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

APR - 3 2014

REPLY TO THE ATTENTION OF:
WW-16J

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

Dear Ms. Flood:

The U.S. Environmental Protection Agency has conducted a complete review of the final Total Maximum Daily Loads (TMDL) for Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, Wilkinson Lake and Unnamed Creek (Lambert Creek), including support documentation and follow up information. These five lakes and one stream segment are located in central Minnesota in Ramsey and Anoka Counties. The TMDLs address aquatic recreational use impairments due to excessive phosphorus and bacteria (*E. coli*) .

EPA has determined that TMDLs for Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, Wilkinson Lake and Unnamed Creek (Lambert Creek) 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 five phosphorus and one bacteria 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,

Tinka G. Hyde
Director, Water Division

Enclosure

cc: Celine Lyman, MPCA
Barbara Peichel, MPCA

TMDLs: Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, & Wilkinson Lake Nutrient TMDLs, and Lambert Creek Bacteria TMDL, Ramsey and Anoka Counties, MN
Date: April 3, 2014

DECISION DOCUMENT FOR THE GEM LAKE, EAST GOOSE LAKE, WEST GOOSE LAKE, GILFILLAN LAKE & WILKINSON LAKE NUTRIENT TMDLS, and LAMBERT CREEK BACTERIA TMDL, RAMSEY AND ANOKA COUNTIES, MN

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

1. Identification of Waterbody, Pollutant of Concern, Pollutant Sources, and Priority Ranking

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

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

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

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

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

Comment:

Location Description/Spatial Extent:

Gem Lake (DNR ID 62-0037-00), East Goose Lake (DNR ID 62-0034-00), West Goose Lake (DNR ID 62-0126-00W), Gilfillan Lake (DNR ID 62-0027-00), Wilkinson Lake (DNR ID 62-0043-00) and Lambert Creek (07010206-801) are all located in the Vadnais Lake Area within Ramsey and Anoka Counties, Minnesota (Figure E-2 of the final TMDL document). This Decision Document,= will refer to the five lakes and one stream segment as the 'Vadnais Lake Area TMDLs'. All water bodies of the Vadnais Lake Area TMDLs are located in the Mississippi River basin. Gem Lake, East Goose Lake and West Goose Lake are east of Vadnais Lake and drain into Lambert Creek. Gilfillan Lake and Wilkinson Lake are both north of Vadnais Lake. Both Wilkinson Lake and Lambert Creek eventually drain into Vadnais Lake (Figure E-2 of the final TMDL document).

The Vadnais Lake Area is northeast of the Minneapolis and north of St Paul within the greater Minneapolis/St. Paul Metro area (See Figures E.1 and E.2 of the final TMDL document). The watershed which encompasses the waters of the Vadnais Lake Area TMDLs is managed by Vadnais Lake Area Water Management Organization (VLAWMO) and its boundaries are outlined in Figure E-2 of the final TMDL document. This watershed area will be referred to as the 'Vadnais Lake watershed' for the duration of this Decision Document.

Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, Wilkinson Lake and Lambert Creek are all within the boundaries of the North Central Hardwood Forest (NCHF) ecoregion. The morphometry characteristics of each lake are found in Table 1 of this Decision Document. The Minnesota Pollution Control Agency (MPCA) classified all of the lakes of Vadnais Lake Area TMDLs as 'shallow lakes', based upon their average depths being less than 15 feet.

Table 1: Morphometric and subwatershed characteristics for Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, Wilkinson Lake & Lambert Creek

Parameter	Gem Lake	East Goose Lake	West Goose Lake	Gilfillan Lake	Wilkinson Lake	Lambert Creek
DNR ID / AUID	62-0037-00	62-0034-00	62-0126-00W	62-0027-00	62-0043-00	07010206-801
Surface Area (acres)	21.6	116.3	24.1	99.2	97.1	--
Average Depth (ft)	8.5	5.5	4.4	2.6	1.7	--
Maximum Depth (ft)	16	9	7	5	4	--
Volume (acre-ft)	183.4	634.7	105.28	255.7	165.1	--
Residence Time (years)	2.9	2.3	0.3	4.3	0.2	--
Littoral Area (%)	> 80%	100%	100%	100%	100%	--
Direct Subwatershed (acres)	306.34	577.55	238.78	531.35	2972.82	4942.63

Land Use:

MPCA explained that the main land use category in the Vadnais Lake watershed is urbanized land uses. MPCA further subdivided urban land uses into commercial lands, industrial lands, institutional lands,

mixed use lands, multi-family residential, parks and recreation lands, and single family residential. Other land uses quantified include; agricultural lands, major highway lands, open water and undeveloped lands (Table 2 of this Decision Document). Figure 3.1 in the final TMDL document presents land use classifications within the Vadnais Lake watershed. MPCA does not anticipate the land use within the Vadnais Lake watershed to be altered significantly in the future because so much of the watershed is already developed. The amount of developed land within the Vadnais Lake watershed is likely to remain fairly constant over the next several decades.

Table 2: Land Use in the Vadnais Lake watershed (subdivided by subwatershed)

Land Use*	Gem Lake subwatershed		East Goose Lake subwatershed		West Goose Lake subwatershed	
	Acres	Percent	Acres	Percent	Acres	Percent
Agricultural	12.44	4%	0.00	0%	0.00	0%
Commercial	35.70	11%	43.96	6%	18.66	7%
Industrial	0.00	0%	0.00	0%	15.45	6%
Institutional	0.00	0%	46.65	7%	0.00	0%
Major Highway	10.78	3%	18.77	3%	17.94	7%
Mixed Use	0.13	0%	0.00	0%	0.00	0%
Multi-Family Residential	0.00	0%	49.10	7%	6.82	3%
Open Water	32.26	10%	112.46	16%	27.96	11%
Park and Recreation	0.21	0%	11.46	2%	36.54	14%
Single Family Residential	89.32	27%	402.20	58%	74.33	28%
Undeveloped	147.09	45%	9.85	1%	65.17	25%
TOTAL	327.93	100%	694.45	100%	262.87	100%
Land Use*	**Lake Gilfillan subwatershed**		**Lake Wilkinson subwatershed**		**Lambert Creek subwatershed**	
	Acres	**Percent**	**Acres**	**Percent**	**Acres**	**Percent**
Agricultural	0.00	0%	313.83	6%	39.31	1%
Commercial	14.59	2%	168.16	3%	221.44	4%
Industrial	0.05	0%	145.03	3%	161.72	3%
Institutional	7.68	1%	54.50	1%	150.25	3%
Major Highway	0.00	0%	166.00	3%	140.36	3%
Mixed Use	0.00	0%	29.86	1%	11.99	0%
Multi-Family Residential	53.39	8%	204.17	4%	305.16	6%
Open Water	118.55	19%	545.48	11%	264.83	5%
Park and Recreation	58.47	9%	964.92	19%	312.08	6%
Single Family Residential	326.69	52%	1213.44	24%	2168.18	44%
Undeveloped	51.14	8%	1227.26	24%	1167.31	24%
TOTAL	630.56	100%	5032.65	100%	4942.63	100%

* Land use data compiled from the 2005 Met Council Land Use Database and Mn-DOT Metro shape files

Problem Identification:

Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, and Wilkinson Lake were all originally listed on the 2010 Minnesota 303(d) list for impaired aquatic recreation attributed to excessive nutrients (phosphorus). Lambert Creek was originally listed on the 2008 Minnesota 303(d) list for impaired aquatic recreation attributed to bacteria (*E. coli*). All water bodies are on the draft 2014 Minnesota 303(d) list for impaired aquatic recreation due to bacteria exceedances (Lambert Creek) and nutrient exceedances (Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, and Wilkinson Lake).

Water quality monitoring has been completed at several locations throughout the Vadnais Lake watershed. The VLAWMO and St Paul Regional Water Service (SPRWS) have conducted water quality sampling within the Vadnais Lake watershed. The five lakes of the Vadnais Lake Area TMDLs and other water bodies within the Vadnais Lake watershed have been sampled at various times between 2000-2010. Water quality information from these sampling efforts was used in the lake modeling and load duration curve efforts of the Vadnais Lake Area TMDLs. The data set compiled by these two entities indicates that both of the water bodies addressed in the Vadnais Lake Area TMDLs are not attaining their designated aquatic recreation uses due to exceedances of bacteria and nutrient criteria.

Total phosphorus (TP), chlorophyll-a (chl-a) and Secchi depth (SD) measurements between 2000-2010 indicated that Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, and Wilkinson Lake were impaired by excess nutrients (total phosphorus) and were not attaining their designated uses. Graphical evidence of these exceedances was prepared by MPCA and can be found in Figures 3.4 to 3.18 of the final TMDL document. Bacteria monitoring completed at six sampling locations in Lambert Creek supported that Lambert Creek was impaired for bacteria and was not meeting its aquatic recreation designated use. Historical bacteria monitoring in Lambert Creek is found in Figure 3.19 of the final TMDL document.

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

Degradations in aquatic habitats or water quality (ex. low dissolved oxygen) can negatively impact aquatic life use. Increased 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.

Growing season averages for total phosphorus (µg/L), chlorophyll-a (µg/L), and Secchi disk depth (m) for Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, and Wilkinson Lake are found in Table 3 of this Decision Document.

