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

MAR 15 2017

REPLY TO THE ATTENTION OF:
WW-16J

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

Dear Mr. Skuta:

The U.S. Environmental Protection Agency has conducted a complete review of the final Total Maximum Daily Loads (TMDL) for the Mustinka River Watershed (MRW), including support documentation and follow up information. The MRW is in western Minnesota in parts of Big Stone, Grant, Otter Tail, Stevens and Traverse Counties. The MRW TMDLs address impaired aquatic recreation due to excessive nutrients and bacteria and impaired aquatic life use due to excessive sediment (turbidity).

EPA has determined that the MRW 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 nineteen TMDLs. The statutory and regulatory requirements, and EPA's review of Minnesota's compliance with each requirement, are described in the enclosed decision document.

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

Sincerely,

for Christopher Korleski
Director, Water Division

Enclosure

cc: Celine Lyman, MPCA

wq-iw5-08g

TMDL: Mustinka River watershed nutrient, bacteria & sediment TMDLs, Big Stone, Grant, Otter Tail, Stevens and Traverse Counties, MN
Date: March 15, 2017

DECISION DOCUMENT
FOR THE MUSTINKA RIVER WATERSHED TMDLS, BIG STONE, GRANT, OTTER TAIL, STEVENS & TRAVERSE COUNTIES, MINNESOTA

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

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

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

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

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

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

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

Comment:

Location Description/Spatial Extent:

The Mustinka River Watershed (MRW) (HUC-8 #09020102) is located in the Glacial Lake Agassiz Plain in western Minnesota. The MRW is approximately 878 square miles (562,112 acres) and spans portions of Big Stone, Grant, Otter Tail, Stevens and Traverse counties. The MRW is a tributary to the Red River of the North in western Minnesota.

The TMDLs address lake eutrophication (phosphorus), stream turbidity (total suspended solids [TSS]), stream dissolved oxygen (DO), stream fish/macroinvertebrate assessments, and stream bacteria (*E. coli*) impairments in 3 lakes and 10 streams (Table 1 of this Decision Document).

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

Water body name	Assessment Unit ID	Affected Use (Impairment)	Pollutant or stressor	TMDL
Mustinka River	09020102-506	Aquatic Recreation (*E. coli*)	Bacteria (*E. coli*)	*E. coli*
Fivemile Creek	09020102-510	Aquatic Recreation (*E. coli*)	Bacteria (*E. coli*)	*E. coli*
Twelvemile Creek	09020102-511	Aquatic Recreation (*E. coli*)	Bacteria (*E. coli*)	*E. coli*
Twelvemile Creek	09020102-514	Aquatic Recreation (*E. coli*)	Bacteria (*E. coli*)	*E. coli*
Mustinka River	09020102-518	Aquatic Recreation (*E. coli*)	Bacteria (*E. coli*)	*E. coli*
Twelvemile Creek	09020102-557	Aquatic Recreation (*E. coli*)	Bacteria (*E. coli*)	*E. coli*
Mustinka River	09020102-580	Aquatic Recreation (*E. coli*)	Bacteria (*E. coli*)	*E. coli*
East Toqua	06-0138-00	Aquatic Recreation (eutrophication)	Excess Nutrients (total phosphorus)	TP
East Lannon Lake	06-0139-00	Aquatic Recreation (eutrophication)	Excess Nutrients (total phosphorus)	TP
Lightning Lake	26-0282-00	Aquatic Recreation (eutrophication)	Excess Nutrients (total phosphorus)	TP
Eighteen Mile Creek	09020102-508	Aquatic Life (DO)	Excess Nutrients (total phosphorus)	TP
Twelvemile Creek, West Branch	09020102-511	Aquatic Life (DO)	Excess Nutrients (total phosphorus)	TP
Twelvemile Creek	09020102-514	Aquatic Life (DO)	Excess Nutrients (total phosphorus)	TP
Mustinka River	09020102-580	Aquatic Life (DO)	Excess Nutrients (total phosphorus)	TP
Mustinka River	09020102-502	Aquatic Life (Turbidity)	Sediment/TSS	TSS
Twelvemile Creek	09020102-514	Aquatic Life (Turbidity)	Sediment/TSS	TSS
Twelvemile Creek	09020102-557	Aquatic Life (Turbidity)	Sediment/TSS	TSS

Mustinka River	09020102-580	Aquatic Life (Turbidity)	Sediment/TSS	TSS
Mustinka River	09020102-582	Aquatic Life (Turbidity)	Sediment/TSS	TSS

To adhere with its eutrophication standard, the Minnesota Pollution Control Agency (MPCA) classifies lakes as either shallow or deep lakes. Shallow lakes are lakes with a maximum depth of 15 feet or less. Deep lakes are enclosed basins with maximum depths greater than 15 feet. MPCA explained that impaired lakes within the Mustinka River Watershed were assessed against the Northern Glaciated Plains Ecoregion water quality standards (Section 2.1.1 of the TMDL). A separate water quality standard was developed for shallow lakes, which tend to have poorer water quality than deeper lakes in this ecoregion. According to the MPCA definition of shallow lakes, a lake is considered shallow if its maximum depth is less than 15 feet, or if the littoral zone (area where depth is less than 15 feet) covers at least 80% of the lake's surface area. All of the impaired lakes in the Mustinka River Watershed are shallow by this definition.

Table 2: Morphometric and watershed characteristics of lakes addressed in the Mustinka River Watershed TMDLs

Parameter	East Toqua (06-0138-00)	East Lannon Lake (06-0139-00)	Lightning Lake (26-0282-00)
Surface Area (acres)	446	113	525
Littoral Area (% of total area)	100%	100%	100%
Volume (acre-feet)	2722	465	4,014
Mean depth (feet)	6.1	4.1	7.6
Maximum Depth (feet)	9	5	11
Watershed area (including lake area) (acres)	15,552	13,521	37,006
Watershed area (surface area)	35:1	120:1	70:1

Land Use:

Land use in the MRW is predominantly cropland (85%) and open water (8%) (Table 3 of this Decision Document). In general, cultivated land is found in the southern and western portions of the watershed, and small lakes and wetlands are found in the northern and eastern portions of the watershed. Significant development is not expected in the MRW. The land use within the watershed is primarily agricultural and according to MPCA is expected to remain agricultural for the foreseeable future.

Table 3: Subwatershed Land Cover (National Land Cover Dataset (NLCD) 2006) for the Mustinka River Watershed

Water body Name / Segment	Developed	Cropland	Grassland / Pasture	Woodland	Open Water / Wetlands
East Toqua (06-0138-00)	15%	48%	6%	< 1%	30%
East Lannon Lake (06-0139-00)	5%	86%	< 1%	< 1%	8%
Lightning Lake (26-0282-00)	5%	70%	2%	2%	21%
Mustinka River (09020102-502)	4%	93%	< 1%	< 1%	2%
Mustinka River (09020102-503)	6%	85%	30%	< 1%	6%
Mustinka River (09020102-506)	5%	80%	3%	2%	10%
Eighteen Mile Creek (09020102-508)	7%	87%	2%	< 1%	4%

Five Mile Creek (09020102-510)	5%	77%	3%	< 1%	15%
Twelve Mile Creek (09020102-511)	5%	86%	1%	< 1%	7%
Twelve Mile Creek (09020102-514)	5%	87%	1%	< 1%	6%
Mustinka River (09020102-518)	5%	88%	2%	< 1%	5%
Unnamed Creek (09020102-538)	4%	84%	2%	2%	8%
Mustinka River Ditch (09020102-553)	8%	85%	< 1%	< 1%	5%
Twelve Mile Creek (09020102-557)	5%	93%	1%	< 1%	2%
Unnamed Creek (09020102-562)	4%	85%	3%	1%	7%
Unnamed Creek (09020102-578)	5%	82%	1%	1%	11%
Mustinka River (09020102-580)	5%	79%	3%	1%	11%
Mustinka River Watershed	**5%**	**85%**	**2%**	**< 1%**	**8%**

Problem Identification:
Bacteria TMDLs: Bacteria impaired segments identified in Table 1 of this Decision Document were included on the Minnesota 303(d) list due to excessive bacteria and are included as Category 5 waters on the draft 2014 Minnesota 303(d) list. Water quality monitoring within the MRW indicated that these segments were not attaining their designated aquatic recreation uses due to exceedances of bacteria criteria. Bacteria exceedances can negatively impact recreational uses (swimming, wading, boating, fishing etc.) and public health. At elevated levels, bacteria may cause illness within humans who have contact with or ingest bacteria laden water. Recreation-based contact can lead to ear, nose, and throat infections, and stomach illness.

