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

JUN 20 2012

REPLY TO THE ATTENTION OF: WW-16J

Rebecca J. Flood, Assistant Commissioner
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 551555-4194

Dear Ms. Flood:

The U. S. Environmental Protection Agency has reviewed the final Total Maximum Daily Loads (TMDLs) for Martin and Typo Lakes (IDs# 02-0034-00 and 30-0009-00), including supporting documentation and follow up information. Minnesota submitted TMDLs for total phosphorus address the excess nutrient loads that impair the Recreational Use Support in Martin Lake and Typo Lake, and the pH and turbidity that impair the Aquatic Life Use Support in the West Branch of the Sunrise River (ID# 07030005-563) in the Sunrise River Watershed. Based on this review, EPA has determined that Minnesota's TMDLs for total phosphorus meet 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 Minnesota's two TMDLs for these impaired lakes. 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 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: Jeff Risberg, MPCA
Dave L. Johnson, MPCA

wq-iw6-08g

TMDL: Martin and Typo Lakes, Minnesota
Date: JUN 20 2012

DECISION DOCUMENT
MARTIN AND TYPO LAKES PHOSPHORUS TMDLs

Section 303(d) of the Clean Water Act (CWA) and U.S. 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 U.S. EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and U.S. 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 U.S. 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 U.S. 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 non-point 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 non-point sources, the TMDL should include a description of the natural background. This information is necessary for U.S. 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; chlorophyl *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

Comments:

Martin and Typo Lakes (Segment IDs# 02-0034-00 and 30-0009-00) are located in the North Central Hardwood Forest Ecoregion. Martin Lake is a 238-acre shallow lake (maximum depth of 17 feet) with a watershed area of 22,888 acres in Anoka County, Minnesota (See Figure 1 and Figure 5 of final TMDL report). Typo Lake is a 280-acre shallow lake (maximum depth of 6 feet) with a watershed area of 11,000 acres in Isanti and Anoka Counties, Minnesota (See Figure 1 and Figure 12 of final TMDL report). Both lakes are connected by the West Branch of the Sunrise River (aka Typo Creek; Segment ID# 07030005-563). Martin and Typo Lakes were identified on Minnesota's 2010 303(d) list as impaired for nutrient/eutrophication biological indicators, which is the impairment contributing to the nonattainment of the aquatic recreational use. The West Branch of the Sunrise River was identified on Minnesota's 2010 303(d) list as impaired for pH, turbidity and fish biota, which are the impairments contributing to the nonattainment of the aquatic life use. The submitted phosphorus TMDLs are addressing the nutrient/eutrophication impairments in Martin and Typo Lakes (See Table 3 in conclusion section of this decision document). The submitted phosphorus TMDL for Typo Lake is also addressing the pH and turbidity impairments affecting the West Branch of the Sunrise River (aka Typo Creek; Segment ID# 07030005-563), which are considered symptoms of the nutrient/eutrophication impairment in Typo Lake.

The land use in Martin Lake's watershed is primarily deciduous forest (29.6%), cultivated crops (25%), and emergent herbaceous wetlands (16.8%) (See Table 4 and Figure 6 of final TMDL report). Most of the wetlands occur adjacent to streams and ditches that drain to the lake. Developed land is only 5.1% of land use. Residential development is concentrated around the lake, especially the west side of the lake. Moderate additional residential development is expected to occur in the near future. Approximately 1,052 acres (9%) of the watershed are publicly owned.

The land use in Typo Lake's watershed is primarily cultivated agriculture (38%), deciduous forest (22.7%), and emergent herbaceous wetlands (13%) (See Table 7 and Figure 13 of final TMDL report). The agricultural land is in closest proximity to waterways in the Data Creek watershed. Developed land is only 3.8% of land use. Future residential development in the watershed is expected to be moderate.

Point sources contributing to the excess nutrient/eutrophication impairments in Martin and Typo Lakes include the John Iacarella – Linwood Terrace Co. Wastewater Treatment Plant (WWTP) (Permit# MN0054372), the City of East Bethel Municipal Separate Storm Sewer System (MS4) (Permit# MNR04000), and stormwater from industrial (Permit# MNR50000) and construction activities (Permit# MNR100001) (Table 24 of the final TMDL report).

Nonpoint sources contributing to the nutrient/eutrophication impairments in Martin and Typo Lakes include agricultural runoff (feedlots), non-regulated stormwater runoff, atmospheric deposition, subsurface sewage treatment systems (SSTS), groundwater, and the internal nutrient recycling from the lake bottom sediments.

Internal loading in lakes refers to the phosphorus load that is released from the sediments into the water column. Low oxygen conditions at the sediment-water interface (hypolimnion) causes sediments to release phosphorus, which accumulates in the deep lake waters. Phosphorus released from the sediments is mixed throughout the water column as stratification changes throughout the growing season. Wind mixing, high pH due to high productivity, and temperature changes are the

primary mechanisms that alter stratification[1] patterns within Typo Lake. Dense fish populations, particularly carp, can disturb the lake bottom sediments during feeding. This can lead to increased phosphorus availability from sediments and eutrophication. Internal loading builds nutrients and algae to very high levels, and reduces water clarity.

Typo Creek flows approximately 1.5 miles from Typo Lake to Martin Lake, with minimal new water entering the creek throughout this length. The water quality problems for this stream reach, which include high pH and turbidity, are considered to be a symptom of the nutrient/eutrophication impairment in Typo Lake.

