0%
	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000)	2.00	0.016	2.00	0.016	0.00	0%
	WLA Totals	**371.00**	**3.041**	**217.00**	**1.779**	**154.00**	**42%**
Load Allocation	Atmospheric Deposition	4.00	0.033	4.00	0.033	0.00	0%
	Internal Load	71.00	0.582	14.00	0.115	57.00	80%
	LA Totals	**75.00**	**0.615**	**18.00**	**0.148**	**57.00**	**76%**
Margin Of Safety (5%)		--	--	12.00	0.098	--	--
Loading Capacity (TMDL)		**446.00**	**3.656**	**247.00**	**2.025**	**211.00**	**47%**

Table 11: Total Phosphorus (TP) lake protection strategy for Lake Lucy (10-0007-00) of the Lower Minnesota River Watershed (Part 2)

Source	**Existing TP Load**		**Target TP Load**		**Load Reduction Goal**	
	lbs/yr	**lbs/day**	**lbs/yr**	**lbs/day**	**lbs/yr**	%
Protection Strategy for Lake Lucy (10-0007-00)						
Chanhassen MS4 (MS400079)	225.00	0.616	191.00	0.523	34.00	15%
Carver County MS4 (MS400079)	0.40	0.001	0.40	0.001	0.00	0%
Atmospheric Deposition	36.00	0.099	36.00	0.099	0.00	0%
Internal Load	427.00	1.170	252.00	0.690	175.00	41%
Groundwater	9.00	0.025	9.00	0.025	0.00	0%
Total Load	**697.40**	**1.911**	**488.40**	**1.338**	**209.00**	**30%**

Table 12: Total Phosphorus (TP) Lake TMDLs for the Lower Minnesota River Watershed (Part 3)

Allocation	Source	Existing TP Load		TMDL TP Load		Estimated Load Reduction	
		lbs/yr	lbs/day	lbs/yr	lbs/day	lbs/yr	%
TP TMDL for Gaystock Lake (10-0031-00)							
Wasteload Allocation	Laketown Community WWTP (MN0054399)	17.50	0.0479	51.00	0.14	--	--
	Laketown Township MS4 (MS400142)	24.00	0.0658	2.80	0.0077	21.20	88%
	Victoria MS4 (MS400126)	25.00	0.0685	2.90	0.0079	22.10	88%
	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000) (0.1%)	0.24	0.00066	0.24	0.00066	--	--
	WLA Totals	**66.74**	**0.18**	**56.94**	**0.156**	**43.30**	**65%**
Load Allocation	Non-MS4 runoff	2018.00	5.5288	235.00	0.6438	1783.00	88%
	Upstream lake contribution - Aue Lake	57.00	0.1562	16.00	0.0438	41.00	72%
	Atmospheric Deposition	17.00	0.0466	17.00	0.0466	0.00	0%
	Internal Load	671.00	1.8384	0.00	0.0000	671.00	100%
	SSTS (septics)	2.60	0.0071	1.30	0.0036	1.30	50%
	Feedlots	300.00	0.8219	37.00	0.1014	263.00	88%
	LA Totals	**3065.60**	**8.40**	**306.30**	**0.84**	**2759.30**	**90%**
Margin Of Safety		*(Implicit MOS)*					
Loading Capacity (TMDL)		**3132.34**	**8.58**	**363.24**	**1.00**	**2802.60**	**89%**
Maria Lake (10-0058-00)							
Wasteload Allocation	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000) (0.1%)	0.055	0.00015	0.055	0.00015	0.00	0%
	WLA Totals	**0.055**	**0.00015**	**0.055**	**0.00015**	**0.00**	**0%**
Load Allocation	Non-MS4 runoff	192.00	0.53	55.00	0.15	137.00	71%
	Atmospheric Deposition	63.00	0.17	63.00	0.17	0.00	0%
	Internal Load	680.00	1.86	0.00	0.00	680.00	100%
	SSTS (septics)	5.20	0.01	2.70	0.01	2.50	48%
	Feedlots	79.00	0.22	30.00	0.08	49.00	62%
	LA Totals	**1019.20**	**2.79**	**150.70**	**0.41**	**868.50**	**85%**
Margin Of Safety		*(Implicit MOS)*					
Loading Capacity (TMDL)		**1019.26**	**2.79**	**150.76**	**0.41**	**868.50**	**85%**
Hazeltine Lake (10-0014-00)							
Wasteload Allocation	APEX (MN0067016)	1.30	0.004	0.00	0.00	1.30	100%
	McLaughlin Gormley King Co. (MN0058033)	49.70	0.136	14.00	0.04	35.70	72%
	Chaska MS4 (MS400080)	197.00	0.540	91.00	0.25	106.00	54%
	Chanhassen MS4 (MS400079)	42.00	0.115	20.00	0.05	22.00	52%
	Carver County MS4 (MS400070)	6.10	0.017	6.10	0.02	0.00	0%
	MNDOT Metro Dist. MS4 (MS400170)	1.10	0.003	1.10	0.00	0.00	0%