Phosphorous 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 MRW 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 MRW 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.

Total Suspended Solids (Sediment)TMDLs: Sediment (turbidity) impaired segments identified in Table 1 of this Decision Document were included on the Minnesota 303(d) list due to excessive sediment within the water column and are included as Category 5 waters on the draft 2014 Minnesota 303(d) list. Water quality monitoring within the MRW indicated that these segments were not attaining their designated aquatic life uses due to high turbidity measurements and the negative impact of those conditions on aquatic life (i.e., fish and macroinvertebrate communities).

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

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

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

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

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

Priority Ranking:
The water bodies addressed by the MRW 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 MRW are popular locations for aquatic recreation. Water quality degradation has led to efforts to improve the overall water quality within the MRW, and to the development of TMDLs for these water bodies.

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

Source Identification (point and nonpoint sources):

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

MRW bacteria TMDLs:
National Pollutant Discharge Elimination Systems (NPDES) permitted facilities: NPDES permitted facilities may contribute bacteria loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge wastewater according to their NPDES permit. MPCA determined that there are seven wastewater treatment facilities (WWTFs) in the MRW which contribute bacteria from treated wastewater releases (Table 4 of this Decision Document) to segments impaired by bacteria. MPCA assigned each of these facilities a portion of the bacteria wasteload allocation (WLA).

Table 4: NPDES facilities which contribute bacteria loading in the Mustinka River Watershed

Facility Name	Permit #	Impaired Reach	WLA
Bacteria (*E. coli*) Load (billions of bacteria/day)			
Wheaton WWTF	MN0047287	09020102-503	8.86
Herman WWTF	MNG580177	09020102-510	3.34
Big Stone Hutterite	MNG580168	09020102-511	0.58
Dumont WWTF	MN0064831		0.54
Graceville WWTF	MNG580159		3.50
Elbow Lake WWTF	MNG580082	09020102-580	7.52
Wendell WWTF	MNG580153		0.78

Municipal Separate Storm Sewer System (MS4) communities: Stormwater from MS4s can transport bacteria to surface water bodies during or shortly after storm events. MPCA determined that the MRW does not have MS4 communities which contribute bacteria loads to the MRW bacteria TMDLs.

Combined Sewer Overflows (CSOs) and Sanitary Sewer Overflows (SSOs): MPCA did not identify any CSOs or SSOs which contribute bacteria to the bacteria impaired segments of the MRW.

Concentrated Animal Feedlot Operations (CAFOs): MPCA recognized the presence of seven CAFOs in the MRW (Table 5 of this Decision Document). CAFO facilities must be designed to contain all surface water runoff from the production facilities (i.e., have zero discharge from their facilities) and have a current manure management plan. MPCA explained that these facilities do not discharge effluent and therefore were not assigned a portion of the WLA (WLA = 0).

Table 5: Permitted CAFOs within the Mustinka River Watershed

Facility	Permit Number
Scott Andrews Farm – Sec 10	MNG440755
Renee Schwebach Farm	MNG441108
Arens Land & Livestock	MNG440495
Big Stone Co Hutterite Colony	MNG440392
Ryan & Lyle Pederson Farm	MNG440876
Craig Lichtsinn Feedlot	MNG440304
Dollymount Dairy LLP (inactive)	MNG440668

MRW phosphorous TMDLs:

NPDES permitted facilities: NPDES permitted facilities may contribute phosphorus loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge wastewater according to their NPDES permit. MPCA identified three NPDES permit holder which contribute nutrient loads to waters impaired by phosphorus within the MRW. The Graceville WWTF (MNG580159), Elbow Lake WWTF (MNG580082), and Wendell WWTF (MNG580153) contribute nutrient loads and were assigned a nutrient WLA.

Table 6: NPDES facilities which contribute phosphorous loading in the Mustinka River Watershed

Facility Name	Permit #	Impaired Reach	WLA
Total Phosphorous Load (kg of total phosphorous/day)			
Elbow Lake WWTF	MNG580082	09020102-580	11.94
Wendell WWTF	MNG580153		0.62
Graceville WWTF	MNG580159	09020102-511	5.55

Municipal Separate Storm Sewer System (MS4) communities: Stormwater from MS4s can transport nutrients to surface water bodies during or shortly after storm events. MPCA determined that the MRW does not have MS4 communities which contribute nutrient loads to the MRW phosphorus TMDLs.

CSOs and SSOs: MPCA did not identify any CSOs or SSOs which contribute nutrients to the nutrient impaired segments of the MRW.

Stormwater runoff from permitted construction and industrial areas: Construction and industrial sites may contribute phosphorus via sediment runoff during stormwater events. These areas within the MRW 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.

MRW sediment (TSS) TMDLs:

NPDES permitted facilities: NPDES permitted facilities may contribute sediment loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge wastewater according to their NPDES permit. MPCA determined that there are six WWTF which contribute sediment from treated wastewater releases (Table 7 of this Decision Document). MPCA assigned each of these facilities a portion of the sediment wasteload allocation (WLA).

Table 7: NPDES permitted facilities receiving a TSS WLA

Facility	Permit Number	Impaired Reach	WLA
Total Suspended Solids Load (kilogram (kg) of sediment/day)			
Herman WWTF	MNG580177	09020102-557	119.34
Big Stone Hutterite Colony	MNG580168	09020102-557	20.54
Dumont WWTF	MN0064831	09020102-557	19.15
Graceville WWTF	MNG580159	09020102-557	124.89
Elbow Lake WWTF	MNG580082	09020102-580	268.2
Wendell WWTF	MNG580153	09020102-580	27.7

Municipal Separate Storm Sewer System (MS4) communities: Stormwater from MS4s can transport sediment to surface water bodies during or shortly after storm events. MPCA determined that the MRW does not have MS4 communities which contribute sediment loads to the MRW.

Stormwater runoff from permitted construction and industrial areas: Construction and industrial sites may contribute sediment via stormwater runoff during precipitation events. These areas within the MRW 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 MRW are:

MRW bacteria TMDLs:

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

Stormwater from agricultural land use practices and feedlots near surface waters: Animal Feeding Operations (AFOs) in close proximity to surface waters can be a source of bacteria to water bodies in the MRW. These areas may contribute bacteria via the mobilization and transportation of pollutant laden waters from feeding, holding and manure storage sites. Runoff from agricultural lands may contain significant amounts of bacteria which may lead to impairments in the MRW. Feedlots generate manure which may be spread onto fields. Runoff from fields with spread manure can be exacerbated by tile drainage lines, which channelize the stormwater flows and reduce the time available for bacteria to die-off.

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

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

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

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

MRW phosphorous 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), and the release of phosphorus from wind mixing the water column, may all contribute internal phosphorus loading to the lakes of the MRW. 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 MRW. 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 MRW.

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.

Discharges from Subsurface Sewage Treatment Systems (SSTS) or unsewered communities: Failing septic systems are a potential source of nutrients within the MRW. 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 MRW. 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 MRW. Storm events may mobilize phosphorus through the transport of suspended solids and other organic debris.

MRW sediment (TSS) TMDLs:

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

Stormwater runoff from agricultural land use practices: Runoff from agricultural lands may contain significant amounts of sediment which may lead to impairments in the MRW. 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.

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

Future Growth:
MPCA outlined its expectations for potential growth in the MRW in Section 5 of the final TMDL document (page 138). MPCA does not expect significant development in the MRW, as it has not changed much in the recent past. The WLA and load allocations for the MRW 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 MRW 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 lakes and segments addressed by the MRW TMDLs are designated as Class 2 waters (2B and 2C) for aquatic recreation use (fishing, swimming, boating, etc.) and aquatic life use, and Class 3 waters (3C) for industrial consumption. 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:

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

Table 8: Bacteria Water Quality Standards Applicable to the MRW TMDLs

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

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

Bacteria TMDL Targets:

The bacteria TMDL targets employed for the MRW bacteria TMDLs are the *E. coli* standards as stated in Table 8 of this Decision Document. The focus of this TMDL is on the 126 organisms (orgs) per 100 mL (126 orgs/100 mL) geometric mean portion of the standard. MPCA believes that using the 126 orgs/100 mL geometric mean portion of the standard for TMDL calculations will result in the greatest bacteria reductions within the MRW and will result in the attainment of the 1,260 orgs/100 mL portion of the standard. While the bacteria TMDLs will focus on the geometric mean portion of the water quality standard, attainment of both parts of the water quality standard is required.