Typo Lake is considered the source of pH impairments for Typo Creek. pH in Typo Creek water is most elevated when it leaves Typo Lake, but decreases further downstream (Table 10 of the final TMDL report). While natural waters can exhibit pH values outside the 6.5 to 8.5 range, the high pH documented within Typo Creek appears to be the direct result of eutrophication (high algal production) in Typo Lake. In the inorganic carbon chemical processes in fresh water systems, atmospheric carbon dioxide dissolves in water and is in equilibrium with the hydrated dissolved carbon product carbonic acid. During rapid photosynthesis, which can result from abundant algal production, the dissolved carbon dioxide concentration is rapidly reduced, which in turn reduces the carbonic acid concentration and raises the pH. According to the Minnesota Pollution Control Agency (MPCA), high pH in highly eutrophic lakes has been commonly observed in Minnesota. MPCA believes that a separate TMDL analysis for the pH listing for Typo Creek (Typo Lake Outlet) is not necessary because the pH impairments in Typo Creek are being addressed via the Typo Lake excess nutrient TMDL analysis.

Typo Lake is also considered the source of turbidity for Typo Creek. The creek's turbidity is highest near the outlet of Typo Lake, and decreases as the water flows further downstream from the lake (Table 11 of the final TMDL report). The average turbidity near the Martin Lake inlet is less than half of the turbidity at the Typo Lake outlet. According to MPCA, this upstream-to-downstream turbidity decline is likely due to some settling in the slow-moving stream. This upstream-to-downstream turbidity decline also provides assurances that other sources of suspended solids between the two lakes are not contributing to the stream's impairment. Additionally, analysis of total suspended solids (TSS)[2] and volatile suspended solids (VSS)[3] sample measurements taken in Typo Creek indicate than more than half of Typo Creek's turbidity is due to algal production in Typo Lake (Figure 17 of the final TMDL report). MPCA believes that a separate TMDL analysis for the turbidity listing for Typo Creek (Typo Lake Outlet) is not necessary because the turbidity impairments in Typo Creek are being addressed via the Typo Lake excess nutrient TMDL analysis.

Minnesota's 2010 303(d) list includes a projected schedule for TMDL completions. This schedule reflects the state's priority ranking of impaired waters. The TMDL schedule for Martin and Typo Lakes for nutrient/ eutrophication have a priority ranking within the top 0.2% of Minnesota's listed waters. The TMDL schedule for West Branch of the Sunrise River has a priority ranking within the top 3% of Minnesota's listed waters.

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1 Lake stratification refers to the separation of lakes into three layers due to a change in the water's density caused by the temperature changes at different depths in the lake. These three layers include the Epilimnion (top of the lake), the Metalimnion or thermocline (middle layer that may change depth throughout the day), and the Hypolimnion (the bottom layer).

2 TSS is a measure of organic and inorganic solids suspended in the water column.

3 VSS is primarily the organic portion of the TSS, such as algae and detritus, and is often expressed as a percentage of TSS.

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning 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 waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy. (40 C.F.R. §130.7(c)(1)).
U.S. 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.

Comments:

Martin and Typo Lakes are located in the North Central Hardwood Forest Ecoregion, and are designated as Class 2B waters under Minnesota Rule 7050.0430. Class 2 waters, 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.

Martin and Typo Lakes are shallow lakes as defined by MPCA. According to Minnesota Rules 7050.0222 Subp 4, the numeric eutrophication water quality standards (WQS) for Class 2B waters applicable to shallow (i.e., ≤15 feet maximum depth or ≥80% littoral area) lakes and reservoirs in the North Central Hardwood Forest Ecoregion include the following:

- Total Phosphorus: ≤60 µg/L
- Chlorophyll-a: ≤20 µg/L
- Secchi disk transparency: ≥1.0 m

Lakes and reservoirs are to meet the total phosphorus (TP), the chlorophyll-a, and the Secchi disk transparency targets in order to achieve the WQS. The eutrophication standards are compared to data averaged over the summer season (June through September).

In developing the lake eutrophication standards (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 chlorophyll-a and Secchi disk. Based on these relationships MPCA believes that by meeting the TP target of 60 µg/L for Martin and Typo Lakes the chlorophyll-a and Secchi standards (20 µg/L and 1.0 m, respectively) will likewise be met. Therefore,

in order to maintain the water quality conditions that warrant full support of the designated uses in Martin and Typo Lakes, the submitted TMDLs adopted the TP criteria of 60 µg/L average concentration over the summer season (June through September) as the primary TMDL target. EPA concurs with the State's approach to determining the TP targets for which the Martin and Typo Lakes TMDLs have been established.

Because the submitted TP TMDL for Typo Lake is also addressing the pH and turbidity impairments affecting the West Branch of the Sunrise River (Typo Creek), which are considered symptoms of the nutrient/eutrophication impairments in Typo Lake, threshold values for pH and turbidity were also used as TMDL targets.

The potential hydrogen (pH) is a measure of acidity or basicity. A pH of 7.0 is neutral, while lesser values indicate acidity and greater values are alkaline. The pH WQS are provided in Minn. Rules Ch. 7050.0222 for Class 2B and 2C waters. Minnesota's pH standard is a minimum pH value of 6.5 and a maximum pH value of 8.5. pH values that are either too high or too low can be harmful to aquatic organisms. Thus, the designated use that this standard protects is aquatic life.

Turbidity measures solids suspended or algae in the water. Surrogate measurements are TSS and transparency. Turbidity WQS are provided in Minn. Rules Ch. 7050.0222 for Class 2B and 2C waters. The Minnesota turbidity standard is 25 NTU (nephelometric turbidity units). High turbidity affects aesthetics, recreational suitability, and can harm aquatic life by making it more difficult to find food, affecting gill function, and covering spawning beds.

As discussed in Section 1 of this decision document, MPCA believes the pH and turbidity impairments in Typo Creek are due to discharge loads from Typo Lake, and that separate TMDL calculations for pH and turbidity were not necessary. Based upon the data analysis, MPCA concluded that reductions in Typo Lake will result in Typo Creek meeting its WQS. EPA concurs with the State's approach to determining the pH and turbidity targets for Typo Creek, which are to be addressed by the Typo Lake TMDL.

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

3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a waterbody for the applicable pollutant. U.S. 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. U.S. 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 non-point source loadings under such *critical conditions*. In particular, the TMDL should discuss the approach used to compute and allocate non-point source loadings, e.g., meteorological conditions and land use distribution.