	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000) (0.1%)	0.20	0.001	0.20	0.00	0.00	0%
	WLA Totals	**297.40**	**0.81**	**132.40**	**0.363**	**165.00**	**55%**
Load Allocation	Non-MS4 runoff	179.00	0.49	83.00	0.23	96.00	54%
	Atmospheric Deposition	60.00	0.16	60.00	0.16	0.00	0%
	Internal Load	2457.00	6.73	0.00	0.00	2457.00	100%
	SSTS (septics)	1.29	0.00	0.67	0.00	0.62	48%
	LA Totals	**2697.29**	**7.39**	**143.67**	**0.39**	**2553.62**	**95%**
Margin Of Safety		*(Implicit MOS)*					
Loading Capacity (TMDL)		**2994.69**	**8.20**	**276.07**	**0.76**	**2718.62**	**91%**
McKnight Lake (10-0216-00)							
Wasteload Allocation	LifeCore Biomedical LLC (MN0060747)	8.30	0.023	37.40	0.10	--	--
	Chaska MS4 (MS400080)	162.00	0.444	59.00	0.16	103.00	64%
	Chanhassen MS4 (MS400079)	20.00	0.055	7.30	0.02	12.70	64%
	Victoria MS4 (MS400126)	35.00	0.096	13.00	0.04	22.00	63%
	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000) (0.1%)	0.24	0.001	0.24	0.00	0.00	0%
	WLA Totals	**225.54**	**0.62**	**116.94**	**0.320**	**137.70**	**61%**
Load Allocation	Non-MS4 runoff	434.00	1.19	160.00	0.44	274.00	63%
	Upstream lake contribution - Bavaria Lake	53.00	0.15	53.00	0.15	0.27	1%
	Atmospheric Deposition	8.60	0.02	8.60	0.02	0.00	0%
	Internal Load	615.00	1.68	0.00	0.00	615.00	100%
	Big Woods outflow excludes LifeCore	772.00	2.12	144.00	0.39	628.00	81%
	LA Totals	**1882.60**	**5.16**	**365.60**	**1.00**	**1517.27**	**81%**
Margin Of Safety		*(Implicit MOS)*					
Loading Capacity (TMDL)		**2108.14**	**5.78**	**482.54**	**1.32**	**1654.97**	**79%**
Jonathan Lake (10-0217-00)							
Wasteload Allocation	Chaska MS4 (MS400080)	82.00	0.225	38.00	0.10	44.00	54%
	MNDOT Metro Dist. MS4 (MS400170)	2.40	0.0066	2.40	0.0066	0.00	0%
	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000) (0.1%)	0.082	0.00022	0.082	0.00022	0.00	0%
	WLA Totals	**84.48**	**0.23**	**40.48**	**0.111**	**44.00**	**52%**
Load Allocation	Non-MS4 runoff	88.00	0.24	41.00	0.11	47.00	53%
	Upstream lake contribution - McKnight Lake	1606.00	4.40	416.00	1.14	1190.00	74%
	Atmospheric Deposition	8.60	0.02	8.60	0.02	0.00	0%
	Internal Load	46.00	0.13	0.00	0.00	46.00	100%
	LA Totals	**1748.60**	**4.79**	**465.60**	**1.28**	**1283.00**	**73%**
Margin Of Safety		*(Implicit MOS)*					
Loading Capacity (TMDL)		**1833.08**	**5.02**	**506.08**	**1.39**	**1327.00**	**72%**

