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

SEP 29 2017

REPLY TO THE ATTENTION OF

WW-16J

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

The U.S. Environmental Protection Agency has conducted a complete review of four final Total Maximum Daily Loads (TMDLs) for the Ramsey-Washington Metro Watershed, located in eastern Ramsey County and western Washington County, Minnesota. The TMDLs are calculated for Total Suspended Solids, *E. Coli*, and Total Phosphorus and address impairments to the designated uses of Aquatic Life, and Aquatic Recreation.

EPA has determined that these TMDLs 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 four TMDLs for the Ramsey-Washington Metro Watershed. 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 addressing aquatic life and recreational uses, and look forward to future 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,

Christopher Korleski
Director, Water Division

Enclosure

cc: Celine Lyman, MPCA
Paul Wymar, MPCA

wq-iw8-54g

# Decision Document for the Ramsey-Washington Metro Watershed District Total Maximum Daily Load Study

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.

TMDL Document Refers to the:

> Ramsey-Washington Metro Watershed District Total Maximum Daily Load Study
> Prepared by Minnesota Pollution Control Agency
> July 2017
> Received by EPA Region 5 August 17th, 2017.

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

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

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

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

> (1) the spatial extent of the watershed in which the impaired waterbody is located; (2) the assumed distribution of land use in the watershed (e.g., urban, forested, agriculture); (3) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources;
> (4) present and future growth trends, if taken into consideration in preparing the TMDL (e.g., the TMDL could include the design capacity of a wastewater treatment facility); and (5) an explanation and analytical basis for expressing the TMDL through *surrogate measures*, if applicable. *Surrogate measures* are parameters such as percent fines and turbidity for sediment impairments; chlorophyll *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

## Section 1 Review Comments:

A comparison of Table 1-1 of the TMDL document to the excerpt from the proposed 2016 MN TMDL list shows the waterbodies and impairments in the table match waterbody impairment combinations on the proposed 2016 TMDL list.

| Water body name | Water body description | AUID | Pollutant or stressor | Year added to List | TMDL target start year | TMDL target completion year |
|---|---|---|---|---|---|---|
| Battle Creek | Battle Creek Lk to Pigs Eye Lk | 07010206-592 | Aquatic macroinvertebrate bioassessments | 2014 | 2012 | 2017 |
| Battle Creek | Battle Creek Lk to Pigs Eye Lk | 07010206-592 | Fishes bioassessments | 2014 | 2012 | 2017 |
| Fish Creek | Carver Lk to Unnamed (North Star) lk | 07010206-606 | Escherichia coli | 2014 | 2012 | 2017 |
| Bennett | Lake or Reservoir | 62-0048-00 | Nutrient/eutrophication biological indicators | 2006 | 2012 | 2017 |
| Wakefield | Lake or Reservoir | 62-0011-00 | Nutrient/eutrophication biological indicators | 2002 | 2011 | 2017 |

*Excerpted from the 2016 proposed MN TMDL list*

Table 1-1 of the TMDL document shows the original targeted start and completion date to develop TMDLs for the waterbody impairments identified. The table of information excerpted from the 2016 Proposed MN TMDL List reflects the updated TMDL completion dates of 2017.

The waterbody pollutant combinations for which the document establishes TMDLs are summarized in Review Table 1 below.

Table 1-1 Impairments addressed in the TMDL Report

| Water Body | Pollutant or Stressor | Impaired Use | Year Listed as Impaired | Target Start Date | Target Completion Date |
|---|---|---|---|---|---|
| Battle Creek (07010206-592) | Chloride | Aquatic Life | 2008 | 2009[1] | 2015[1] |
| | Fishes Bioassessments | Aquatic Life | 2014 | 2011 | 2015 |
| | Aquatic Macroinvertebrate Bioassessments | Aquatic Life | 2014 | 2011 | 2015 |
| Fish Creek (07010206-606) | *E. coli* | Aquatic Recreation | 2014 | 2011 | 2015 |
| Bennett Lake (62-0048-00) | Nutrient/Eutrophication Biological Indicators | Aquatic Recreation | 2006 | 2012 | 2015 |
| | Mercury in fish tissue | Aquatic Consumption | 2012 | N/A[2] | N/A[2] |
| Wakefield Lake (62-0011-00) | Nutrient/Eutrophication Biological Indicators | Aquatic Recreation | 2002 | 2011 | 2015 |

[1] Chloride impairment in Battle Creek addressed in the approved https://www.pca.state.mn.us/sites/default/files/wq-iw11-06e.pdf.