Comments:

MPCA determined that the total loading capacities, i.e., total maximum daily loads, of Total Phosphorus (TP) for the Martin Lake and Typo Lake (Segment IDs# 02-0034-00 and 30-0009-00) were 12 lbs/day and 4.5 lbs/day respectively (Section 3.5 and Section 3.6 of the final TMDL report).

Modeling (Section 3 and Appendix B of the final TMDL report)

MPCA used land use export coefficients to estimate existing watershed phosphorus loading to the lakes based on land cover data. Phosphorus loading from the export coefficient calculations was combined with phosphorus loading from all other estimated external sources to the lakes: atmospheric deposition, subsurface sewage treatment systems, and upstream lake loading. A phosphorus budget was prepared based on these estimates. Ultimately, external phosphorus loading served as input to the BATHTUB model, a lake response model that implicitly takes internal loading into account. Since BATHTUB allows choice among several different mass balance phosphorus models, the Canfield-Bachmann lake model was selected. For other parameters, MPCA used the default model selections (chlorophyll-*a* model based on phosphorus, light, and flushing; transparency model based on chlorophyll-*a* and turbidity). The BATHTUB models were calibrated to existing in-lake water quality data (multi-year growing season means from available data from the 10-year period from 1998 to 2007) and were then used to identify the phosphorus load reductions needed to meet state in-lake WQS.

The BATHTUB model is a steady-state annual or seasonal model that predicts a lake's summer (June through September) mean surface water quality. BATHTUB has built-in statistical calculations that account for data variability and provide a means for estimating confidence in model predictions. The heart of BATHTUB is a mass-balance phosphorus model that accounts for water and phosphorus inputs from tributaries, watershed runoff, the atmosphere, sources internal to the lake, and groundwater; and outputs through the lake outlet, groundwater, water loss via evaporation, and phosphorus sedimentation and retention in the lake sediments.

Separate models were developed for each of the impaired lakes, and the direct drainage area for each lake (i.e., segment) and loading from upstream water bodies were lumped as a single tributary input. Only Martin Lake has loading from upstream lakes (Typo Lake and Island Lake). Inputs required to run the BATHTUB model included lake geometry, climate data, water quality and flow data for runoff contributing to the lake. Since the BATHTUB model is based on empirical data, an average rate of internal loading is implicit. The model provides an option to include an additional load identified as an internal load if circumstances warrant. Modeling adjustments to internal loading were conducted only for Typo Lake, where the uncalibrated model underestimated the in-lake phosphorus concentration.

The Martin and Typo Lakes TMDLs were first determined in terms of annual loads. In-lake water quality models predicted annual averages of water quality parameters based on annual loads. The annual loads were then converted to daily loads by dividing the annual loads by 365.

EPA has reviewed the information provided by MPCA and agrees that the BATHTUB model used for the TMDL calculations has been appropriately calibrated and validated, and reasonably represents watershed processes. Model selection and development are consistent with EPA guidance[4], and the State has submitted sufficient documentation in the final TMDL Report to demonstrate that the model is capable of being a reasonable predictor of conditions in the watershed.

Martin Lake TMDL

The total modeled phosphorus load to Martin Lake is 7,213 lbs/year or 19 lbs/day (Table 18 of the final TMDL report). According to BATHTUB model estimates, Martin Lake receives 7,149 lbs/year or 99% of the phosphorus from watershed sources (Table 19 of the final TMDL report). The largest source of external phosphorus is from discharge from Typo Lake (4,787 lbs/year or 67% of the load). Watershed runoff from Martin Lake's direct watershed area contributes 1,790 lbs/year or 25% of the phosphorus to the lake. Watershed runoff from Island Lake watershed contributes 408 lbs/year or 5.7% of phosphorus to the lake. SSTS contributes 164 lbs/year or 2.3% of the phosphorus to the lake. Atmospheric loading contributes 64 lbs/year or 0.89% of the phosphorus to the lake.

Internal loading is inherent in the Canfield-Bachmann model that is used in BATHTUB, and cannot be explicitly estimated. The BATHTUB model employs empirical equations derived from actual lakes and reservoirs, including a certain average level of internal loading, which is implicit in the results. The in-lake modeling of Martin Lake did not identify an unknown load to be attributed to internal loading. This does not suggest that internal load is non-existent, but rather that the amount of internal loading falls within the range of internal loads in the lakes used to develop the algorithms in the BATHTUB model. Therefore, while internal loading to Martin Lake was not explicitly called out as a source, it is something that MPCA will consider in the implementation of this TMDL.

MPCA found the overall phosphorus loading capacity (TMDL) for Martin Lake to be 4,240 lbs/year or 12 lbs/day (Table 23 of final TMDL report). To meet the TMDL, the total load to the lake needs to be reduced by 41%, or 2,973 lbs/year (8.1 lbs/day). A large part of this reduction will need to come from the Typo Lake Watershed. Any reductions done to improve Typo Lake will have a direct impact on Martin Lake.

Typo Lake TMDL

The total modeled phosphorus load to Typo Lake is 8,668 lbs/year or 23.7 lbs/day (Table 20 of the final TMDL report). According to BATHTUB model estimates, Typo Lake receives 7,588 lbs/year or 87.5% of the phosphorus from watershed sources (Table 21 of the final TMDL report). The largest source of external phosphorus is from the direct watershed runoff which contributes 7,550 lbs/year of phosphorus loading to the lake. SSTS contributes 38 lbs/year of phosphorus loading to the lake. Internal loading accounts for an additional 1,002 lbs/year or 10% of phosphorus loading to the lake. This internal loading estimate is in addition to the internal loading inherent in the Canfield-Bachmann model of BATHTUB, which cannot be explicitly estimated. Therefore, the actual internal load

[4] Protocol for Developing Nutrient TMDLs, 1999; and Compendium of Tools for Watershed Assessment and TMDL Development, 1997

represents more than 10% of the total load to the lake. Atmospheric deposition contributes 78 lbs/year or 1.0% of phosphorus loading to the lake.

