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

MAY 14 2015

REPLY TO THE ATTENTION OF:

WW-16J

Rebecca J. Flood, Assistant Commissioner
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155-4194

Dear Ms. Flood:

The U.S. Environmental Protection Agency has conducted a complete review of the final Total Maximum Daily Loads (TMDL) for segments within the Mississippi River (St. Cloud) watershed, including support documentation and follow up information. The Mississippi River (St. Cloud) watershed (MRSCW) is in central Minnesota in Benton, Meeker, Mille Lacs, Morrison, Sherburne, Stearns and Wright Counties. The MRSCW TMDLs address impaired aquatic recreation due to excessive nutrients (phosphorus) and impaired aquatic life due to low dissolved oxygen and sediment.

EPA has determined that the MRSCW 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 twelve nutrient TMDLs, three dissolved oxygen TMDLs and 1 sediment TMDL. The statutory and regulatory requirements, and EPA's review of Minnesota's compliance with each requirement, are described in the enclosed decision document.

We wish to acknowledge Minnesota's efforts in submitting these TMDLs and look forward to future TMDL submissions by the State of Minnesota. If you have any questions, please contact Mr. Peter Swenson, Chief of the Watersheds and Wetlands Branch, at 312-886-0236.

Sincerely,

Tinka G. Hyde
Director, Water Division

Enclosure

cc: Celine Lyman, MPCA

wq-iw8-46g

TMDL: Mississippi River (St. Cloud) watershed nutrient, dissolved oxygen & sediment TMDLs, Benton, Meeker, Mille Lacs, Morrison, Sherburne, Stearns and Wright Counties, MN
Date: May 14, 2015

DECISION DOCUMENT
FOR THE MISSISSIPPI RIVER (ST. CLOUD) WATERSHED TMDLS, BENTON, MEEKER, MILLE LACS, MORRISON, SHERBURNE, STEARNS & WRIGHT COUNTIES, MN

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

1. Identification of 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 Mississippi River (St. Cloud) watershed (MRSCW) (HUC-8 #07010203) is located in the upper Mississippi River Basin (MRB) in central Minnesota. The MRSCW is approximately 1,121 square miles (717,479 acres) and spans Benton, Meeker, Mille Lacs, Morrison, Sherburne, Stearns and Wright counties in central Minnesota. The MRSCW originates at the confluence of the Sauk River and the mainstem of the Mississippi River near St. Cloud, Minnesota. The mainstem of the Mississippi River flows in southeasterly direction in the MRSCW where the North Fork of the Crow River joins the mainstem (Figure 1-2 of the final TMDL document).

The MRSCW TMDLs address twelve nutrient impaired lakes, three creek segments for dissolved oxygen and turbidity impairments and one creek segment for impaired biota. All segments of the MRSCW TMDL are within the boundaries of the North Central Hardwood Forest (NCHF) ecoregion (Table 1 of this Decision Document).

Table 1: Mississippi River (St. Cloud) Watershed impaired waters addressed by the Mississippi River (St. Cloud) Watershed TMDL (2015)

Water body name	Assessment Unit ID	Affected Use	Pollutant or stressor	TMDL
Clearwater River	07010203-511	Aquatic Life	Dissolved Oxygen	CBOD, NBOD, SOD TMDL[1]
Rice Creek	07010203-512	Aquatic Life	Dissolved Oxygen	CBOD, NBOD, SOD TMDL[1]
Rice Creek	07010203-512	Aquatic Life	Turbidity	Total Suspended Solids TMDL
Battle Brook	07010203-535	Aquatic Life	Aquatic macroinvertebrate bio-assessments (Low DO)	CBOD, NBOD, SOD TMDL[1]
Donovan Lake (Main Bay)	05-0004-02	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
Julia Lake	71-0145-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
Briggs lake	71-0146-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
Rush Lake	71-0147-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
Birch Lake	71-0057-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
Orono Lake (Lower)	71-0013-02	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL[2]
Orono Lake (Upper)	71-0013-01	Aquatic Recreation	Excess Nutrients (total phosphorus)	
Fish Lake	86-0183-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
Mink Lake	86-0229-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL

Somers Lake	86-0230-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
Silver Lake	86-0140-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
Indian Lake	86-0223-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
Locke Lake	86-0168-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL

1 = Carbonaceous Biochemical Oxygen Demand (CBOD), Nitrogenous Biochemical Oxygen Demand (NBOD), & Sediment Oxygen Demand (SOD) TMDLs
2 = Treated as one water body

The Minnesota Pollution Control Agency (MPCA) classified Donovan Lake, Julia Lake, Rush Lake and Somers Lake as shallow lakes. The morphometric and watershed characteristics of these four shallow lakes are found in Table 2 of this Decision Document within the shaded rows. MPCA characterizes shallow lakes as lakes with a maximum depth of 15 feet or less. Deep lakes are enclosed basins with maximum depths greater than 15 feet (Table 2 of this Decision Document – unshaded rows).

Table 2: Morphometric and watershed characteristics of lakes addressed in the Mississippi River (St. Cloud) Watershed TMDL

Lake Name	Lakeshed Area	Lake Surface Area	% Littoral	Max Depth	Mean Depth
	(acres)	(acres)		(feet)	(feet)
Birch Lake	726	154	77%	18	10
Briggs Lake	8,619	404	54%	25	13
Donovan Lake (Main Bay)	1,026	54	100%	5	4
Fish Lake	4,421	96	56%	38	13
Indian Lake	445	135	41%	31	17
Julia Lake	725	152	89%	15	8
Locke Lake	24,624	133	31%	49	18
Mink Lake	2,320	298	86%	30	6
Orono Lake	388,129	300	94%	18	5
Rush Lake	8,892	160	100%	10	5
Silver Lake	18,921	83	31%	42	17
Somers Lake	2,528	147	100%	15	10

Land Use:
Land use in the MRSCW is comprised of hay/pasture lands, croplands, forested lands, developed lands, wetlands, natural areas and open water (Table 3 of this Decision Document). MPCA estimated that land use within the MRSCW is primarily composed of cropland (39%), pastureland (22%) and forested lands (18%). Significant development is not expected in the MRSCW. The land use within the watershed is primarily agricultural and according to MPCA is expected to remain agricultural for the foreseeable future. There may be a shift in crop usage within the watershed (i.e. pasture/hay land uses to row crop land uses) but MPCA does not believe that this will have a significant impact on pollutant loading to water bodies within the MRSCW.

Table 3: Land Use* in the Mississippi River (St. Cloud) Watershed

Impaired Watershed	Hay/Pasture	Cultivated Cropland	Forest	Developed	Wetland	Natural Areas[1]	Open Water
Birch Lake	4%	0%	65%	2%	28%	0%	3%
Briggs Lake[2]	13%	26%	36%	11%	12%	0%	2%
Donovan Lake	17%	38%	8%	14%	20%	0%	3%
Fish Lake	29%	11%	37%	11%	7%	0%	6%
Indian Lake	4%	49%	32%	14%	0%	0%	0%
Julia Lake	9%	3%	69%	15%	4%	0%	1%
Locke Lake[2]	11%	33%	24%	10%	11%	0%	11%
Mink Lake	9%	58%	10%	16%	7%	0%	1%
Rush Lake[2]	12%	24%	35%	11%	11%	0%	6%
Silver Lake[2]	10%	37%	21%	10%	10%	0%	12%
Somers Lake[2]	7%	51%	9%	14%	6%	0%	12%
Upper & Lower Orono Lake[2]	18%	27%	25%	10%	17%	0%	2%

1 = Includes barren and shrublands

2 = Includes upstream lakes

* = Based on the 2006 NLCD Land Use Survey

Impaired Watershed	Hay/Pasture	Cultivated Cropland	Forest	Developed	Wetland	Natural Areas[1]	Open Water	Watershed Size (acres)
Rice Creek	19%	38%	17%	11%	14%	0%	1%	29,169
Battle Brook	15%	23%	23%	11%	26%	0%	3%	25,749
Clearwater River	14%	39%	20%	12%	8%	0%	8%	111,897

1 = Includes barren and shrublands

Problem Identification:

Nutrient TMDLs: Lakes identified in Table 1 of this Decision Document were included on the Minnesota 303(d) list due to excessive nutrients (phosphorus) and are included as Category 5 waters on the draft 2014 Minnesota 303(d) list. Total phosphorus (TP), chlorophyll-*a* (chl-a) and Secchi depth (SD) measurements in the MRSCW indicated that lakes addressed via these TMDL efforts were not attaining their designated aquatic recreation uses due to exceedances of nutrient criteria. Water quality monitoring within the MRSCW was completed at several locations and the data collected during these efforts was the foundation for modeling efforts completed in this TMDL study.