[2] Mercury impairment in Bennett Lake addressed in the approved MPCA Statewide Mercury TMDL.

*Excerpted from the TMDL document*

| Review Table 1 – Ramsey Washington TMDL Document<br>Waterbodies, pollutants and applicable water quality standards addressed. | | |
|---|---|---|
| Waterbody (AU) | TMDL Pollutant | Water Quality Standard (WQS) |
| Battle Creek - (07010206-592) | Suspended Sediment (TSS) | 30 mg/L |
| The aquatic life designated use for Battle Creek is identified as impaired. Chloride, fishes bioassessments, and aquatic macroinvertebrate bioassessments are listed as pollutants or stressors. Chloride is addressed in a different TMDL. Suspended sediment is determined to be the pollutant of concern leading to the other two stressors mentioned. A TMDL for TSS is developed for Battle Creek. The TSS WQS for Battle Creek are identified in Section 2.2 of the RWTMDL Document. The TSS standard of 30 mg/L for Class 2B streams located in the Central River Nutrient Region is identified as the applicable Water Quality Standard that may be exceeded no more than 10% of the time. The standard applies April 1 through September 31. | | |
| Fish Creek - (07010206-606) | *E. coli* | 126 organisms/100 ml - or - 10% of samples < 1260 org/100 ml |
| The designated use of aquatic recreation is listed as impaired for Fish Creek with *E. coli* identified as the pollutant of concern causing the impairment. An *E. coli* TMDL is developed for Fish Creek. The applicable bacteria (*E. coli*) water quality standards for Fish Creek are described in Section 2.3 of the TMDL document. The *E. coli* water quality criterion | | |

| | | |
|---|---|---|
| not to be exceeded is 126 organisms per 100 milliliters as a geometric mean of not less than five samples representative of conditions within any calendar month, nor shall more than 10% of all samples taken during any calendar month individually exceed 1,260 organisms per 100 milliliters. The standard applies to Class 2C waters only between April 1 and October 31. | | |
| Bennett Lake - (62-0048-00) | Total Phosphorus (P) | GS P ≤ 60 µg/L |
| The designated use of aquatic recreation is identified as impaired, with nutrient/eutrophication and biological indicators identified as the relevant pollutants and stressors. Phosphorus is determined to be the pollutant of concern leading to the stresses and impairment. An aquatic consumption impairment related to mercury in fish tissue present in this waterbody is addressed by a different TMDL. – A total phosphorus (P) TMDL is developed for Bennet Lake. An Excess Nutrients (Total Phosphorous) WQS applicable to both Bennet Lake and Wakefield Lake are identified and described in Section 2.4 of the RWTMDL Document.<br>Growing Season (GS) (June-September) means of total phosphorus concentration ≤ 60 µg/L, chlorophyll-a concentration ≤ 20 µg/L, and Secchi disc transparency ≥ 1.0 meter. Applies to shallow lake Class 2B waters located in the North Central Hardwood Forest Ecoregion. | | |
| Wakefield Lake - (62-0011-00) | Total Phosphorus (P) | GS P ≤ 60 µg/L |
| The designated use of aquatic recreation is identified as impaired, with nutrient/eutrophication and biological indicators identified as the relevant pollutants and stressors. Phosphorus is determined to be the pollutant of concern leading to the stresses and impairment. A total phosphorus (P) TMDL is developed for Wakefield Lake.<br>The Excess Nutrients (Total Phosphorous) WQS applicable to Wakefield Lake during the growing season is identified and described in Section 2.4 of the TMDL document. Growing Season (June-September) means of total phosphorus concentration ≤ 60 µg/L, chlorophyll-a concentration ≤ 20 µg/L, and Secchi disc transparency ≥ 1.0 meter. Applies to shallow lake Class 2B waters located in the North Central Hardwood Forest Ecoregion. | | |

Battle Creek - (07010206-592) - Suspended Sediment (TSS)

Section 3.6.1 of the TMDL document provides a general discussion of the types and characteristics of the different point and nonpoint sources of pollutants to a waterbody. Identified point sources of suspended sediment to Battle Creek include Municipal Separate Storm Sewer Systems (MS4s) and construction and industrial stormwater. Non-point sources include internal sources from the stream bed and banks, and upstream inputs.