MPCA found the overall phosphorus loading capacity (TMDL) calculated for Typo Lake to be 1,627 lbs/year, or 4.5 lbs/day (Table 26 of final TMDL report). To meet the TMDL, the total load to the lake needs to be reduced by 81% or 7,041 lbs/year (19.3 lbs/day).

Critical Conditions

The critical conditions for the phosphorus impairments in Martin and Typo Lakes correspond to the summer growing season (June through September), when the symptoms of nutrient enrichment normally are the most severe. Surface runoff contains nutrients which are transported into the lake during summer rain events. Nutrients can also be internally loaded to the lake, resulting from aquatic plant senescence or direct sediment release from hypolimnetic water during summer mixing events. The TMDLs take into account the critical conditions because they are based on growing season averages.

Based on our review, EPA concurs with the State's modeling approach and assumptions made in determining the total phosphorus TMDL allocations (WLAs and LAs) for the Martin and Typo Lakes TMDLs. The final TMDL Report and supporting data support the approach and are consistent with EPA guidance.

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

4. Load Allocations (LAs)

U.S. 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:

MPCA determined that the total load allocations (LAs) of total phosphorus for the Martin and Typo Lakes were 10 lbs/day and 4.0 lbs/day respectively (Section 3.5 and Section 3.6 of the final TMDL report). The Martin and Typo Lakes LAs correspond to phosphorus load reductions of 48% and 81% (3,380 lbs/year and 6,129 lbs/year respectively) from the estimated existing phosphorus loads by nonpoint sources (7,102 lbs/year and 7,588 lbs/year respectively). The existing nonpoint sources contributing to the LA include agricultural runoff (cropland and livestock), non-regulated stormwater runoff, atmospheric deposition, subsurface sewage treatment systems (SSTS), groundwater, and the internal nutrient recycling from the lake bottom sediments. A breakout of the load allocation sources for Martin and Typo Lakes are included in Table 1 below, and Table 25 and Table 28 of the final TMDL report.

Table 1

Martin Lake				
Nonpoint Source	**Existing TP Load** (lbs/year)	**LA** (lbs/year)	**LA** (lbs/day)	**% Reduction**
Direct Watershed	1,790	1,790	4.9	0%
Island Lake Watershed (non-regulated)	361	361	0.99	0%
Typo Lake Watershed	4,787	1,507	4.13	69%
SSTS	164	0	0	100%
Atmospheric	64	64	0.18	0%
Total	7,102	3,722	10	48%
Typo Lake				
Nonpoint Source	**Existing TP Load** (lbs/year)	**LA** (lbs/year)	**LA** (lbs/day)	**% Reduction**
Direct Watershed	7,550	1,078	2.95	86%
SSTS	38	0	0	100%
Internal	1,002	303	0.83	70%
Atmospheric	78	78	0.21	0%
Total	7,588	1,459	4.0	81%

TP = Total Phosphorus

Direct Watershed Runoff Loading

Direct watershed runoff was estimated using export coefficients based on land cover categories (Table 16 of the final TMDL report). This methodology was applied to the direct watersheds of the impaired lakes (excluding areas discharging to upstream lakes). Martin Lake's direct watershed excludes Island and Typo Lakes and their drainage areas. Typo Lake's direct watershed includes its total drainage area.

Loading from Upstream Waters

Loading from lakes and streams upstream of Martin Lake (Table 17 of the final TMDL report) were also evaluated to determine if there were sufficient data to estimate a TP load from that resource. Annual average phosphorus loads were calculated for the Island Lake and Typo Lake Watersheds, which were determined from in-lake phosphorus concentration data and average annual runoff volumes during the 10-year time period used for long-term average in-lake modeling (1998-2007). Growing season data used for Island Lake were from the years 2003 through 2007; data from Typo Lake were from 1998-2007 excluding 2002, 2004, and 2006. The average annual runoff was derived using the MN Hydrology Guide.

Unregulated Stormwater

Stormwater runoff regulated by an MS4 permit was modeled together with the unregulated stormwater runoff (non-point source runoff), since all stormwater runoff was modeled based on land use and export coefficients. For the purpose of setting WLAs and LAs, regulated stormwater runoff was considered separately from unregulated runoff. Land uses used to approximate areas not regulated under the MS4 permit included rural and low density residential. All residential densities at or lower than 1 unit per 2.5 acres were considered low density and not regulated under the MS4 permit.

Loading from Atmospheric deposition

Atmospheric deposition represents the phosphorus that is bound to particulates in the atmosphere and is deposited directly onto surface waters as the particulates settle out of the atmosphere. Average phosphorus atmospheric deposition loading rates estimated for the St. Croix River Basin were 0.27 lb/ac of TP per year. This rate was applied to each lake's surface area to determine the total pounds per year of atmospheric phosphorus deposition to each of the TMDL lakes.

Loading from Subsurface Sewage Treatment Systems (SSTS)

Phosphorus loads attributed to SSTS adjacent to each of the lakes were calculated using data provided by Washington County and the MPCA (page 46 of TMDL final report). SSTS total loading was based upon the number of houses within 300 ft of the lake, whether the SSTS system is conforming or failing[5], the number of people using the system[6], and an average value for phosphorus production per person per year[7].

Internal loading

Internal loading was estimated through the in-lake (BATHTUB) modeling process. BATHTUB does not account explicitly for internal load. It employs empirical equations derived from actual lakes and reservoirs, including a certain average level of internal loading, which is implicit in the results. BATHTUB provides the option to include an additional internal load if circumstances warrant. In the case of Typo Lake, the uncalibrated model under-predicted the long-term average in-lake phosphorus concentration. This was assumed to be an internal loading contribution greater than the average level of the lakes and reservoirs used to develop the Canfield-Bachmann model. The model was calibrated by including an additional internal load to the model so that predicted in-lake phosphorus concentration matched the observed phosphorus. The model was then calibrated to chlorophyll-*a* and Secchi transparency by modifying calibration coefficients so that the predicted values matched the observed values. Matches were made to the nearest whole number for phosphorus and chlorophyll-*a* concentrations (µg/L), and to the nearest tenth of a meter for Secchi transparencies.