While TP is an essential nutrient for aquatic life, elevated concentrations of TP can lead to nuisance algal blooms that negatively impact aquatic life and recreation (swimming, boating, fishing, etc.). Algal decomposition depletes dissolved oxygen levels within the water column. The decreases in dissolved oxygen can stress benthic macroinvertebrates and fish. Depletion of oxygen in the water column can also lead to conditions where phosphorus is released from bottom sediments (i.e. internal loading). Also, excess algae can shade the water column which limits the distribution of aquatic vegetation. Aquatic vegetation stabilizes bottom sediments, and also is an important habitat for macroinvertebrates and fish.

CBOD, NBOD & SOD TMDLs: Clearwater River (07010203-511), Rice Creek (07010203-512) and Battle Brook (07010203-535) were included on the Minnesota 303(d) list due to low concentrations of dissolved oxygen and the negative impact of those conditions on aquatic life (i.e., fish and macroinvertebrate communities). The pollutants of concern addressed in the CBOD, NBOD & SOD TMDLs are organic material or organic-rich sediment within the water column. Microorganisms feed on the organic material and consume oxygen from the water column thereby reducing the amount of available oxygen from the water column.

The DO TMDLs allocate loads to carbonaceous biochemical oxygen demand (CBOD), nitrogenous biochemical oxygen demand (NBOD), and sediment oxygen demand (SOD). Biological processes associated with the breakdown and conversion of organic carbon to carbon dioxide are measured by CBOD. Biological processes associated with conversion of organic nitrogen to nitrate, via nitrification, are measured by NBOD. SOD is a measure of the oxygen depletion of biological and chemical processes in sediment (ex. the aerobic decay of organic materials in stream sediments). CBOD, NBOD and SOD remove oxygen from the water column or the sediment/water column interface.

Low dissolved oxygen concentrations can negatively impact aquatic life use. The decreases in dissolved oxygen can stress benthic macroinvertebrates and fish. 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 (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.

Sediment (Total Suspended Solids) TMDL: Rice Creek (07010203-512) was included on the Minnesota 303(d) list due to high turbidity measurements and the negative impact of those conditions on aquatic life (i.e., fish and macroinvertebrate communities). Excess siltation and flow alteration in streams may 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 also reduce spawning and rearing habitats for certain fish species. In addition, excess suspended sediment can clog the gills of fish and thus reduce fish health. Flow alterations due to drainage improvements on or near agricultural lands, have in some instances resulted in increased peak flows. Higher peak flows in stream environments, which typically occur during storm events, can carry increased sediment loads to streams and erode streambanks.

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

Pollutants of Concern:
The pollutants of concern are phosphorus for the nutrient impaired water bodies, and CBOD, NBOD and SOD for the dissolved oxygen impaired water bodies, and sediment (TSS) for the Rice Creek (07010203-512) segment with evidence of macroinvertebrate impairments.

Source Identification (point and nonpoint sources):

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

MRSCW nutrient TMDLs:
National Pollutant Discharge Elimination Systems (NPDES) permitted facilities: NPDES permitted facilities may contribute phosphorus loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge treated wastewater according to their NPDES permit. MPCA identified three NPDES permit holders in the Orono Lake subwatershed (Table 4 in this Decision Document).

Table 4: Permitted NPDES dischargers in the Mississippi River (St. Cloud) Watershed

NPDES ID	Facility Name	Subwatershed
MN0066028	Aspen Hills WWTF	Orono Lake
MN0025666-SD-1	Becker Municipal WWTF	Orono Lake
MN0042331	Zimmerman WWTF	Orono Lake
MS400234	MS4 - Big Lake Township	Birch Lake
MS440067	MS4 - Benton County	Donovan Lake
MS400052	MS4 - St. Cloud City	Donovan Lake
MS400147	MS4- Minden Township	Donovan Lake
MS400180	MS4 – Minnesota Department of Transportation (MN-DOT) Outstate District MS4 (non-traditional)	Donovan Lake
MS400089	MS4 - City of Elk River	Orono Lake
MS400234	MS4 - Big Lake Township	Orono Lake
MS400249	MS4 - City of Big Lake	Orono Lake

Municipal Separate Storm Sewer System (MS4) communities: There are eight regulated MS4 permittees within the MRSCW (Table 4 of this Decision Document). All MS4 permittees received a portion of the wasteload allocation (WLA). Stormwater from MS4s can transport phosphorus to surface water bodies during or shortly after storm events.

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

Concentrated Animal Feedlot Operations (CAFOs): MPCA identified three CAFOs within the Orono Lake subwatershed (Table 5 of this Decision Document). MPCA explained that these facilities do not discharge effluent and therefore were not assigned a portion of the WLA for the Orono Lake TP TMDL.

Table 5: CAFO facilities in the Mississippi River (St. Cloud) Watershed

CAFO NPDES Permit Holder	Permit Number	Animal Units	Watershed Location
Goenner Poultry LLC	MNG441109	396	Orono Lake
Eiler Bros.	MNG440909	1060	Orono Lake
Duane Winkleman Farm	MNG440909	864	Orono Lake

MRSCW CBOD, NBOD & SOD TMDLs: *Clearwater River (07010203-511), Rice Creek (07010203-512) and Battle Brook (07010203-535) subwatersheds*

NPDES permitted facilities: MPCA determined that there are no permitted NPDES dischargers that discharge to the Clearwater River, the Rice Creek or the Battle Brook subwatersheds.

MS4 communities: There are no MS4 communities within the Clearwater River, the Rice Creek or the Battle Brook subwatersheds.

Permitted construction and industrial areas: Construction and industrial sites may contribute organic material and organic-rich sediment via runoff during stormwater events. These areas within the MRSCW must comply with the requirements of the MPCA's NPDES Stormwater Program. The NPDES program requires construction and industrial sites to create a SWPPP that summarizes how stormwater will be minimized from the site.

MRSCW sediment (TSS) TMDL: *Battle Brook (07010203-535) subwatershed*
NPDES permitted facilities: MPCA determined that there are no permitted NPDES dischargers that discharge to the Battle Brook subwatershed.

MS4 communities: There are no MS4 communities within the Battle Brook subwatershed.

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

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

MRSCW nutrient and CBOD, NBOD & SOD 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, ex. 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 MRSCW. 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.

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

Groundwater discharge: Phosphorus can be added to the lake's water column through groundwater discharge. Phosphorus concentrations in groundwater are usually below the water quality standards for phosphorus. In those instances where significant groundwater discharge into lake environments is occurring, phosphorus inputs can impact the phosphorus budgeting of the water body.

Contributions from upstream lake subwatersheds: Upstream lakes may contribute nutrient, organic material and organic-rich sediment loads via water flow between hydrologically connected upstream and downstream lake systems. Upstream lakes may contribute nutrient loads to downstream lakes via non-regulated stormwater runoff into the upstream lakes, nutrient contributions from wetland areas and forested areas into the upstream lakes, internal loading in upstream lakes, etc. These nutrient sources can all add nutrients to hydrologically connected downstream lake waters.

Illicit discharges from Subsurface Sewage Treatment Systems (SSTS) or unsewered communities: Failing septic systems are a potential source of nutrients within the MRSCW. 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.