Table 3: Water Quality Summary Table : Growing Season Averages

North Central Hardwood Forest Water Quality Standards	Parameter	Gem Lake	East Goose Lake	West Goose Lake
	DNR ID / AUID	62-0037-00	62-0034-00	62-0126-00W
	Sampling Years	2000 - 2005, 2007 - 2009	2007 - 2010	2007 - 2010
TP < 60 (µg/L)	Long Term Summer Average TP (µg/L)	71.7	26.1	167
chl-a < 20 (µg/L)	Long Term Summer Average chl-a (µg/L)	63.8	104.8	56
SD > 1.0 (m)	Long Term Summer Average Secchi Depth (m)	1.25	0.27	0.46
North Central Hardwood Forest Water Quality Standards	Parameter	Gilfillan Lake	Wilkinson Lake	
	DNR ID / AUID	62-0027-00	62-0043-00	
	Sampling Years	2006 - 2010	2001 - 2005, 2007 - 2009	
TP < 60 (µg/L)	Long Term Summer Average TP (µg/L)	138.3	148.8	
chl-a < 20 (µg/L)	Long Term Summer Average chl-a (µg/L)	37.9	29.7	
SD > 1.0 (m)	Long Term Summer Average Secchi Depth (m)	0.42	0.67	

Bacteria: Bacteria exceedances can negatively impact recreational uses (fishing, swimming, wading, boating, etc.) and public health. At elevated levels, bacteria may cause illness within humans who have contact with or ingest bacteria laden water. Recreation-based contact can lead to ear, nose, and throat infections, and stomach illness.

A summary of the *E. coli* samples by month for the five sample stations located within Lambert Creek is presented in Table 4 of this Decision Document. There were 62 exceedances of the acute standard (16% of total samples collected) and 281 samples exceeding the chronic standard.

Table 4: Water Quality Summary Table : Bacteria (*E. coli*) samples in Lambert Creek

Sample Month	Total Samples (n)	#>126 MPN/100 mL	#>1260 MPN/100mL	Monthly Geomean	% of samples >1260 MPN/100 mL
April	No data collected				
May	48	18	4	85	8%
June	96	68	14	287	15%
July	86	68	13	367	15%
August	101	78	19	371	19%
September	58	45	9	358	16%
October	5	4	3	1475	60%

Priority Ranking:

The Vadnais Lake Area 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 and the restorability of the water body, the technical capability and the willingness of local partners to assist with the TMDL, and the appropriate sequencing of TMDLs within a watershed or basin. Areas within the Vadnais Lake watershed are popular locations for aquatic recreation. Water quality degradation has led to efforts to improve the overall water quality within the segments identified in this TMDL effort, and to the development of TMDLs for these water bodies.

Pollutants of Concern:
The pollutants of concern are phosphorus and bacteria (*E. coli*).

Source Identification (point and nonpoint sources):
Point Source Identification:

The potential **point sources for the Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake and Wilkinson Lake nutrient TMDLs** are:

National Pollutant Discharge Elimination Systems (NPDES) permitted facilities: NPDES permitted facilities may contribute phosphorus loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge treated wastewater according to their NPDES permit. There is one NPDES permitted facility, M-Foods Dairy LLC (Permit #MNG255067) which discharges non-contact cooling water into the West Goose Lake subwatershed (Table 4.1 of the final TMDL document). Non-contact cooling water is water that is used to reduce temperature that does not come into contact with a raw material, intermediate product, waste product other than heat, or finished product. The M-Foods Dairy facility was assigned a portion of the WLA for the West Goose Lake nutrient TMDL (Table 11 of this Decision Document).

Municipal Separate Storm Sewer System (MS4) communities: There are nine MS4 communities which received a portion of the wasteload allocation (WLA) (Table 5 of this Decision Document). Stormwater from MS4s can transport phosphorus to surface water bodies during or shortly after storm events. Each of the MS4 communities within Table 5 of this Decision Document was assigned a portion of the WLA.

Table 5: Regulated MS4 Permittees in the Vadnais Lake watershed assigned a portion of the WLA for the nutrient TMDLs

Regulated MS4 Permittees	NPDES Permit ID
Gem Lake City (MS4)	MS400020
Ramsey County (MS4)	MS400191
Minnesota Dept. of Transportation (MN-DOT) - Metro District (MS4)	MS400170
White Bear Lake City (MS4)	MS400060
North Oaks City (MS4)	MS400109
Vadnais Heights City (MS4)	MS400057
White Bear Township (MS4)	MS400163
Anoka County (MS4)	MS400066
Lino Lakes City (MS4)	MS400100

Permitted Construction and Industrial Areas: Construction and industrial sites may contribute phosphorus via sediment runoff during stormwater events. These areas within the Vadnais Lake watershed 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. MPCA expects that those MS4 communities with existing SWPPPs will update their SWPPP following the approval of the TMDL.

Combined Sewer Overflows (CSOs): There are no CSO communities in the Vadnais Lake watershed. CSOs may deliver phosphorus to waterways during or shortly after storm events.

Concentrated Animal Feedlot Operations (CAFOs): There are no CAFOs within the Vadnais Lake watershed.

The potential **point sources for the Lambert Creek bacteria TMDL** are:

Municipal Separate Storm Sewer System communities: Six regulated MS4 permittees within the Vadnais Lake watershed (Table 6 of this Decision Document) received a portion of the WLA in the Lambert Creek bacteria TMDL. Stormwater from MS4s can transport bacteria to surface water bodies during or shortly after storm events.

Table 6: Regulated MS4 Permittees in the Vadnais Lake Area assigned a portion of the WLA for the Lambert Creek bacteria TMDL

Regulated MS4 Permittees	NPDES Permit ID
Gem Lake City (MS4)	MS400020
Ramsey County (MS4)	MS400191
MNDOT - Metro District (MS4)	MS400170
White Bear Lake City (MS4)	MS400060
Vadnais Heights City (MS4)	MS400057
White Bear Township (MS4)	MS400163

Combined Sewer Overflows (CSOs): There are no CSO communities in the Vadnais Lake watershed. CSOs may deliver bacteria to waterways during or shortly after storm events.

Concentrated Animal Feedlot Operations (CAFOs): There are no CAFOs within the Vadnais Lake watershed.

Nonpoint Source Identification:

The potential **nonpoint sources for the Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake and Wilkinson Lake nutrient TMDLs** are:

Internal loading: The release of phosphorus from lake sediments, the release of phosphorus via physical disturbance from benthic fish (rough fish, ex. carp), the release of phosphorus from wind mixing the water column, and the release of phosphorus from decaying curly-leaf pondweeds, may all contribute internal phosphorus loading to Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake and Wilkinson Lake. 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.

Atmospheric deposition: Phosphorus may be added via particulate deposition. Particles from the atmosphere may fall onto lake surfaces or other surfaces within the Vadnais Lake watershed. 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. The East Goose Lake and Gilfillan Lake TMDLs apportioned part o the load allocation (LA) to groundwater phosphorus inputs.

Failing Subsurface Sewage Treatment Systems (SSTS): Failing septic systems are a potential source of phosphorus within the Vadnais Lake watershed. 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. The Gem Lake and Gilfillan Lake TMDLs apportioned part of the LA to septic inputs.

Non-regulated stormwater runoff: Non-regulated stormwater runoff can add phosphorus to the watershed. The sources of phosphorus in stormwater include: decaying vegetation (leaves, grass clippings, etc.), domestic and wild animal wastes, soil particles, atmospheric deposited particles, and phosphorus containing fertilizers.

Wetland and Forest Sources: Phosphorus may be added to surface waters by stormwater flows through wetland or forested areas in the Vadnais Lake watershed. Storm events may mobilize phosphorus through the transport of suspended solids and other organic debris.

Shoreline Erosion: Phosphorus may be added to Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake and Wilkinson Lake by erosional processes impacting lake shoreline areas. Phosphorus may be attached to eroded shoreline materials and may be mobilized through the transport of sediment and suspended solids.

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

The potential **nonpoint sources for the Lambert Creek bacteria TMDL** are:

Non-regulated stormwater runoff: Non-regulated stormwater runoff can add bacteria to Lambert Creek. The sources of bacteria in stormwater include pet wastes from urban areas that do not go directly to an MS4 conveyance system.

Failing Subsurface Sewage Treatment Systems (SSTS): Failing septic systems are a potential source of bacteria within the Vadnais Lake watershed. 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.

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.

Future Growth:
Significant development is not expected in the Vadnais Lake watershed since much of the land within the watershed is already developed. MPCA estimates that the population within the Vadnais Lake watershed may slightly increase over the next few decades but the land use within the watershed is generally expected to remain unchanged. In the event that development/redevelopment projects are to occur in the Vadnais Lake watershed, those future projects would be covered under the construction rules of individual MS4 communities within the Vadnais Lake watershed. The WLA and load allocations for the Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, Wilkinson Lake and Lambert Creek 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 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 waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy (40 C.F.R. §130.7(c)(1)). EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

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

Comment:

Designated Uses:

Minnesota Rule Chapter 7050 designates uses for waters of the state. Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, Wilkinson Lake and Lambert Creek are designated as Class 2B waters for aquatic recreation use (boating, swimming, fishing, etc.). The Class 2 aquatic recreation 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:

For nutrient impaired waters:

Numeric criteria for total phosphorus, chlorophyll-a, and Secchi Disk depth are set forth in Minnesota Rules 7050.0222. These three parameters are the eutrophication standards that must be achieved to attain the aquatic recreation designated use. The numeric eutrophication standards that are applicable to Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, and Wilkinson Lake are those set forth for Class 2B shallow lakes in the NCHF ecoregion (Table 8 of this Decision Document).