Based on our review, EPA considers that the State's modeling approach and assumptions made in determining the LAs for the Martin and Typo Lakes TMDLs, as described in the final TMDL Report, are consistent with EPA guidance.

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

5. Wasteload Allocations (WLAs)

U.S. 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.

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[5] Conforming versus failing systems were calculated based on an estimate that 11.4% of SSTS are failing within the St. Croix River Basin.

[6] The Isanti and Anoka County capita per residence values are derived from the 2000 Census.

[7] Values for phosphorus production per capita per year and the percentage of phosphorus passing through the SSTS for both conforming and non-conforming systems were derived by MPCA (page 46 of final TMDL report).

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. U.S. 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:

MPCA determined that the total waste load allocations (WLAs) of total phosphorus for Martin and Typo Lakes were 0.26 lbs/day and 0.013 lbs/day respectively (Section 3.5 and Section 3.6 of the final TMDL report). The existing point sources contributing to the WLAs include the John Iacarella – Linwood Terrace Co. Wastewater Treatment Plant (WWTP) (Permit# MN0054372), the City of East Bethel Municipal Separate Storm Sewer System (MS4) (Permit# MNR04000), stormwater from industrial activity (General Permit# MNR50000), and stormwater from construction activity (General Permit# MNR100001). A breakout of the individual wasteload allocation permitted sources for Martin and Typo Lakes are included in Table 2 below, and Table 24 and Table 27 of the final TMDL report.

Table 2

Martin Lake			
Point Source	**Permit No.**	**LA (lbs/year)**	**LA (lbs/day)**
Construction Stormwater	MNR100001	20	0.055
Industrial Stormwater	MNR50000	20	0.055
MS4 Stormwater, East Bethel	MNR04000	7.0	0.019
John Iacarella - Linwood Terrace Mobile Home Park WWTF	MN0054372	47	0.13
Total		94	0.26
Typo Lake			
Point Source	**Permit No.**	**WLA (lbs/year)**	**WLA (lbs/day)**
Construction Stormwater	MNR100001	2.3	0.0064
Industrial Stormwater	MNR50000	2.3	0.0064
Total		4.6	0.013

TP = Total Phosphorus

Municipal and Industrial Wastewater Treatment Systems

The Linwood Terrace Mobile Home Park WWTF (Permit# MN0054372) discharges within the Martin Lake watershed; discharge is to an isolated wetland (Figure 19 of the final TMDL report). The WWTF is a small activated sludge facility with extended aeration, which also includes a manual bar-screen, chlorination and dechlorination for disinfection, a secondary clarifier, sludge storage, and chemical

phosphorus removal. The WWTF is designed to treat 0.0167 mgd or 16,700 gallons per day – Average Wet Weather design. The influent flow consists of primarily domestic waste from a manufactured homes development. The Linwood Terrace Mobile Home Park WWTF has a permitted daily phosphorus discharge limit of 0.06 kg/day (48 lbs/year, or 0.13 lbs/day), which was used to establish the WLA. Water quality monitoring data from Island Lake, which were used to estimate phosphorus loading from Island Lake to Martin Lake, accounted for any overflows from the isolated wetland.

Regulated Stormwater Runoff - MS4

Stormwater runoff regulated by an MS4 permit was modeled together with the unregulated stormwater runoff (non-point source runoff), since all stormwater runoff was modeled based on land use and export coefficients. For the purpose of setting WLAs and LAs, regulated stormwater runoff was considered separately from unregulated runoff.

There is one regulated MS4 (City of East Bethel, Permit# MN400087) in the TMDL project area (Figure 20 of the final TMDL report). Within the City of East Bethel's community, 2020 land use data was used to approximate the areas that are (or will be) regulated by the MS4 permit. Only those land uses that are regulated under the MS4 permit were considered to be part of regulated stormwater runoff. Land uses used to approximate areas regulated under the MS4 permit included single family residential, multi-family residential, and Community Park and recreation. All residential densities higher than 1 unit per 2.5 acres were considered high density and regulated under the MS4 permit. Martin Lake is the only lake that contains areas within the city of East Bethel, and the Martin Lake watershed contains land uses that are or will be regulated by an MS4 permit. The WLA for the East Bethel MS4 stormwater is 0.019 lbs/day.

Construction Stormwater

The NPDES/SDS Construction Stormwater Permit administered by the MPCA requires that all construction activity disturbing areas equal or greater than one acre of land must obtain a permit and create a Stormwater Prevention Pollution Plan (SWPPP) that outlines how runoff pollution from the construction site will be minimized during and after construction. Construction stormwater permits cover construction sites throughout the duration of the construction activities, and the level of on-going construction activity varies.

The construction stormwater wasteload allocations were calculated based on the estimated annual area of Isanti and Anoka County under permitted construction activity using approximately 5 years (January 2005 to January 2010) of data. Project areas of permits were aggregated within the county and presented as an annual average percent of total county area that has been issued a construction stormwater permit. These percentages were then applied to each watershed, area-weighted based on the distribution of each county in each watershed. In the Martin and Typo watersheds, respectively, 0.52% and 0.16% were the estimates for the annual average percent area under a construction stormwater permit. These percentages were multiplied by the corresponding total TMDL (loading capacity) minus the MOS to determine the construction stormwater WLA (0.055 lbs/day for the Martin Lake and 0.0064 lbs/day for Typo Lake).

Industrial Stormwater

There are no regulated industrial stormwater sources located in either lake watershed. A small portion of the TMDL for each lake was set aside for future regulated industrial stormwater sources. The industrial stormwater WLA is equal to the amount allocated for regulated construction stormwater (0.52% and 0.16% of the total TMDL for the Martin and Typo watersheds, respectively, minus the

MOS). In other words, the industrial stormwater WLAs for the Martin and Typo watersheds are 0.055 lbs/day and 0.0064 lbs/day respectively.
The State's modeling approach and assumptions made in determining wasteload allocations as described in the TMDL Report are consistent with EPA guidance.