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

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 MRSCW. 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. Wildlife contributes to the potential impact of contaminated runoff from animal habitats, such as urban park areas, forest, and rural areas.

MRSCW sediment (TSS) TMDL:

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 MRSCW. 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 Sources: Sediment may be added to surface waters by stormwater flows through wetland areas in the MRSCW. Storm events may mobilize particulates through the transport of suspended solids and other organic debris.

Forest Sources: Sediment may be added to surface waters via runoff from forested areas within the watershed. Runoff from forested areas may include debris from decomposing vegetation and organic soil particles.

Atmospheric deposition: Sediment may be added via particulate deposition. Particles from the atmosphere may fall onto lake surfaces or other surfaces within the MRSCW.

Future Growth:

MPCA outlined its expectations for potential growth in the MRSCW in Section 3.4 of the final TMDL document. Significant development is not expected in the MRSCW, though there is expected to be some expansion of MS4 areas in the MRSCW. MPCA incorporated a future growth allocation within the WLAs assigned to MS4 communities (Sections 3.1.1.1 and 3.4 of the final TMDL document). The WLA and load allocations for the MRSCW 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 MRSCW 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 MRSCW TMDLs are designated as Class 2 waters for aquatic recreation use (fishing, swimming, boating, etc.) and aquatic life use. The Class 2 designated use is described in Minnesota Rule 7050.0140 (3):

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

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

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

Numeric criteria:

Nutrient TMDLs: 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 MRSCW lake TMDLs are found in Table 6 of this Decision Document.

Table 6: Minnesota Eutrophication Standards, North Central Hardwood Forests Ecoregion

Parameter	Eutrophication Standard, General	Eutrophication Standard, Shallow Lakes
TP (µg/L)	TP < 40	TP < 60
Chlorophyll-a (µg/L)	chl-a < 14	chl-a < 20
Secchi depth (m)	SD > 1.4	SD > 1.0
Lakes	Birch, Briggs, Fish, Indian, Locke, Orono, Mink, & Silver	Donovan, Julia, Rush, Somers

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 40 µg/L and 60 µg/L, the response variables chl-*a* and SD will be attained and the lakes addressed by the MRSCW lake TMDLs 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: MPCA selected TP targets of 40 µg/L and 60 µg/L to develop TP TMDLs for the lakes addressed by the MRSCW lake TMDLs. 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 in the MRSCW lake TMDLs to be reasonable.

CBOD, NBOD & SOD TMDLs: Dissolved oxygen is used by oxygen demanding organisms in both the sediment and the water column in a water body. A relationship between DO and CBOD of microorganisms in the water column; DO and NBOD of microorganisms in the water column; and DO and SOD was developed for the MRSCW DO TMDLs. The three oxygen demanding biological processes (CBOD, NBOD and SOD) were used to determine the oxygen loading for the DO TMDLs. Table 1.1 of the final TMDL document references the Minnesota water quality standard for dissolved oxygen, a **5.0 mg/L daily minimum** (Minnesota Rules 7050.2222). Compliance with this standard is required 50 percent of the days at which the flow of the receiving water is equal to the 7Q10 and 100 percent of the days at which flow of the receiving water is greater than 7Q10 flow. The 7Q10 flow is a flow statistic which describes the lowest 7-day average flow that occurs on average once every 10 years.

CBOD, NBOD & SOD TMDL Targets: MPCA stated that the dissolved oxygen target is the daily minimum criteria of **5.0 mg/L**.

Sediment (TSS) TMDL: 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: The regional TSS criterion which applies to Rice Creek (07010203-512) and was used to calculate the TSS TMDL for the MRSCW is the TSS criterion for the Central River Nutrient Region (CRNR) of **30 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:

MRSCW Nutrient TMDLs: MPCA used the BATHTUB model to calculate the loading capacities for each of the nutrient impaired lakes in Table 1 of this Decision Document. The BATHTUB model was utilized to link observed phosphorus water quality conditions and estimated phosphorus loads to in-lake water quality estimates. MPCA has previously employed BATHTUB successfully in many lake studies in Minnesota. BATHTUB is a steady-state annual or seasonal model that predicts a lake's growing season (June 1 to September 30) average surface water quality. BATHTUB utilizes annual or seasonal time-scales which are appropriate because watershed 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 choice among several different mass-balance TP models.

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 Margin of Safety (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 deep and shallow lake nutrient WQS (Table 6 of this Decision Document). Loading capacities on the annual scale (lbs./year) were calculated to meet the WQS during the growing season (June 1 through September 30). The time period of June to September was chosen by MPCA as the growing season because it corresponds to the eutrophication criteria, contains the months that the general public typically uses the MRSCW lakes 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 7 to 18 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 MRSCW lakes during the worst water quality conditions of the year. MPCA assumed that the loading capacities established by the TMDL will be protective of water quality during the remainder of the calendar year (October through May).

Tables 7 to 18 are located at the end of this Decision Document

Tables 7 to 18 of this Decision Document communicate MPCA's estimates of the reductions required for the MRSCW nutrient impaired lakes 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 their designated uses are no longer considered impaired.

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 MRSCW nutrient TMDLs. Additionally, EPA concurs with the loading capacities calculated by the MPCA in these twelve nutrient TMDLs. EPA finds MPCA's approach for calculating the loading capacity to be reasonable and consistent with EPA guidance.

MRSCW CBOD, NBOD & SOD TMDLs: MPCA employed the Stream Water Quality Model QUAL2K (Version 2.11) to develop the three CBOD, NBOD & SOD TMDLs in the MRSCW. QUAL2K is a one-dimensional, steady state model which has been approved by EPA for calculating dissolved oxygen concentrations is rivers. MPCA incorporated DO, CBOD, nitrogen and phosphorus data to characterize CBOD decay, nitrification, algal photosynthesis and respiration and SOD into the setup of QUAL2K. MPCA included flow rate, non-point source concentrations and headwater and tributary inflows as inputs.

The QUAL2K model was run and model outputs included; a quantification of SOD contributions in downstream wetlands and assimilative capacities for Battle Brook, Rice Creek and Clearwater River under steady state conditions and low flow conditions. The loading capacity calculations represent the maximum allowable oxygen demand from oxygen depleting processes (CBOD, NBOD and SOD) which the water column of the stream can withstand and still attain the water quality target of 5.0 mg/L. MPCA calculated the loading capacity based on SOD rates and pollutant loading estimates from headwaters and tributaries. The QUAL2K model runs were reduced until model-predicted minimum daily dissolved oxygen concentration in each stream was greater than 5.0 mg/L.

The linkage of the impairment to the source, as well as the load and WLAs is based on thorough evaluation of water quality data, hydrologic and hydraulic data collected by the MPCA and the Sherburne SWCD and Clearwater River Watershed District. The models were calibrated to survey data as described in technical memos (Appendix's C-F of the final TMDL document). MPCA described the potential point and nonpoint source contributors for each stream in Sections 5.5 to 5.7 of the final TMDL document.

