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

FEB 02 2012

REPLY TO THE ATTENTION OF:

WW-16J

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

Dear Ms. Flood:

The U.S. Environmental Protection Agency has conducted a complete review of the final Total Maximum Daily Load (TMDL) for Little Rock Lake, dated November 2011, (DNR ID#05-0013-00; Hydrologic Unit Code 07010201) including supporting documentation and follow up information. Little Rock Lake is located in the southeastern portion of the Upper Mississippi River basin, in western Benton County in Minnesota. The TMDL addresses Aquatic Recreation use impairment due to excess nutrients (total phosphorus).

The TMDL 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 Minnesota's one (1) TMDL for total phosphorus for Little Rock Lake (DNR ID#05-0013-00). 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 Mr. Peter Swenson, Chief of the Watersheds and Wetlands Branch, at 312-886-0236.

Sincerely,

for Tinka G. Hyde
Director, Water Division

Enclosure

cc: David Johnson, MPCA
Margaret Leach, MPCA

TMDL: Little Rock Lake (#05-0013-00), Benton and Morrison Counties, MN
Date: 02/02/2012

DECISION DOCUMENT FOR LITTLE ROCK LAKE NUTRIENT TMDL

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

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

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

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

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

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

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

Comment:

Location Description/Spatial Extent: The Minnesota Pollution Control Agency (MPCA) in cooperation with Benton Soil and Water Conservation District (BWSCD) has developed a TMDL for Little Rock Lake (DNR ID#05-0013-00; Hydrologic Unit Code 07010201). Little Rock Lake is approximately 10 miles north of St. Cloud, Minnesota and is located in a portion of Morrison County and the western portion of Benton County. The watershed is contained within the North Central Hardwood Forest Ecoregion, and drains to the Upper Mississippi River watershed (Sections 1.3. and 1.4 of the TMDL).

Little Rock Lake has a surface area of 1,270 acres and it is the receiving waterbody for a 67,650 acre watershed. Little Rock Lake outflow is named the Little Rock Channel, or Harris Channel. The channel discharges to the Mississippi River when channel water levels are higher than the river. Little Rock Lake was historically a wetland; however construction of Sartell dam 3 miles downstream on the Mississippi River raised water levels approximately 7 feet in Little Rock Lake (Section 1.4 of the TMDL).

Little Rock Lake meets the definition of a shallow lake set forth in Minnesota Rules Ch. 7050 and quoted in Section 1.2 of the TMDL. Approximately 96% of the lake is less than 15 feet deep and is classified as a littoral zone. It has a mean depth of 8 feet and a maximum depth of 17 feet. The estimated average residence time is 0.3 to 0.5 years (Section 1.4 of the TMDL).

Land Use: Rolling hills and high plains comprise the natural watershed terrain. The western portion of Little Rock Lake watershed rests on an abandoned river terrace and consists of sand and gravel soils from the ancient river bed. These soils have high infiltration rates. The eastern portion of the Little Rock Lake watershed is not part of the river terrace, but an old glacial "drumlin field" which contains mostly silt and clay soils with poor porosity and infiltration (Section 1.4 and 1.5 of the TMDL). Thus MPCA states that greater runoff is expected from the eastern portion of the watershed relative to the western and upland portion of the watershed (Figure 1.3 in Section 1.5.1 of the TMDL).

Land use coverage was determined using National Agricultural Statistical Service (NASS) data from 2006. NASS data indicated that 48% of the watershed was made up of cropland, 15% was woodland, 14% grass/pasture, 13% wetlands, 8% urban development, and 2% open water. Much of the development in the watershed is centralized near the shoreline. MPCA determined that a total of 383 lakeshore parcels existed; 260 of these were classified as residential, and 123 were seasonal parcels.