> *Internal Sources – Includes sediment resuspension within the stream channel, erosion and bank failure within the stream corridor, and in-channel algal production can all contribute to TSS loading.*
> *Loading from upstream waterbodies – Headwater ponds and other waterbodies that discharge flow into the stream corridor can be significant sources of sediment loading.*
> *[Excerpted from the TMDL Document]*

Table 4-1 of the TMDL document provides a listing of MS4s in the watershed that contribute sediment to Battle Creek.

Table 4-1 MS4 summary for Battle Creek

| MS4 Name | MS4 ID Number | MS4 Area within the Contributing Watershed (acres)[1] |
|---|---|---|
| Maplewood | MS400032 | 921 |
| MnDOT Metro District | MS400170 | 118 |
| Ramsey County | MS400191 | 552 |
| St. Paul | MN0061263 | 790 |
| Washington County | MS400160 | 6 |
| Woodbury | MS400128 | 268 |

[1] Open water area removed from total MS4 contributing watershed area (open water summary in Table 3-2).

*Excerpted from the TMDL document*

Section 4.1.4.3 of the TMDL document states:

> *"There are no non-stormwater NPDES permitted point source surface dischargers identified within the Battle Creek Watershed."*
> *[Excerpted from the TMDL Document]*

Figure 4-3 of the TMDL document shows the location of the MS4s that contribute sediment to Battle Creek.