Phosphorous TMDLs: Numeric criteria for lakes for TP, chl-*a*, and SD 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 MRW lake TMDLs are found in Table 9 of this Decision Document.

Table 9: Minnesota Eutrophication Standards for Shallow lakes within the Northern Glaciate Plains (NGP) ecoregion

Parameter	NGP Eutrophication Standard (shallow lakes)[1]
	East Toqua, East Lannon Lake, Lightning Lake
Total Phosphorus (µg/L)	TP < 90
Chlorophyll-a (µg/L)	chl-a < 30
Secchi Depth (m)	SD > 0.7

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

In developing the lake nutrient standards for Minnesota lakes, MPCA evaluated data from a large cross-section of lakes within each of the State's ecoregions. Clear relationships were established between the causal factor, TP, and the response variables, chl-*a* and SD depth. MPCA anticipates that by meeting the TP concentration of 90 µg/L the response variables chl-*a* and SD will be attained and the lakes addressed by the MRW 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.

The numeric eutrophication standards which are applicable to the MRW river TMDLs are found in Table 10 of this Decision Document.

Table 10: Minnesota Eutrophication Standards in Southern Nutrient Region streams

Parameter	Eutrophication Standard, rivers
Total Phosphorous (µg/L)	TP ≤ 150
Chlorophyll-a (µg/L)	chl-*a* ≤ 35
DO flux (mg/L)	DO ≤ 4.5
BOD5 (mg/L)	BOD5 ≤ 3.0

The river eutrophication phosphorous standard for the Southern Nutrient Regions streams is 150 µg/L as a growing season (June through September) average and will be used as the water quality target for stream phosphorous. Stream eutrophication standards were developed based on data evaluated from a large cross-section of rivers from across the state. Clear relationships were established between TP as the causal factor and the biological response variables (stressors): sestonic Chl-a, DO flux, and the 5-day biochemical oxygen demand (BOD5). Based on these relationships, it is expected that by meeting the phosphorus target, the Chl-a, DO flux and BOD5 standards will likewise be met.

Phosphorous TMDL Targets: MPCA selected TP a target of 90 µg/L to develop TP TMDLs for the lakes addressed by the MRW 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. 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. The river eutrophication phosphorous standard for the Southern Nutrient Regions streams is 150 µg/L as a growing season average (June through September) and will be used as the water quality target for stream phosphorous. EPA finds the nutrient targets employed in the MRW lake TMDLs to be reasonable.

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

Sediment (TSS) TMDL Targets: The regional TSS criterion which applies to the sediment (TSS) TMDLs of the MRW and was used to calculate the TSS TMDL for the MRW is the TSS criterion for the South River Nutrient Region (SRNR) of **65 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:

MRW bacteria TMDLs:

For all *E. coli* TMDLs addressed by the MRW TMDLs the geometric mean portion (**126 orgs/100 mL**) of the *E. coli* water quality standard was used to set the loading capacity of the bacteria TMDLs. MPCA believes the geometric mean portion of the WQS provides the best overall characterization of the status of the watershed. EPA agrees with this assertion, as stated in the preamble of, *"The Water Quality*

Standards for Coastal and Great Lakes Recreation Waters Final Rule" (69 FR 67218-67243, November 16, 2004) on page 67224, "...the geometric mean is the more relevant value for ensuring that appropriate actions are taken to protect and improve water quality because it is a more reliable measure, being less subject to random variation, and more directly linked to the underlying studies on which the 1986 bacteria criteria were based." MPCA stated that the bacteria TMDLs will focus on the geometric mean portion of the water quality standard (126 orgs/100 mL) and that it expects that by attaining the 126 orgs/100 mL portion of the *E. coli* WQS the 1,260 orgs/100 mL portion of the *E. coli* WQS will also be attained. EPA finds these assumptions to be reasonable.

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

Separate flow duration curves (FDCs) were created for the each of the bacteria TMDLs in the MRW, or the stream TMDL derivation, HSPF modeled flows for the period of 2001 through 2006 were used to develop flow duration curves. The loading capacities were determined by applying the E. coli water quality standard (126 org/ 100 mL) to the flow duration curve to produce a bacteria standard curve. Loading capacities presented in the allocation tables represent the median *E. coli* load (in billion org/day) along the bacteria standard curve within each flow regime. A bacteria load duration curve and a TMDL allocation table are provided for each stream in Section 4.3.6 of the final TMDL document. Estimated existing bacteria loads are plotted along with the bacteria standard curve for Fivemile Creek and the Mustinka River (AUID -518). Existing loads were estimated by pairing observed E. coli concentrations with area-weighted gaged flow (USGS gage 0504900) for these reaches where records overlapped (2008 and 2009). Existing loads were not estimated for other impaired reaches due to insufficient overlap in *E. coli* data and available flow records.

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

Water quality monitoring was completed in the MRW and measured *E. coli* concentrations were converted to individual sampling loads by multiplying the sample concentration by the instantaneous flow measurement observed/estimated at the time of sample collection. The individual sampling loads were plotted on the same figure with the created LDC. Individual LDCs are found in Section 4.3.6 of the final TMDL document.

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

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

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

Bacteria TMDLs for the MRW were calculated and those results are found in Table 9 of this Decision Document. Load allocations (ex. stormwater runoff from agricultural land use practices and feedlots, SSTS, wildlife inputs etc.) were not split among individual nonpoint contributors. Instead, load allocations were combined together into a categorical LA ('Watershed Load') to cover all nonpoint source contributions.

Table 11 of this Decision Document reports five points (the midpoints of the designated flow regime) on the loading capacity curve. However, it should be understood that the components of the TMDL equation could be illustrated for any point on the entire loading capacity curve. The LDC method can be used to display collected bacteria monitoring data and allows for the estimation of load reductions necessary for attainment of the bacteria water quality standard. Using this method, daily loads were developed based upon the flow in the water body. Loading capacities were determined for the segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Table 11 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 11: Bacteria (*E. coli*) TMDLs for the Mustinka River Watershed are located at the end of this Decision Document

Table 11 of the Decision Document presents MPCA's loading reduction estimates for each TMDL. These loading reductions (i.e., the percent reduction row at the bottom of each TMDL table) were calculated from field sampling data collected in the MRW. MPCA explained that its load reduction estimates are likely more conservative since they are based on a limited water quality data set.

EPA concurs with the data analysis and LDC approach utilized by MPCA in its calculation of loading capacities, wasteload allocations, load allocations and the margin of safety for the MRW bacteria TMDLs. The methods used for determining the TMDL are consistent with U.S. EPA technical memos.[1]

<u>MRW lake phosphorous TMDLs:</u> MPCA used the U.S. Army Corps of Engineers (USACE) BATHTUB model to calculate the loading capacities for each of the nutrient impaired lakes in Table 1 of this Decision Document (Section 4.1 and Appendix A of the final TMDL 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 the user the choice of several different mass-balance TP models for estimating loading capacity.

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

The BATHTUB modeling efforts were used to calculate the loading capacity for each lake. The loading capacity is the maximum phosphorus load which each of these water bodies can receive over an annual period and still meet the shallow and general lake nutrient WQS (Tables 12, 13 and 14 of this Decision Document). Loading capacities on the annual scale (kilograms per year (kg/year)) were calculated to

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

meet the WQS during the growing season (June 1 through September 30). The time period of June to September was chosen by MPCA as the growing season because it corresponds to the eutrophication criteria, contains the months that the general public typically uses lakes in the MRW 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 12, 13 and 14 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 degraded and phosphorus loading inputs are the greatest. TMDL allocations assigned during the summer growing season will protect the MRW lakes during the worst water quality conditions of the year. MPCA assumed that the loading capacities established by the TMDL will be protective of water quality during the remainder of the calendar year (October through May).