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.[1] Clear relationships were established between the causal factor, TP, and the response variables, chl-a and SD depth. Based on these relationships, TP loadings designed to meet the TP WQS of 60 µg/L for Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, and Wilkinson Lake, were estimated to also result in attainment of chl-a and SD depth standards.

[1] Heiskary, S.A. and W.W. Walker, Jr. 1988. Developing Phosphorus Criteria for Minnesota Lakes. Lake and Reservoir Management, 1988 4(1): 1-9.

Table 7: Minnesota Eutrophication Standards for shallow lakes within the North Central Hardwood Forest ecoregion

Parameter	Eutrophication Standard
Total Phosphorus (µg/L)	TP < 60
Chlorophyll-a (µg/L)	chl-a < 20
Secchi Depth (m)	SD > 1.0

For bacteria impaired waters:
Water quality standards (WQS) are the fundamental benchmarks by which the quality of surface waters is measured. Within the State of Minnesota, WQS are developed pursuant to the Minnesota Statutes (MS) 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. The bacteria water quality standards which apply to Lambert Creek are:

Table 8: Bacteria Water Quality Standards Applicable in the Lambert Creek TMDL

Parameter	Units	Water Quality Standard
E. coli [1]	# / 100 mL	1,260 in < 10% of samples [2]
		Geometric Mean < 126 [3]
[1] = *E. coli* standards apply only between April 1 and October 31		
[2] = Standard shall not be exceeded by more than 10% of the samples taken within any calendar month		
[3] = Geometric mean based on minimum of 5 samples taken within any calendar month		

TMDL Targets:
For nutrient impaired waters:
MPCA selected a target of 60 µg/L of TP to develop the TMDLs for Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, and Wilkinson Lake. MPCA selected total phosphorus as the appropriate parameter to address eutrophication problems at Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, and Wilkinson Lake because of the interrelationships between TP and chl-a, as well as SD depth. Algal abundance is measured by chl-a, which is a pigment found in algal cells. As more phosphorus becomes available, algae growth can increase. Increased algae in the water column will decrease water clarity that is measured by SD depth.

For bacteria impaired waters:
The target is the standard as stated above, for both the geometric mean portion and the daily maximum portion, which is applicable from April 1st through October 31st. However, the focus of this TMDL is on the 'chronic' geometric mean standard of 126 cfu/100ml. MPCA believes that using the 126 cfu/100 mL portion of the water quality standard will result in the greatest bacteria reductions within the MCLH watershed. Additionally, MPCA believes that the geometric mean is the more relevant value in determining water quality. MPCA stated that while the TMDL will focus on the geometric mean portion of the water quality standard, compliance is required with both parts of the water quality standard.

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

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

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

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

Comment:
Vadnais Lake Area nutrient TMDLs:
The approach used by MPCA to calculate the loading capacity for the Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, and Wilkinson Lake nutrient TMDLs is described in the final TMDL in Sections 4.0 to 6.0. MPCA determined appropriate phosphorus budgets for each source contributor and then used the BATHTUB model to examine how different lake response variables (chl-a and SD depth) respond to changes in nutrient loads.

MPCA used the P8 Urban Catchment Model to estimate direct watershed nutrient inputs to the 5 lakes of the Vadnais Lake Area nutrient TMDLs. The P8 model input was generated from 2005 land use data (i.e., areal coverage and impervious cover) and hydrologic soil grouping information. Impervious areas were assigned within each lake direct watershed based on review of land use information and maps. The impervious areas were designated as those areas which are hydraulically connected to conveyance systems (i.e., curbs, catch basins, storm drains, etc.), and therefore to the lake, without flowing over pervious areas. P8 was calibrated to measured runoff at the watershed outlet and incorporated load calculations based on inputs of directly connected impervious areas within each watershed.

Existing nutrient loads were calculated and portioned to each MS4 based on data and P8 modeling efforts. Individual MS4 loads were assigned to individual MS4 permittees based on estimated runoff-volumes generated from a 1.5-inch precipitation event. The 1.5-inch event was chosen to be representative as the majority of the annual phosphorus loading and also accounts for runoff from pervious areas.

Allocation of the load reduction across all MS4s was based on their existing contribution percentages. Each MS4 has an equivalent percent load reductions based on their existing contributions. For example, the required load reduction to Gem Lake is 24%; each of the MS4s discharging to Gem Lake received a load reduction of 24% from their existing loads. This approach provides opportunities for MS4s to work together and the flexibility to site BMPs where they are the most cost effective and to share costs. It provides for maximum local flexibility and facilitates a collaborative effort led by VLAWMO.

TP loading estimates were also calculated for the atmospheric load phosphorus contributions, internal load phosphorus contributions, groundwater phosphorus contributions, septic system nutrient contributions, upstream lake contributions (for West Goose Lake and Wilkinson Lake) and augmentation load contributions (for Gilfillan Lake). Atmospheric deposition phosphorus contributions were based on annual precipitation measurements and atmospheric phosphorus loading rates. The atmospheric load was calculated by multiplying the lake area by the atmospheric deposition rate. Internal load phosphorus contributions were estimated based on sediment release rates of phosphorus and the average annual anoxic period for each lake system (Table 4.6 of the final TMDL document). Groundwater contributions were based on regional hydrologic atlas values, water budgets for each lake and published values for groundwater characteristics in the Vadnais Lake Area watershed (Table 4.7 of the final TMDL document).

Septic system nutrient inputs were assigned to the load allocation for the Gem Lake TMDL and the Gilfillan Lake TMDL. MPCA determined that both of these lakes had houses which were serviced by septic systems. MPCA assigned a portion of the load allocation to septics based on the failure rates of septic systems in these subwatersheds (Table 4.9 of the final TMDL document). Upstream lake contributions (for West Goose Lake and Wilkinson Lake) were considered by MPCA as a boundary condition and loads from these upstream areas were assigned as part of the load allocation. Augmentation load contributions (for Gilfillan Lake) were assigned a portion of the load allocation. Water levels in Gilfillan Lake are augmented by lake water from Pleasant Lake. Pleasant Lake has an average TP concentration of 54 µg/L. MPCA account for this additional TP input via an augmented load contribution (Table 12 of this Decision Document).

The BATHTUB model was utilized to link phosphorus loads with in-lake water quality and to calculate loading capacity values for the Vadnais Lake Area nutrient TMDLs. BATHTUB has previously been used successfully in many lake studies in Minnesota. BATHTUB is a steady-state annual or seasonal model that predicts a lake's growing season (June 1 to September 30) average surface water quality. BATHTUB utilizes annual or seasonal time-scales which are appropriate because watershed TP loads are normally impacted by seasonal conditions.

BATHTUB has built-in statistical calculations which account for data variability and provide a means for estimating confidence in model predictions. BATHTUB employs a mass-balance TP model that accounts for water and TP inputs from tributaries, direct watershed runoff, the atmosphere, and sources

internal to the lake, and outputs through the lake outlet, water loss via evaporation, and TP sedimentation and retention in the lake sediments. BATHTUB provides flexibility to tailor model inputs to specific lake morphometry, watershed characteristics and watershed inputs. The BATHTUB model also allows MPCA to assess different impacts of changes in nutrient loading. BATHTUB allows choice among several different mass-balance TP models. For lakes in Minnesota, the Canfield-Bachmann lake formulation has proven to be appropriate in most cases. The Canfield-Bachmann lake formulation subroutine was utilized in the Vadnais Lake Area nutrient TMDLs.

The pollutant sources were identified and estimated based on;

- Three to eight years of measured in-lake water quality data;
- Measured watershed runoff values;
- Watershed phosphorus loading from P8 Urban Catchment modeling efforts. These phosphorus loading estimates were calibrated to measured runoff at the watershed outlet;
- Land use information specific to the Vadnais Lake watershed (based on 2005 METC land use information);
- Lake morphometry information; and
- Measured and modeled internal lake nutrient cycling and anoxic information (Table 4-6 of the final TMDL document).

The loading capacity of each of the 'five lakes' (Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, and Wilkinson Lake) was determined through the use of BATHTUB and the Canfield-Bachmann subroutine and then allocated to the WLA, LA and Margin of Safety. 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 for each of the five lakes (i.e., the maximum allowable load to the system, while allowing it to meet WQS) from June 1to September 30. The modeling simulations focused on reducing the TP to the system.

The time period of June to September was chosen by MPCA as the growing season because it corresponds to the eutrophication criteria, contains the months that the general public typically uses the five lakes for aquatic recreation, and is the time of the year when water quality is likely to be impaired by excessive nutrient loading. Loading capacities were divided by 365 to calculate the daily loading capacities. The daily load reduction targets in the Vadnais Lake Area TMDLs were calculated from the current phosphorus budget for each lake. The budget is an average of several years of monitoring data, and includes both wet and dry years.

MPCA subdivided the loading capacity among the WLA, LA and MOS components of the TMDL (Tables 9 to 13 of this Decision Document). The LA accounted for a majority of the loading capacity. These calculations were based on the critical condition, the summer growing season, which is typically when the water quality in the lake is degraded and phosphorus loading inputs are the greatest. TMDL allocations assigned during the summer growing season will protect Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, and Wilkinson Lake 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).