Table 19: CBOD, NBOD & SOD TMDLs for Mississippi River (St. Cloud) Watershed

Allocation	Source	CBOD *(lbs/day)*	NBOD *(lbs/day)*	SOD *(lbs/day)*
Battle Brook (07010203-535)				
Wasteload Allocation	Construction Stormwater	0.10	1.00	--
Load Allocation	Headwater Watershed Load	0.70	4.00	--
	Tributary Watershed Load	1.80	35.90	--
	Sediment Oxygen Demand (SOD) Load	--	--	21.10
MOS	***Margin Of Safety (MOS)***	*Implicit MOS*		
	Loading Capacity	**2.60**	**40.90**	**21.10**
Rice Creek (07010203-512)				
Wasteload Allocation	Construction Stormwater	2.00	5.00	
Load Allocation	Headwater Watershed Load	124.00	255.00	
	Tributary Watershed Load	15.00	82.00	
	Sediment Oxygen Demand (SOD) Load	--	--	169.00
MOS	***Margin Of Safety (MOS)***	*Implicit MOS*		
	Loading Capacity	**141.00**	**342.00**	**169.00**
Clearwater River (07010203-511)				
Wasteload Allocation	Construction Stormwater	113.00	41.00	
Load Allocation	Headwater Watershed Load	7404.00	2670.00	
	Tributary Watershed Load	14.00	0.00	
	Sediment Oxygen Demand (SOD) Load	--	--	649.00
MOS	***Margin Of Safety (MOS)***	*Implicit MOS*		
	Loading Capacity	**7531.00**	**2711.00**	**649.00**

Stream	Allocation	CBOD (lbs/day) *(% reduction)*	NBOD (lbs/day) *(% reduction)*	SOD (lbs/day) *(% reduction)*
Battle Brook (07010203-535)	WLA	80%	80%	--
	LA	80%	80%	80%
Rice Creek (07010203-512)	WLA	80%	80%	--
	LA	80%	80%	80%
Clearwater River (07010203-511)	WLA	80%	80%	--
	LA	80%	80%	10%

Table 19 of this Decision Document discusses MPCA's estimates of the reductions required for the three stream reaches to meet their dissolved oxygen 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 target and each segment's water quality will return to a level where its designated use is no longer considered impaired.

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 MRSCW CBOD, NBOD & SOD TMDLs. Additionally, EPA concurs with the loading capacities calculated by the MPCA in these three CBOD, NBOD & SOD TMDLs. EPA finds MPCA's approach for calculating the loading capacity to be reasonable and consistent with EPA guidance.

MRSCW sediment (TSS) TMDL: MPCA attributed sediment inputs as the main stressor on aquatic life in Rice Creek. MPCA determined that the primary source of sediment to Rice Creek is nonpoint source load from agricultural runoff (page 73 of the final TMDL document). Agricultural runoff can be attributed to high-density agricultural activities and pastures, removal or lack of vegetative buffers adjacent to ditches, channels and streams, and other land use alterations to the surrounding landscape (i.e., such as changes in land cover from forest to grass or shrub lands). These changes in land cover can increase sediment delivery if the watershed is ditched or tiled, or if there is a lack of intervening buffer vegetation to filter sediment from overland flow. The watershed sources were recognized as a nonpoint source to Rice Creek and assigned a portion of the load allocation (Table 20 of this Decision Document).

MPCA developed a load duration curve (LDC) to calculate sediment TMDLs for Rice Creek. A flow duration curve (FDC) was created based on measured flows from a flow monitoring station at CSAH-16 bridge over Rice Creek. FDC 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 CRNR TSS WQS (30 mg/L) and then multiplying that value by a conversion factor. The resulting points are plotted onto a load duration curve graph (Figure 7-2 of the final TMDL document). The LDC graph, for Rice Creek has flow duration interval (percentage of time flow exceeded) on the X-axis and TSS load (tons/day) on the Y-axis. The blue curved line of Figure 7-2 of the final TMDL document represents the TMDL of the respective flow conditions observed at that location.

Water quality monitoring was completed in the Rice Creek subwatershed between 2000 and 2012 and measured TSS 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. The individual sampling loads were plotted on the same figure with the created LDC.

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

The strengths of using the LDC method are that critical conditions and seasonal variation are considered in the creation of the FDC by plotting hydrologic conditions over the flows measured during the entire year. 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 sediment loads based on flow magnitudes. Different sources will contribute sediment 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 sediment loading into surface waters. This allows for a more efficient implementation effort.

A sediment (TSS) TMDL for Rice Creek was calculated (Table 20 of this Decision Document). The load allocation was calculated after the determination of the WLA, and the Margin of Safety. Load allocations (ex. 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.

Table 20 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 CRNR TSS water quality standard. Using this method, daily loads were developed based upon the flow in the water body. Loading capacities were determined for the segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Table 7 of this Decision Document identifies the loading capacity for the water body at each flow regime. Although there are numeric loads for each flow regime, the LDC is what is being approved for this TMDL.

Table 20: Rice Creek (07010203-512) Sediment (TSS) TMDL for Mississippi River (St. Cloud) Watershed

Flow Regime TMDL analysis TSS (tons/day)	Very High Flow	High Flow	Mid-Range Flow	Low Flow	Dry Flow
		Rice Creek (07010203-512)			
Wasteload Allocation (WLA) - Construction Stormwater	0.14	0.05	0.02	0.01	0.00
Load Allocation (LA) - NPS and instream contributions	8.97	3.00	1.34	0.43	0.17
Margin Of Safety (MOS)			*Implicit MOS*		
TMDL	**9.11**	**3.05**	**1.36**	**0.44**	**0.17**

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 Rice Creek sediment (TSS) TMDL. Additionally, EPA concurs with the loading capacities calculated by the MPCA in the Rice Creek sediment (TSS) TMDL. EPA finds MPCA's approach for calculating the loading capacity for the Rice Creek sediment (TSS) 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 or water quality targets. MPCA recognized that LAs for each of the individual TMDLs addressed by the MRSCW TMDLs can be attributed to different nonpoint sources.

MRSCW nutrient TMDLs: MPCA divided the LA for the lakes between a variety of nonpoint sources. These nonpoint sources included: watershed contributions from each lake's direct watershed, watershed contributions from upstream watersheds, internal loading, atmospheric deposition, and groundwater contributions. MPCA calculated estimated percent reductions for different LA sources. These reductions represent the estimated decreases necessary to meet the NCHF WQS (Tables 7 to 18 of this Decision Document). The reductions necessary from nonpoint sources ranged from 0% to 88%.

Certain lakes in the MRSCW (ex. Donovan Lake, Briggs Lake, Mink Lake) have considerable internal loading and substantial internal load reductions are necessary in order for these lakes to attain WQS. MPCA recognizes that its load reductions goals for internal load are aggressive but these goals are based on the on the best available information for the MRSCW nutrient TMDLs and the reduction targets are within the range of reductions required for other lakes in Minnesota. Once implementation actions are conducted to address both internal loads and watershed loads and additional water quality monitoring is completed to assess the progress, MPCA and local partners plan to revisit the reduction goals of the MRSCW nutrient TMDLs. Through this adaptive management approach, MPCA and local partners will be able to decide whether further implementation actions are needed or if MPCA should consider a site-specific water quality standard.

MRSCW CBOD, NBOD & SOD TMDLs: MPCA divided the LA for the three CBOD, NBOD & SOD TMDLs between: headwater watershed load contributions, tributary watershed load contributions and sediment oxygen demand load. MPCA calculated estimated percent reductions for different LA sources. These reductions represent the estimated decreases necessary to meet the dissolved oxygen WQS (Table 19 of this Decision Document). The reductions necessary from nonpoint sources ranged from 10% to 80%.

MRSCW sediment (TSS) TMDL: The calculated LA values for the sediment (TSS) TMDL are applicable across all flow conditions in the Rice Creek (07010203-512) subwatershed (Table 20 of this Decision Document). MPCA identified several nonpoint sources which contribute sediment loads to the surface waters in the MRSCW. 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. 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:
MRSCW nutrient TMDLs: MPCA identified the three NPDES permitted wastewater treatment facilities (WWTF) in the Orono Lake TMDL (Table 4 and Table 12 of this Decision Document). MPCA assigned each facility a portion of the WLA; Aspen Hills WWTF (59.52 lbs. of TP per year), Becker Municipal WWTF (1,990.77 lbs. of TP per year) and Zimmerman WWTF (923.74 lbs. of TP per year) (Table 21 of this Decision Document).