Table 12: Phosphorous TMDL for East Toqua Lake (06-0138-00) in the Mustinka River watershed

Allocation	Source	Existing TP Load	TMDL		Load Reduction	
		(kg/yr)	*(kg/yr)*	*(kg/day)*	*(kg/yr)*	*(%)*
Wasteload Allocation	Construction Stormwater (MNR100001)	0.05	0.05	0.00014	0.0	0%
	Industrial Stormwater (MNR50000)	0.05	0.05	0.00014	0.0	0%
	WLA Totals	***0.10***	***0.10***	***0.0003***	***0.0***	***0%***
Load Allocation	Watershed runoff	193.80	57.70	0.158	136.1	70%
	Failing septics	0.10	0.00	0.000	0.1	100%
	West Lannon Lake	3243.10	342.00	0.937	2901.1	89%
	Internal Load	14801.70	465.30	1.275	14336.4	97%
	Atmospheric	45.30	45.30	0.124	0.0	0%
	LA Totals	***18284.00***	***910.30***	***2.494***	***17373.7***	***95%***
Margin Of Safety (10%)		--	101.20	0.277	--	--
Loading Capacity (TMDL)		**18284.10**	**1011.60**	**2.772**	**17373.7**	**95%**

Table 13: Phosphorous TMDL for East Lannon Lake (06-0139-00) in the Mustinka River watershed

Allocation	Source	Existing TP Load	TMDL		Load Reduction	
		(kg/yr)	*(kg/yr)*	*(kg/day)*	*(kg/yr)*	*(%)*
Wasteload Allocation	Construction Stormwater (MNR100001)	0.05	0.05	0.00014	0.0	0%
	Industrial Stormwater (MNR50000)	0.05	0.05	0.00014	0.0	0%
	WLA Totals	***0.10***	***0.10***	***0.0003***	***0.000***	***0%***
Load Allocation	Watershed runoff	1765.90	412.00	1.129	1353.9	77%
	Livestock	0.00	0.00	0.000	0.0	0%
	Failing septics	0.10	0.00	0.000	0.1	100%
	Internal Load	7598.20	109.50	0.300	7488.7	99%
	Atmospheric Deposition	11.90	11.90	0.033	0.0	0%
	LA Totals	***9376.10***	***533.40***	***1.461***	***8842.7***	***94%***
Margin Of Safety (10%)		--	59.30	0.162	--	--
Loading Capacity (TMDL)		**9376.20**	**592.80**	**1.624**	**8842.70**	**94%**

Table 14: Phosphorous TMDL for Lightning Lake (26-0282-00) in the Mustinka River watershed

Allocation	Source	Existing TP Load	TMDL		Load Reduction	
		(kg/yr)	*(kg/yr)*	*(kg/day)*	*(kg/yr)*	*(%)*
Wasteload Allocation	Construction Stormwater (MNR100001)	0.21	0.21	0.0006	0.0	0%
	Industrial Stormwater (MNR50000)	0.21	0.21	0.0006	0.0	0%
	WLA Totals	***0.42***	***0.42***	***0.0012***	***0.000***	***0%***
Load Allocation	Watershed runoff	3474.60	1370.80	3.756	2103.8	61%
	Livestock	1.50	1.50	0.004	0.0	0%
	Failing septics	6.90	0.00	0.000	6.9	100%
	Internal Load	147.90	132.60	0.363	15.3	10%
	Atmospheric Deposition	55.60	55.60	0.152	0.0	0%
	LA Totals	***3686.50***	***1560.50***	***4.275***	***2126.0***	***58%***
Margin Of Safety (10%)		--	173.40	0.475	--	--
Loading Capacity (TMDL)		**3686.92**	**1734.32**	**4.752**	**2126.00**	**58%**

Tables 12, 13, and 14 of this Decision Document communicate MPCA's estimates of the reductions required for the three 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 the designated uses are no longer considered impaired.

MRW river phosphorous TMDLs: The loading capacities for impaired stream reaches receiving a TMDL were determined using load duration curves (LDCs). Flow and LDCs are used to determine the flow conditions (flow regimes) under which exceedances occur. Flow duration curves provide a visual display of the variation in flow rate for the stream. The x-axis of the plot indicates the percentage of time that a flow exceeds the corresponding flow rate as expressed by the y-axis. LDCs take the flow distribution information, constructed for the stream, and factor in pollutant loading to the analysis. A standard curve is developed by applying a particular pollutant standard or criteria to the stream flow duration curve and is expressed as a load of pollutant per day. The standard curve represents the upper limit of the allowable in-stream pollutant load (loading capacity) at a particular flow. Monitored loads of a pollutant are plotted against this curve to display how they compare to the standard. Monitored values that fall above the curve represent an exceedance of the standard.

For the stream TMDL derivation, HSPF modeled flows for the period of 2001 through 2006 were used to develop flow duration curves. The loading capacities were determined by applying the TP water quality standard (0.150 mg/L) to the flow duration curve to produce a TP standard curve. Minnesota stream eutrophication standards were developed such that by meeting the phosphorus target, the Chl-a, DO flux, and BOD5 standards will likewise be met. Loading capacities presented in the allocation tables represent the median TP load (in kg/day) along the TP standard curve within each flow regime. A TP LDC and a TMDL allocation table are provided for each stream in Section 4.1.6 of the TMDL report. Modeled TP loads for simulation dates within the phosphorus assessment window (June through September) are plotted along with the TP standard curve on LDCs. Within each flow duration interval, the existing load is approximated as the median value of the modeled TP loads.

The LDC method is based on an analysis that encompasses the cumulative frequency of historical flow data over a specified period. Because this method uses a long-term record of daily flow volumes, virtually the full spectrum of allowable loading capacities is represented by the resulting curve. In the TMDL tables in Section 4.1.6 of the TMDL report, only five points on the entire loading capacity curve are depicted (the midpoints of the designated flow zones) although the entire curve represents the TMDL.

Table 15 of this Decision Document communicates MPCA's estimates of the reductions required for the four stream segments to meet their water quality targets. These loading reductions (i.e., the percentage column) were estimated from existing and TMDL load calculations. MPCA expects that these reductions will result in the attainment of the water quality targets and the stream water quality will return to a level where the designated uses are no longer considered impaired.

Table 15: Total phosphorus TMDLs for the Mustinka River Watershed

Allocation	Source	Very High	High	Mid	Dry	Very Dry
		Total phosphorus (kg/day)				
TMDL for Eighteenmile Creek (09020102-508)						
Existing Load		26.8	4.6	2.7	1.3	n/a*
Wasteload Allocation	Construction Stormwater (MNR100001)	0.00048	0.00009	0.00005	0.00002	0.00001
	Industrial Stormwater (MNR50000)	0.00048	0.00009	0.00005	0.00002	0.00001
	WLA Totals	0.00096	0.00018	0.00010	0.00004	0.00002
Load Allocation	Watershed runoff	11.6	2.2	1.2	0.6	0.24
	Atmospheric Deposition	0.01	0.01	0.01	0.01	0.01
	LA Totals	11.6	2.2	1.2	0.6	0.3