In developing the lake nutrient standards for Minnesota lakes (Minn. Rule 7050), the MPCA evaluated

data from a large cross-section of lakes within each of the state's ecoregions. Clear relationships were established between the causal factor TP and the response variables chl-a and SD depth. Based on these relationships it is expected that the allocations set forth in this TMDL to meet the phosphorus target of 60 µg/L and will result in the chlorophyll-a and Secchi standards being met.

Table 9: TMDL load for Gem Lake

Allocation	Source	Existing TP Load		TMDL		Load Reduction	
		(lbs/yr)	*(lbs/day)*[2]	*(lbs/yr)*	*(lbs/day)*[2]	*(lbs/yr)*	*(%)*
Wasteload	Gem Lake City MS4 (MS400020) [3,4]	62.1	0.170	23.9	0.065	--	--
	Ramsey County MS4 (MS400191) [3,4]			9.0	0.025	--	--
	White Bear Lake City MS4 (MS400060) [3,4]			8.9	0.024	--	--
	MN-DOT (MS400170)			5.2	0.014	--	--
	WLA Totals	***62.1***	***0.17***	***47.0***	***0.129***	***15.1***	***24%***
Load	Septics	5.1	0.014	0.0	0.000	5.1	100%
	Atmospheric Deposition	5.2	0.014	5.2	0.014	0.0	0%
	Internal Load	0.0	0.000	0.0	0.000	0.0	0%
	LA Totals	***10.3***	***0.03***	***5.2***	***0.014***	***5.1***	--
Margin Of Safety (5 %) [1]		--	--	2.7	0.007	--	--
Total		**72.4**	**0.198**	**54.9**	**0.150**	**17.5**	**24%**

1 = The MOS was deducted from the modeled allowable drainage area load and the total load reduction values (lbs/yr and %) to account for the MOS.

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

3 = An construction stormwater load was included in the annual (lbs/season) and daily (lbs/day) loading values assigned to municipal MS4 permittees. Adherence to the construction stormwater loads derived in this TMDL are the responsibility of the individual municipal MS4 permittee.

4 = An industrial stormwater load was included in the annual (lbs/season) and daily (lbs/day) loading values assigned to municipal MS4 permittees. Adherence to the industrial stormwater loads derived in this TMDL are the responsibility of the State of Minnesota.

Table 10: TMDL for East Goose Lake

Allocation	Source	Existing TP Load		TMDL		Load Reduction	
		(lbs/yr)	*(lbs/day)*[2]	*(lbs/yr)*	*(lbs/day)*[2]	*(lbs/yr)*	*(%)*
Wasteload	Gem Lake City MS4 (MS400020) [3,4]	214.8	0.588	2.2	0.006	--	--
	Ramsey County MS4 (MS400191) [3,4]			3.9	0.011	--	--
	White Bear Lake City MS4 (MS400060) [3,4]			64.7	0.177		
	Mn-DOT (MS400170)			7.9	0.022	--	--
	WLA Totals	***214.8***	***0.59***	***78.7***	***0.216***	***136.1***	***63%***
Load	Atmospheric Deposition	27.9	0.076	27.9	0.076	0.0	0%
	Groundwater	0.8	0.002	0.8	0.002	0.0	0%
	Internal Load	1777.2	4.869	71.1	0.195	1706.1	96%
	Septics	0.0	0.000	0.0	0.000	0.0	--
	LA Totals	***1805.9***	***4.948***	***99.8***	***0.273***	***0.0***	--
Margin Of Safety (5 %) [1]		--	--	9.4	0.026	--	--
	Total	**2,020.7**	**5.536**	**187.9**	**0.515**	**136.1**	**7%**

1 = The MOS was deducted from the modeled allowable drainage area load and the total load reduction values (lbs/yr and %) to account for the MOS.

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

3 = An construction stormwater load was included in the annual (lbs/season) and daily (lbs/day) loading values assigned to municipal MS4 permittees. Adherence to the construction stormwater loads derived in this TMDL are the responsibility of the individual municipal MS4 permittee.

4 = An industrial stormwater load was included in the annual (lbs/season) and daily (lbs/day) loading values assigned to municipal MS4 permittees. Adherence to the industrial stormwater loads derived in this TMDL are the responsibility of the State of Minnesota.

Table 11: TMDL for West Goose Lake

Allocation	Source	Existing TP Load		TMDL		Load Reduction	
		(lbs/yr)	*(lbs/day)*[2]	*(lbs/yr)*	*(lbs/day)*[2]	*(lbs/yr)*	*(%)*
Wasteload	M-Foods Dairy [1]	16.5	0.045	24.7	0.068	(+ 8.2)	(+ 33%)
	Gem Lake City MS4 (MS400020) [3,4]	110.4	0.302	2.8	0.008	--	--
	Ramsey County MS4 (MS400191) [3,4]			1.6	0.004	--	--
	White Bear Lake City MS4 (MS400060) [3,4]			7.3	0.020	--	--
	MN-DOT (MS400170)			3.6	0.010	--	--
	WLA Totals	***126.9***	***0.348***	***40.0***	***0.110***	***86.90***	***68%***
Load	Atmospheric Deposition	5.8	0.016	5.8	0.016	0.0	0%
	Internal Load (includes Motor-boating)	427.1	1.170	123.1	0.337	304.0	71%
	Upstream Lakes	189.1	0.518	44.1	0.121	145.0	77%
	Septics	0.0	0.000	0.0	0.000	0.0	0%
	LA Totals	***622.0***	***1.704***	***173.0***	***0.474***	--	--
Margin Of Safety (5 %) [5]		--	--	11.2	0.031	--	--
	Total	**748.9**	**2.052**	**224.2**	**0.614**	**524.7**	**70%**

1 = WLA for M-Foods Dairy may be expanded in the future (Section 6.1.3)

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

3 = An construction stormwater load was included in the annual (lbs/season) and daily (lbs/day) loading values assigned to municipal MS4 permittees. Adherence to the construction stormwater loads derived in this TMDL are the responsibility of the individual municipal MS4 permittee.

4 = An industrial stormwater load was included in the annual (lbs/season) and daily (lbs/day) loading values assigned to municipal MS4 permittees. Adherence to the industrial stormwater loads derived in this TMDL are the responsibility of the State of Minnesota.

5 = The MOS was deducted from the modeled allowable drainage area load and the total load reduction values (lbs/yr and %) to account for the MOS.

Table 12: TMDL for Gilfillan Lake

Allocation	Source	Existing TP Load		TMDL		Load Reduction	
		(lbs/yr)	*(lbs/day)*[2]	*(lbs/yr)*	*(lbs/day)*[2]	*(lbs/yr)*	*(%)*
Wasteload	Ramsey County MS4 (MS400191) [3,4]	17.0	0.047	0.5	0.001	--	--
	North Oaks City MS4 (MS400109) [3,4]			14.7	0.040	--	--
	Vadnais Heights City MS4 (MS4000057) [3,4]			0.1	0.0003	--	--
	White Bear Township MS4 (MS400163) [3,4]			1.7	0.005	--	--
	WLA Totals	***17.0***	***0.047***	***17.0***	***0.047***	***0.0***	***0.00***
Load	Septics	24.3	0.067	0.0	0.000	24.3	100%
	Atmospheric Deposition	23.8	0.065	23.8	0.065	0.0	0%
	Internal Load [1]	364.2	0.998	107.5	0.295	264.7	73%
	Augmentation Load	0.0	0.000	8.0	0.022	0.0	0%
	LA Totals	***412.3***	***1.130***	***139.3***	***0.382***	--	--
Margin Of Safety (5 %) [5]		--	--	8.3	0.023	--	--
Total		**429.3**	**1.176**	**164.6**	**0.451**	**264.70**	**62%**

1 = The Internal Load Reduction accounts for the Augmentation Load

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

3 = An construction stormwater load was included in the annual (lbs/season) and daily (lbs/day) loading values assigned to municipal MS4 permittees. Adherence to the construction stormwater loads derived in this TMDL are the responsibility of the individual municipal MS4 permittee.

4 = An industrial stormwater load was included in the annual (lbs/season) and daily (lbs/day) loading values assigned to municipal MS4 permittees. Adherence to the industrial stormwater loads derived in this TMDL are the responsibility of the State of Minnesota.

5 = The MOS was deducted from the modeled allowable internal load and the total load reduction values (lbs/yr and %) to account for the MOS.