Table 21: WLA for NPDES permitted facilities in the MRSCW

Facility Name	Design Flow	Average Reported Flow	Current Concentration Permitted	Average Reported Concentration	Current P Load Permitted	WLA
	(MGD)	(MGD)	(mg/L)	(mg/L)	(lb/year)	(lb/year)
Aspen Hills WWTF (MN0066028)	0.0195	0.0124	1.0	0.912	60	59.52
Becker Municipal WWTF (MN0025666-SD-1)	2.15	1.09	1.0	0.608	2575	1990.77
Zimmerman WWTF (MN0042331)	0.452	0.397	1.0	0.601	1376	923.74

MPCA used categorical WLAs to assign nutrient WLAs to MS4 permittees in the Donovan Lake nutrient TMDL (Table 7 of this Decision Document) and the Orono Lake nutrient TMDL (Table 12 of this Decision Document). MPCA calculated an individual WLA for the Big Lake Township MS4 (MS400234) within the Birch Lake nutrient TMDL (Table 11 of this Decision Document) since there was only one MS4 community within the Birch Lake subwatershed. The use of a categorical nutrient WLA for nutrient TMDLs in the MRSCW is consistent with aspects of EPA[1] and MPCA guidance for incorporating MS4 stormwater programs into TMDLs. MPCA has explained that a categorical WLA is appropriate when each permittee can perform the same stormwater management activities to accomplish the requirements of the TMDL. This situation also occurs when the TMDL prescribes a set of best management practices (BMPs) for more than one stormwater entity and those BMPs alone will achieve the WLA.[2] MPCA has explained that a categorical WLA may be appropriate when a single MS4 or other entity, such as the Clearwater River Watershed District (CRWD), can track BMPs implementation and associated load reductions.

MPCA calculated a portion of the WLA and assigned it to construction stormwater. MPCA's calculation for the construction stormwater WLA was based on areal coverage of construction permits from the previous 10-years. MPCA allocated 1% of the loading capacity to construction stormwater loads for all nutrient TMDLs in the MRSCW to account for any future construction activities within the MRSCW.

MPCA explained that BMPs and other stormwater control measures should be implemented at active construction sites to limit the discharge of pollutants of concern. BMPs and other stormwater control measures which should be implemented at construction sites are defined in the State's NPDES/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 MNR1000001 and applicable local construction stormwater ordinances, including those related to impaired waters discharges and any applicable additional requirements found in Appendix A of the Construction General Permit, the stormwater discharges would be expected to be consistent with the WLA in this TMDL.

The NPDES program requires construction 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 MRSCW TMDLs. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified.

MPCA determined that there were three CAFO facilities (Table 5 of this Decision Document) in the MRSCW. 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 MRSCW nutrient TMDLs.

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[1] EPA, November 2002. *Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs*

[2] Minnesota Pollution Control Agency, October 2011. *Supporting Material for Guidance and Policy for Incorporating Stormwater Language into Total Maximum Daily Loads.* Document Number: wq-strm7-03. St. Paul, MN.

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

MRSCW CBOD, NBOD & SOD TMDLs: MPCA assigned a portion of the loading capacity to construction stormwater (1.5% of the loading capacity) in Table 19 of this Decision Document. MPCA reviewed construction stormwater permit application records from the previous 10-years and estimated that approximately 1% of the total watershed area was covered by construction stormwater permits. MPCA researched sites which were greater than 1 acre in size. Construction sites may contribute sediment during stormwater events. This sediment, when washed into MRSCW streams, may lead to increased microorganism activity which decreases dissolved oxygen concentrations in the water column. MPCA explained that permitted construction sites must comply with the construction stormwater requirements of MPCA's NPDES Stormwater Program. These requirements state that construction sites must create a SWPPP which outlines how the site will minimize stormwater migrating offsite.

MPCA concluded that there were no NPDES permitted facilities, MS4 communities, nor other potential point sources which should have been assigned a portion of the loading capacity for the CBOD, NBOD & SOD TMDLs.

EPA finds the MPCA's approach for calculating the WLA for the MRSCW CBOD, NBOD & SOD TMDLs to be reasonable and consistent with EPA guidance.

MRSCW sediment (TSS) TMDL: MPCA assigned a portion of the loading capacity to construction stormwater (1.5% of the loading capacity) in Table 20 of this Decision Document. MPCA reviewed construction stormwater permit application records from the previous 10-years and estimated that approximately 1% of the total watershed area was covered by construction stormwater permits. MPCA researched sites which were greater than 1 acre in size. Construction sites may contribute sediment during stormwater events. MPCA explained that permitted construction sites must comply with the construction stormwater requirements of MPCA's NPDES Stormwater Program. These requirements state that construction sites must create a SWPPP which outlines how the site will minimize stormwater migrating offsite.

MPCA concluded that there were no NPDES permitted facilities, MS4 communities, nor other potential point sources which should have been assigned a portion of the loading capacity for the TSS TMDL.

EPA finds the MPCA's approach for calculating the WLA for the MRSCW sediment (TSS) 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 final TMDL submittal outlines the determination of the Margin of Safety for the nutrient TMDLs (an explicit MOS set at 10% of the loading capacity), the CBOD, NBOD & SOD TMDLs (an implicit MOS) and sediment (TSS) TMDL (an implicit MOS).

MRSCW nutrient TMDLs: The nutrient TMDLs employed an explicit MOS set at 10% of the loading capacity. The explicit MOS was applied by reserving 10% of the total loading capacity, and then allocating the remaining loads to point and nonpoint sources (Tables 7 to 18 of this Decision Document). MPCA explained that the explicit MOS was set at 10% due to the following factors discovered during the development of the MRSCW nutrient TMDLs:

- Environmental variability in pollutant loading;
- Variability in water quality data (i.e., collected water quality monitoring data);
- The agreement between water quality models' predicted and observed values;
- Conservative assumptions made during the modeling efforts; and
- MPCA's confidence in the Canfield-Bachmann model's performance during the development of nutrient TMDLs.

MRSCW CBOD, NBOD & SOD TMDLs: The CBOD, NBOD & SOD TMDLs employed an implicit MOS which was based on conservative assumptions made by MPCA during the CBOD, NBOD & SOD TMDL development and modeling processes. MPCA explained that it used conservative kinetic rates and conservative sensitivity model settings during its calculation of loading capacities for the CBOD, NBOD and SOD TMDLs. DO modeling efforts (i.e., DO concentrations in riverine systems) were very sensitive to hydraulic, channel slope and channel morphometry characterizations. Therefore, MPCA employed more conservative model sensitivity settings during its TMDL calculations. Additionally, MPCA described a conservative, weight of evidence approach used during the comparison of modeling efforts and hydrologic system responses to actual LiDAR and survey information. These conservative efforts also provided an implicit MOS to the CBOD, NBOD and SOD TMDLs.

Load reduction calculations were based on minimum DO concentrations measured in each of the three segments. Minimum DO concentration measurements represent the worst DO conditions in the MRSCW and estimates designed to meet water quality targets, using these minimum conditions, will overestimate the actual loads necessary to meet the targets. This bias toward using minimum DO conditions for load reduction calculations incorporates conservative MOS.

MRSCW sediment (TSS) TMDL: The sediment (TSS) TMDL employed conservative assumptions during the sediment (TSS) TMDL development process and in the calculation of the load reduction estimates for the five flow regimes of the load duration curve. Load reductions were based on observed water quality concentration data, specifically, the 90th percentile concentration measurement within the particular flow regime (ex. very high flows, low flows etc.) subtracted from the LDC concentration measurement. This effectively calculates the load reduction from the higher end of the observed water quality data subtracted from the corresponding concentration of the LDC to determine loading reductions within Rice Creek across five flow regimes.

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:

MRSCW nutrient TMDLs: Seasonal variation was considered for the MRSCW nutrient TMDLs as described in Section 4.1.2 of the final TMDL document. The nutrient targets employed in the MRSCW nutrient TMDLs 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 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 MRSCW 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-late summer time period is typically when eutrophication standards are exceeded and water quality within the MRSCW 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).