Little Rock Lake watershed can be divided into five subwatersheds: Little Rock Creek drains the upland and a portion of the northeastern watershed (67% of watershed area) and discharges through an inlet on the northern shore of Little Rock Lake; Zuleger Creek (18%) drains an eastern portion of the watershed and flows into Little Rock Lake through an inlet that is east of

Little Rock Creek inlet; Sucker Creek (4%) drains a small area in the direct lakeshed; direct runoff to the lake (lakeshed 9%), and the lake (2%) (Section 2.1 of the TMDL). These subwatersheds were used to further specify where load allocations were given to nonpoint sources.

Problem Identification: Water quality data indicate that Little Rock Lake is not attaining numeric water quality standards and that it is not attaining its designated use.

Following citizen complaints of excess algal blooms, MPCA collected algal samples in 2007 and confirmed that algal concentrations were 120 µg/L, which is six times greater than the numeric chl-a criteria. The complete results of the 2007 study were used to place Little Rock Lake on the 303(d) list in 2008 (Section 1.2 and 1.3 of the TMDL). The 2007 study is documented in a State of Minnesota Office Memoranda (Appendix A of the TMDL).

Most of the measured data used to calculate current phosphorus loads and develop a loading capacity were taken from the 2007 study by MPCA, a study completed by BSWCD from 2006-2007, and 2006-2008 data collected for another TMDL effort on Little Rock Creek. Water quality concentrations measured in 2006-2008 ranged from 202-315 µg/L for total phosphorus, 114-227 µg/L for chl-a, and 0.3-0.6 m for Secchi disc. By comparison, the relevant water quality standards are shown in Table 1 of this document (Section 1.2 and 1.4 of the TMDL). Historical data from 1979-2003 also indicated that Little Rock Lake is hypereutrophic, but that water quality was exceptionally high in the 2006-2008 period (Table 5, and Sections 2.1 of the TMDL).

Priority Ranking: Minnesota's priority ranking of the water body is indicated by the target dates for start and completion of a TMDL study. Little Rock Lake TMDL studies were targeted to begin in 2008 and to be completed by 2012 (TMDL Summary Table).

Pollutant of Concern: MPCA determined that the pollutant of concern for Little Rock Lake is total phosphorus. The TMDL is also developed to meet numeric standards for chl-a and Secchi disc depth.

Source Identification:
Nonpoint sources- MPCA identified the nonpoint sources that contribute to the excess nutrient impairment in Little Rock Lake to include: internal loading, atmospheric deposition in rainfall, greywater, septic loads, direct lakeshed runoff, streambank erosion, agricultural runoff, and impervious surfaces. The watershed has a high manure production to acre ratio (Section 1.6). Manure and lawn fertilizer are sources of particular concern in this watershed because these sources contain high amounts of soluble reactive phosphorus (SRP). The SRP form of phosphorus is part of the total phosphorus component, yet it is immediately available for uptake by plants and algae, thus once the manure and lawn fertilizer enters surface waters it can have a direct impact on water quality.

MPCA identified practices and land use types that likely increase the delivery rate of phosphorus to Little Rock Lake. These included: row-crop lands, tiling, winter manure application, and impervious surfaces. Furthermore, if these practices or land uses occurred closer to Little Rock

Lake, they can reasonably be assumed to be a more direct, and therefore larger source of phosphorus. In particular, septic loads, greywater, and impervious surfaces associated with lakeshore development frequently discharge directly to the lake itself, rather than being transported and partially assimilated in receiving tributaries.

Backflow from the Mississippi River was determined not to be a significant source of phosphorus to the lake during 2006-2008. Backflows to Little Rock Lake from the river were not observed during this time, and prior hydraulic modeling results (as cited in Section 2.1 of the TMDL) indicate that backflows occur very infrequently. Monitoring data showed higher total phosphorus levels in the lake than the river, so that if backflow did occur it would be an unlikely source of phosphorus to the lake.

Point Sources- MPCA did not identify any of the following point sources in the Little Rock Lake watershed: individual NPDES facilities, CSOs, or general NPDES industrial stormwater permitted discharges.