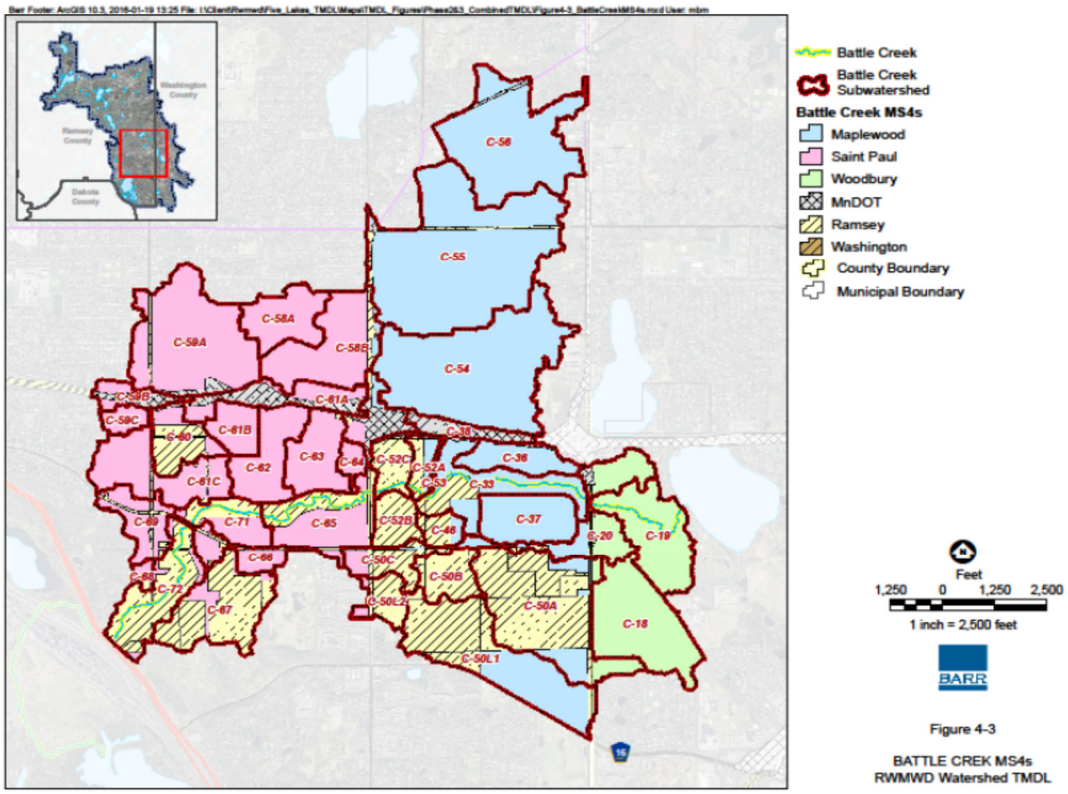


Figure 4-3 MS4s in Battle Creek Watershed

*Excerpted from the TMDL document*

Fish Creek - (07010206-606)-*E. coli*

Section 3.6.2 of the TMDL document discusses the sources of *E. coli* in the Fish Creek watershed. Human waste from malfunctioning septic systems and leaking sanitary system sewers, improperly managed pet waste, fecal matter from wildlife, and agricultural sources, are all identified as potential sources. The majority of the watershed is covered by MS4 permits and accounted for in the waste load allocation. Additional details of the respective sources are discussed in separate subsections of the document.

> *This section provides an inventory of the sources of bacteria within the Fish Creek Watershed. The sources of bacteria in the watershed include: ·*
>
> - *Septic systems and human waste (Section 3.6.2.1)*
> - *Stormwater runoff and pets (Section 3.6.2.2)*
> - *Sanitary sewer exfiltration (Section 3.6.2.3)*

- *Fecal matter from wildlife (Section 3.6.2.4)*
- *Agricultural sources (Section 3.6.2.5)*

*[Excerpted from the TMDL Document]*

Table 3-13 of the TMDL document provides a summary of the different types of sources of *E. coli* present in the Fish Creek watershed and their relative contributions. In section 3.6.2.5 of the TMDL document, agricultural sources are discussed and ruled out as a significant source of E. coli to the watershed due to a lack of evidence of grazing activities within the watershed and a lack of evidence of elevated E. coli concentrations downstream of commercial nurseries. Therefore, agricultural sources are not represented in Table 3-13.

Table 3-13 Estimated population and monthly *E. coli* production by source

| Category | Source | Animal Population | *E. coli* Organisms per Unit per Month ($10^9$ organisms)* | Total *E. coli* Organisms Available per Month ($10^9$ organisms) | % of Total *E. coli* Organisms Available per Month |
|---|---|---|---|---|---|
| Human | Pop. using SSTSs | 102 | 30 | 3066 | 8% |
| | Pop. using sanitary sewer | 123 | 30 | 3679 | 10% |
| Urban Runoff | Cats | 215 | 75 | 16088 | 43% |
| | Dogs | 189 | 75 | 14138 | 38% |
| Wildlife | Deer | 13 | 5.4 | 69 | 0.2% |
| | Wild Turkey | 0.2 | 3.9 | 1 | 0% |
| | Geese | 0.02 | 0.3 | 0 | 0% |
| | Ducks | 0.002 | 165 | 0 | 0% |
| | Other Wildlife | -- | -- | 141 | 0.4% |

* From the Upper Mississippi River Bacteria TMDL (2014), modified from daily fecal coliform loading rates from MetCalf and Eddy (1991) and EPA (2001).

*Excerpted from the TMDL document*

Table 4-3 of the TMDL document provides a listing of the MS4s within the watershed that contribute bacteria to Fish Creek, including permit numbers and contributing area within the watershed.

Table 4-3 MS4 summary for Fish Creek

| MS4 Name | MS4 ID Number | MS4 Area within the Contributing Watershed (acres)[1] |
|---|---|---|
| Maplewood | MS400032 | 394 |
| Newport | MS400040 | 32 |
| MnDOT Metro District | MS400170 | 45 |
| Ramsey County | MS400191 | 104 |
| St. Paul | MN0061263 | 21 |
| Washington County | MS400160 | 4 |
| Woodbury | MS400128 | 182 |

[1] Open water area removed from total MS4 contributing watershed area (open water summary in Table 3-2).

