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

APR 08 2009

REPLY TO THE ATTENTION OF:

WW-16J

Paul Eger, Commissioner
Minnesota Pollution Control Agency
520 Lafayette Road North,
St. Paul, Minnesota 55155-4194

Dear Mr. Eger:

The U. S. Environmental Protection Agency has reviewed the final Total Maximum Daily Loads (TMDLs) from the Minnesota Pollution Control Agency for the Long and Farquar Lakes Watershed in Minnesota. The TMDL is for Total Phosphorus, and addresses the recreational use and aquatic life impairment in this waterbody.

Based on this review, EPA has determined that Minnesota's TMDL for Total Phosphorus meets the requirements of Section 303(d) of the Clean Water Act and EPA's implementing regulations at 40 C.F.R. Part 130. Therefore, EPA hereby approves two TMDLs for two impairments in the Long and Farquar Watershed in Minnesota. The statutory and regulatory requirements, and EPA's review of Minnesota's compliance with each requirement, are described in the enclosed decision document.

We wish to acknowledge Minnesota's effort in submitting this TMDL and look forward to future TMDL submissions by the State of Minnesota. If you have any questions, please contact Kevin Pierard, Chief of the Watersheds and Wetlands Branch, at 312-886-4448.

Sincerely,

Tinka G. Hyde
Director, Water Division

Enclosures

cc: Barb Peichel, MPCA
Dave L. Johnson, MPCA

wq-iw9-06g

TMDL: **Long and Farquar Lakes Total Phosphorus TMDL, MN**
Effective Date: **2009**

Decision Document for Approval of
Long and Farquar Lakes Total Phosphorus TMDL, MN Report

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

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

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

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

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

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

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

Comment:

Location/Description/Spatial Extent:

Long and Farquar Lakes, Hydrologic Unit Code: 07040001 (MnDNR Lake ID #s 19-0022-00 and 19-0023-00, respectively), are 34 acres and 67 acres in area, respectively, located in the City of Apple Valley, Minnesota. The location of the Lakes is shown in Figure 2.1 of the Long and Farquar Lakes Total Phosphorus TMDL Report. Long and Farquar Lakes and their surrounding drainage areas are located within the Vermillion River Watershed, and largely within the jurisdictional boundaries of the City of Apple Valley, with a small amount of the watershed extending into Dakota County's Lebanon Hills Regional Park and the City of Rosemount. Long and Farquar Lakes and their contributing watersheds are both located within the Western Corn Belt Plains (WCBP) ecoregion.

Land Use:

Section 2 of the Long and Farquar Lakes Total Phosphorus (TP) TMDL Report stated that the watershed surrounding Long and Farquar Lakes were predominately forest and wetland until the late 1800s. During the late 1800s and early 1900s the area surrounding the lake was converted from forest to agricultural use. Conversion to agricultural use included construction of numerous drainage channels to drain fields and wetlands, which likely increased the drainage area and hydrologic and nutrient flux to the lake. As the population grew from 585 people in 1960 to 45,527 in 2000, agricultural and forested land in the northeast area of the City was converted into residential suburban neighborhoods, the contributing watershed to Farquar Lake grew from an estimated pre-urban development area of 353 acres to a fully developed urban watershed area of about 2,100 acres.

Problem Identification:

In Section 1.2 of the Long and Farquar Lakes TP TMDL Report, MPCA stated that the Long and Farquar Lakes were placed on Minnesota's 2002 Section 303(d) list due to the impairment of recreational and aquatic life uses as indicated by elevated levels of mean summer phosphorus values that exceeded the standard for Class 2B recreational waters.

Pollutant of Concern:

Total Phosphorus (TP)

Source Identification:

MPCA conducted watershed and lake response modeling as well as analysis of the in-lake water quality data. The results indicated that stormwater runoff and internal loading were the primary sources of nutrients to both Long and Farquar Lakes. The MPCA believes that the majority of external loading to the lakes is from urban runoff. Analysis of lake water quality data as well as modeling for both lakes also showed that there is a large internal phosphorus load from a combination of curly-leaf pondweed senescence, sediment release of phosphorus due to high pH and/or low dissolved oxygen, and rough fish activity. MPCA believes that atmospheric deposition of phosphorus contributes a small portion of the phosphorus load entering the lakes. More details can be found in Section 4.1 and 4.2 of the Long and Farquar Lakes TP TMDL Report.