Grace Lake (10-0218-00)							
Wasteload Allocation	Chaska MS4 (MS400080)	59.00	0.16	59.00	0.16	0.00	0%
	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000) (0.1%)	0.060	0.00016	0.060	0.00016	0.00	0%
	WLA Totals	**59.06**	**0.162**	**59.06**	**0.162**	**0.00**	**0%**
Load Allocation	Non-MS4 runoff	1.50	0.0041	1.50	0.0041	0.00	0%
	Upstream lake contribution - Jonathan Lake	1549.00	4.24	459.00	1.26	1090.00	70%
	Atmospheric Deposition	7.50	0.021	7.50	0.021	0.00	0%
	LA Totals	**1558.00**	**4.27**	**468.00**	**1.28**	**1090.00**	**70%**
Margin Of Safety		*(Implicit MOS)*					
Loading Capacity (TMDL)		**1617.06**	**4.43**	**527.06**	**1.44**	**1090.00**	**67%**

Table 13: TP TMDLs for the Lower Minnesota River Watershed (Part 1)

Allocation	Source	Load
		TP (lbs/day)
TMDL for Bevens Creek (07020012-843)		
Wasteload Allocation	Hamburg WWTP (MN0025585)	1.200
	Construction Stormwater (MNR100001)	0.016
	Industrial Stormwater (MNR050000)	0.016
	WLA Totals	1.232
Load Allocation	Watershed Load	13.000
	LA Totals	13.000
Margin Of Safety (5%)		0.750
	Loading Capacity (TMDL)	**14.982**
Estimated Load Reduction (%)		**61%**
TMDL for Carver Creek (07020012-806)		
Wasteload Allocation	Carver City MS4 (MS400077)	0.570
	Carver County MS4 (MS400070)	0.120
	Construction Stormwater (MNR100001)	0.031
	Industrial Stormwater (MNR050000)	0.031
	WLA Totals	0.752
Load Allocation	Watershed Load	19.000
	LA Totals	19.000
Upstream Waterbodies (Miller Lake)		11.000
Margin Of Safety (5%)		1.600
	Loading Capacity (TMDL)	**32.352**
Estimated Load Reduction (%)		**60%**
TMDL for Sand Creek (07020012-839)		
Wasteload Allocation	Montgomery WWTP (MN0024210)	2.200
	Seneca Foods Corp-Montgomery (MN0001279)	0.750
	Construction Stormwater (MNR100001)	0.020
	Industrial Stormwater (MNR050000)	0.020
	WLA Totals	2.990
Load Allocation	Watershed Load	16.000
	LA Totals	16.000
Upstream Waterbodies (Pepin, Phelps, Sanborn Lakes)		5.800
Margin Of Safety (5%)		1.300
	Loading Capacity (TMDL)	**26.090**
Estimated Load Reduction (%)		**67%**
TMDL for Sand Creek (07020012-840)		
Wasteload Allocation	New Prague City MS4[1]	0.440
	Construction Stormwater (MNR100001)	0.014
	Industrial Stormwater (MNR050000)	0.014
	WLA Totals	0.468
Load Allocation	Watershed Load	11.000