MRSCW CBOD, NBOD & SOD TMDLs: Critical conditions and seasonal variation for the CBOD, NBOD & SOD TMDLs were accounted for via the daily stream flow records used to develop the CBOD, NBOD & SOD TMDLs. Seasonal variation was addressed in the development of CBOD, NBOD & SOD TMDLs by using the critical period in terms of flow regime and temperature. MPCA made the assumption that if targeted dissolved oxygen concentrations could be attained during the critical periods/flow regimes then the dissolved oxygen targets would be met for the remainder of the year in other temperatures and flow regimes.

The critical periods for dissolved oxygen impaired waters are typically when flows in the stream are decreased or water temperatures are increased. Low flow periods (ex. 7Q10 flow periods) typically correlate to lower dissolved oxygen concentrations in the water column. Stream temperatures may also impact dissolved oxygen concentrations in waters of the MRSCW. Temperatures vary seasonally due to climatic conditions (i.e., air temperatures, precipitation, snow/ice coverage, solar exposure etc.). Peak stream temperatures generally occur during the summer months (June, July, August and September). In the warmer summer months, surface waters typically exhibit decreased dissolved oxygen concentrations.

MRSCW sediment (TSS) TMDL: Sediment inputs to surface waters typically occur primarily through wet weather events. Critical conditions that impact the response of MRSCW 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.

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 MRSCW nutrient, CBOD, NBOD & SOD and sediment (TSS) TMDLs provide reasonable assurance that actions identified in the implementation section of the final TMDL (i.e., Section 8.0 of the final TMDL document), will be applied to attain the loading capacities and allocations calculated for the impaired reaches within the MRSCW. 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.

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 some of 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 MRSCW 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).

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.

MPCA is responsible for applying federal and state regulations to protect and enhance water quality within the TMDL study area. MPCA oversees all regulated MS4 entities (ex. Big Lake Township and St. Cloud 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, expected in 2018.

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.

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 nutrient, oxygen demanding pollutants and TSS 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.

Various funding mechanisms will be utilized to execute the recommendations made in the implementation section of this TMDL. An implementation plan based on the recommendations from the MRSCW TMDLs will be finalized within one year of the approval of the MRSCW TMDLs. Funding for implementation efforts will be a mixture of local, state and federal funding vehicles. Local funding may be through SWCD cost-share funds, Natural Resources Conservation Service (NRCS) cost-share funds, and MRSCWD and local government cost-share funds. Federal funding, via the Section 319 grants program, may provide money to implement voluntary nonpoint source programs within the Mississippi River St Cloud watershed. State efforts may be via Clean Water Legacy Act (CWLA) grant money and the Minnesota Clean Water Partnership program.

<u>Clean Water Legacy Act:</u> The CWLA is a statute passed in Minnesota in 2006 for the purposes of protecting, restoring, and preserving Minnesota water and providing the funding to do so. The Act discusses how MPCA and the involved public agencies and private entities will coordinate efforts regarding land use, land management, water management, etc. Cooperation is also expected between agencies and other entities regarding planning efforts, and various local authorities and responsibilities. This would also include informal and formal agreements to jointly use technical, educational, and financial resources. The CWLA provides the process to be used in Minnesota to develop TMDL implementation plans, which detail the restoration activities needed to achieve the allocations in the TMDL. The TMDL implementation plans are required by the State to obtain funding from the Clean Water Fund. MPCA expects the implementation plans to be developed within a year of TMDL approval.

The CWLA also provides details on public and stakeholder participation, and how the funding will be used. The implementation plans are required to contain ranges of cost estimates for point and nonpoint source load reductions, as well as monitoring efforts to determine effectiveness. MPCA has developed guidance on what is required in the implementation plans (Implementation Plan Review Combined Checklist and Comment, MPCA), which includes cost estimates, general timelines for implementation, and interim milestones and measures. 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 '11 Clean Water Fund Competitive Grants Policy; Minnesota Board of Soil and Water Resources, 2011).

MPCA has identified several local partners which have expressed interest in working to improve water quality within the MRSCW. Implementation practices will be implemented over the next several years. The following groups are expected to work closely with one another to ensure that pollutant reduction efforts via BMPs are being implemented within the MRSCW: the Clearwater River Watershed District, Sherburne, Benton and Wright Soil and Water Conservation Districts (SWCDs), Minnesota Department of Natural Resources (DNR), Natural Resource Conservation Service (NRCS), National Park Service (NPS) and U.S. Fish and Wildlife Service.

The EPA finds that this criterion has been adequately addressed.

9. Monitoring Plan to Track TMDL Effectiveness

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

Comment:
The final TMDL document outlines the water monitoring efforts in the Mississippi River St. Cloud watershed. 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., CRWD) as long as there is sufficient funding to support the efforts of these local entities. Additionally, volunteers may be relied on to complete monitoring in the lakes discussed within this TMDL. At a minimum, the MRSCW 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 MRSCW. 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 MRSCW. Watershed managers will have the opportunity to reflect on the progress or lack of progress, and will have the opportunity to change course if progress is unsatisfactory. Review of BMP efficiency is expected to be completed by the local and county partners.

Stream Monitoring:
River and stream monitoring in the MRSCW, has been completed by a variety of organizations (i.e., SWCDs) and funded by Clean Water Partnership Grants, and other available local funds. MPCA anticipates that stream monitoring in the MRSCW 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 of the MRSCW 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 MRSCW TMDLs will be used to inform the selection of implementation activities as part of the Mississippi River St. Cloud Watershed Restoration and Protection Strategy (WRAPS) process. The purpose of the WRAPS report is to support local working groups and jointly develop scientifically-supported restoration and protection strategies to be used for subsequent implementation planning. The TMDL outlined implementation strategies in Section 8 of the final TMDL document. MPCA outlined the importance of prioritizing areas within the MRSCW, education and outreach efforts with local partners, and partnering with local stakeholders to improve water quality within the watershed. Reduction goals for the nutrient, CBOD, NBOD & SOD and sediment (TSS) TMDLs may be met via components of the following strategies:

MRSCW nutrient and CBOD, NBOD & SOD TMDLs:
Septic Field Maintenance: Septic systems are believed to be a source of nutrients to waters in the MRSCW. 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 MRSCW.

Manure management (feedlot and manure stockpile runoff controls): Manure has been identified as a potential source of nutrients in the MRSCW. 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 MRSCW. 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 MRSCW. 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 (ex. 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 MRSCW nutrient 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 (ex. aluminum sulfate) to lakes of the MRSCW 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 MRSCW.

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

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

11. Public Participation

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

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

Comment:
The public participation section of the TMDL submittal is found in Section 8.11 of the final TMDL document. Throughout the development of the MRSCW TMDLs the public was given various opportunities to participate. As part of the strategy to communicate the goals of the TMDL project and to engage with members of the public, MPCA formed a 'civic engagement committee'. This committee was composed of staff from Sherburne, Benton and Wright SWCDs, Clearwater River Watershed

District, Minnesota Department of Natural Resources, and MPCA. The MRSCW civic engagement committee held public meetings in 2011, 2013, and 2014 where the committee explained the TMDL process, the results of water quality sampling conducted in the MRSCW, draft results of MRSCW TMDLs and the Watershed Restoration and Protection Study (WRAPS) process. A full description of civic engagement activities associated with the TMDL process will be available within in the MRSCW WRAPS report.

MPCA posted the draft TMDL online at (http://www.pca.state.mn.us/water/tmdl) for a public comment period. The 30-day public comment period was started on October 13, 2014 and ended on November12, 2014. MPCA received 1 public comment during the public comment period from the Minnesota Department of Agriculture (MDA)

The comment from MDA requested the inclusion of additional language within the final MRSCW TMDL to discuss soil characteristics, the inclusion of a map illustrating the locations NPDES permittees and CAFOs, the inclusion of language to clarify SSTS source contributions, and greater information regarding agricultural influences to water quality in Donovan Lake. MPCA agreed to update language within the final MRSCW TMDL. EPA believes that MPCA adequately addressed the comment from MDA and updated the final TMDL appropriately. MPCA submitted MDA's public comment and its response in the final TMDL submittal packet received by the EPA on March 19, 2015.