Priority Ranking:

The MPCA's projected schedule for TMDL completions, as indicated on Minnesota's 303(d) impaired waters list, implicitly reflects Minnesota's priority ranking of these TMDLs. This project was scheduled to be completed in 2011. Ranking criteria for scheduling TMDL projects include, but are not limited to: impairment impacts on public health and aquatic life; public value of the impaired water resource; likelihood of completing the TMDL in an expedient manner, including a strong base of existing data and restorability of the waterbody; technical capability and willingness of local stakeholders to assist with the TMDL; and appropriate sequencing of TMDLs within a watershed or basin.

Future Growth:

As stated in Section 6.2 of the Long and Farquar Lakes TP TMDL Report, the Apple Valley Surface Water Management Plan includes a nondegradation policy for future land development. The policy requires that any proposed development within the watershed that creates over 0.2 acres of new impervious surface achieve no-net-increase in average annual runoff volume as well as total phosphorus and total suspended solids loading compared to the condition of the site that existed immediately prior to the proposed alteration. Apple Valley has been designated as an MS4 community, and nutrient loading from future developments is included in the Waste Load Allocation of this TMDL and will be addressed in the Apple Valley Storm Water Pollution Prevention Program.

EPA finds that the TMDL document submitted by MPCA satisfies all requirements of this first element.

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

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the water body, the applicable numeric or narrative water quality criterion, and the antidegradation policy. (40 C.F.R. §130.7(c)(1)).

EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

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

Comment:

Designated Use of Waterbody:

As stated in Section 3.1. of the Long and Farquar Lakes TP TMDL Report, Minnesota Rules, Chapter 7050, identifies designated uses for both Long and Farquar Lakes as aquatic life and recreation. Long and Farquar Lakes are primarily used by shoreline residents for fishing and aesthetic viewing of wildlife. Farquar Lake is also used for limited boating and swimming.

Water Quality Standard TP:

In Section 3.1 of the Long and Farquar Lakes TP TMDL Report, MPCA stated that both Long and Farquar Lakes are designated as Class 2B waters of the state. Both lakes and their watersheds are located in the Western Corn Belt Plains (WCBP) ecoregion, and both lakes are considered shallow lakes as well. The MPCA defines a shallow lake as an enclosed basin with a maximum depth of 15 feet or less or with 80 percent or more of the lake area shallow enough to support emergent and submerged rooted aquatic plants (littoral zone). MPCA recently revised some of the water quality standards presented in Minn. R. Chap. 7050 to include numeric targets for shallow lakes. The numeric phosphorus, chlorophyll-a, and water clarity standards for Class 2B shallow lakes in the WCBP ecoregion are ≤ 90 µg/l, ≤ 30 µg/l, and ≥ 0.7 meters, respectively.

Target:

The target for total Phosphorus as stated above and in Section 3.1 of the Long and Farquar Lakes TP TMDL Report is ≤ 90 µg/l, the TP standard for Class 2B shallow lakes in the WCBP ecoregion.

EPA finds that the TMDL document submitted by MPCA satisfies all requirements of this second element.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

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

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

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

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

Comment:

Loading Capacity:

In Section 5.2 and 5.3 of the Long and Farquar Lakes TP TMDL Report, MPCA stated that a P8 urban watershed model was developed for the Long and Farquar Lakes watersheds based on readily available data for sub-watershed areas, land use, and stormwater treatment ponds within the watersheds in order to calculate the loading capacities for Long and Farquar Lakes. P8 is a model for predicting the generation and transport of stormwater runoff pollutants in urban watersheds. Continuous water-balance and mass-balance calculations are performed on a user-defined system. Simulations are driven by continuous hourly rainfall and daily air temperature time series. Predicted water quality components include suspended solids, total phosphorus, total Kjeldahl nitrogen, copper, lead, zinc, and total hydrocarbons.

Primary applications include site BMP design to achieve total suspended solids removal efficiencies (70% or 85%) and simulated BMP types include detention ponds (wet, dry, extended), infiltration basins, swales, and buffer strips. The model is used to examine the water quality implications of alternative treatment objectives.