	LA Totals	11.000
Upstream Waterbodies (Sand Creek AUID -839, Cedar Lake and Pleasant Lake)		27.000
Margin Of Safety (5%)		2.000
	Loading Capacity (TMDL)	**40.468**
Estimated Load Reduction (%)		**67%**
TMDL for Sand Creek (07020012-513)		
Wasteload Allocation	Belle Plain City MS4[1]	0.0028
	Elko New Market City MS4 (MS400237)	0.120
	Jordan City MS4[1]	1.000
	Louisville Township MS4 (MS400144)	0.860
	New Prague City MS4[1]	1.200
	Prior Lake City MS4 (MS400113)	1.000
	Shakopee City MS4 (MS400120)	0.042
	Jordan WWTP (MN0020869)	3.800
	New Prague Utilities Commission (MNG640117)	0.022
	New Prague WWTP (MN0020150)	5.400
	Construction Stormwater (MNR100001)	0.120
	Industrial Stormwater (MNR050000)	0.120
	WLA Totals	13.687
Load Allocation	Watershed Load	51.000
	LA Totals	51.000
Upstream Waterbodies (Sand Creek AUID -840, Cynthia Lake)		43.000
Margin Of Safety (5%)		5.700
	Loading Capacity (TMDL)	**113.387**
Estimated Load Reduction (%)		**67%**

1 = MPCA calculated a WLA for communities which are soon to be covered under MS4 permit

Table 14: TSS TMDLs for the Lower Minnesota River Watershed (Part 1)

Allocation	Source	Very High	High	Mid-range	Low	Very Low
		Sediment (lbs/day)				
TMDL for Rush River (07020012-548)						
Wasteload Allocation	Dairy Farmers of America Inc - Winthrop (MN0003671)	301.00	301.00	301.00	--[a]	--[a]
	Gaylord WWTP (MNG580204)	1651.00	1651.00	1651.00	--[a]	--[a]
	MG Waldbaum Co. (MN0060798)	138.00	138.00	138.00	--[a]	--[a]
	Starland Hutterian Brethren Inc. (MN0067334)	60.00	60.00	60.00	--[a]	--[a]
	Winthrop WWTP (MN0051098)	785.00	785.00	785.00	--[a]	--[a]
	Construction Stormwater (MNR100001)	120.00	25.00	5.20	--[a]	--[a]
	Industrial Stormwater (MNR050000)	120.00	25.00	5.20	--[a]	--[a]
	WLA Totals	3175.00	2985.00	2945.40	0.00	0.00
Load Allocation	**Load Allocation**	99558.00	20665.00	4356.00	--[a]	--[a]
Margin Of Safety (5%)		5407.00	1245.00	384.00	127.00	29.00
Loading Capacity (TMDL)		**108,140.00**	**24,895.00**	**7,685.40**	**2,539.00**	**585.00**
Estimated Load Reduction (%)		**--**				
TMDL for Rush River (07020012-521)						
Wasteload Allocation	Altona Hutterian Brethren WWTP (MN0067610)	44.00	44.00	44.00	44.00	--[a]
	Dairy Farmers of America Inc - Winthrop (MN0003671)	301.00	301.00	301.00	301.00	--[a]
	Gaylord WWTP (MNG580204)	1651.00	1651.00	1651.00	1651.00	--[a]
	Gibbon WWTP (MNG580020)	373.00	373.00	373.00	373.00	--[a]
	Lafayette WWTP (MN0023876)	24.00	24.00	24.00	24.00	--[a]
	MG Waldbaum Co. (MN0060798)	138.00	138.00	138.00	138.00	--[a]
	Starland Hutterian Brethren Inc. (MN0067334)	60.00	60.00	60.00	60.00	--[a]
	Winthrop WWTP (MN0051098)	785.00	785.00	785.00	785.00	--[a]
	Construction Stormwater (MNR100001)	230.00	52.00	13.00	1.60	--[a]
	Industrial Stormwater (MNR050000)	230.00	52.00	13.00	1.60	--[a]
	WLA Totals	3836.00	3480.00	3402.00	3379.20	0.00
Load Allocation	**Load Allocation**	197432.00	44437.00	2915.00	924.00	--[a]
Unallocated Load		0.00	0.00	8403.00	467.00	--[a]
Margin Of Safety (5%)		10593.00	2522.00	775.00	251.00	64.00
Loading Capacity (TMDL)		**211,861.00**	**50,439.00**	**15,495.00**	**5,021.20**	**1,283.00**
Estimated Load Reduction (%)		**89%**				
TMDL for High Island Creek (07020012-653)						
Wasteload Allocation	Construction Stormwater (MNR100001)	38.00	7.90	2.50	0.68	0.14