Based on our review, EPA considers that the State's modeling approach and assumptions made in determining the WLAs for the Martin and Typo Lakes TMDLs, as described in the final TMDL Report, are consistent with EPA guidance.

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning 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)). U.S. 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:

The Martin and Typo Lakes TMDL incorporated an explicit margin of safety (MOS) of 10% (1.2 lbs/day and 0.45 lbs/day respectively) in the allowable pollutant load calculation to account for the uncertainty in the estimated loads based upon the data available (Section 3.5 and Section 3.6 of the final TMDL report). The explicit MOS was considered to be appropriate to address the uncertainty in the TMDLs based upon the generally good agreement between the water quality models predicted and observed values that were demonstrated during the calibration and validation processes. In other words, the models reasonably reflected the conditions in the lakes watersheds based upon the data available.

U.S. EPA finds that the TMDL document submitted by MPCA contains an appropriate MOS satisfying all requirements concerning 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-lake water quality in Martin and Typo Lakes varies seasonally. In Minnesota lakes, the majority of the watershed phosphorus load often enters the lake during the spring. During the growing season

months (June through September) in deep lakes, phosphorus concentrations may not change drastically if major runoff events do not occur. However, chlorophyll-*a* concentrations may still increase throughout the growing season due to warmer temperatures fostering higher algal growth rates. In shallow lakes, the phosphorus concentration more frequently increases throughout the growing season due to the additional phosphorus load from internal sources. This can lead to even greater increases in chlorophyll-*a* since not only is there more phosphorus but temperatures are also higher. In Typo and Martin Lakes, the highest monthly chlorophyll-*a* means generally occur in either August or September.

The total phosphorus TMDLs for Martin and Typo Lakes accounted for seasonal variation by using the eutrophication standards, which are based on growing season averages, as the TMDL goals. The eutrophication standards were set with seasonal variability in mind. The load reductions are designed so that the lakes will meet the water quality standards over the course of the growing season (June through September).

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning 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 non-point sources, and the WLA is based on an assumption that non-point source load reductions will occur, U.S. EPA's 1991 TMDL Guidance states that the TMDL should provide reasonable assurances that non-point source control measures will achieve expected load reductions in order for the TMDL to be approvable. This information is necessary for U.S. EPA to determine that the TMDL, including the load and wasteload allocations, has been established at a level necessary to implement water quality standards.

U.S. EPA's August 1997 TMDL Guidance also directs Regions to work with States to achieve TMDL load allocations in waters impaired only by non-point sources. However, U.S. EPA cannot disapprove a TMDL for non-point 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:

Section 5 of the final TMDL report contains a list of several factors at the local, county, and state level that MPCA considers could serve as reasonable assurances that the Martin and Typo Lakes TMDLs will be successfully implemented. These factors include:

- The necessary leadership and support for future implementation efforts must come from local jurisdictions and citizens. Local water resource management groups are active and have collaborative relationships. These groups include the Sunrise River Watershed Management Organization, Typo Lake residents, Martin Lakers Association, and Anoka Conservation District. The Sunrise River Watershed Management Organization is a local special purpose unit of

government. Its board members live in the vicinity of these lakes. They have identified Martin and Typo Lakes as high priorities in their Watershed Management Plan. Typo Lake residents are not currently organized into a lake association, but as a result of this TMDL and TMDL public meetings they formed an informal network and discussed becoming more formally organized. The Martin Lakers Association is already active, has begun a water quality improvement fund, and is working toward accomplishing recommendations in these TMDLs. The Anoka Conservation District was the local lead for these TMDLs and has a continued commitment to improvement of these lakes.

- Local funding covered >60% of these TMDLs' development costs, so local groups have a vested interest in implementation.
- Feasibility of certain implementation strategies was considered during periods of delay in TMDL development (when MPCA was updating shallow lakes standards) and has resulted in improvements to these TMDLs. Local partners have begun investing in the smaller-scale implementation strategies that are within their financial means. For example, in 2008 the Sunrise River Watershed Management Organization funded commercial rough fish harvests. After approval of this TMDL and an implantation plan, lake managers will be able to apply for larger state-level grants to undertake larger lake improvement efforts.
- The Sunrise River Watershed Management Organization included implementation of these TMDLs as a focus area of their recent 10-year watershed management plan, which was completed in late 2009.
- The MN DNR actively manages both lakes' fisheries. Their past fisheries management efforts have included measures directed at water quality issues. They have indicated their efforts will continue.
- The MN DNR manages a wildlife area just west of Typo Lake where some nutrient reduction projects, especially lateral ditch blocks, could be implemented. The MN DNR has expressed support in pursuing projects that could improve both the lakes and wildlife habitat.
- Regulatory authority and technical assistance exist for addressing septic system problems. Anoka County enforces shoreland septic system ordinances and the University of Minnesota Extension is providing technical assistance. Greater effort from the townships could result in more effective utilization of these resources.
- Local units of government are aware that the Typo and Martin Lake watersheds are priority areas for strong enforcement of existing regulatory programs, which include stormwater, grading, or construction permit programs. These regulatory programs, as well as other voluntary Best Management Practices (BMPs) are important for assuring no additional degradation of these lakes. The importance of these efforts was discussed at an information meeting for local leaders on August 22, 2005.
- New development in the watershed may create opportunities for local government to correct past land use alterations that have been detrimental to water quality. A recent example is the "Boettcher Farm Preserve" residential development where past agricultural ditches were converted to a wetland mitigation bank.
- A Sunrise River Watershed study is underway that may identify more opportunities for water quality improvement and increase the likelihood of funding. That study is being coordinated by Chisago County and the US Army Corps of Engineers, and will ultimately become an additional TMDL project.