BATHTUB applies a series of empirical eutrophication models to morphologically complex lakes and reservoirs. The program performs steady-state water and nutrient balance calculations in a spatially segmented hydraulic network which accounts for advective and diffusive transport, and nutrient sedimentation. Eutrophication-related water quality conditions (total phosphorus, total nitrogen, chlorophyll-a, transparency, and hypolimnetic oxygen depletion) are predicted using empirical relationships derived from assessments of reservoir data. The Canfield –Bachmann lake-response model which is module within the BATHTUB Model was used to estimate internal loading and phosphorus concentrations in the lakes. The results of the modeling effort are presented in Tables 6.1 and 6.2 of the Long and Farquar Lakes TP TMDL Report and also in Tables 1 and 2 of this document.

Table 1 (6.1) Summary of assigned source TP WLA and LA for Long Lake

Sources	Existing Load		Allocations		Load Reduction
	Lbs/yr	Lbs/day	Lbs/yr	Lbs/day	Lbs/yr
City of Apple Valley (WLA)	299	0.82	48	0.13	251
Dakota County (WLA)	12	0.03	12	0.03	0
Internal Loading (LA)	188	0.52	54	0.15	134
Direct Atmospheric Loading (LA)	9	0.02	9	0.02	0
MOS=Implicit					
Total	508	1.39	123	0.33	385

Table 2 (6.2) Summary of assigned source TP WLA and LA for Farquar Lake

Sources	Existing load		Allocations		Reduction
	Lbs/yr	Lbs/day	Lbs/yr	Lbs/day	Lbs/yr
City of Apple Valley(WLA)	232	0.64	63	0.17	169
City of Rosemount (WLA)	2	0.005	2	0.005	0
Dakota County (WLA)	31	0.08	31	0.08	0
Internal Loading (LA)	510	1.40	150	0.41	360
Direct atmospheric load (LA)	17	0.05	17	0.05	0
MOS =Implicit					
Total	792	2.18	263	0.72	529

Method for cause-and-effect relationship:

The watershed modeling and lake response modeling as well as analysis of the in-lake water quality data indicated that stormwater runoff and internal loading were the primary sources of nutrients to both Long and Farquar Lakes. The models also showed that the majority of external loading to the lakes can be attributed to urban runoff. Analysis of lake water quality data as well as modeling for both lakes also showed that there is a large internal phosphorus load from a combination of curly-leaf pondweed senescence, sediment release of phosphorus due to high pH and/or low dissolved oxygen, and rough fish activity. The urban watershed model P-8 was used by MPCA to estimate the

load contribution of the major sub-watersheds draining to Long Lake based on land use characteristics, local climate, soils information, and any ponding Best Management Practices (BMPs) in the watersheds. The watershed model was calibrated to growing season mean phosphorus concentration data monitored for Ponds EVR-P12 and EVR-P170. Figure 2.4 and Figure 2.5 of the Long and Farquar Lakes TP TMDL Report shows individual sub-watersheds delineated by major discharge inlets to the lakes and are labeled in accordance with the satellite ponds discharging directly to the lakes. Pumping records for the Farquar Lake lift station, which serves as the outlet for the project watershed, was used to calibrate the hydrology in the P8 model.

As discussed in Section 4.2.2 of the Long and Farquar Lakes TP TMDL Report, Long and Farquar Lakes have been exposed to nutrient loading that is greater than the assimilative capacities of the lakes. The excess phosphorus has settled to the bottom sediments. The excess phosphorus is released into the water column when conditions are favorable for nutrient release. This occurs when sediment is resuspended by wind mixing and rough fish activity as well as when DO (dissolved oxygen) levels near the sediment water interface drop below 2 mg/L. Phosphorus is also released when the heavy growths of curly-leaf pondweed, characteristic of each lake, die back in early to mid summer. All of these mechanisms for internal loading of phosphorus occur in Long and Farquar Lakes and lead to conditions that promote algae growth, especially in mid to late summer. Using a "weight of evidence approach," a number of techniques were considered by MPCA to determine to what level internal loading is affecting Long and Farquar Lakes. Nürnberg's Anoxic Factor approach, as well as a reverse Canfield-Bachmann lake response model was used.

Direct measurement of the internal loading through a mass balance approach was used for dry periods. The mass balance method was suitable in estimating internal loading rates during curly leaf pondweed senescence and nutrient release. The Nürnberg method provided a reasonable range of seasonal internal phosphorus release rates based on the amount of time and area of anoxic sediment. The results of the analysis estimated internal load between 104 - 269 lbs/year for Long Lake and 204 - 531 lbs/year for Farquar Lake.