Margin Of Safety (10%)		1.3	0.2	0.1	0.1	0.0
Loading Capacity (TMDL)		**12.9**	**2.4**	**1.3**	**0.7**	**0.3**
Estimated Load Reduction (TP load)		13.9	2.2	1.4	0.6	n/a
Estimated Load Reduction (%)		52%	48%	51%	45%	n/a
TMDL for Twelvemile Creek, West Branch (09020102-511)						
Existing Load		106.6	13.7	7.3	4.4	n/a *
Wasteload Allocation	Graceville WWTF (MNG580159)	5.6	5.6	**	**	**
	Construction Stormwater (MNR100001)	0.002	0.0003	0.0002	0.0001	0.0006
	Industrial Stormwater (MNR50000)	0.002	0.0003	0.0002	0.0001	0.0006
	WLA Totals	5.6	5.6	0.0004	0.0002	0.0012
Load Allocation	Watershed runoff	39.3	2.6 §	4.7	3.0	1.4
	Atmospheric Deposition	0.02	0.02	0.02	0.02	0.02
	LA Totals	39.3	2.6	4.7	3.0	1.4
Margin Of Safety (10%)		5.0	0.9	0.5	0.3	0.2
Loading Capacity (TMDL)		**49.9**	**9.1**	**5.2**	**3.3**	**1.6**
Estimated Load Reduction (TP load)		56.7	4.6	2.1	1.1	n/a
Estimated Load Reduction (%)		53%	34%	28%	25%	n/a
TMDL for Twelvemile Creek (09020102-514)						
Existing Load		94.1	15.3	9.0	6.0	n/a *
Wasteload Allocation	Construction Stormwater (MNR100001)	0.0015	0.0003	0.0002	0.0001	0.0006
	Industrial Stormwater (MNR50000)	0.0015	0.0003	0.0002	0.0001	0.0006
	WLA Totals	0.0030	0.0006	0.0004	0.0002	0.0012
Load Allocation	Watershed runoff	35.8	7.6	4.5	2.9	1.4
	Atmospheric Deposition	0.01	0.01	0.01	0.01	0.01
	LA Totals	35.8	7.6	4.5	2.9	1.4
Margin Of Safety (10%)		4.0	0.8	0.5	0.3	0.2
Loading Capacity (TMDL)		**39.8**	**8.4**	**5.0**	**3.2**	**1.6**
Estimated Load Reduction (TP load)		54.3	6.9	4.0	2.8	n/a
Estimated Load Reduction (%)		58%	45%	44%	46%	n/a
TMDL for Mustinka River (09020102-580)						
Existing Load		59.7	8.2	4.8	2.3	n/a *
Wasteload Allocation	Elbow Lake WWTF (MNG580082)	11.94	**	**	**	**
	Wendell WWTF (MNG580153)	0.62	0.62	0.62	0.62	0.62 ***
	Construction Stormwater (MNR100001)	0.002	0.0003	0.001	0.0001	0.0001

	Industrial Stormwater (MNR50000)	0.002	0.0003	0.001	0.0001	0.0001
	WLA Totals	12.6	0.6	0.6	0.6	0.6
Load Allocation	Watershed runoff	30.2	4.4	1.2	0.1	0.01
	Atmospheric Deposition	0.2	0.2	0.2	0.2	0.2
	LA Totals	30.4	4.6	1.4	0.3	0.2
Margin Of Safety (10%)		4.8	0.6	0.2	0.1	0.09
Loading Capacity (TMDL)		**47.8**	**5.8**	**2.2**	**1.0**	**0.3** ∞
Estimated Load Reduction (TP load)		11.9	2.4	2.6	1.3	n/a
Estimated Load Reduction (%)		20%	29%	54%	56%	n/a
* - Very low flow condition atypical during the assessment window (June - September)						
** - The WLA methodology in the lower flow zones is described in Section 4.1.3.5 of the TMDL and Section 5 of this Decision Document						
§ - Special discharge conditions for Graceville WWTF allow for a greater watershed allocation in the Mid and Dry flow regimes (Section 5 of this Decision Document)						
*** - Discharge rarely occurs under these conditions or at this load, and only with State oversight (Section 5 of this Decision Document)						
∞ - Wendell WWTF rarely discharges under these conditions and only with State oversight; the LC is estimated at 0.3 kg/day (Section 5 of this Decision Document)						

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

MRW sediment (TSS) TMDLs: MPCA developed LDCs to calculate sediment TMDLs for the 10 impaired segments of the MRW. The same LDC development strategies were employed for the sediment and bacteria TMDLs (ex. the incorporation of HSPF model simulated flows to develop FDCs, water quality monitoring information collected within the MRW informing the LDC, etc.). The FDC were transformed into LDC by multiplying individual flow values by the SRNR TSS WQS (65 mg/L) and then multiplying that value by a conversion factor (Section 4.2 of the final TMDL document).

TSS TMDLs were calculated (Table 16 of this Decision Document). 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 16 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 SRNR TSS water quality standard. Using this method, daily loads were developed based upon the flow in the water body. Loading capacities were determined for each segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Table 16 of this Decision Document identifies the loading capacity for each segment at each flow regime. Although there are numeric loads for each flow regime, the LDC is what is being approved for this TMDL.

Table 16 of this Decision Document is located at the end of this Decision Document

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

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

4. Load Allocations (LA)

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

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

MRW bacteria TMDLs: The calculated LA values for the bacteria TMDLs are applicable across all flow conditions in the MRW (Table 11 of this Decision Document). MPCA identified several nonpoint sources which contribute bacteria loads to the surface waters of the MRW, including; non-regulated urban stormwater runoff, stormwater from agricultural and feedlot areas, failing septic systems, and wildlife (deer, geese, ducks, raccoons, turkeys and other animals). MPCA did not determine individual load allocation values for each of these potential nonpoint source considerations, but aggregated the nonpoint sources into a categorical LA value.

MRW phosphorous TMDLs: MPCA identified several nonpoint sources which contribute nutrient loading to the lakes of the MRW (Table 12, 13, and 14 of this Decision Document) and streams of the MRW (Table 15 of this Decision Document). 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 individual load allocation values for each of these potential nonpoint source considerations where appropriate. MPCA estimated nonpoint source loading reductions necessary for East Toqua Lake, East Lannon Lake, and Lightning Lake to meet their respective phosphorous TMDL targets would require reductions from nonpoint sources to be 10% to 100% (Tables 12, 13, and 14 of this Decision Document). For the stream segments, watershed runoff and atmospheric deposition comprised the load allocations (Table 15 of this Decision Document). Stream phosphorous concentrations are high in the MRW across all flow regimes. Large peaks in phosphorous loads are linked to peaks in sediment loading under high flow conditions, indicating watershed runoff is the dominant source of phosphorous under high flows.

MRW sediment (TSS) TMDLs: The calculated LA values for the TSS TMDL are applicable across all flow conditions. MPCA identified several nonpoint sources which contribute sediment loads to the surface waters in the MRW. 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:

MRW bacteria TMDLs: MPCA identified NPDES permitted facilities within the MRW and assigned those facilities a portion of the WLA (Table 4 of this Decision Document). The WLAs for each of these individual facilities were calculated based on the facility's wet weather design flow and the *E. coli* WQS (126 orgs /100 mL). MPCA explained that the WLA for each individual WWTP was calculated based on the *E. coli* WQS but WWTF permits are regulated for fecal coliform (a 30-day geometric mean of 200 orgs /100 mL). MPCA explained that if a facility is meeting its fecal coliform limits, which are set in the facility's discharge permit, MPCA assumes the facility is also meeting the calculated *E. coli* WLA from the MRW TMDLs. The WLA was therefore calculated using the assumption that the *E. coli* standard of 126 orgs/100 mL provides equivalent protection from illness due to primary contact recreation as the fecal coliform WQS of 200 orgs/100 mL.

MPCA acknowledged the presence of CAFOs in the MRW in Section 3.6.3.1 of the final TMDL document. CAFOs and other feedlots are generally not allowed to discharge to waters of the State (Minnesota Rule 7020.2003). CAFOs were assigned a WLA of zero (WLA = 0) for the MRW bacteria TMDLs.

MRW phosphorous TMDLs: MPCA identified three NPDES permit holders which contributed nutrient loads to phosphorus impaired waters within the MRW. The Graceville WWTF (MNG580159) contributes nutrient loads to Twelvemile Creek – West Branch (09020102-511) and was assigned a nutrient WLA (5.55 kg/day). The Elbow Lake WWTF (MNG580082) contributes nutrient loads to Mustinka River (09020102-580) and was assigned a nutrient WLA (11.94 kg/day). The Wendell WWTF (MNG580153) contributes nutrient loads to (09020102-580) and was assigned a nutrient WLA (0.62 kg/day) (Table 6 of this Decision Document).

MPCA noted that the three facilities are pond systems, where discharge is limited to spring (March 1-Jume 30) and fall (September 1 to December 31). The state designated these windows to ensure discharge occurred when there was sufficient flow to maintain water quality. During development of the TMDLs, MPCA determined that discharge will have to be controlled in June, to ensure there is sufficient in-stream flow. MPCA will be pursuing permit conditions that will allow discharge only when the instream flow is 14 cubic feet per second (cfs) for the Graceville WWTF, and 15 cfs for the Elbow Lake WWTF. In addition, discharge will be prohibited in September for both Graceville WWTF and the Elbow Lake WWTF, as there is insufficient assimilative capacity in the receiving streams. Based upon these calculations, discharge will occur for these facilities only under the Very High or High as noted in Table 15 above. Section 8.1.3.1 of the TMDL report describes the new discharge requirements for the city of Elbow Lake and the city of Graceville. The actual permit conditions will be addressed through the NPDES process.