The Clean Water Legacy Act (CWLA) is a statute passed in Minnesota in 2006 for the purposes of protecting, restoring, and preserving Minnesota water. The CWLA provides the process to be used in Minnesota to develop TMDL implementation plans, which detail the restoration activities needed to

achieve the allocations in the TMDL. The TMDL implementation plans are required by the State to obtain funding from the Clean Water Fund. The Act discusses how MPCA and the involved public agencies and private entities will coordinate efforts regarding land use, land management, water management, etc. Cooperation is also expected between agencies and other entities regarding planning efforts, and various local authorities and responsibilities. This would also include informal and formal agreements and to jointly utilize technical educational, and financial resources. MPCA expects the implementation plans to be developed within a year of TMDL approval.

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

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

9. Monitoring Plan to Track TMDL Effectiveness

U.S. EPA's 1991 document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (U.S. EPA 440/4-91-001), recommends a monitoring plan to track the effectiveness of a TMDL, particularly when a TMDL involves both point and non-point sources, and the WLA is based on an assumption that non-point source load reductions will occur. Such a TMDL should provide assurances that non-point 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:

Monitoring is necessary to determine whether sufficient progress is being made toward attaining WQS. Periodic monitoring is necessary for the adaptive management strategy that will be utilized in these TMDLS, in which management strategies will be continuously re-evaluated and refined based on lessons learned from previous efforts. The implementation plan for this TMDL will contain a plan for effectiveness monitoring which includes sites, frequency of monitoring, and parameters. Sampling sites will include both lakes, Typo Creek between the lakes, and tributaries to the lakes where phosphorus reduction activities take place. Sites will be monitored at least two years following significant phosphorus reduction work. Parameters shall include those for which these waterbodies are impaired, plus additional parameters determined helpful to understanding lake ecology. Given that both lakes already have a robust baseline dataset, continued baseline monitoring will be limited to every third year.

U.S. EPA finds that this ninth element has been adequately addressed in the TMDL document submitted by MPCA, although U.S. EPA is not approving these recommendations for monitoring or

any other aspect of Minnesota's monitoring program through this decision.

10. Implementation

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

Comments:

Section 7 of the final TMDL report presents some implementation alternatives for resolving the water quality problems associated with phosphorus in Martin and Typo Lakes by focusing on reducing both internal and external phosphorus loads. A separate document following this TMDL report will contain the formal TMDL Implementation Plans. Implementation will focus on shifting from a turbid, algae-dominated state to clearer water with more macrophytes. This implementation priority is elevated because downstream impaired waters, including the St. Croix River, are high priority. The Implementation Plan will be executed using adaptive management principles, because it is difficult to predict the lake response that will occur from implementing strategies with the paucity of information available to demonstrate expected reductions. Continued monitoring and "course corrections" responding to monitoring results are the most appropriate strategy for attaining the water quality goals established in these TMDLs.

Watershed and Local Plans

Numerous governing units have water quality responsibilities in the watershed, including the MS4 permit holder and the Sunrise Watershed WMO. These agencies are focused on protecting water quality through implementation of their watershed and local plans as well as MS4 Stormwater Pollution Prevention Programs (SWPPPs). These plans and permits will outline the activities to be undertaken by each governing unit, including best management practices and capital improvements.

Construction Stormwater Regulation

To meet the WLA for construction stormwater, construction storm water activities are required to meet the conditions of the Construction General Permit under the NPDES program and properly select, install and maintain all BMPs required under the permit, including any applicable additional BMPs required in Appendix A of the Construction General Permit for discharges to impaired waters, or meet local construction stormwater requirements if they are more restrictive than requirements of the State General Permit.

Industrial Stormwater Regulation

To meet the WLA for industrial stormwater, industrial storm water activities are required to meet the conditions of the industrial stormwater general permit or General Sand and Gravel general permit (MNG49) under the NPDES program and properly select, install and maintain all BMPs required under the permit.

MPCA's Priority Areas for Nutrient Reductions

While the magnitude of phosphorus reductions needed to meet water quality standards necessitate large phosphorus reductions from all sources, MPCA believes that some prioritization of implementation work is appropriate. According to the State, Typo Lake internal loading should be the highest implementation priority. Typo Lake causes the impairment of Typo Creek and is by far the largest phosphorus source to Martin Lake. None of the waterbodies can reach water quality standards without large improvements to Typo Lake. A key measure to address Typo Lake internal loading in both lakes is installation of a new outlet to Typo Lake and inlet to Martin Lake. The current structures are culverts. Structures which serve as fish barriers and allow water level manipulations (if even by pumping) are desirable. Effective management of rough fish populations, draw-downs, and other management tools require these types of water control structures. Data Creek, which is the direct drainage to Typo Lake, should be the second implementation priority. Other implementation priorities for phosphorus reductions should be the SSTS's around Martin Lake, and direct drainage to Martin Lake.

Since phosphorus loading from Data Creek seems to be largely due to past hydrological manipulation (ditching), MPCA believes that blocking lateral ditches with landowner cooperation could yield measurable and reliable benefits. Other suggested options for phosphorus reductions included a water treatment facility near the inlet to Typo Lake, a water control structure in the main ditch, and agricultural BMP's throughout the watershed.

MPCA believes that septic system improvements should be a medium-level priority, and focus on neighborhoods near Martin Lake. They contribute a relatively small amount of phosphorus, but contribute to both environmental and human health threats. As documented in research for this TMDL, at least 30% of systems in the shoreland zone are older than their expected lifespan and 30% are not maintained properly. In 2010 the MPCA updated their rules for septic systems (MN Rules 7080 et al.). Enforcement of these rules will help address these issues. Additional work could include grant or loan programs for septic system improvements (none currently exist in this area) and maintenance education.

Although farther down the priority list, MPCA believes that the phosphorus sources in the areas directly draining to Martin Lake should receive attention. Some direct discharges of stormwater to the lake do occur. According to MPCA, a goal of no untreated stormwater entering the lake is realistic and should be pursued.