MPCA did identify three Phase II NPDES MS4 dischargers with a partial extent in the watershed: Watab Township, Benton County, and MnDOT Outstate. These discharges are covered under Minnesota General Permit MNR040000 and further identified in Table 4 of this decision document. Additional point sources identified by MPCA included: two permitted Concentrated Animal Feeding Operations (CAFOs), septic tanks servicing shoreline developments, and general NPDES permitted discharges for construction stormwater (TMDL Summary Table, Section 1-6, and Appendix A-1 of the TMDL).

Future Growth: MPCA expects minimal growth in this predominantly agricultural watershed. Additionally, much of the lakeshore is already developed, and thus impacts of lakeshore development on water quality are incorporated into current observations on water quality. Developed land in the watershed increased approximately 2% over the past 18 years (1990 to 2008). However, to account for future growth, a wasteload allocation based on historical construction activity in the watershed was allocated to NPDES construction stormwater permits (TMDL Summary Table, and Appendix B of the TMDL).

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

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

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy (40 C.F.R. §130.7(c)(1)). EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. The TMDL expresses the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target. Occasionally, the pollutant of concern is different from the pollutant that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as Dissolved Oxygen (DO) criteria). In such cases, the TMDL submittal should explain the linkage between the pollutant of concern and the chosen numeric water quality target.

Comment:

Designated Uses: Little Rock Lake is designated as a Class 2B water (MN. R. 7050.0430). Class 2 waters include waters which "do or may support fish, other aquatic life, bathing, boating, or other recreational purposes..." (MN R. 7050.0150(3)). The designated use addressed by this TMDL is Class 2B aquatic recreation (Section 1.2 of the TMDL).

Standards: Minnesota has numeric criteria to limit the quantity of nutrients entering waters. MN R. 7050.0222(4) defines the numeric criteria, based upon ecoregions. Little Rock Lake is classified by MPCA as a shallow lake (< 15 feet deep or > 80% littoral area) in the North Central Hardwood Forest ecoregion (Section 1.2 of the TMDL). These characteristics determine the applicable numeric water quality criteria for Little Rock Lake and are shown in Table 1 below.

Table 1. Applicable Numeric Criteria for Little Rock Lake, a shallow Lake in the North Central Hardwood Forest ecoregion (MN R. 7050.0222(4)).

	Total Phosphorus	Chl-a	Secchi Depth
Water Quality Criteria	≤ 60 µg/L	≤ 20 µg/L	≥1.0 m

Target: MPCA selected a 60 µg/L total phosphorus TMDL target to achieve the designated use and attain applicable water quality numeric criteria (Section 2.1 of the TMDL).

MPCA selected total phosphorus as the appropriate parameter to address eutrophication problems at Little Rock Lake because of the interrelationships between total phosphorus and chl-a, as well as Secchi disc depth. Algal abundance is measured by chl-a, which is a pigment found in algal cells. As more phosphorus becomes available, algae growth can increase. Increased algae in the water column will decrease water clarity that is measured by Secchi disc depth.

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

In order to select the numeric total phosphorus target that would result in all three water quality criteria being met, the MPCA consulted regression relationships that were previously developed for shallow lakes in Minnesota (Minn. Rule 7050; Section 2.6 of the TMDL). Regression relationships were established between the causal factor total phosphorus and the response variables chl-a and Secchi disc depth. Based on these relationships it was predicted that attaining a total phosphorus target of 60 µg/L would subsequently result in a chl-a concentration of 18 µg/L, and a Secchi disc depth of 1.08 meters (Appendix B of the TMDL). Thus a TMDL based on the total phosphorus target of 60 µg/L was predicted to result in meeting the relevant total phosphorus, chl-a, and Secchi disc depth numeric water quality standards.

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

3. Loading Capacity - Linking Water Quality and Pollutant Sources

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

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

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

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

Comment: The loading capacity developed to meet the phosphorus criteria for Little Rock Lake is **13.208 kg/day** (TMDL Summary Table, Administrative Record No. 14). The loading capacity is the sum of the wasteload allocation (WLA), load allocation (LA), and margin of safety (MOS).