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 MRSCW TMDL document, submittal letter and accompanying documentation from MPCA on March 19, 2015. The transmittal letter explicitly stated that the final TMDLs referenced in Table 1 of this Decision Document were being submitted to EPA pursuant to Section 303(d) of the Clean Water Act for EPA review and approval.

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

The EPA finds that the TMDL transmittal letter submitted for the Mississippi River (St. Cloud) watershed TMDLs by MPCA satisfies the requirements of this twelfth element.

13. Conclusion

After a full and complete review, the EPA finds that the twelve nutrient TMDLs, the three CBOD, NBOD & SOD TMDLs and the one sediment (TSS) TMDL satisfy all elements for approvable TMDLs. This TMDL approval is for **sixteen TMDLs**, addressing fifteen different water bodies for aquatic recreational and aquatic life use impairments (Table 1 of this Decision Document).

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

Table 7: Nutrient TMDL for Donovan Lake (05-0004-02) in the Mississippi River (St. Cloud) Watershed

Allocation	Source	TMDL	
		(lbs./yr)	*(lbs./day)*[1]
Wasteload Allocation	MS4 - Benton County (MS440067)	12.16	0.033
	MS4 - St. Cloud City (MS400052)		
	MS4 - Minden Township (MS400147)		
	MS4 - MNDOT Outstate District MS4 (non-trad) (MS400180)		
	Construction Stormwater	0.76	0.0021
	WLA Totals	***12.92***	***0.0354***
Load Allocation	Watershed contributions	63.08	0.1728
	Internal Load	28.91	0.0792
	Atmospheric Deposition + Groundwater Contributions	24.04	0.0659
	LA Totals	***116.03***	***0.3179***
Margin Of Safety (10 %)		14.33	0.0393
Total		**143.28**	**0.393**

1 = Annual loads converted to daily loads by dividing by 365 days per year

Source		Existing TP Load	TMDL	Load Reduction
		(lbs./yr)	*(lbs./yr)*	*(%)*
PS + NPS	Watershed Load	240.89	76.00	68%
NPS	Atmospheric + Groundwater	24.04	24.04	0%
NPS	Internal	86.72	28.91	67%
MOS	MOS (10%)	--	14.33	--
Total		351.65	143.28	63%

Table 8: Nutrient TMDL for Julia Lake (71-0145-00) in the Mississippi River (St. Cloud) Watershed

Allocation	Source	TMDL (lbs./yr)	TMDL (lbs./day)[1]
Wasteload Allocation	Construction Stormwater	0.59	0.0016
	WLA Totals	***0.59***	***0.0016***
Load Allocation	Watershed contributions	58.73	0.16
	Internal Load	211.82	0.58
	Atmospheric Deposition + Groundwater Contributions	67.67	0.19
	LA Totals	***338.22***	***0.93***
	Margin Of Safety (10 %)	37.65	0.10
	Total	**376.46**	**1.03**

1 = Annual loads converted to daily loads by dividing by 365 days per year

Source		Existing TP Load (lbs./yr)	TMDL (lbs./yr)	Load Reduction (%)
PS + NPS	Watershed Load	96.97	59.32	39%
NPS	Upstream Lakes	--	--	--
NPS	Atmospheric + Groundwater	67.67	67.67	0%
NPS	Internal	211.82	211.82	0%
MOS	MOS (10%)	--	37.65	--
Total		376.46	376.46	39%

Table 9: Nutrient TMDL for Briggs Lake (71-0146-00) in the Mississippi River (St. Cloud) Watershed

Allocation	Source	TMDL (lbs./yr)	TMDL (lbs./day)[1]
Wasteload Allocation	Construction Stormwater	7.39	0.020
	WLA Totals	***7.39***	***0.020***
Load Allocation	Watershed contributions	732.03	2.01
	Upstream Lake (Julia Lake)	82.82	0.23
	Internal Load	265.91	0.73
	Atmospheric Deposition + Groundwater Contributions	125.80	0.34
	LA Totals	***1,206.56***	***3.31***
	Margin Of Safety (10 %)	134.90	0.37
	Total	**1,348.85**	**3.70**

1 = Annual loads converted to daily loads by dividing by 365 days per year

Source		Existing TP Load (lbs./yr)	TMDL (lbs./yr)	Load Reduction (%)
PS + NPS	Watershed Load	1134.57	739.42	35%
NPS	Upstream Lakes	82.82	82.82	0%
NPS	Atmospheric + Groundwater	125.80	125.80	0%
NPS	Internal	1,688.34	265.91	84%
MOS	MOS (10%)	--	134.90	--
Total		3031.53	1348.85	56%

Table 10: Nutrient TMDL for Rush Lake (71-0147-00) in the Mississippi River (St. Cloud) Watershed

Allocation	Source	TMDL	
		(lbs./yr)	*(lbs./day)*[1]
Wasteload Allocation	Construction Stormwater	0.43	0.0012
	WLA Totals	***0.43***	***0.0012***
Load Allocation	Watershed contributions	42.41	0.12
	Upstream Lake (Briggs Lake)	597.54	1.64
	Internal Load	573.49	1.57
	Atmospheric Deposition + Groundwater Contributions	78.41	0.21
	LA Totals	***1,291.85***	***3.54***
Margin Of Safety (10 %)		143.59	0.39
Total		**1,435.87**	**3.93**

1 = Annual loads converted to daily loads by dividing by 365 days per year

Source		Existing TP Load	TMDL	Load Reduction
		(lbs./yr)	*(lbs./yr)*	*(%)*
PS + NPS	Watershed Load	133.87	42.84	68%
NPS	Upstream Lakes	1,263.30	597.54	53%
NPS	Atmospheric + Groundwater	78.41	78.41	0%
NPS	Internal	1,289.78	573.49	56%
MOS	MOS (10%)	--	143.59	--
Total		2765.36	1435.87	48%

Table 11: Nutrient TMDL for Birch Lake (71-0057-00) in the Mississippi River (St. Cloud) Watershed

Allocation	Source	TMDL	
		(lbs./yr)	*(lbs./day)*[1]
Wasteload Allocation	MS4 - Big Lake Township (MS400234)	2.39	0.007
	Construction Stormwater	1.48	0.0041
	WLA Totals	***3.87***	***0.0106***
Load Allocation	Watershed contributions	143.91	0.3943
	Internal Load	27.41	0.0751
	Atmospheric Deposition + Groundwater Contributions	65.08	0.1783
	LA Totals	***236.40***	***0.6477***
Margin Of Safety (10 %)		26.70	0.0732
Total		**266.97**	**0.731**

1 = Annual loads converted to daily loads by dividing by 365 days per year

Source		Existing TP Load	TMDL	Load Reduction
		(lbs./yr)	*(lbs./yr)*	*(%)*
PS + NPS	Watershed Load	174.48	147.51	15%
NPS	Upstream Lakes	--	--	--
NPS	Atmospheric + Groundwater	65.08	65.08	0%
NPS	Internal	27.41	27.41	0%
MOS	MOS (10%)	--	26.70	--
Total		266.97	266.70	15%

Table 12: Nutrient TMDL for Upper and Lower Orono Lake (71-0013-01 & 71-0013-02) in the Mississippi River (St. Cloud) Watershed

Allocation	Source	TMDL	
		(lbs./yr)	*(lbs./day)*[1]
Wasteload Allocation	MS4 - City of Elk River (MS400089)	468.11	1.282
	MS4 - City of Big Lake (MS400234)		
	MS4 - Big Lake Township (MS400249)		
	Aspen Hills WWTF (MN0066028)	59.52	0.163
	Becker Municipal WWTF (MN0025666-SD-1)	1,990.77	5.454
	Zimmerman WWTF (MN0042331)	923.740	2.531
	Construction Stormwater	234.050	0.641
	WLA Totals	***3,676.19***	***10.0718***
Load Allocation	Watershed contributions	22,703.26	62.2007
	Upstream Lake (Big Elk Lake)	18,740.85	51.3448
	Internal Load	460.99	1.2630
	Atmospheric Deposition + Groundwater Contributions	152.03	0.4165
	LA Totals	***42,057.13***	***115.2250***
	Margin Of Safety (10 %)	5,081.50	13.9219
	Total	**50,814.82**	**139.219**