Although a formal implementation plan is not required as a condition for TMDL approval under the current U.S. EPA regulations, U.S. EPA finds that the TMDL document submitted by MPCA adequately addresses this tenth element.

11. Public Participation

U.S. 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, U.S. EPA has explained that final TMDLs submitted to U.S. 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 U.S.

EPA establishes a TMDL, U.S. EPA regulations require U.S. 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 U.S. EPA determines that a State/Tribe has not provided adequate public participation, U.S. EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by U.S. EPA.

Comments:

The Martin and Typo Lakes TMDLs were developed in conjunction with an extensive public participation process. The primary investigator was the Anoka Conservation District (ACD). The Sunrise River Watershed Management Organization (SRWMO) was the other major local partner, providing impetus for the study and partial funding. The Martin Lakers Association provided minor funding, created a water quality committee to periodically meet with agency staff, and orchestrated several opportunities for agency staff to meet with lake residents. The MPCA provided partial funding for this TMDL, as well as computer modeling.

The TMDLs were developed from data and investigative studies across multiple years. The TMDL work originated with an investigative study of water quality problems in 2001 by the ACD and SRWMO. From 2003 to 2005 the MPCA provided funding for a more formalized TMDL process. Work during this period included additional monitoring and investigative study, a formal public input process, computer modeling, and formatting the study as a TMDL. The approvals process at MPCA was delayed until the State's shallow lakes standards were updated in 2008. During the interim, ACD and the SRWMO completed additional investigative study to refine understanding of phosphorus sources and management strategies. In 2008, the TMDL was updated with the new information. MPCA reviews and edits occurred in 2009 and early 2010. In 2011 a final draft of the TMDL was submitted to MPCA.

The public involvement that occurred throughout the TMDL development included:

- A project summary flier including draft results was distributed widely to residents, agencies, municipalities, and others in 2005.
- Public informational and comment meetings were held on August 29, 2005 and September 8, 2011. Promotion included informational fliers to all lakeshore homes, notices at Linwood Town Hall, an article in the Anoka Union newspaper, and website notices. The public was also invited to submit written comments.
- Public officials informational and comment meeting August 22, 2005. Direct invitations were sent to township and other local officials.
- Informational and comment meeting on August 24, 2005 for residents with property along or near Data Creek, which will likely be an important area for implementation activities. Direct invitations were sent to these landowners.
- Presentation to the Isanti Conservation District Board in August 2005.
- Minnesota Department of Natural Resources fisheries staff commented on TMDL drafts.
- Updates to the Sunrise River Watershed Management Organization no less than once per year.
- Presentation and periodic updates to the Anoka Conservation District Board of Supervisors.
- Regular communications with downstream water resource professionals in Chisago County.

- Regular updates to, and input from, the Martin Lakers Association water quality committee. These included occasional presentations to the lake association general membership. Residents from Typo Lake were invited to some of these presentations.
- A website for the TMDL study was established and regularly updated at http://www.anokanaturalresources.com/srwmo/martin_typo_impaired_study.htm

The Martin and Typo Lakes TMDLs were public noticed from January 23 to February 22, 2012. The public was made aware of the TMDL public meetings and public notice through local press releases to local media outlets and letters of invitation to interested parties. Copies of the draft TMDL Report for Martin and Typo Lakes were available to the public upon request and on the MPCA website at http://www.pca.state.mn.us/index.php/water/water-types-and-programs/minnesotas-impaired-waters-and-tmdls/tmdl-projects/tmdl-projects-and-staff-contacts.html. As part of the final TMDL submittal, the state provided copies of the press releases of public notice, letters of invitation to interested parties, the mailing list of interested parties, and copies of the written comments received during the public comment period and the state responses to these comments. MPCA received comments only from U.S. EPA during the Martin and Typo Lakes TMDL public comment period, and all of these comments were adequately addressed by MPCA.

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning 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 U.S. 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 U.S. EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and U.S. 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.

Comments:

The U.S. EPA received the formal submission of the final Martin and Typo Lakes TMDLs on May 1, 2012 along with a cover letter from Rebecca J. Flood, Assistant Commissioner, MPCA dated April 24, 2012. The letter stated that the Martin and Typo Lakes TMDLs were final TMDLs submitted under Section 303(d) of CWA for EPA review and approval. The letter also contained the waterbody segment names, and the cause/pollutant of concern for the TMDLs submitted.

U.S. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this twelfth element.

13. Conclusion

After a full and complete review, U.S. EPA finds that the TMDLs for Martin and Typo Lakes (Segment IDs# 02-0034-00 and 30-0009-00) satisfy the elements of approvable TMDLs. These approvals address two (2) segments for one (1) pollutant for a total of two (2) TMDLs addressing four (4) impairments (Table 3 below).

U.S. EPA agrees with MPCA's determination that Typo Lake is the source of the impairments in Typo Creek (Segment ID# 07030005-563), and that the TMDL for Typo Lake should address the Typo Creek impairments (pH and turbidity). The 303(d) list status will be determined on the next list cycle.

Table 3

Impaired Reach Name	Assessment Unit ID	Pollutant	Impairment (s) Addressed by TMDL
Martin Lake	02-0034-00	Total phosphorus	Nutrient/Eutrophication Biological Indicators
Typo Lake	30-0009-00	Total phosphorus	Nutrient/Eutrophication Biological Indicators, pH*, and turbidity*

*The pH and turbidity impairments addressed are affecting the West Branch of the Sunrise River (Typo Creek; Segment ID# 07030005-563).

U.S. EPA's approval of the Martin and Typo Lakes TMDLs extend to the waterbodies which are identified in this decision document and the TMDL study with the exception of any portions of the waterbodies that are within Indian Country, as defined in 18 U.S.C. Section 1151. U.S. EPA is taking no action to approve or disapprove the State's TMDLs with respect to those portions of the waters at this time. U.S. EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under Section 303(d) for those waters.