TMDL	=	**WLA**	+	**LA**	+	**MOS**
13.208 kg/day	=	0.508 kg/day	+	12.700 kg/day	+	implicit

Modeling Summary:

Current Loading- First, to calculate current total phosphorus loads to Little Rock Lake, a water budget was calculated using a mass balance equation. A mass balance equation defines that the difference between water into the lake and water out of the lake will be described as the change in lake volume during the same period:

$$\text{Change in Lake Volume} = \sum\text{Inflow} - \sum\text{Outflow}$$

where; $\sum$ Inflow = Rainfall on lake + Tributary inflow+ Groundwater + Direct runoff;
$\sum$ Outflow = Evaporation + Tributary Outflow + Groundwater; and
Change in lake volume is calculated often using lake level measurements, bathymetry, and lake surface area.

Total phosphorus concentrations in the sources of inflow and outflow were measured, taken from regionally relevant literature estimates, and then used as inputs to a model. Sampling locations for streamflow, in-stream total phosphorus and orthophosphorus, and in-lake water quality are shown in Figure 4 of the TMDL. Table 6 in Section 2.6 of the TMDL shows the estimated loads of phosphorus from the different lake inflows, and outflows.

Phosphorus loads were estimated from Little Rock Creek, Zulegar, and Sucker Creeks.
To estimate current phosphorus loads from tributaries, MPCA monitored stream flow and total phosphorus loads at five stations. Flow and in-stream chemistry measurements were collected during May to October in 2006-2009. Where data gaps in the flow record occurred, a regression analysis was used in order to create a continuous flow record from March-October 2006-2009, and to account for spring runoff events that were not measured (Section 2.2 of the TMDL). Tributary flows were adjusted using regional streamflow and precipitation data, in order to supplement the period of record (Figure 11 in the TMDL).

Phosphorus in direct runoff to the lake was estimated using drainage area ratios. Septic system loads were estimated based on assuming three people were serviced per septic tank, 300 septic tanks were present in the watershed, a 10% failure rate existed, and that each tank contributed 0.66 kg of phosphorus/year (Page A-1, Appendix B of the TMDL).

Phosphorus loads leaving the lake, via the Little Rock Lake/ Harris Channel (outflow), were computed using phosphorus readings in the Channel, and flow volume that was back-calculated using the mass balance equation cited above.

Phosphorus inputs resulting from internal loading at Little Rock Lake were estimated by MPCA. MPCA provides excerpts of a study in Appendix B of the TMDL, which indicate that internal loading occurred most often in July and August during the 2006-2008 study period.

Phosphorus from precipitation and evaporation was estimated using regional estimates developed for Minnesota and thus reasonably assumed applicable to Little Rock Lake. The amount of precipitation falling on the lake during the study period was estimated using weather station data from three miles west-northwest of the watershed. Next, to calculate the TMDL, these current loading estimates were input to the Canfield-Bachman model.

Loading Capacity- The Canfield-Bachman model was used to simulate the loading capacity (i.e., the total phosphorus load that the lake could receive and still meet water quality standards). The Canfield-Bachman model uses empirical equations to predict in-lake total phosphorus, conditions based on lake morphometry and tributary loading information. The empirical equations were derived using data measured in several Minnesota Lakes, and thus are assumed to be relevant for use in Little Rock Lake. The Canfield-Bachman model was selected because of its simple input requirements, and the level of data required to set up alternative and more complex models was not available.

To determine the numeric value of the loading capacity, the different source loads were iteratively changed, until the Canfield-Bachman model predicted in-lake phosphorus, chl-a, and Secchi disc depth conditions that met water quality standards (Section 2.6 and Appendix B of the TMDL).

Critical Condition: MPCA determined that the critical condition is the summer growing season (Section 2.4 and 2.7 of the TMDL). During this period, warmer temperatures, increased phosphorus concentrations, and longer days cause increased algal growth. More specifically, critical conditions at Little Rock Lake occur during exceptionally warm and dry summers such as the summer of 2007 when historically high total phosphorus and chl-a levels were measured in the lake. In this exceptionally warm summer with little precipitation, phosphorus loads remained in the lake for a greater period of time relative to a wet year in which phosphorus loads would have been flushed downstream at a greater rate. Less flushing increased in-lake concentrations, which increased algal growth and the occurrence of nuisance algal blooms. Reduced flushing and increased algal growth also can create anoxic conditions that lead to internal loading, which contributes additional phosphorus loads and can further exacerbate eutrophication.