	Industrial Stormwater (MNR050000)	38.00	7.90	2.50	0.68	0.14
	WLA Totals	76.00	15.80	5.00	1.36	0.28
Load Allocation	**Load Allocation**	57155.00	12000.00	3712.00	1026.00	214.00
Margin Of Safety (5%)		3012.00	632.00	196.00	54.00	11.00
Loading Capacity (TMDL)		**60,243.00**	**12,647.80**	**3,913.00**	**1,081.36**	**225.28**
Estimated Load Reduction (%)		--				
TMDL for High Island Ditch 2 (07020012-588)						
Wasteload Allocation	Construction Stormwater (MNR100001)	13.00	3.10	0.82	0.28	0.06
	Industrial Stormwater (MNR050000)	13.00	3.10	0.82	0.28	0.06
	WLA Totals	26.00	6.20	1.64	0.56	0.12
Load Allocation	**Load Allocation**	10542.00	2503.00	657.00	224.00	48.00
Margin Of Safety (5%)		556.00	132.00	35.00	12.00	2.60
Loading Capacity (TMDL)		**11,124.00**	**2,641.20**	**693.64**	**236.56**	**50.72**
Estimated Load Reduction (%)		--				
TMDL for Buffalo Creek (07020012-832)						
Wasteload Allocation	Construction Stormwater (MNR100001)	20.00	3.50	0.18	0.05	0.0035
	Industrial Stormwater (MNR050000)	20.00	3.50	0.18	0.05	0.0035
	WLA Totals	40.00	7.00	0.36	0.10	0.0070
Load Allocation	**Load Allocation**	15728.00	2852.00	147.00	40.00	2.80
Unallocated Load		0.00	0.00	520.00	117.00	21.00
Margin Of Safety (5%)		830.00	151.00	35.00	8.20	1.20
Loading Capacity (TMDL)		**16,598.00**	**3,010.00**	**702.36**	**165.30**	**25.01**
Estimated Load Reduction (%)		**83%**				
TMDL for High Island Creek (07020012-834)						
Wasteload Allocation	Arlington WWTP (MN0020834)	201.00	201.00	201.00	201.00	201.00
	Seneca Foods Corp. - Arlington (MN0000264)	38.00	38.00	38.00	38.00	38.00
	Construction Stormwater (MNR100001)	155.00	41.00	12.00	1.90	0.45
	Industrial Stormwater (MNR050000)	155.00	41.00	12.00	1.90	0.45
	WLA Totals	549.00	321.00	263.00	242.80	239.90
Load Allocation	**Load Allocation**	184564.00	48798.00	13770.00	2094.00	208.00
Unallocated Load		0.00	0.00	0.00	68.00	287.00
Margin Of Safety (5%)		9743.00	2585.00	739.00	127.00	39.00
Loading Capacity (TMDL)		**194,856.00**	**51,704.00**	**14,772.00**	**2,531.80**	**773.90**
Estimated Load Reduction (%)		**74%**				
TMDL for Unnamed Creek - East Creek (07020012-581)						
Wasteload Allocation	LifeCore Biomedical LLC (MN0060747)	13.00	13.00	13.00	13.00	13.00
	McLaughlin Gormley King Co. (MN0058033)	2.00	2.00	2.00	2.00	2.00
	Carvery County MS4 (MS400070)	134.00	21.00	5.80	2.80	0.0640
	Chanhassen City MS4 (MS400079)	62.00	9.60	2.70	1.30	0.0290