The mass balance method was also used by MPCA to determine the phosphorus accumulation in the lakes during dry periods, when no runoff was occurring in the watershed. During the 2003 summer season, only about 13.5 inches of rain fell allowing for the dry season analysis for Long Lake. Analysis was completed based on TP samples collected on a bi-weekly basis, during no runoff conditions. A total of three bi-weekly periods from 2002 and 2003 were analyzed for Long Lake and five periods from 2003 - 2005 were analyzed for Farquar Lake. The increase in TP concentrations in each lake was converted to a mass over the period and accumulation of TP was converted to an average summertime loading rate. Figure 4.3 of the Long and Farquar Lakes TP TMDL Report shows examples of periods when TP concentrations increased and no runoff occurred. The average calculated estimate for internal loading was 256 lbs/year for Long Lake and 604 lbs/year for Farquar Lake.

Using the Canfield-Bachmann lake response model, the seasonal average phosphorus concentration and the modeled external loads were used to estimate the internal component of the load based on the total load required to achieve the seasonal monitored concentrations. From this analysis, for 2005, the internal loading to Long Lake was 188 lbs/year and the internal load to Farquar was 510

lbs/year. Each of these methods provided an approximation of internal loading within Long and Farquar Lakes. MPCA believes that the method presented by Nürnberg is well established and provides a range of reasonable values. The mass balance approach also provides a fair estimate for internal loading by direct measurement, but due to the small sample size it does not necessarily represent the average loading rate for the years sampled. The Canfield-Bachmann model used to back calculate internal loading, knowing the in-lake concentration and calibrated model watershed loading and atmospheric loading, provided a reasonable estimate for internal loading that was similar to the mass balance loads and fell within the range provided by Nürnberg. Therefore this approach was used for calculating internal loads for the dry, average and wet scenarios.

MPCA stated that the transfer of nutrients between Long and Farquar Lakes is essentially one directional. Due to the size of the watersheds and the volume and area of the lakes and due to the elevation difference of the lakes, the flow of water and nutrients is virtually always from Long to Farquar under average annual precipitation conditions. No backflow occurs from Farquar Lake to Long Lake unless runoff from precipitation events exceeding a 10-year recurrence interval occurs. Therefore, the phosphorus load from the Long Lake watershed to Farquar Lake can be estimated as the seasonal in-lake phosphorus concentration multiplied by the discharge to Farquar. On average this load is bout 186 lbs/year.

The deposition of phosphorus from the atmosphere over the surface of the lakes is accounted for in the modeling but it is small in comparison to calculated external loads and internal phosphorus recycling. An estimate based on average depositional rates in the area was used for both Long and Farquar Lakes. The rate is estimated to be 0.27 lbs/acre/year; this corresponds to the average value suggested in the BATHTUB model, yielding an average annual mass load of 9 lbs/year for Long Lake and 17 lbs/year for Farquar Lake. MPCA stated in section 4.2.5 of the Long and Farquar Lakes TP TMDL Report, that there are no known contributions from dwellings and /or individual on-site wastewater disposal facilities.

Critical Condition:

TMDL Summary Table identified the summer growing season as the critical condition for the Long and Farquar Lakes TMDLs. MPCA believes that the lake water quality is worst and most sensitive to loads during summer, therefore developed loads based the summer growing season. Therefore, MPCA believes that the Long and Farquar Lakes TMDLs will be protective during all seasons.

EPA finds that the TMDL document submitted by MPCA satisfies all requirements of this third element.

4. Load Allocations (LAs)

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity attributed to existing and future non-point 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 non-point sources.

Comments:

In Section 6.1.2 of the Long and Farquar Lakes TP TMDL Report, MPCA discussed the Load Allocations (LA). Internal loading of phosphorus, resulting from aquatic plant senescence and entrainment of phosphorus-rich benthic sediment and pore water by periodic mixing events and rough fish disturbance, has been designated as a Load Allocation. The loading of phosphorus from atmospheric deposition onto the lake is also included as a Load Allocation.

Farquar Lake's internal loading of phosphorus is predicted by MPCA to decrease by 321 lbs/year as external load is reduced and in-lake plant and fish management activities are conducted. Table 6.1 and Table 6.2 of the Long and Farquar Lakes TP TMDL Report and in Table 1 and Table 2 of this document summarize the Load Allocations for Long and Farquar Lakes, respectively, as they refer to both internal loading and direct atmospheric loading.