Table 13: TMDL for Wilkinson Lake

Allocation	Source	Existing TP Load		TMDL		Load Reduction	
		(lbs/yr)	*(lbs/day)*[2]	*(lbs/yr)*	*(lbs/day)*[2]	*(lbs/yr)*	*(%)*
Wasteload	Ramsey County MS4 (MS400191) [3,4]	740.4	2.028	1.8	0.005	--	--
	White Bear Lake City MS4 (MS400060) [3,4]			35.1	0.096	--	--
	North Oaks City MS4 (MS400109) [3,4]			26.4	0.072	--	--
	White Bear Township MS4 (MS400163) [3,4]			67.6	0.185	--	--
	Anoka County MS4 (MS400066) [3,4]			0.1	0.000	--	--
	Lino Lakes City (MS400100) [3,4]			1.2	0.003	--	--
	MN-DOT (MS400170)			47.2	0.129		
	WLA Totals	***740.4***	***2.028***	***179.4***	***0.492***	***561.0***	***75.8%***
Load	Atmospheric Deposition	23.3	0.064	23.3	0.064	0.0	0.0%
	Groundwater	1.4	0.004	1.4	0.004	0.0	0.0%
	Internal Load	51.8	0.142	51.8	0.142	0.0	0.0%
	Septics	0.0	0.000	0.0	0.000	0.0	0.0%
	Upstream Lakes	49.8	0.136	49.8	0.136	0.0	0.0%
	LA Totals	***126.3***	***0.346***	***126.3***	***0.346***	--	--
Margin Of Safety (5 %) [1]		--	--	16.1	0.044	--	--
Total		**866.7**	**2.375**	**321.8**	**0.882**	**544.90**	**63%**

1 = The MOS was deducted from the modeled allowable drainage area load and the total load reduction values (lbs/yr and %) to account for the MOS.

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

3 = An construction stormwater load was included in the annual (lbs/season) and daily (lbs/day) loading values assigned to municipal MS4 permittees. Adherence to the construction stormwater loads derived in this TMDL are the responsibility of the individual municipal MS4 permittee.

4 = An industrial stormwater load was included in the annual (lbs/season) and daily (lbs/day) loading values assigned to municipal MS4 permittees. Adherence to the industrial stormwater loads derived in this TMDL are the responsibility of the State of Minnesota.

Tables 9 to 13 of this Decision Document discusses MPCA's estimates of the reductions required for each lake to meet the its nutrient water quality targets and ultimately attain water quality standards. These loading reductions (i.e., the Load Reduction Percentage column within Tables 9 to 13) were estimated from existing and TMDL load calculations. MPCA expects that these reductions will result in the attainment of the water quality targets for Gem Lake, Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, and Wilkinson Lake and each lake's water quality will return to a level where its designated use is no longer considered impaired.

EPA supports the data analysis and modeling approach utilized by MPCA in their calculation of wasteload allocations, load allocations and the margin of safety for the Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, and Wilkinson Lake TMDLs. Additionally, EPA concurs with the

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

Vadnais Lake Area bacteria TMDL (Lambert Creek):

For the *E. coli* TMDL addressed by the Lambert Creek TMDL, a geometric mean of **126 cfu/100 ml** for five samples equally spaced over a 30-day period was used to set the loading capacity of the TMDL. MPCA believes the geometric mean portion of the WQS provides the best overall characterization of the status of the watershed. The EPA agrees with this assertion, as stated in the preamble of, *"The Water Quality Standards for Coastal and Great Lakes Recreation Waters Final Rule"* (69 FR 67218-67243, November 16, 2004) on page 67224, "...the geometric mean is the more relevant value for ensuring that appropriate actions are taken to protect and improve water quality because it is a more reliable measure, being less subject to random variation, and more directly linked to the underlying studies on which the 1986 bacteria criteria were based."

MPCA believes that bacteria reductions necessary to restore water quality will occur in the Lambert Creek subwatershed by calculating the bacteria TMDLs to the chronic water quality standard of 126 cfu/100 mL instead of the acute water quality standard of 1,260 cfu/100 mL. MPCA stated that the bacteria TMDLs will focus on the geometric mean portion of the water quality standard (126 cfu/100mL). MPCA expects that compliance with the chronic WQS (126 cfu/100 mL) will result in the acute WQS (1,260 cfu/100 mL) being met. EPA finds these assumption 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 Lambert Creek bacteria TMDL, MPCA used Minnesota's water quality standards for *E. coli* (126 cfu/100 mL). A loading capacity is, "the greatest amount of loading that a water can receive without violating water quality standards." (40 CFR §130.2). Therefore, a loading capacity set at the WQS will assure that the water does not violate WQS. MPCA's *E. coli* TMDL approach is based upon the premise that all discharges (point and nonpoint) must meet the WQS when entering the water body. If all sources meet the WQS at discharge, then the water body should meet the WQS and the designated use.

A flow duration curve (FDC) was created for the Lambert Creek watershed. The FDC was developed from flow frequency data measured at station S002-774 in Lambert Creek near Kohler Road. Flow data from this station focused on dates within the recreation season (April 1 to October 31). Dates outside of the recreation season were excluded from the flow record. Daily stream flows were necessary to implement the load duration curve (LDC) approach.

FDC graphs have flow duration interval (percentage of time flow exceeded) on the X-axis and discharge (flow per unit time) on the Y-axis. The FDC were transformed into LDC by multiplying individual flow values by the WQS (126 cfu/100 mL) and then multiplying that value by a conversion factor. The resulting points are plotted onto a load duration curve graph. LDC graphs, for the Lambert Creek bacteria TMDL, have flow duration interval (percentage of time flow exceeded) on the X-axis and *E. coli* concentrations (number of bacteria per unit time) on the Y-axis. The Lambert Creek LDC used

E. coli measurements in billions of bacteria per day. The curved line on a LDC graph represents the TMDL for the respective flow conditions observed at that location.

Water quality monitoring was completed in the Vadnais Lake watershed between 2000-2010 and measured *E. coli* concentrations (Table 4 of this Decision Document). *E. coli* values from these efforts were converted to individual sampling loads by multiplying the sample concentration by the instantaneous flow measurement observed/estimated at the time of sample collection. The individual sampling loads were plotted on the same figure with the LDC.

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

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

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

A TMDL for Lambert Creek was calculated and WLAs were assigned to MS4 communities as appropriate. There are six regulated MS4 permittees (Table 6 of this Decision Document) which received a portion of the WLA for the bacteria TMDL. The load allocation was calculated after the determination of the WLA, and the Margin of Safety (10% of the loading capacity). Individual nonpoint sources (ex. non-regulated stormwater runoff , wildlife inputs etc.) were not given an individual load and the load allocation value for the Lambert Creek bacteria TMDL was represented as one value.

Table 14 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 load duration curve method can be used to display collected bacteria monitoring data and allows for the estimation of load reductions necessary for attainment of the bacteria water quality standard. Using this method, daily loads

were developed based upon the flow in the water body. Loading capacities were determined for the segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Table 14 of this Decision Document identifies the loading capacity for Lambert Creek at each flow regime. Although there are numeric loads for each flow regime, the LDC is what is being approved for this TMDL.

Table 14: Bacteria (*E. coli*) TMDL for Lambert Creek (07010206-801)

Flow Regime TMDL analysis *E. coli* (billions of bacteria/day)	High Flow	Wet	Mid-Range	Dry	Low Flow
Duration Interval	0 - 10 %	10 - 40 %	40 - 60 %	60 - 90 %	90 - 100 %
Wasteload Allocation (WLA): MS4 Load					
Gem Lake City MS4 (MS400020)	0.68	0.21	0.10	0.04	0.00
MN-DOT (MS400170)	1.17	0.36	0.17	0.06	0.00
Ramsey County MS4 (MS400191)	0.56	0.17	0.08	0.03	0.00
Vadnais Heights City MS4 (MS4000057)	8.78	2.73	1.28	0.45	0.00
White Bear Lake City MS4 (MS400060)	3.74	1.16	0.55	0.19	0.00
White Bear Township MS4 (MS400163)	0.45	0.15	0.07	0.02	0.00
TOTAL WLA	**15.38**	**4.78**	**2.25**	**0.79**	**0.00**
Load Allocation (LA)	3.56	1.11	0.52	0.18	0.00
Margin Of Safety (MOS) (10%)	2.10	0.65	0.31	0.11	0.00
TMDL	**21.04**	**6.54**	**3.08**	**1.08**	**0.00**

The reduction from current conditions needed to meet the bacteria WQS was estimated for Lambert Creek. The reductions were calculated from the geometric mean of *E. coli* observed in each reach. The calculation used was:

((observed geometric mean – 126 cfu/100 ml) / observed geometric mean)

MPCA states that these estimated reductions needed are intended to be approximate, and does not account for variability in flow and bacteria itself can be a highly variable parameter. The estimates are intended to give a relative magnitude of reductions needed in Lambert Creek across the five flow regimes of the LDC. Table 15 in this Decision Document summarizes the estimated reductions needed in Lambert Creek by flow regime.

Table 15: Percent Reductions for the Bacteria (*E. coli*) TMDL for Lambert Creek (07010206-801)

Flow Regime TMDL analysis *E. coli* (billions of bacteria/day)	High Flow	Wet	Mid-Range	Dry	Low Flow
Duration Interval	0 - 10 %	10 - 40 %	40 - 60 %	60 - 90 %	90 - 100 %
Estimated Current Load	**54.35**	**14.26**	**4.91**	**2.46**	**0.00**
Total Wasteload Allocation (WLA)	15.38	4.78	2.25	0.79	0.00
Load Allocation (LA)	3.56	1.11	0.52	0.18	0.00
Margin Of Safety (MOS) (10%)	2.10	0.65	0.31	0.11	0.00
TMDL	**21.04**	**6.54**	**3.08**	**1.08**	**0.00**
Reduction Needed (%)	61%	54%	37%	56%	--

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

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 Vadnais Lake Area TMDLs can be attributed to different nonpoint sources.