The critical conditions that occur during the summer growing season, and particularly warm and dry summer seasons, were accounted for in the current loading and TMDL given that stream loading and in-lake data were recorded during summer months in 2006-2008, which were warm and dry years (Figures 11 and 12 in Section 2.4 of the TMDL).

An additional critical condition is spring runoff because it impacts the total loads to the lake on an annual cycle. This was accounted for in the TMDL by estimating spring runoff flows from regression analysis, when they had not been directly measured. Data from wet years were estimated from regression.

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

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 nonpoint sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R.

§130.2(g)). Where possible, load allocations should be described separately for natural background and nonpoint sources.

Comment: Load allocations were given to each tributary, the lakeshed, and atmospheric deposition (rainfall) (Section 6.1.2 of the TMDL). Load allocations require reductions from the tributary subwatersheds. Load allocations for the lakeshed and atmospheric loads were set equal to current loading estimates, although reductions from the former source are anticipated by MPCA during implementation.

Load allocations for internal loading were not given, as the impact of internal loading is incorporated in the in-lake response measurements, and the majority of current phosphorus loads in sediments can reasonably be assumed to have originated from the watershed, given the high watershed to lake area ratio. Load allocations identified by MPCA are shown in Table 2.

Table 2. Load allocations for Little Rock Lake and the concentration (µg/L) associated with the load.

Assigned Nonpoint Source	Total Phosphorus Load Allocation (kg/day)	Total Phosphorus Concentration (µg/L)
Atmospheric Deposition (Rainfall)	0.4	30
Little Rock Creek (at CH 12)	7.0	83
Zuleger Creek	2.0	83
Sucker Creek	1.0	83
Direct Runoff (Lakeshed)	2.3	184
Total	**12.7**	**n/a**

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

5. Wasteload Allocations (WLAs)

EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to individual existing and future point source(s) (40 C.F.R. §130.2(h), 40 C.F.R. §130.2(i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit.

The individual WLAs may take the form of uniform percentage reductions or individual mass based limitations for dischargers where it can be shown that this solution meets WQSs and does not result in localized impairments. These individual WLAs may be adjusted during the NPDES permitting process. If the WLAs are adjusted, the individual effluent limits for each permit issued to a discharger on the impaired water must be consistent with the assumptions and requirements of the adjusted WLAs in the TMDL. If the WLAs are not adjusted, effluent limits contained in the permit must be consistent with the individual WLAs specified in the TMDL. If a draft permit provides for a higher load for a discharger than the corresponding individual WLA in the TMDL, the State/Tribe must demonstrate that the total WLA in the TMDL will be

achieved through reductions in the remaining individual WLAs and that localized impairments will not result. All permittees should be notified of any deviations from the initial individual WLAs contained in the TMDL. EPA does not require the establishment of a new TMDL to reflect these revised allocations as long as the total WLA, as expressed in the TMDL, remains the same or decreases, and there is no reallocation between the total WLA and the total LA.

Comment: Wasteload allocations for Little Rock Lake are shown in Table 4. A wasteload allocation was given to three Phase II NPDES MS4 permittees based on the proportion of MS4 jurisdictional area that existed within the watershed at the time of writing the TMDL. The two permitted CAFOs in the watershed were given a zero wasteload allocation. Septic loads were given a zero wasteload allocation as Minnesota state law prohibits direct discharge from septic tanks to surface waters. There were no NPDES permitted industrial stormwater sources in the watershed. A small wasteload allocation, based on historical construction activity, was given to general NPDES construction stormwater permits to account for future construction activity (TMDL summary Table, Table 6, and Section 2.6.2 of the TMDL).