EPA finds that the TMDL document submitted by MPCA satisfies all requirements of this fourth element.

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.

Comments:

As discussed in the Sections 6.11 of the Long and Farquar Lakes TP TMDL Report and above, the City of Apple Valley, City of Rosemount, and Dakota County have been designated as Mandatory

Small Municipal Separate Storm Sewer Systems (MS4s) by the MPCA. As a result, the allowable discharge associated with these MS4s has been designated as Waste Load Allocation (WLA). Table 6.1 and Table 6.2 of the Long and Farquar Lakes TP TMDL Report and Table 1 and Table 2 above summarize the Waste Load Allocations for Long and Farquar Lakes, respectively, as they refer to the appropriate MS4s.

Mn/DOT currently does not have right of way in the watershed for these lakes. If they do build a road in the future in the watershed, they will work with one of the existing MS4s to purchase the land for the road and then the WLA will be adjusted as needed. This would result in no change in the overall WLA for the lakes.

There are no current or planned industrial discharges in the watershed. Therefore industrial stormwater activities are not given a categorical or individual WLA.

EPA finds that the TMDL document submitted by MPCA satisfies all requirements of this fifth element.

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.

Comments:

As discussed in Section 6.1 of the Long and Farquar Lakes TP TMDL Report, a margin of safety has been provided in part by not including in the waste load allocation estimated reductions of 0.12 lbs/ac/yr in the direct drainage of Farquar Lake (direct drainage means that part of the drainage discharging to the lake without first traveling through a pond or other structural BMP). This reduction is attributed to:

* Enhanced street sweeping by the City of Apple Valley

* A cooperative education/information effort focused on keeping vegetative and other debris off paved surfaces, compliance with the state law to use no-phosphorus fertilizer on lawns, and disconnection of downspouts from connected impervious areas

* Installation of rainwater gardens and other bioretention features as opportunities arise

This amounts to a load reduction of 9 lbs/year of phosphorus to Farquar Lake.
In addition, a margin of safety is implicit in each TMDL due to the conservative assumptions of the

modeling and proposing an adaptive management approach based on monitoring results. These were used to account for an inherently imperfect understanding of this highly dynamic shallow lake system and to ultimately ensure that the nutrient reduction strategy is protective of the water quality standard.

* Impacts of biology not modeled: MPCA noted that invasive plants and rough fish populations have a significant impact on the two main stormwater ponds that drain into Long Lake (Section 5.3 of the Long and Farquar Lakes TP TMDL Report). Therefore, the P8 model overestimates the phosphorus reductions needed to achieve water quality standards. MPCA will be implementing activities designed to reduce the impacts of the invasive plants and rough fish population (Section 8.1 of the Long and Farquar Lakes TP TMDL Report).

* Utilizing data from three years to account for inter-annual variability.

EPA finds that the TMDL document submitted by MPCA satisfies all requirements of this sixth element.

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)).

Comments:

In Section 6.1.4 of the Long and Farquar Lakes TP TMDL Report, MPCA stated that the nutrient loads and in-lake phosphorus concentrations for Long and Farquar Lakes are affected by annual precipitation patterns. MPCA estimated TP loadings to Long and Farquar Lakes during dry (2003), normal (2005), and wet (2002) years. The annual precipitation for the dry, normal, and wet years was, 19.5 inches, 33.1 inches, and 41.1 inches, respectively. The Canfield-Bachmann lake response models along with modeled watershed loads from P8 were used to determine the total loads and the external and internal components of the loads for each scenario for both lakes. Figure 6.1 of the Long and Farquar Lakes TP TMDL Report shows the seasonal variations for TP loads to Long and Farquar Lakes with the standard load required to meet the phosphorus target. The reductions needed achieve the targets are 86% during dry year, 76% for normal year and 74% for wet year in Long Lake, and for Farquar Lake the reductions of 61% for dry year, 67% for normal year and 64% for a wet year is needed to reach the targets.

EPA finds that the TMDL document submitted by MPCA satisfies all requirements of this seventh element.

8. Reasonable Assurances

When a TMDL is developed for waters impaired by point sources only, the issuance of a

National Pollutant Discharge Elimination System (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.