Vadnais Lake Area nutrient TMDLs:
MPCA divided the LA for the Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, and Wilkinson Lake nutrient TMDLs between a variety of nonpoint sources. These nonpoint sources included; internal loading (ex. lake sediments, curly-leaf pondweed), atmospheric deposition, groundwater inputs, failing SSTS, non-regulated stormwater runoff, wetland and forest sources, and wildlife. MPCA calculated and assigned loads to some of these nonpoint sources (Tables 9 to 13 of this Decision Document). Additionally, MPCA estimated nonpoint source loading reductions necessary for the water body to meet the NCHF WQS (Tables 9 to 13 of this Decision Document). The reductions from nonpoint sources ranged from 71% to 100%.

MPCA recommended that stakeholders prioritize their efforts for decreasing nonpoint phosphorus inputs to the Vadnais Lake Area nutrient TMDLs. MPCA explained that its strategy for assigning nonpoint source reductions to each individual lake was based on targeting external (or direct) watershed nonpoint sources first. After fully investigating the nonpoint source load which could reasonably be expected to be reduced from external watershed sources, MPCA then focused its reduction efforts on internal load to each of the individual lakes. MPCA believes that external watershed loads should be addressed prior to internal loads because loading from external watershed sources oftentimes contributes to phosphorus available in the lake bottom sediments. Without mitigating one of the main sources to internal load MPCA explained stakeholders may be presented with the ongoing challenge of managing internal load.

East Goose Lake, West Goose Lake and Gilfillan Lake have considerable internal loading. MPCA expects that boating activities on West Goose Lake may likely limit the impact of any internal load management activities. MPCA recognizes that its load reductions goals for internal load are aggressive

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

but these goals are based on the on the best available information for the Vadnais Lake Area TMDLs and the reduction targets are within the range of reductions required for other lakes in Minnesota. Once implementation actions are conducted to address both internal loads (e.g. alum treatment) and watershed loads (e.g. stormwater treatment) and additional water quality monitoring is completed to assess the progress, MPCA and local partners plan to revisit the reduction goals of the Vadnais Lake Area nutrient TMDLs. Through this adaptive management approach, MPCA and local partners will be able to decide whether further implementation actions are needed or if MPCA should consider a site-specific water quality standard.

EPA finds MPCA's approach for calculating the LA for Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, and Wilkinson Lake to be reasonable.

Vadnais Lake Area bacteria TMDL (Lambert Creek):
The calculated LA values for the bacteria TMDL are applicable across all flow conditions in the Lambert Creek subwatershed (Table 14 of this Decision Document). MPCA identified several nonpoint sources which contribute bacteria loads to the surface waters in Lambert Creek and the Vadnais Lake watershed. Load allocations were recognized as originating from many diverse nonpoint sources including; non-regulated urban stormwater runoff, failing SSTS, 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 one LA value.

EPA finds the MPCA's approach for calculating the LA for the Lambert Creek bacteria TMDL 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:

Vadnais Lake Area nutrient TMDLs:

MPCA assigned portions of the WLA to a NPDES permitted facility (M-Foods Dairy LLC) and to regulated MS4 permittees (Tables 9 to 13 in the Decision Document). WLAs were assigned based on the necessary TP load reductions required for each lake to meet the its nutrient water quality targets and ultimately attain water quality standards.

MPCA explained that the M-Foods Dairy LLC facility (MNG255067) discharges untreated cooling water to the West Goose Lake subwatershed. The M-Foods Dairy LLC facility was assigned a portion of the WLA based on concentration values of phosphorus measured in the aquifer from which the cooling water is withdrawn. Minnesota's Noncontact Cooling Water General National Pollutant Discharge Elimination System (NPDES) Permit (MNG255) does not currently contain a phosphorus limit. However, the current permit has expired and the new draft permit includes a proposed phosphorus limit for M-Foods Dairy LLC which is consistent with the TMDL WLA (Table 11 of this Decision Document).

For the loads apportioned to MS4 Phase II MS4 permittees, MPCA employed the P8 Urban Catchment Model to estimate the WLAs for individual MS4 municipalities (Table 5 and Tables 9 to 13 of this Decision Document). The P8 model input was generated from 2005 land use data (i.e., areal coverage and impervious cover) and hydrologic soil grouping information. MS4 allocations were estimated based on each MS4 permittee's jurisdictional area within the Vadnais Lake Area watershed.

Table 16: Nutrient WLA by MS4 (as annual loads (lbs/year))

NPDES Permittee	Gem Lake	East Goose Lake	West Goose Lake	Lake Gilfillan	Lake Wilkinson	NPDES Permittee Totals
	Total Phosphorus (lbs / year)					
M-Foods Dairy LLC	--	--	24.7	--	--	24.7
Anoka County MS4 [1,2]	--	--	--	--	0.1	0.1
Gem Lake City MS4 [1,2]	23.9	2.2	2.8	--	--	28.9
Lino Lakes City MS4 [1,2]	--	--	--	--	1.2	1.2
MN-DOT	5.2	7.9	3.6	--	47.2	63.9
North Oaks City MS4 [1,2]	--	--	--	14.7	26.4	41.1
Ramsey County MS4 [1,2]	9.0	3.9	1.6	0.5	1.8	16.8
Vadnais Heights City MS4 [1,2]	--	--	--	0.1	--	0.1
White Bear Lake City MS4 [1,2]	8.9	64.7	7.3	--	35.1	116
White Bear Township MS4 [1,2]	--	--	--	1.7	67.6	69.3
TMDL Totals	47.0	78.7	40.0	17.0	179.4	

1 = An construction stormwater load was included in the annual (lbs/season) and daily (lbs/day) loading values assigned to municipal MS4 permittees. Adherence to the construction stormwater loads derived in this TMDL are the responsibility of the individual municipal MS4 permittee.

2 = An industrial stormwater load was included in the annual (lbs/season) and daily (lbs/day) loading values assigned to municipal MS4 permittees. Adherence to the industrial stormwater loads derived in this TMDL are the responsibility of the State of Minnesota.

Attaining the construction stormwater and industrial stormwater loads described in the Vadnais Lake Area nutrient TMDLs is the responsibility of construction and industrial site managers. Local municipal MS4 permittees are responsible for overseeing construction stormwater loads which impact water quality in Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, and Wilkinson Lake. MS4 communities within the watershed are required to have a construction stormwater ordnance at least as stringent as the State's NPDES/SDS General Stormwater Permit for Construction Activity (MNR100001). In the final TMDL document MPCA explained that if a construction site owner/operator obtains coverage under the NPDES/SDS General Stormwater Permit (MNR100001) and properly selects, installs and maintains all BMPs required under MNR1000001 and applicable local construction stormwater ordinances, including those related to impaired waters discharges and any applicable additional requirements found in Appendix A of the Construction General Permit, the stormwater discharges would be expected to be consistent with the WLA in this TMDL. BMPs and other

stormwater control measures which act to limit the discharge of the pollutant of concern (phosphorus) are defined in MNR100001.

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

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

There are no CSOs nor CAFOs within the Vadnais Lake watershed. These potential point sources did not receive an apportionment of the WLA (WLA = 0). 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 Vadnais Lake Area nutrient TMDLs.

EPA finds MPCA's approach for calculating the WLA for Vadnais Lake Area nutrient TMDLs to be reasonable.

Vadnais Lake Area bacteria TMDL (Lambert Creek):

MPCA assigned individual WLAs to six regulated MS4 permittees (Table 14 of this Decision Document). These individual WLAs were calculated based on existing bacteria data and P8 modeling efforts. The P8 model input was generated from 2005 land use data (i.e., areal coverage and impervious cover) and hydrologic soil grouping information. MS4 allocations were estimated based on each MS4 permittee's jurisdictional area within the Vadnais Lake Area watershed.

There are no CSOs within the Vadnais Lake watershed, therefore, CSOs were assigned a WLA of zero (WLA = 0) for the Lambert Creek bacteria TMDL. MPCA determined that there were no CAFO facilities within the Vadnais Lake watershed. 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 Lambert Creek bacteria TMDL.

EPA finds the MPCA's approach for calculating the WLA for the Lambert Creek bacteria TMDL to be reasonable.

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:
Section 6 of the final TMDL submittal outlines the Margin of Safety (MOS) used in the Vadnais Lake Area TMDLs. The MOS accounts for uncertainties in both characterizing current conditions and the relationship between the load, wasteload, monitored flows and in-stream water quality. The purpose of the MOS is to account for uncertainty so the TMDL allocations result in attainment of water quality standards.

Vadnais Lake Area nutrient TMDLs:
MPCA used an explicit MOS (set at 5% of the loading capacity) and implicit/conservative assumptions to account for MOS. MPCA believed that incorporating both an explicit and implicit MOS will ultimately offset the environmental variability in phosphorus loading to the lakes addressed by the Vadnais Lake Area nutrient TMDLs.

MPCA used a robust data set to develop the TMDLs for the Vadnais Lake Area nutrient TMDLs. Several years of in-lake water quality data, watershed runoff data and bathymetry data were available for TMDL development calculations. This information also assisted the calibration and validation of the BATHTUB modeling efforts and gave greater validity to the efforts of the MPCA to adequately represent the average conditions in the Vadnais Lake watershed. The BATHTUB modeling practices and the size of the water quality and watershed runoff data set encouraged MPCA to set the explicit MOS at 5%. Additionally, the calibration and validation processes of the BATHTUB model also functioned to reduce error from assumptions made in the modeling process.