	Chaska City MS4 (MS400080)	2410.00	372.00	103.00	50.00	1.1000
	Laketown Township MS4 (MS400142)	13.00	2.00	0.56	0.27	0.0062
	MnDOT Metro MS4 (MS400170)	123.00	19.00	5.30	2.50	0.0580
	Victoria City MS4 (MS400126)	116.00	18.00	5.00	2.40	0.0550
	Construction Stormwater (MNR100001)	15.00	2.20	0.62	0.30	0.0069
	Industrial Stormwater (MNR050000)	15.00	2.20	0.62	0.30	0.0069
	WLA Totals	2903.00	461.00	138.60	74.87	16.33
Load Allocation	**Load Allocation**	6188.00	957.00	264.00	127.00	2.90
Unallocated Load		0.00	898.00	520.00	168.00	105.00
Margin Of Safety (5%)		478.00	122.00	49.00	20.00	6.50
Loading Capacity (TMDL)		**9,569.00**	**2,438.00**	**971.60**	**389.87**	**130.73**
Estimated Load Reduction (%)		**2%**				
TMDL for Robert Creek (07020012-575)						
Wasteload Allocation	Belle Plaine WWTP (MN0022772)	1409.00	1409.00	1409.00	--[a]	--[a]
	Belle Plain City MS4[1]	143.00	19.00	2.20	--[a]	--[a]
	Construction Stormwater (MNR100001)	19.00	5.20	0.59	--[a]	--[a]
	Industrial Stormwater (MNR050000)	19.00	5.20	0.59	--[a]	--[a]
	WLA Totals	1590.00	1438.40	1412.38	0.00	0.00
Load Allocation	**Load Allocation**	6771.00	1846.00	210.00	--[a]	--[a]
Unallocated Load		0.00	0.00	117.00	--[a]	--[a]
Margin Of Safety (5%)		440.00	173.00	91.00	52.00	21.00
Loading Capacity (TMDL)		**8,801.00**	**3,457.40**	**1,830.38**	**1,033.00**	**425.00**
Estimated Load Reduction (%)		**72%**				
TMDL for Sand Creek (07020012-839)						
Wasteload Allocation	Montgomery WWTP (MN0024210)	242.00	242.00	242.00	242.00	--[a]
	Seneca Foods Corp. - Montgomery (MN0001279)	125.00	125.00	125.00	125.00	--[a]
	Construction Stormwater (MNR100001)	22.00	5.30	1.70	0.26	--[a]
	Industrial Stormwater (MNR050000)	22.00	5.30	1.70	0.26	--[a]
	WLA Totals	411.00	377.60	370.40	367.52	0.00
Load Allocation	**Load Allocation**	46085.00	12160.00	3734.00	490.00	--[a]
Unallocated Load		5897.00	0.00	0.00	0.00	--[a]
Margin Of Safety (5%)		2758.00	660.00	216.00	45.00	7.70
Loading Capacity (TMDL)		**55,151.00**	**13,197.60**	**4,320.40**	**902.52**	**154.00**
Estimated Load Reduction (%)		**27%**				
TMDL for Sand Creek (07020012-840)						
Wasteload Allocation	Montgomery WWTP (MN0024210)	242.00	242.00	242.00	242.00	--[a]
	Seneca Foods Corp. - Montgomery (MN0001279)	125.00	125.00	125.00	125.00	--[a]
	New Prague City MS4[1]	469.00	111.00	35.00	5.60	