Comments:

In Section 8.2 of the Long and Farquar Lakes TP TMDL Report, MPCA stated that to maximize effectiveness, an adaptive management strategy will guide the development of the Implementation Plan. The Implementation Plan will identify specific BMPs that will reduce nutrient loading to the lakes. Because lakes are dynamic systems, MPCA anticipates a mid-course correction may be necessary to adapt to interim conditions. In addition, as research and technology continue to advance, and as knowledge of and experience with new BMPs increases, actions and management plans may need to be changed to incorporate these advances. The lakes are located in the City of Apple Valley and in the Vermillion River watershed. MPCA identified three primary mechanisms that will assure improvements: the Vermillion River Watershed Joint Powers Organization (VRWJPO) and its Management Plan (2005); the City of Apple Valley and its Local Water Management Plan; and the City of Apple Valley and its NPDES Phase II Stormwater Permit. Existing and future regulation, programs and capital projects will be utilized to attenuate the Long and Farquar Lakes are described in detail Section 8.2.1., 8.2.2. and 8.2.3 of the Long and Farquar Lakes TP TMDL Report.

EPA finds that the TMDL document submitted by MPCA adequately addresses this eighth element.

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.

Comments:

In Section 8.3 of the Long and Farquar Lakes TP TMDL Report, MPCA addressed the monitoring efforts. The City of Apple Valley NPDES Phase II MS4 Annual Report will be the mechanism by which the City of Apple Valley will evaluate and report on progress toward implementing the BMPs detailed in the TMDL Implementation Plan. For those actions identified in this Plan for implementation by other parties, the City of Apple Valley will request an annual progress report from that party for incorporation into the Annual Report. For this TMDL, the only parties other than the City of Apple Valley that have implementation responsibilities are the respective Lake Associations, who will take the lead in specified public education and outreach activities with residents in the direct drainage of each Lake. The City of Apple Valley will work with the Associations to help assure they can carry out their responsibilities. Adaptive Management requires ongoing monitoring to evaluate the effectiveness and impact of BMPs on water quality. Current plans are to continue the existing water quality monitoring program by Lake Association members for both Lakes through the Metropolitan Council's CAMP (Citizen Assisted Lake Monitoring Program) effort. This includes bi-weekly collection of surface water temperature and water clarity data as well as collection of discrete surface water sample collection between April 15 and October 15. Water samples will be analyzed for total phosphorus and chlorophyll-a. Supplemental monitoring will also be conducted by the City of Apple Valley monthly between May 1 and September 30 on both lakes as well as on Ponds EVR-P12 and EVR-P170. This will include temperature and dissolved oxygen profiles as well as pH and conductivity for each water body. Water samples will also be collected on EVR-P12 and -P170 and analyzed for total phosphorus, total nitrogen, and chlorophyll-a. MPCA stated that monitoring of aquatic plant and fish community species composition and abundance in both Lakes as well as in Ponds EVR-P12 and EVR-P170 will be conducted by the City of Apple Valley for each year of the initial 5-year project implementation period, with a more intensive effort undertaken during the first three years. Inflow quantity and quality monitoring will also be carried out during and after implementation of this TMDL to quantify actual external load reductions. The City of Apple Valley will reconvene the Technical Advisory Committee (TAC) near the beginning of the fourth year of initial 5-year implementation period to review the monitoring data and evaluate project progress as well as determine if the Implementation Plan should be amended. The City of Apple Valley will act as the lead agency in this effort. If the Implementation Plan should be amended, those changes will be reflected in the next five-year NPDES Phase II General Permit covering the period 2012 to 2017. The City of Apple Valley will work with the TAC and the MPCA to amend the Implementation Plan, obtain agency and stakeholder review and input on those amendments, and achieve final agency review and approval.

EPA finds that the TMDL document submitted by MPCA adequately addresses this ninth element.

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.

Comments:

MPCA addressed the management strategies for phosphorus in Section 8.1 of the Long and Farquar Lakes TP TMDL Report. The TMDL Implementation Plan will focus on reducing the movement of phosphorus from the watershed area into both Long and Farquar Lakes as well as working within the lakes themselves to reduce internal phosphorus recycling, decrease algal production as defined by chlorophyll-a, and improve water clarity to meet the WCBP ecoregion shallow lake criteria adopted by MPCA. There will be an emphasis on assessing the impacts of the management actions to a reasonable extent and applying lessons learned to guide future actions as progress is made toward the goals. After the first 5-year phase of nutrient reduction efforts, a re-evaluation will occur based on the monitored response of the system to those changes, and activities will be identified that need to be modified, removed, or added to reach the standards.