MPCA noted that the WLA for the Wendell WWTF does not have an in-stream flow requirement. The Wendell WWTF is very small, with a secondary pond size of 1 acre. The facility is allowed to discharge from March 1-June 30 and September 1-December 31, when flows are generally not in the "very low" flow regime. The state will continue to monitor the system to determine if further discharge restriction are needed.

MPCA also calculated a portion of the WLA for construction and industrial stormwater. This WLA was represented as a categorical WLA for construction stormwater and a categorical WLA for industrial stormwater. Overall, the construction and industrial stormwater WLA make up a very small portion of the overall loading capacity but MPCA wanted to recognize their contributions. MPCA's calculation for the construction stormwater WLA was based on the average annual fraction of the impaired subwatershed under construction activity over the previous 5-year period, based on MPCA Construction Stormwater Permit data from January 2007 to October 2012 (Section 4 of the final TMDL). This percentage was area weighted based on the fraction of the subwatershed located in each county and then multiplied by the watershed runoff load component to determine the construction stormwater WLA. The watershed runoff load component is equal to the total TMDL (loading capacity) minus the sum of the non-watershed runoff load components (atmospheric load, upstream lake loads, internal loads and MOS). MPCA set the industrial WLA equal to the calculation of the construction WLA.

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 MRW TMDLs. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified.

MPCA determined that there were CAFO facilities in the MRW. 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 MRW phosphorous TMDLs.

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

MRW sediment (TSS) TMDLs: MPCA identified NPDES permitted facilities within the MRW and assigned those facilities a portion of the WLA (Table 16 of this Decision Document). The WLAs for each of these individual facilities were calculated based on the facility's wet weather design flow and the TSS WQS of SRNR of 65 mg/L.

Similar to the phosphorous TMDLs, MPCA calculated a portion of the WLA and assigned it to construction and industrial stormwater. This WLA was represented as a categorical WLA for construction stormwater and a categorical WLA for industrial stormwater. Overall, the construction and industrial stormwater WLA make up a very small portion of the overall loading capacity but MPCA wanted to recognize their contributions. MPCA's calculation for the construction stormwater WLA was based on the average annual fraction of the impaired subwatershed under construction activity over the previous 5-year period, based on MPCA Construction Stormwater Permit data from January 2007 to October 2012 (Section 4 of the final TMDL). This percentage was area weighted based on the fraction of the subwatershed located in each county, then multiplied by the watershed runoff load component to determine the construction stormwater WLA. The watershed runoff load component is equal to the total TMDL (loading capacity) minus the sum of the non-watershed runoff load components (atmospheric load, upstream lake loads, internal loads, and MOS). MPCA set the industrial WLA equal to the calculation of the construction WLA.

MPCA's expectations and responsibilities for overseeing construction and industrial stormwater loads for the phosphorus TMDLs are the same for the sediment TMDLs. Construction and industrial sites are expected to create SWPPPs which summarize how stormwater pollutant discharges will be minimized from construction and industrial sites. Under 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 TSS TMDLs for MRWW. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified within 18-months of the approval of the TMDL by the U.S. EPA. This applies to sites under permits for MNR100001, MNR050000 and MNG490000.

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

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

6. Margin of Safety (MOS)

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

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

MRW bacteria and TSS TMDLs: The bacteria and TSS TMDLs incorporated a 10% explicit MOS applied to the total loading capacity calculation for each flow regime of the LDC. Ten percent of the total loading capacity was reserved for MOS with the remaining load allocated to point and nonpoint sources (Tables 11 and 16 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 MRW bacteria and TSS TMDLs:

- Most of the uncertainty in flow is a result of extrapolating flows from the hydrologically nearest stream gage. The explicit MOS, in part, accounts for this.
- Allocations are a function of flow, which varies from high to low flows. This variability is accounted for through the development of a TMDL for each of five flow regimes.

- With respect to the *E. coli* TMDLs, the load duration analysis does not address bacteria re-growth in sediments, die-off, and natural background levels. The MOS helps to account for the variability associated with these conditions.

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

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

MRW phosphorous TMDLs: The lake (Tables 12-14 of this Decision Document) and stream (Table 15 of this Decision Document) phosphorous TMDLs employed an explicit MOS set at 10% of the loading capacity (Section 4.1.4 of the final TMDL document). 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 12-15 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 MRW phosphorous lake TMDLs:

- Precedence for using an explicit 10% MOS in most other lake TMDLs in Minnesota;
- BATHTUB model calibration using added internal load with values typical of very shallow, eutrophic lakes (see Section 3.6.1.2: Internal Loading);
- The generally good agreement between BATHTUB model predicted and observed values indicating that the models reasonably reflect the conditions in the lakes and their subwatersheds; and
- Three or more years of in-lake water quality data used to calibrate the BATHTUB model.

An explicit MOS equal to 10% of the loading capacity was used for the stream phosphorus TMDLs based on the following considerations:

- Most of the uncertainty in flow is the result of extrapolating flows (area weighting and the use of regression equations) from the hydrologically nearest stream gage (located near the outlet of the Mustinka River Watershed). The explicit MOS, in part, accounts for this; and
- Allocations are a function of flow, which varies from high to low flows. This variability is accounted for through the development of a TMDL for each of 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:

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

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

MRW phosphorous TMDLs: Seasonal variation was considered for the MRW nutrient TMDLs as described in Section 4.1.5 of the final TMDL document. The nutrient targets employed in the MRW 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 NGP 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 MRW 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 MRW 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).

MRW TSS TMDL: The TSS WQS applies from April to September which is also the time period when high concentrations of sediment are expected in the surface waters of the MRW (Section 2.2.2 of the final TMDL document). Sediment loading to surface waters in the MRW varies depending on surface water flow, land cover and climate/season. Typically, in the MRW, sediment is being moved from terrestrial source locations into surface waters during or shortly after wet weather events. Spring is typically associated with large flows from snowmelt, the summer is associated with the growing season as well as periodic storm events and receding streamflows, and the fall brings increasing precipitation and rapidly changing agricultural landscapes.

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

MPCA has identified several local partners which have expressed interest in working to improve water quality within the MRW. 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 MRW: the Bois de Sioux Watershed District (BdSWD) and the Big Stone, Grant, Otter Tail (East and West), Stevens, and Traverse County Soil and Water Conservation Districts (SWCDs), City of Elbow Lake, City of Graceville, and Natural Resources Conservation Service (NRCS).

Each year the Big Stone and East Otter Tail Soil and Water Conservation Districts highlights an individual or family farm to receive the Conservation Farmer award for demonstrating a concern for soil and water resources and using farming practices to address those concerns. West Otter Tail SWCD is actively promoting the state buffer initiative. The new law specifies November 2017 as the deadline for establishment of 50-foot wide buffers on public waters and November 2018 for 16.5-foot wide buffers on public drainage systems. Otter Tail County is already underway with assisting landowners to move in direction of 100% voluntary compliance via the Otter Tail County Buffer Initiative. West Otter Tail Soil and Water Conservation District (SWCD), in partnership with Otter Tail County and East Otter Tail SWCD, are inventorying and mapping areas adjacent to Otter Tail County's public waters that may be lacking the required 50-foot continuous buffer of perennially rooted vegetation.

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.

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 MRW 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.

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

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

The Mustinka River WRAPS was approved by MPCA on September 26, 2016. The report provides a summary of the stressors causing impairments for the stream segments, including a chart of point sources, and a table outlining the relative magnitude of contributing nonpoint pollutant sources in the MRW. According to the WRAPS, because much of the nonpoint source strategies outlined rely on voluntary implementation by landowners, land users, and residents of the watershed it is imperative to create social capital (trust, networks, and positive relationships) with those who will be needed to voluntarily implement best management practices. Thus, effective ongoing civic engagement is fully a part of the overall plan for moving forward. Section 3.3 of the Mustinka River WRAP, Restoration and Protection Strategies, includes detailed tables identifying restoration and protection strategies for individual lakes and streams in each HUC-11 subwatershed that restore or protect water quality. All of the MRW impaired streams and lakes are included in the tables. The projects are divided into sections by HUC-11 subwatershed, and include the following information:

- County location;
- Water quality conditions and goals;
- Strategies;
- Estimated scale of adoption needed for each strategy to achieve the water quality goal;
- Governmental units with primary responsibility;
- Estimated timeline for full implementation of strategy; and
- Interim 10-year milestones for implementation of strategy.