1 = Annual loads converted to daily loads by dividing by 365 days per year

Source		Existing TP Load	TMDL	Load Reduction
		(lbs./yr)	*(lbs./yr)*	*(%)*
PS + NPS	Watershed Load	48249.56	23405.42	51%
NPS	Upstream Lakes	44270.97	18740.85	58%
NPS	Atmospheric + Groundwater	152.03	152.03	0%
NPS	Internal	3841.62	460.99	88%
MOS	MOS (10%)	--	5081.50	--
Total		96514.18	47840.79	48%

Table 13: Nutrient TMDL for Fish Lake (86-0183-00) in the Mississippi River (St. Cloud) Watershed

Allocation	Source	TMDL (lbs./yr)	TMDL (lbs./day)[1]
Wasteload Allocation	Construction Stormwater	4.68	0.0128
	WLA Totals	***4.68***	***0.0128***
Load Allocation	Watershed contributions	463.73	1.27
	Internal Load	15.03	0.04
	Atmospheric Deposition + Groundwater Contributions	21.33	0.06
	LA Totals	***500.09***	***1.37***
	Margin Of Safety (10 %)	56.09	0.15
	Total	**560.86**	**1.54**

1 = Annual loads converted to daily loads by dividing by 365 days per year

Source		Existing TP Load (lbs./yr)	TMDL (lbs./yr)	Load Reduction (%)
PS + NPS	Watershed Load	678.61	468.42	31%
NPS	Upstream Lakes	--	--	--
NPS	Atmospheric + Groundwater	21.33	21.33	0%
NPS	Internal	16.70	15.03	10%
MOS	MOS (10%)	--	56.09	--
Total		716.64	560.87	22%

Table 14: Nutrient TMDL for Mink Lake (86-0229-00) in the Mississippi River (St. Cloud) Watershed

Allocation	Source	TMDL (lbs./yr)	TMDL (lbs./day)[1]
Wasteload Allocation	Construction Stormwater	1.93	0.0053
	WLA Totals	***1.93***	***0.0053***
Load Allocation	Watershed contributions	190.68	0.52
	Internal Load	320.34	0.88
	Atmospheric Deposition + Groundwater Contributions	71.22	0.20
	LA Totals	***582.24***	***1.60***
Margin Of Safety (10 %)		64.91	0.18
Total		**649.08**	**1.78**

1 = Annual loads converted to daily loads by dividing by 365 days per year

Source		Existing TP Load (lbs./yr)	TMDL (lbs./yr)	Load Reduction (%)
PS + NPS	Watershed Load	719.30	192.60	73%
NPS	Upstream Lakes	--	--	--
NPS	Atmospheric + Groundwater	71.22	71.22	0%
NPS	Internal	1,334.76	320.34	76%
MOS	MOS (10%)	--	64.91	--
Total		2125.28	649.07	69%

Table 15: Nutrient TMDL for Somers Lake (86-0230-00) in the Mississippi River (St. Cloud) Watershed

Allocation	Source	TMDL	
		(lbs./yr)	*(lbs./day)*[1]
Wasteload Allocation	Construction Stormwater	0.23	0.0006
	WLA Totals	***0.23***	***0.0006***
Load Allocation	Watershed contributions	22.86	0.06
	Upstream Lake (Mink Lake)	199.83	0.55
	Internal Load	279.51	0.77
	Atmospheric Deposition + Groundwater Contributions	35.20	0.10
	LA Totals	***537.40***	***1.47***
Margin Of Safety (10 %)		59.74	0.16
Total		**597.37**	**1.64**

1 = Annual loads converted to daily loads by dividing by 365 days per year

Source		Existing TP Load	TMDL	Load Reduction
		(lbs./yr)	*(lbs./yr)*	*(%)*
PS + NPS	Watershed Load	64.49	23.09	64%
NPS	Upstream Lakes	400.46	199.83	50%
NPS	Atmospheric + Groundwater	35.20	35.20	0%
NPS	Internal	524.60	279.51	47%
MOS	MOS (10%)	--	59.74	--
Total		1024.75	597.37	42%

Table 16: Nutrient TMDL for Silver Lake (86-0140-00) in the Mississippi River (St. Cloud) Watershed

Allocation	Source	TMDL (lbs./yr)	TMDL (lbs./day)[1]
Wasteload Allocation	Construction Stormwater	8.76	0.0240
	WLA Totals	***8.76***	***0.0240***
Load Allocation	Watershed contributions	867.59	2.38
	Upstream Lake (Mink Lake and Somers Lake)	299.44	0.82
	Internal Load	31.05	0.09
	Atmospheric Deposition + Groundwater Contributions	18.37	0.05
	LA Totals	***1,216.45***	***3.33***
Margin Of Safety (10 %)		136.14	0.37
Total		**1,361.35**	**3.73**

1 = Annual loads converted to daily loads by dividing by 365 days per year

Source		Existing TP Load (lbs./yr)	TMDL (lbs./yr)	Load Reduction (%)
PS + NPS	Watershed Load	2686.18	876.36	67%
NPS	Upstream Lakes	367.41	299.44	18%
NPS	Atmospheric + Groundwater	18.37	18.37	0%
NPS	Internal	62.09	31.05	50%
MOS	MOS (10%)	--	136.14	--
Total		3134.05	1361.36	57%

Table 17: Nutrient TMDL for Indian Lake (86-0223-00) in the Mississippi River (St. Cloud) Watershed

Allocation	Source	TMDL (lbs./yr)	TMDL (lbs./day)[1]
Wasteload Allocation	Construction Stormwater	0.57	0.0016
	WLA Totals	***0.57***	***0.0016***
Load Allocation	Watershed contributions	56.32	0.15
	Internal Load	121.17	0.33
	Atmospheric Deposition + Groundwater Contributions	29.91	0.08
	LA Totals	***207.40***	***0.57***
	Margin Of Safety (10 %)	23.11	0.06
	Total	**231.08**	**0.63**

1 = Annual loads converted to daily loads by dividing by 365 days per year

Source		Existing TP Load (lbs./yr)	TMDL (lbs./yr)	Load Reduction (%)
PS + NPS	Watershed Load	99.99	56.89	43%
NPS	Upstream Lakes	--	--	--
NPS	Atmospheric + Groundwater	29.91	29.91	0%
NPS	Internal	184.99	121.17	34%
MOS	MOS (10%)	--	23.11	--
Total		314.89	231.08	27%

Table 18: Nutrient TMDL for Locke Lake (86-0168-00) in the Mississippi River (St. Cloud) Watershed

Allocation	Source	TMDL (lbs./yr)	TMDL (lbs./day)[1]
Wasteload Allocation	Construction Stormwater	6.26	0.0172
	WLA Totals	***6.26***	***0.0172***
Load Allocation	Watershed contributions	620.22	1.70
	Upstream Lake (Silver Lake)	1,269.61	3.48
	Internal Load	206.01	0.56
	Atmospheric Deposition + Groundwater Contributions	29.55	0.08
	LA Totals	***2,125.39***	***5.82***
Margin Of Safety (10 %)		236.85	0.65
Total		**2,368.50**	**6.49**

1 = Annual loads converted to daily loads by dividing by 365 days per year

Source		Existing TP Load (lbs./yr)	TMDL (lbs./yr)	Load Reduction (%)
PS + NPS	Watershed Load	955.12	626.48	34%
NPS	Upstream Lakes	3,008.56	1,269.61	58%
NPS	Atmospheric + Groundwater	29.55	29.55	0%
NPS	Internal	206.01	206.01	0%
MOS	MOS (10%)	--	238.85	--
Total		4199.24	2370.50	44%