	Construction Stormwater (MNR100001)	77.00	18.00	5.70	0.92	--[a]
	Industrial Stormwater (MNR050000)	77.00	18.00	5.70	0.92	--[a]
	WLA Totals	990.00	514.00	413.40	374.44	0.00
Load Allocation	**Load Allocation**	79680.00	18790.00	5905.00	947.00	--[a]
Margin Of Safety (5%)		4246.00	1016.00	333.00	70.00	12.00
Loading Capacity (TMDL)		**84,916.00**	**20,320.00**	**6,651.40**	**1,391.44**	**236.00**
Estimated Load Reduction (%)		**61%**				
TMDL for Sand Creek (07020012-538)						
Wasteload Allocation	Montgomery WWTP (MN0024210)	242.00	242.00	242.00	242.00	242.00
	New Prague Utilities Commission (MNG640117)	9.00	9.00	9.00	9.00	9.00
	New Prague WWTP (MN0020150)	458.00	458.00	458.00	458.00	458.00
	Seneca Foods Corp. - Montgomery (MN0001279)	125.00	125.00	125.00	125.00	125.00
	Belle Plain City MS4[1]	2.60	0.78	0.31	0.13	0.03
	New Prague City MS4[1]	1082.00	329.00	131.00	55.00	14.00
	Construction Stormwater (MNR100001)	129.00	39.00	16.00	6.60	1.70
	Industrial Stormwater (MNR050000)	129.00	39.00	16.00	6.60	1.70
	WLA Totals	2176.60	1241.78	997.31	902.33	851.43
Load Allocation	**Load Allocation**	100972.00	30710.00	12240.00	5170.00	1348.00
Margin Of Safety (5%)		5429.00	1682.00	697.00	320.00	116.00
Loading Capacity (TMDL)		**108,577.60**	**33,633.78**	**13,934.31**	**6,392.33**	**2,315.43**
Estimated Load Reduction (%)		**--**				
TMDL for Porter Creek (07020012-815)						
Wasteload Allocation	Elko New City Market City MS4 (MS400237)	92.00	20.00	3.30	4.60	1.80
	Construction Stormwater (MNR100001)	22.00	6.00	2.50	1.10	0.42
	Industrial Stormwater (MNR050000)	22.00	6.00	2.50	1.10	0.42
	WLA Totals	136.00	32.00	8.30	6.80	2.64
Load Allocation	**Load Allocation**	13410.00	2912.00	477.00	670.00	260.00
Unallocated Load		0.00	828.00	1107.00	0.00	0.00
Margin Of Safety (5%)		713.00	199.00	84.00	36.00	14.00
Loading Capacity (TMDL)		**14,259.00**	**3,971.00**	**1,676.30**	**712.80**	**276.64**
Estimated Load Reduction (%)		**60%**				
TMDL for Porter Creek (07020012-817)						
Wasteload Allocation	Elko New City Market City MS4 (MS400237)	162.00	45.00	19.00	4.00	3.10
	Construction Stormwater (MNR100001)	79.00	22.00	9.20	1.90	1.50
	Industrial Stormwater (MNR050000)	79.00	22.00	9.20	1.90	1.50
	WLA Totals	320.00	89.00	37.40	7.80	6.10
Load Allocation	**Load Allocation**	34028.00	9448.00	3929.00	833.00	648.00