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 2017 Clean Water Fund Competitive Grants Request for Proposal (*RFP*); *Minnesota Board of Soil and Water Resources*, 2017).

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 Mustinka River 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., the River Watch Program coordinated by the Bois de Sioux Watershed District) 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 streams and lakes discussed within this TMDL. At a minimum, the MRW 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 MRW. 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 MRW. 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 MRW, 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 MRW 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, MPCA expects that 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 MRW 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 MRW TMDLs will be used to inform the selection of implementation activities as part of the Mustinka River 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 MRW, education and outreach efforts with local partners, and partnering with local stakeholders to improve water quality within the watershed. The information in this section can be referenced within the Mustinka River WRAPS document. Reduction goals for the bacteria, phosphorous, and TSS TMDLs may be met via components of the following strategies:

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

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

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

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

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

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

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

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

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

MRW phosphorous TMDLs:

Septic Field Maintenance: Septic systems are believed to be a source of nutrients to waters in the MRW. 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 MRW.

Manure management (feedlot and manure stockpile runoff controls): Manure has been identified as a potential source of nutrients in the MRW. 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 MRW. 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 MRW. 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 (for the lake TMDLs in the MRW): Internal nutrient loads may be addressed to meet the TMDL allocations outlined in the MRW 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 MRW 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 MRW.

MRW sediment (TSS) TMDLs:
Improved Agricultural Drainage Practices: A review of local agricultural drainage networks should be completed to examine how improving drainage ditches and drainage channels could be reorganized to reduce the influx of sediments to the surface waters in the MRW. 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 MRW. 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 MRW 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 9 of the final TMDL document. Throughout the development of the MRW 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 technical committee. The technical committee is made up of members representing the Bois de Sioux Watershed District, MPCA, DNR, Counties, and SWCDs within the watershed. More information can be found on the Mustinka River Watershed TMDL and WRAPS website: http://www.healthofthevalley.com/.

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 March 28, 2016 and ended on April 27, 2016. MPCA received one public comment letter during the public comment period, which was submitted by the Minnesota Department of Agriculture. MPCA submitted all comments received during the public notice period and its responses to each of the specific comments with the final TMDL submittal packet received by EPA on September 28, 2016.

Dr. Heidi Peterson, of the Minnesota Department of Agriculture (MDA), suggested editorial clarifications regarding lake eutrophication in eastern basin of Lannon Lake, redundant dissolved oxygen tables, animal units in permitted sources of bacteria, and expanding discussion on measures to prevent wind erosion. Dr. Peterson also suggested using the 2011 National Land Cover Dataset instead of the 2006 NLCD. MPCA chose to keep the NLCD 2006 Land Cover data in the TMDL report because it represents the HSPF modeling time period (2001-2006) used in the TMDL, and because land cover changed very little in this watershed between 2006 and 2011. Dr. Peterson suggested clarification on sources of stream *E. coli*, as well as including a map identifying the location of livestock or feedlots, including an estimate of animal units. Finally, Dr. Peterson recommended including the Engineering Report for the Redpath Plan and Project published by the Bois de Sioux Watershed District. MPCA addressed each of Dr. Peterson's comments and updated the final TMDL appropriately in its response to Dr. Peterson's comments.

EPA believes that MPCA adequately addressed the comments received during the public notice period and updated the final TMDL appropriately. MPCA submitted MDA's public comments and its response in the final TMDL submittal packet received by the EPA on September 28, 2016.

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 Mustinka River watershed TMDL document, submittal letter and accompanying documentation from MPCA on September 28, 2016. The transmittal letter explicitly stated that the final TMDLs referenced in Table 1 of this Decision Document were being submitted to EPA pursuant to Section 303(d) of the Clean Water Act for EPA review and approval.

The letter clearly stated that this was a final TMDL submittal under Section 303(d) of CWA. The letter also contained the name of the watershed as it appears on Minnesota's 303(d) list, and the 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-Winona watershed TMDLs by MPCA satisfies the requirements of this twelfth element.

13. Conclusion

After a full and complete review, the EPA finds that the 7 bacteria TMDLs, the 7 phosphorous TMDLs, and 5 TSS TMDLs satisfy all elements for approvable TMDLs. This TMDL approval is for **nineteen TMDLs**, addressing segments 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.

TMDL Tables for the Mustinka River Watershed

Table 11: Bacteria (*E. coli*) TMDLs for the Mustinka River Watershed

Allocation	Source	Very High	High	Mid	Low	Very Low
		E. coli (billions of bacteria/day)				
TMDL for Mustinka River (09020102-506)						
Existing Load		No Data	No Data	No Data	No Data	No Data
Wasteload Allocation	NPDES permitted facilities	0.00	0.00	0.00	0.00	0.00
Load Allocation	Watershed runoff	65.3	10.2	4.0	1.6	0.4
Margin Of Safety (10%)		7.3	1.1	0.4	0.2	0.1
	Loading Capacity (TMDL)	**72.6**	**11.3**	**4.4**	**1.8**	**0.5**
Estimated Load Reduction (*E. coli* load)		--	--	--	--	--
Estimated Load Reduction (%)		--	--	--	--	--
TMDL for Fivemile Creek (09020102-510)						
Existing Load		No Data	23.30	18.50	62.30	44.50
Wasteload Allocation	Herman WWTF (MNG580177)	3.3	3.3	3.3	3.3	3.3
	WLA Totals	3.3	3.3	3.3	3.3	3.3
Load Allocation	Watershed runoff	109.2	30.3	14.0	5.5	0.7
Margin Of Safety (10%)		12.5	3.7	1.9	1.0	0.4
	Loading Capacity (TMDL)	**125.0**	**37.3**	**19.2**	**9.8**	**4.4**
Estimated Load Reduction (*E. coli* load)		--	0.0	0.0	52.5	40.1
Estimated Load Reduction (%)		--	0%	0%	84%	90%
TMDL for Twelvemile Creek (09020102-511)						
Existing Load		No Data	No Data	No Data	No Data	No Data
Wasteload Allocation	Big Stone Hutterite (MNG580168)	0.58	0.58	0.58	0.58	0.58
	Dumont WWTF (MN0064831)	0.54	0.54	0.54	0.54	0.54
	Graceville WWTF (MNG580159)	3.50	3.50	3.50	3.50	3.50
	NPDES Permitted Feedlots	0.0	0.0	0.0	0.0	0.0
	WLA Totals	4.6	4.6	4.6	4.6	4.6
Load Allocation	Watershed runoff	372.3	63.7	35.3	20.7	7.4
Margin Of Safety (10%)		41.9	7.6	4.4	2.8	1.3
	Loading Capacity (TMDL)	**418.8**	**75.9**	**44.3**	**28.1**	**13.3**
Estimated Load Reduction (*E. coli* load)		--	--	--	--	--
Estimated Load Reduction (%)		--	--	--	--	--
TMDL for Twelvemile Creek (09020102-514)						
Existing Load		No Data	No Data	No Data	No Data	No Data