Potential actions to achieve the phosphorus load reductions required to achieve in-lake standards include the following:

1. Modification of an existing stormwater basin in the Long Lake watershed to enhance phosphorus removal efficiencies. This action would be conducted within the first two years of the project implementation time period and is estimated to cost $100,000 - $150,000.

2. Retro-fitting of infiltration practices to treat runoff from impervious cover at high priority locations in the watershed. This action would be taken within the first five years of the project implementation time period and is estimated to cost $50,000 - $150,000.

3. Reducing average annual phosphorus outflow loads from key satellite ponds to Long and Farquar Lakes through a combination of actions emphasizing pre-treatment of stormwater entering the ponds, physical modifications to the ponds themselves, and management of biology in the ponds to try to achieve a clear water, native-plant dominated system. These improvements are anticipated to take place within the first three to five years of the project implementation time period and are estimated to cost $500,000 -$1,000,000.

4. Enhanced street sweeping and public education, emphasizing areas in the direct drainage of each lake as well as key satellite ponds. These actions would be undertaken throughout the project implementation time period and are estimated to cost up to $10,000 per year.

5. Reduction of internal loading sources in both Long Lake and Farquar Lake by supplementing

reductions in phosphorus loadings to both lakes from the watershed with measures such as water level drawdown to control undesirable invasive aquatic plant and roughfish/stunted panfish populations, and, if needed, chemical inactivation of phosphorus in the lake sediments with iron and aluminum compounds. These elements are anticipated to take place in the first five years of the project implementation time period and are estimated to cost up to $285,000.

EPA is not required to and does not approve TMDL implementation plans. EPA finds that the TMDL document submitted by MPCA adequately addresses this tenth element.

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.

Comments:

In Section 7.1 of the Long and Farquar Lakes TP TMDL Report, MPCA detailed the public participation efforts. The determination of a target goal, the waste load, load allocations, and the implementation plan for achieving those goals were completed with the help of a large group of stakeholders representing a range of interests and responsibilities in managing and/or using the lake and its watershed. Between June 2006 and June 2007, five meetings were held. The first and fifth meetings were held with the stakeholder group comprised of members of all of the groups listed in Section 7.1 of the Long and Farquar Lakes TP TMDL Report. The draft TMDL document and a supporting implementation plan were presented to the entire stakeholders group to receive final comments and for endorsement. The draft document was presented for review by the stakeholders group two weeks prior to the meeting. The Long and Farquar Lakes TP TMDL Report was public noticed, from November 24, 2008 through December 24, 2008 and MPCA responded to all comments received during the Public Notice process. The copies of all comments and responses were submitted with the Long and Farquar Lakes TP TMDL Report.

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

12. Submittal Letter

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

Comment:

The transmittal letter was dated February 9, 2009, from Paul Eger, Commissioner, MPCA, to Tinka Hyde, Water Division Director, U.S.EPA Region 5. The letter stated clearly that the Long and Farquar Lakes Watershed TP TMDL submittal is for final approval under Section 303(d) of the CWA. The letter also contains the name of the watershed as it appears on the Minnesota's Section 303(d) list, and the pollutant of concern, and period that this TMDL was public noticed, from November 24, 2008 through December 24, 2008.

EPA finds that the TMDL documents submitted by MPCA satisfy all requirements of this twelfth element.

13. Conclusion

After a full and complete review, EPA finds that the TMDLs for the Long and Farquar Lakes Watershed satisfy all of the elements of an approvable TMDL. As indicated in Table 3 below, this approval document is for Long and Farquar Lakes, impaired by total phosphorus for a total of two TMDLs addressing two impairments. EPA's approval of this document does not extend to those waters that are within Indian Country, as defined in 18 U.S.C. Section 1151. EPA is taking no action to approve or disapprove TMDLs for those waters at this time. EPA or eligible Indian Tribes as appropriate will retain responsibilities under CWA Section 303(d) for those waters.

Table 3. TMDLs approved

Impaired Reach Name	Assessment Unit ID	Pollutant	Impairment addressed by TMDL
Long Lake	19-0022-00	Total Phosphorus	Excess Nutrients
Farquar Lake	19-0023-00	Total Phosphorus	Excess Nutrients