Table 4. Waste Load Allocations for Little Rock Lake

Assigned Point Source	Total Phosphorus Wasteload Allocation (kg/day)
CAFO Permit Number MNG440950	0
CAFO Permit Number MNG441098	0
Septic Systems	0
MS4 Permit Numbers MS400161 (Watab Township) MS400067 (Benton County) MS400180 (MnDOT Outstate)	0.5
Industrial Stormwater	n/a
Construction Stormwater	0.008
Total	**0.508**

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

6. Margin of Safety (MOS)

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

Comment: MPCA used an implicit margin of safety. The TMDL was developed on data from dry and warm years which resulted in extremely elevated levels of total phosphorus and chl-a. Therefore total phosphorus load reductions were based on this period of very poor water quality and were interpreted to be conservative recommendations. MPCA believes that the phosphorus reductions determined for the watershed were an overestimate (i.e. conservative), and therefore achieving the TMDL reductions would result in attaining water quality standards.
Given the estimated costs allocated to feedlot improvement and installation of filter strips in the TMDL implementation plan, it is apparent MPCA will be targeting manure management. Animal waste and fertilizer are of particular concern in the watershed because these sources have a high component of soluble reactive phosphorus (SRP). Once transported to surface waters, the SRP is immediately available for uptake by plants and algae, whereas total phosphorus is not as readily available. BMPs designed to meet total phosphorus reduction targets, such as contoured buffers, filter strips, and feedlot projects, would intercept greater amounts of SRP for every total phosphorus amount reduced in animal waste and fertilizer. The result is greater reductions in SRP which in turn, directly prevents added algal growth and improves water quality more than estimated using total phosphorus targets alone (Section 2.8 of the TMDL).

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

7. Seasonal Variation

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

Comment: Phosphorus loads can vary by season, and the contribution from several identified sources varies with precipitation. For example in a dry year with little precipitation, less flushing of lake volume concentrates nutrients, and can cause internal loading. By contrast, in a wet precipitation year, water and nutrients are flushed through at greater rates and volumes which can inhibit conditions necessary for internal loading.

The TMDL was developed based on data taken in years with higher than average in-lake total phosphorus, and chl-a concentrations (2006-2008). While this time period effectively captures critical conditions, it does not as effectively capture the impact of varying climate on phosphorus loads. To mitigate this limitation, the tributary inflow and outflow phosphorus loads were adjusted based on Sauk and Elk River watershed loading data which were available from 1990-2009. The result is that estimated mean loads coming from the tributaries, and direct drainage to the lake increased compared to estimates based on the 2006-2008 period alone. This reasonably increased the estimate of required load reductions that would be necessary from tributaries, and in addition, tributary loads were then more representative of seasonal variation from climate (Page A-2 of Appendix B, and Section 6.1.4 of the TMDL).

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

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.

Comment:

Point Sources: Reasonable assurance that the WLAs will be implemented is provided by regulatory actions. According to 40 CFR 122.44(d)(1)(vii)(B), NPDES permit effluent limits must be consistent with assumptions and requirements of all WLAs in an approved TMDL. MPCA implements its storm water and NPDES permit programs, and is responsible for making the effluent limits consistent with the WLAs in this TMDL. Furthermore, MPCA stated that MS4s must ensure that their Storm Water Pollution Prevention Plans (SWPPPs) are updated to be consistent with the TMDL (Section 2.9 of the TMDL).

Non Point Sources: Reasonable assurance that WLAs will be implemented is provided by an already active stakeholder community, and the activities of an implementing local agency (i.e., BSWCD). A watershed stakeholder committee was formed during development of the TMDL. The committee met in July, August, and December of 2010 to discuss the TMDL and management of implementation actions that would follow approval of the TMDL. This group is comprised of individuals who live in or work in the Little Rock Lake Watershed. It includes representatives from each township, as well as commissioners from Benton and Morrison County.

The Benton SWCD coordinated development of the TMDL, and will play an important role in implementing BMPs to address the TMDL. It can reasonably be assumed that the effort Benton SWCD has spent developing relationships with stakeholders, and relevant agencies, will ensure implementation of BMPs and land use practices in order to achieve the TMDL (Section 3.0 and 4.0 of the TMDL).