Wasteload Allocation	NPDES permitted feedlots	0.0	0.0	0.0	0.0	0.0
Load Allocation	Watershed runoff	301.0	64.3	37.9	24.1	11.4
Margin Of Safety (10%)		33.4	7.1	4.2	2.7	1.3
Loading Capacity (TMDL)		**334.4**	**71.4**	**42.1**	**26.8**	**12.7**
Estimated Load Reduction (*E. coli* load)		--	--	--	--	--
Estimated Load Reduction (%)		--	--	--	--	--
TMDL for Mustinka River (09020102-518)						
Existing Load		No Data	No Data	69.70	55.30	25.50
Wasteload Allocation	NPDES permitted facilities	0.0	0.0	0.0	0.0	0.0
Load Allocation	Mustinka River (-580)	361.1	43.6	16.5	7.5	2.1
	Watershed runoff	157.8	30.7	15.5	9.1	3.6
	LA Totals	518.9	74.3	32.0	16.6	5.7
Margin Of Safety (10%)		57.7	8.3	3.6	1.8	0.6
Loading Capacity (TMDL)		**576.6**	**82.6**	**35.6**	**18.4**	**6.3**
Estimated Load Reduction (*E. coli* load)		--	--	34.1	36.9	19.2
Estimated Load Reduction (%)		--	--	49%	67%	75%
TMDL for Twelvemile Creek (09020102-557)						
Existing Load		No Data	No Data	No Data	No Data	No Data
Wasteload Allocation	NPDES permitted facilities	0.0	0.0	0.0	0.0	0.0
Load Allocation	Fivemile Creek (-510)	112.5	33.6	17.3	8.8	4.0
	Twelvemile Creek (-511)	376.9	68.3	39.9	25.3	12.0
	Twelvemile Creek (-514)	301.0	64.3	37.9	24.1	11.4
	Watershed runoff	147.7	27.8	18.3	14.0	6.4
	LA Totals	938.1	194.0	113.4	72.2	33.8
Margin Of Safety (10%)		104.2	21.5	12.6	8.0	3.8
Loading Capacity (TMDL)		**1042.3**	**215.5**	**126.0**	**80.2**	**37.6**
Estimated Load Reduction (*E. coli* load)		--	--	--	--	--
Estimated Load Reduction (%)		--	--	--	--	--
TMDL for Mustinka River (09020102-580)						
Existing Load		No Data	No Data	No Data	No Data	No Data
Wasteload Allocation	Elbow Lake WWTF (MNG580082)	7.5	7.5	7.5	*	*
	Wendell WWTF (MNG580153)	0.8	0.8	0.8	*	*
	WLA Totals	8.3	8.3	8.3	*	*
Load Allocation	Mustinka River (-506)	65.3	10.2	4.0	1.60	0.40
	Watershed runoff	287.5	25.1	4.2	*	*
	LA Totals	352.8	35.3	8.2	*	*
Margin Of Safety (10%)		40.1	4.9	1.8	0.8	0.2
Loading Capacity (TMDL)		**401.2**	**48.5**	**18.3**	**8.30**	**2.30**
Estimated Load Reduction (*E. coli* load)		--	--	--	--	--

Estimated Load Reduction (%)	--	--	--	--	--

* The WLA for treatment facilities requiring NPDES permits is based on the design flow. The WLA exceeded the Low and Very Low flow regime TMDL allocation to the Mustinka River as denoted by '*'. The WLA and LA allocations are instead determined by the formula: E. coli Allocation = (flow volume contribution from a given source) x (126 org/100mL E. coli)

Table 16: Total Suspended Solids (TSS) TMDLs for the Mustinka River Watershed

Allocation	Source	Very High	High	Mid	Low	Very Low
		TSS (kg/day)				
TMDL for Mustinka River (09020102-502)						
Existing Load		1051496	27348	4163	2866	1111
	Construction Stormwater (MNR100001)	0.1	0.05	0.04	0.02	0.004
	Industrial Stormwater (MNR50000)	0.1	0.05	0.04	0.02	0.004
	WLA Totals	0.2	0.1	0.08	0.04	0.008
Load Allocation	Mustinka River -518	26766.5	3832.8	1651.1	852.0	291.0
	Twelvemile Creek -557	48384.5	10003.0	5848.8	3723.6	1746.5
	Watershed runoff	1819.7	1565.8	921.9	430.7	93.1
	LA Totals	76970.70	15401.60	8421.80	5006.30	2130.60
Margin Of Safety (10%)		8552.3	1711.3	935.8	556.3	236.7
Loading Capacity (TMDL)		**85523.2**	**17113.0**	**9357.7**	**5562.6**	**2367.3**
Estimated Load Reduction (TSS load)		965972.8	10235.0	0.0	0.0	0.0
Estimated Load Reduction (%)		92%	37%	0%	0%	0%
TMDL for Twelvemile Creek (09020102-514)						
Existing Load		189046	3276	965	701	346
Wasteload Allocation	Construction Stormwater (MNR100001)	0.64	0.14	0.08	0.05	0.02
	Industrial Stormwater (MNR50000)	0.64	0.14	0.08	0.05	0.02
	WLA Totals	1.3	0.3	0.2	0.1	0.04
Load Allocation	Watershed Runoff	15523.6	3313.4	1954.6	1246.0	589.1
	LA Totals	15523.6	3313.4	1954.6	1246.0	589.1
Margin Of Safety (10%)		1725.0	368.2	217.2	138.5	65.4
Loading Capacity (TMDL)		**17249.9**	**3681.9**	**2172.0**	**1384.6**	**654.5**
Estimated Load Reduction (TSS load)		171796	0.00	0.00	0.00	0.00
Estimated Load Reduction (%)		91%	0%	0%	0%	0%
TMDL for Twelvemile Creek (09020102-557)						
Existing Load		657904	10869	2677	2022	898
Wasteload Allocation	Big Stone Hutterite (MNG580168)	20.5	20.5	20.5	20.5	20.5

	Dumont WWTF (MN0064831)	19.2	19.2	19.2	19.2	19.2
	Graceville WWTF (MNG580159)	124.9	124.9	124.9	124.9	124.9
	Herman WWTF (MNG580177)	119.3	119.3	119.3	119.3	119.3
	Construction Stormwater (MNR100001)	1.3	0.25	0.14	0.08	0.03
	Industrial Stormwater (MNR50000)	1.3	0.25	0.14	0.08	0.03
	WLA Totals	286.5	284.4	284.2	284.1	284.0
Load Allocation	Twelvemile Creek (-514)	15524.9	3313.7	1954.8	1246.1	589.1
	Watershed Runoff	32573.1	6404.9	3609.8	2193.4	873.4
	LA Totals	48098.0	9718.6	5564.6	3439.5	1462.5
Margin Of Safety (10%)		5376.0	1111.4	649.9	413.7	194.1
Loading Capacity (TMDL)		**53760.5**	**11114.4**	**6498.7**	**4137.3**	**1940.6**
Estimated Load Reduction (TSS load)		604144	0.00	0.00	0.00	0.00
Estimated Load Reduction (%)		92%	0%	0%	0%	0%
TMDL for Mustinka River (09020102-580)						
Existing Load		198761	6429	1315	622	177
Wasteload Allocation	Elbow Lake WWTF (MNG580082)	268.7	268.7	268.7	268.7	*
	Wendell WWTF (MNG580153)	27.8	27.8	27.8	27.8	*
	Construction Stormwater (MNR100001)	1.4	0.1	0.04	0.01	< 0.01
	Industrial Stormwater (MNR50000)	1.4	0.1	0.04	0.01	< 0.01
	WLA Totals	299.3	296.7	296.6	296.5	*
Load Allocation	Watershed Runoff	18325.7	1952.9	551.4	87.4	*
	LA Totals	18325.7	1952.9	551.4	87.4	*
Margin Of Safety (10%)		2069.5	250.0	94.2	42.6	11.8
Loading Capacity (TMDL)		**20694.5**	**2499.6**	**942.2**	**426.5**	**117.5**
Estimated Load Reduction (TSS load)		178067	3929	373	196	59
Estimated Load Reduction (%)		90%	61%	28%	31%	34%
TMDL for Mustinka River (09020102-582)						
Existing Load		803722	5360	785	438	166
Wasteload Allocation	Construction Stormwater (MNR100001)	0.2	0.1	0.04	0.02	0.01
	Industrial Stormwater (MNR50000)	0.2	0.1	0.04	0.02	0.01
	WLA Totals	0.4	0.2	0.08	0.04	0.02
Load Allocation	Mustinka River (-580)	18625.0	2249.6	848.0	383.9	105.7
	Watershed Runoff	3211.6	877.2	499.0	311.1	131.7

	LA Totals	21836.6	3126.8	1347.0	695.0	237.4
Margin Of Safety (10%)		2426.3	347.4	149.7	77.2	26.4
Loading Capacity (TMDL)		**24263.3**	**3474.4**	**1496.8**	**772.2**	**263.8**
Estimated Load Reduction (TSS load)		779459	1886	0	0	0
Estimated Load Reduction (%)		97%	35%	0%	0%	0%

* = the WLA for treatment facilities requiring NPDES permits is based on the design flow. The WLA exceeded Very Low flow regime TMDL allocation to the Mustinka River as denoted by "*" in Table 62. The WLA and LA allocations are determined instead by the formula: *TSS Allocation = (flow volume contribution from a given source) x (45 mg/L TSS)*