MPCA incorporated additional implicit/conservative assumptions in its development of the nutrient TMDLs. The assumptions involved MPCA's knowledge of shallow lake behaviors versus deep lake behaviors. Shallow lakes tend to have higher sedimentation rates than deeper lakes and the water clarity of shallow lakes tend to exist in either a turbid water state or a clear water state. MPCA explained that lake response models assume that even when TP concentrations in lakes are attaining or lower than concentrations of the WQS, the model will still assume the lake's water quality is in the turbid state.

As nutrient loads are reduced and other internal load management activities such as fish community management occur to provide a more balanced lake system, shallow lakes will tend to "flip" to a clear water condition. In that balanced, clear water condition, light penetration allows rooted aquatic vegetation to grow and stabilize the sediments, and zooplankton to thrive and graze on algae at a much higher rate than is experienced in turbid waters. Thus, in a clear water state more phosphorus will be removed from the water column through settling than the model would predict.

MPCA set the Vadnais Lake Area nutrient TMDLs to achieve WQS while in a turbid water state. To achieve the beneficial use, the lake must flip to a clear water state that can support the response variables at higher total phosphorus concentrations due to increased zooplankton grazing, reduced sediment re-suspension, etc. Therefore, this TMDL is inherently conservative by setting allocations for the turbid water state.

Vadnais Lake Area bacteria TMDL (Lambert Creek):

The Lambert Creek bacteria TMDL incorporated an explicit MOS of 10% of the total loading capacity. The MOS reserved 10% of the loading capacity and allocated the remaining loads to point (WLA) and nonpoint sources (LA) (Table 14 of this Decision Document). The use of the LDC approach minimized variability associated with the development of the Lambert Creek bacteria TMDL because the calculation of the loading capacity was a function of flow multiplied by the target value. The MOS was set at 10% to account for uncertainty due to field sampling error and assumptions made during the TMDL development process.

Challenges associated with quantifying MS4 stormwater *E. coli* loads include the dynamics and complexity of bacteria in urban streams. Factors such as die-off and re-growth contribute to general uncertainty that makes quantifying stormwater bacteria loads particularly difficult. The MOS for the Lambert Creek bacteria TMDL also incorporated certain conservative assumptions in the calculation of the TMDLs. No rate of decay, or die-off rate of pathogen species, was used in the TMDL calculations or in the creation of load duration curves for *E. coli*. Bacteria have a limited capability of surviving outside their hosts, and normally a rate of decay would be incorporated. MPCA determined that it was more conservative to use the WQS (126 cfu/100 mL) and not to apply a rate of decay, which could result in a discharge limit greater than the WQS.

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

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

7. Seasonal Variation

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

Comment:

Vadnais Lake Area nutrient TMDLs:

The Minnesota eutrophication standards state that total phosphorus WQS are defined as the mean concentration of phosphorus values measured during the growing season. The nutrient targets employed in the Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake and Wilkinson Lake nutrient TMDLs were based on the average nutrient values collected during the growing season (June 1 to September 30). The water quality targets were designed to meet the NCHF eutrophication WQS during the period of the year where the frequency and severity of algal growth is the greatest. The mid-late summer time period is typically when eutrophication standards are exceeded and water quality is deficient. By calibrating the TMDL development efforts to protect water bodies during the worst water quality conditions of the year, MPCA assumes that the loading capacities established by the TMDLs will be protective of water quality during the remainder of the calendar year (October through May).

MPCA explained that the critical condition for the five lakes of the Vadnais Lake Area TMDLs is typically the summer growing season. Minnesota lakes typically demonstrate impacts from excessive nutrients during the summer recreation season (June 1st through September 30th) including excessive algal blooms and fish kills. The daily load reduction targets in the Vadnais Lake Area TMDLs were calculated from the current phosphorus budget for each lake. The phosphorus budgets were based on the average of several years of monitoring data, including both wet and dry years. MPCA described that averaging over several modeled years addresses annual variability in lake loading.

Vadnais Lake Area bacteria TMDL (Lambert Creek):

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 flow measurements from a local flow gages. These flow measurements were collected over a variety of flow conditions observed during the recreation season. LDCs developed from these flow records represented a range of flow conditions within the Vadnais Lake watershed 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).

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 Vadnais Lake watershed nutrient and bacteria TMDLs outline reasonable assurance activities in Section 9.0 of the final TMDL document. There are several groups which will have a role in ensuring that nutrient and bacteria reductions within the Vadnais Lake watershed move forward in the coming years. The following groups are expected to work closely with one another to ensure that nutrient and bacteria reduction efforts are implemented within the watershed; the VLAWMO, Ramsey County, Anoka County, the Minnesota Department of Transportation (MN-DOT), and the MS4 communities in Tables 5 & 6 of this Decision Document.

MPCA and MS4 communities in the Vadnais Lake watershed:
MPCA is responsible for applying federal and state regulations to protect and enhance water quality within the Vadnais Lake watershed. MPCA oversees all regulated MS4 entities (ex. White Bear Lake City, MN-DOT, Ramsey County, etc.) in stormwater management accounting activities. The area of the Vadnais Lake watershed which is targeted by the Vadnais Lake Area TMDLs is composed of Phase II MS4 permittees. All regulated MS4 communities are required to satisfy the requirements of the MS4 general permit (MNR040000). The MS4 general permit requires the permittee to develop a SWPPP which addresses all permit requirements, including the following six minimum control measures:

- Public education and outreach;
- Public participation;
- Illicit Discharge Detection and Elimination (IDDE) Program;
- Construction-site runoff controls;
- Post-construction runoff controls; and

- Pollution prevention and municipal good housekeeping measures.

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

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

The Vadnais Lake Area TMDLs assign nutrient and bacteria pollutant loads to regulated MS4s (Tables 5 and 6 of this Decision Document). The MS4 Phase II General permit requires permittees to develop compliance schedules for any EPA approved TMDL WLAs not being achieved at the time of permit application. This includes BMPs that will be implemented over five-year permit term, timelines for their implementation, and a long term strategy for continued progress toward ultimately achieving those WLAs. For any WLA that is being met at the time of application, at least the same level of treatment must be maintained into the future. Per federal rule, all MS4 permittees, regardless of TMDL status, are required to reduce loading from their storm sewer system to Maximum Extent Practicable (MEP).

Reasonable assurance that the WLAs calculated for the Vadnais Lake Area TMDLs will be implemented is provided by regulatory actions. According to 40 CFR 122.44(d)(1)(vii)(B), NPDES permits must be consistent with assumptions and requirements of all WLAs in an approved TMDL. MPCA's stormwater program and its NPDES permit program are the state programs responsible for ensuring that implementation activities are initiated and maintained and are consistent with the WLAs calculated from the TMDLs.

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 Vadnais Lake Area TMDLs. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified within 18-months of the approval of the TMDL by the U.S. EPA. This applies to sites under 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).

Funding opportunities:

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

The CWLA was passed in Minnesota in 2006 for the purposes of protecting, restoring, and preserving Minnesota water. The CWLA provides the protocols and practices to be followed in order to develop TMDL implementation plans. TMDL implementation plans are expected to be developed within a year of TMDL approval and are required in order for local entities to apply for funding from the State. 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. The implementation plans are required to contain ranges of cost estimates for point and nonpoint source load reductions, as well as monitoring efforts to determine effectiveness. MPCA has developed guidance on what is required in the implementation plans (Implementation Plan Review Combined Checklist and Comment, MPCA), which includes cost estimates, general timelines for implementation, and interim milestones and measures. The Minnesota Board of Soil and Water Resources administers the Clean Water Fund as well, and has developed a detailed grants policy explaining what is required to be eligible to receive Clean Water Fund money (FY '11 Clean Water Fund Competitive Grants Policy; Minnesota Board of Soil and Water Resources, 2011).

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 Vadnais Lake watershed. Annual water quality monitoring is expected to continue via Citizens Lake Monitoring Program (CLMP) and efforts of the St. Paul Regional Water Service (SPRWS). The CLMP monitors lakes within the Vadnais

Lake watershed and the SPRWS measures surface waters which flow into Vadnais Lake and certain lakes within the watershed (i.e., Charley Lake, Pleasant Lake, Sucker Lake and Vadnais Lake). VLAWMO has monitored Lambert Creek and other lakes within the Vadnais Lake watershed. Data from these efforts will inform local watershed managers on the success of nutrient reduction efforts within the Vadnais Lake 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., CLMP monitoring efforts organized by the VLAWMO) as long as there is sufficient funding to support the efforts of these local entities.

Water quality monitoring is a critical component of the adaptive management strategy employed as part of the implementation efforts utilized in Vadnais Lake watershed. Water quality information will aid watershed managers in understanding how BMP phosphorus and bacteria removal efforts are impacting water quality within the Vadnais Lake watershed. 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 bacteria and nutrient loading into water bodies of the Vadnais Lake watershed. 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.

The EPA finds that this criterion has been adequately addressed.