Interim targets were identified as part of the TMDL analysis. While EPA's decision does not extend to approval of these targets, the outline of interim goals can inform implementation schedules. MPCA aims to complete an implementation plan for a water within a year of a TMDL being approved for that particular waterbody. Development of this plan provides reasonable assurance that practices will be designed to achieve LAs in the TMDL.

Clean Water Legacy Act (CWLA): The 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 to jointly use 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).

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

9. Monitoring Plan to Track TMDL Effectiveness

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

Comment: A monitoring plan was outlined in Section 2.9 of the TMDL to track the changes in the lake following implementation activities. Monitoring will be continued by the Citizens Monitoring Program, and MDNR, as well as Benton SWCD. Section 2.9 outlined how current

monitoring should adjust in order to track TMDL effectiveness. While the monitoring plan recommends that spring and fall months be included, it also suggests which in-lake sites could be eliminated, which would ease cost requirements.

Data are described in Section 2.1 of the TMDL that could inform TMDL tracking. These data are a pre-TMDL implementation water quality conditions and can be used to track changes that occur during and after TMDL implementation.

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

10. Implementation

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

Comment: In accordance with MPCA policy, an implementation plan will be completed within one year of TMDL approval. Section 2.9 of the TMDL identifies implementation actions that were produced based on input from watershed stakeholders and implementing agencies.

Estimated costs to implement the TMDL were provided. The implementation practices listed in Table 7 and 8 in the TMDL address the sources identified in the TMDL and are separated into two lists; priority and second priority practices. Recommended activities included feedlot projects, residue and tillage management, water and sediment control basins, and septic system inspection and upgrades, among others (Section 2.9 of the TMDL).

The EPA finds that this criterion has been adequately addressed.

11. Public Participation

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

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

Comment: Stakeholder input was received during TMDL development through three meetings held with a technical advisory committee. Benton SWCD also worked with and attended meetings of the local townships in the watershed prior to public notice of the TMDL to address questions.

The TMDL document was open twice for public comment. The first time was in May-June of 2011. During the first public comment review process, MPCA determined that CAFOs and MS4s existed within the watershed that had not been accounted for in the previous draft. The TMDL was revised to address those comments and then public noticed from September 12 to October 12, 2011. To inform the public of the comment period, MPCA issued a press release, published an announcement in the state register, and posted the draft TMDL on the MPCA website.

Three written comments were received during the final public comment period and MPCA responded to each in writing (TMDL Administrative Record No. 12-3). Comments were received from a private landowner in the watershed, Minnesota Grower's Association, and Minnesota Department of Transportation. A copy of each original comment, and MPCA's response was included in the final TMDL submittal package. MPCA's responses indicated how errors had been minimized where possible, clarified language in their responses when necessary, identified how stakeholders could continue their involvement via SWCD Board meetings, and indicated the information sources used to estimate animal unit density numbers cited in the TMDL.

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

12. Submittal Letter

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

Comment: On December 30, 2011, EPA received a submittal letter dated December 13, 2011 signed by Rebecca Flood, MPCA Assistant Commissioner, addressed to Tinka Hyde, EPA Region 5, Water Division Director. The submittal letter identified the name and location of the waterbody for which the TMDL was developed. The letter explicitly states that the Little Rock

Lake TMDL is being submitted for final approval by USEPA under Section 303(d) of the Clean Water Act.

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

13. Conclusion

After a full and complete review, the EPA finds that this TMDL for total phosphorus for Little Rock Lake (DNR ID#05-0013-00; Hydrologic Unit Code 07010201) meets all of the required elements of an approvable TMDL. This decision document addresses one (1) TMDL for Little Rock Lake (DNR ID#05-0013-00; Hydrologic Unit Code 07010201) as identified on Minnesota's 2008 303(d) list.

EPA's approval of this TMDL 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 the CWA Section 303(d) for those waters.