Unallocated Load		0.00	0.00	0.00	867.00	0.00
Margin Of Safety (5%)		1808.00	502.00	209.00	90.00	34.00
Loading Capacity (TMDL)		**36,156.00**	**10,039.00**	**4,175.40**	**1,797.80**	**688.10**
Estimated Load Reduction (%)		**47%**				
TMDL for Sand Creek (07020012-513)						
Wasteload Allocation	Jordan WWTP (MN0020869)	322.00	322.00	322.00	322.00	--[a]
	Montgomery WWTP (MN0024210)	242.00	242.00	242.00	242.00	--[a]
	New Prague Utilities Commission (MNG640117)	9.00	9.00	9.00	9.00	--[a]
	New Prague WWTP (MN0020150)	458.00	458.00	458.00	458.00	--[a]
	Seneca Foods Corp. - Montgomery (MN0001279)	125.00	125.00	125.00	125.00	--[a]
	Belle Plain City MS4[1]	3.50	0.81	0.26	0.038	--[a]
	Elko New City Market City MS4 (MS400237)	256.00	60.00	19.00	2.80	--[a]
	Jordan City MS4[1]	1209.00	285.00	90.00	13.00	--[a]
	Louisville Township MS4 (MS400144)	1043.00	246.00	77.00	12.00	--[a]
	New Prague City MS4[1]	1463.00	345.00	109.00	16.00	--[a]
	Prior Lake City MS4 (MS400113)	1221.00	288.00	91.00	14.00	--[a]
	Shakopee City MS4 (MS400120)	52.00	12.00	3.80	0.57	--[a]
	Construction Stormwater (MNR100001)	417.00	100.00	32.00	6.50	--[a]
	Industrial Stormwater (MNR050000)	417.00	100.00	32.00	6.50	--[a]
	WLA Totals	7237.50	2592.81	1610.06	1227.41	0.00
Load Allocation	**Load Allocation**	227397.00	53653.00	16887.00	2527.00	--[a]
Unallocated Load		0.00	0.00	0.00	215.00	0.00
Margin Of Safety (5%)		12349.00	2960.00	974.00	209.00	41.00
Loading Capacity (TMDL)		**246,983.50**	**59,205.81**	**19,471.06**	**4,178.41**	**823.00**
Estimated Load Reduction (%)		**89%**				

1 = MPCA calculated a WLA for communities which are soon to be covered under MS4 permit

a = MPCA explained that the permitted wastewater design flows exceed the stream flow in the indicated flow zone(s). The allocations in these instances are expressed as an equation rather than an absolute number. Allocation = (flow contribution from a given source) * (65 mg/L (or NPDES permit concentration)) * conversion factors

Table 15: TSS TMDLs for the Lower Minnesota River Watershed (Part 2)

Allocation	Source	Very High	High	Mid	Low	Very Low
		Sediment (lbs/day)				
TMDL for Riley Creek (07020012-511)						
Wasteload Allocation	Eden Prairie City MS4 (MS400015)	2059.00	553.00	206.00	29.00	21.00
	Hennepin County MS4 (MS400138)	146.00	39.00	15.00	2.00	1.00
	Construction Stormwater (MNR100001) and Industrial Stormwater (MNR050000)	22.00	6.00	2.00	1.00	1.00
	WLA Totals	2227.00	598.00	223.00	32.00	23.00
Load Allocation	Riley Lake Boundary Condition	246.00	66.00	25.00	18.00	13.00
	Watershed LA	3797.00	1019.00	381.00	54.00	40.00
	Unallocated Load	0.00	0.00	0.00	358.00	266.00
	LA Totals	4043.00	1085.00	406.00	430.00	319.00
Margin Of Safety (5%)		330.00	89.00	33.00	24.00	18.00
Loading Capacity (TMDL)		**6600.00**	**1772.00**	**662.00**	**486.00**	**360.00**
Estimated Load Reduction (%)		**88%**				

Table 16: Chloride TMDL for the Lower Minnesota River Watershed (Part 1)

Allocation	Source	Chloride Load
		(lbs/day)
TMDL for Credit River (07020012-811)		
Wasteload Allocation	Burnsville City MS4 (MS400076)	22,368
	Credit River Township MS4 (MS400131)	
	Dakota County MS4 (MS400132)	
	Lakeville City MS4 (MS400099)	
	MnDOT Metro MS4 (MS400170)	
	Prior Lake City MS4 (MS400113)	
	Savage City MS4 (MS400119)	
	Scott County MS4 (MS400154)	
	Spring Lake Township MS4 (MS400156)	
	WLA Totals	22,368
Load Allocation	Unregulated Runoff	31,308
	Natural Background	5,331
	LA Totals	36,639
Margin Of Safety (10%)		6,556
Loading Capacity (TMDL)		**65,563**