10. Implementation

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

Comment:
Implementation strategies are outlined in Section 8.0 of the final TMDL document. MPCA presented a variety of possible implementation activities which could be undertaken within the Vadnais Lake watershed. MPCA presented a variety of possible implementation activities which could be undertaken within the watershed. Reduction goals for the nutrient and bacteria TMDLs will be met via components of the following strategies:

Vadnais Lake Area nutrient TMDLs:
Urban/Residential nutrient reduction strategies: Urban BMPs should focused on volume reduction, under the presumption that decreased stormwater flows will also result in reduced TP loads. Controlling runoff associated with development typically consists of end-of-pipe measures such as stormwater detention and retention, or on-site (decentralized) stormwater management, which increases infiltration and reduces runoff generation by decreasing imperviousness. Decentralized BMPs that promote

infiltration and filtration, also referred to as green infrastructure, include bioretention, bioswales, rain gardens, green roofs, infiltration basins and trenches, underground storage, permeable pavement, and stormwater wetlands. Reducing peak flow stormwater inputs within the Vadnais Lake watershed may be accomplished via reducing impervious cover or employing other low impact development/ green technologies which allow stormwater to infiltrate, evaporate or evapotranspire before reaching the stormwater conveyance system.

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

Septic Field Maintenance: Septic systems are believed to be a source of nutrients to waters in the Vadnais Lake watershed. Failing systems are expected to be identified and addressed via upgrades to 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 Vadnais Lake watershed.

Internal Loading Reduction Strategies: Internal nutrient loads may be addressed to meet the TMDL allocations outlined in the Vadnais Lake watershed 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 three water bodies addressed in this TMDL.

- *Alum Treatment:* The addition of aluminum sulfate to permanently bind phosphorus into the lake bottom sediments. This would decrease phosphorus releases from sediments into the lakes addressed via the Vadnais Lake Area nutrient TMDLs. Phosphorus releases are typically precipitated by anoxic conditions in the water column.
- *Redesigning boating traffic patterns:* To limit boat operation in shallow or vegetated areas which may resuspend phosphorus from lake bottom sediments.
- *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.

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 and streams within the Vadnais Lake watershed. The VLAWMO could mail annual newsletters to local property owners encouraging them to visit the VLAWMO website or to consult information within the newsletter which would outline nutrient reduction strategies.

Vadnais Lake Area bacteria TMDL (Lambert Creek):

Urban/residential stormwater reduction strategies: The land use in the Vadnais Lake watershed is largely composed of developed urban/suburban areas with varying levels of impervious cover (ex. roads, parking lots, sidewalks, roofs etc.) MPCA believes that reducing stormwater flows into surface waters of the Vadnais Lake watershed from impervious surfaces will greatly benefit the water quality within the watershed.

Bacteria are a unique pollutant since they are living organisms. There are many challenges for quantifying them and estimating loads and, likewise, there are challenges with respect to reducing excess loads. At this time with our current understanding the best approaches for addressing excess bacteria loads appear to fall into categories of source reduction or volume control practices. These practices include, but are not limited to:

- Pet waste management and disposal ordinances
    - Education
    - Disposal options
    - Enforcement
- Illicit discharge ordinances
    - Banning non-stormwater discharges from storm sewer systems
    - Enforcement
- Illicit discharge detection and elimination program enhancement
    - Incorporate into existing BMP inspection program
    - Municipal staff trained to recognize illicit discharges
    - Reporting system for staff and public

Stormwater volume control and infiltration BMPs: To mitigate the impact of stormwater in the Vadnais Lake watershed, the MPCA recommends the installation of stormwater BMPs, including some combination of; rain gardens, vegetated swales/bioswales/bioretention areas, detention ponds, rain barrels, pervious pavement and infiltration trenches. Reducing peak flow stormwater inputs within the Vadnais Lake watershed may be accomplished via reducing impervious cover or employing other low impact development/ green technologies which allow stormwater to infiltrate, evaporate or evapotranspire before reaching the stormwater conveyance system.

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 into surface waters of the Vadnais Lake watershed.

Public Education Efforts: Public programs will be developed to provide guidance to the general public on bacteria 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 surface waters of the Vadnais Lake watershed.

Septic System Improvements: Local septic management programs and educational opportunities can aid in the reduction 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 bacterial inputs to the Vadnais Lake watershed.

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 7.0 of the final TMDL document. Throughout the development of the Vadnais Lake Area TMDLs the public was given various opportunities to participate. MPCA worked with members of the Technical Advisory Committee, which is composed of local stakeholders, technical staff, city officials, members of county SWCDs, and members from local lake associations, to solicit their input for potential implementation strategies. Members of the Technical Advisory Committee are the main groups which will ultimately be responsible for the implementation efforts within the Vadnais Lake watershed. The meetings between MPCA and the Technical Advisory Committee were held in 2009 and 2012. These discussions allowed MPCA to share information about the TMDL development efforts, monitoring data, and to present the public notice draft of the Vadnais Lake Area bacteria and nutrient TMDLs.

In addition to the Technical Advisory Committee meetings, MPCA hosted public meetings in 2012 and 2013. Members of the general public and lake associations were invited to a series of stakeholder meetings to discuss the progress of the Vadnais Lake watershed TMDLs. The draft TMDL was posted online by MPCA at (http://www.pca.state.mn.us/water/tmdl). The 30-day public comment period was started on September 16, 2013 and ended on October 15, 2013. MPCA received four public comments during the public notice period. Comments were submitted by the Minnesota Department of Natural Resources (MN-DNR), the Minnesota Department of Transportation, the Midwest Ski Otter Club (MSOC) and the City of Lino Lakes (via WSB and Associates).

The MN-DNR had general comments on fish management strategies and prior efforts completed at certain lakes within the Vadnais Lake watershed. Some of these comments included MN-DNR alerting MPCA that there should be no carp in Gilfillan Lake, that MPCA should add greater detail regarding chemical treatments to Goose Lake to remove certain species of the fish community (bullheads), and

fish management recommendations for Wilkinson Lake. MPCA, for the most part, agreed with MN-DNR's comments and revised the public notice draft TMDL were appropriate.

The MN-DOT shared comments on septic systems within the Vadnais Lake watershed and the compliance of these nonpoint sources, WLA assigned to MN-DOT and the NPDES General Construction Stormwater Permit and Memorandum of Understanding (MOU) with MPCA. MPCA explained their rationale for assigning septic systems a portion of the LA for the Gem Lake TMDL and Gilfillan Lake TMDLs and described their methodology for calculating MS4 allocations assigned to individual MS4 entities. Lastly, MPCA encouraged MN-DOT to continue to work with MPCA's stormwater regulatory program to develop acceptable reporting methods under the NPDES General Construction Stormwater Permit.

The MSOC communicated 8 comments on the description and TMDL assigned to West Goose Lake. The MSOC uses West Goose Lake for water skiing activities. The comments from MSOC highlighted MSOC's efforts within the West Goose Lake watershed, the history of the formation of West Goose Lake, water quality in West Goose Lake, internal loading in West Goose Lake, macrophyte (curly-leaf pondweed) loading in West Goose Lake, and the positive effects of boating on lakes in Minnesota. MPCA answered all of MSOC's comments, made updates to language within the public notice draft TMDL, where appropriate, and encouraged MSOC to continue to be involved in the stewardship of West Goose Lake.

The City of Lino Lakes submitted comments via WSB and Associates. These comments concerned MPCA's calculations of MS4 allocation to the City of Lino Lakes, future development for the City of Lino Lakes and the accounting of BMPs in the calculation of WLAs assigned to for stormwater runoff. MPCA answered these concerns and explained their modeling efforts and discussed their methodology for calculating MS4 allocations assigned to individual municipalities.

EPA concludes that MPCA has adequately addressed the comments submitted during the public notice period. MPCA included the public comment letters and its responses within the final TMDL submittal packet received by the EPA on February 26, 2014.

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 waterbody, and the pollutant(s) of concern.

Comment:

The EPA received the final Vadnais Lake Area TMDL document, submittal letter and accompanying documentation from MPCA on February 26, 2014. The transmittal letter explicitly stated that the final Vadnais Lake Area TMDLs were being submitted to EPA pursuant to Section 303(d) of the Clean Water Act for EPA review and approval. Those TMDLs were;

- Gem Lake (DNR ID 62-0037-00) for nutrients,
- East Goose Lake (DNR ID 62-0034-00) for nutrients,
- West Goose Lake (DNR ID 62-0126-00W) for nutrients,
- Gilfillan Lake (DNR ID 62-0027-00) for nutrients,
- Wilkinson Lake (DNR ID 62-0043-00) TMDLs for nutrients, and
- Lambert Creek (07010206-801) TMDL for bacteria (*E. coli*).

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 by MPCA for Gem Lake, East Goose Lake, West Goose Lake, Gilfillan Lake, Wilkinson Lake and Lambert Creek satisfies the requirements of this twelfth element.

13. Conclusion

After a full and complete review, the EPA finds that the final Vadnais Lake Area nutrient and bacteria TMDLs satisfy all of the elements of an approvable TMDL. This approval is for six TMDLs, addressing six different water bodies for aquatic recreational use impairments.

- Gem Lake (DNR ID 62-0037-00) for nutrients,
- East Goose Lake (DNR ID 62-0034-00) for nutrients,
- West Goose Lake (DNR ID 62-0126-00W) for nutrients,
- Gilfillan Lake (DNR ID 62-0027-00) for nutrients,
- Wilkinson Lake (DNR ID 62-0043-00) TMDLs for nutrients, and
- Lambert Creek (07010206-801) TMDL for bacteria (*E. coli*).

The EPA's approval of this TMDL extends to the water bodies 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.