*Excerpted from the TMDL document*

Figure 4-6 of the TMDL document shows the location of the MS4s within the watershed that contribute E. coli to Fish Creek.

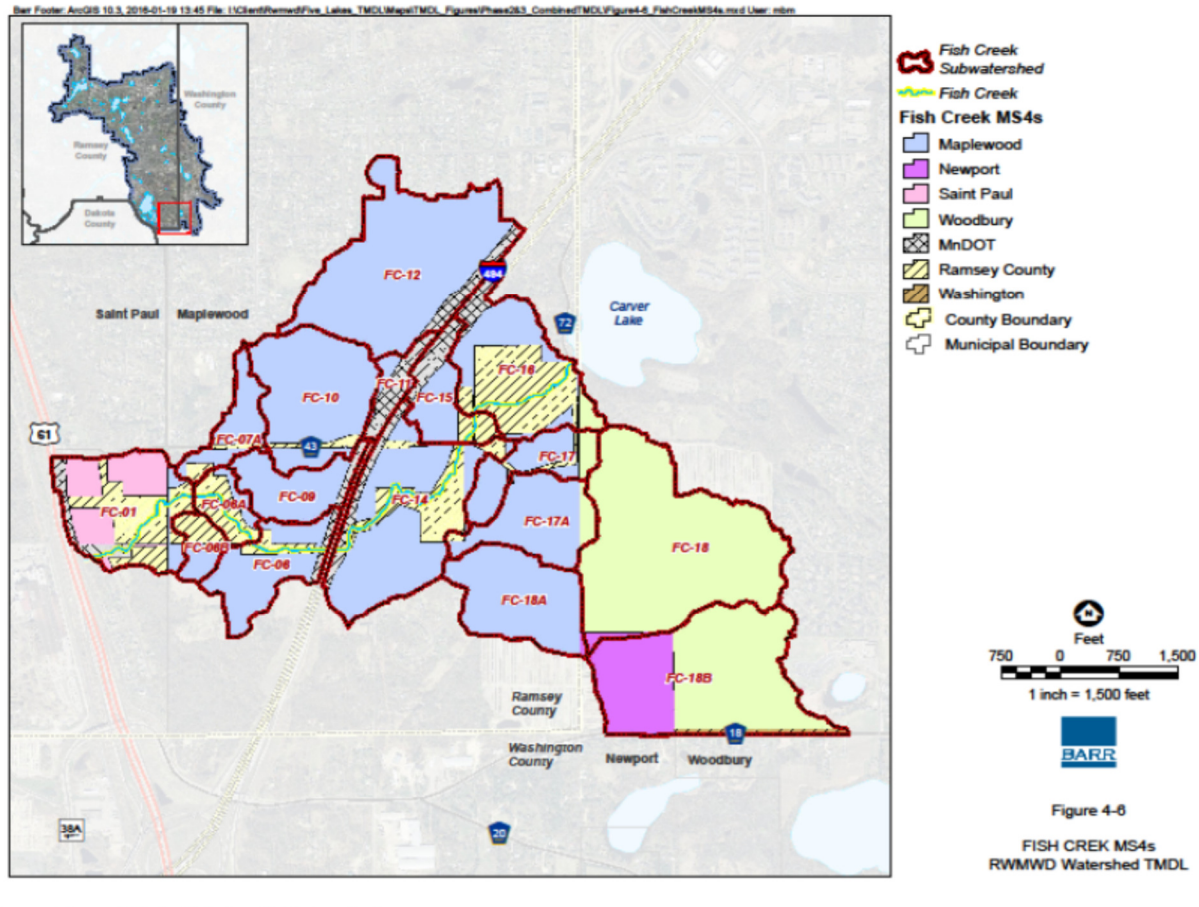


Figure 4-6 MS4s in Fish Creek Watershed

*Excerpted from the TMDL document*

*Bennett Lake - (62-0048-00)-Total Phosphorus (P) and Wakefield Lake - (62-0011-00)-Total Phosphorus (P)*

Section 3.6.6 of the TMDL document provides a discussion of the potential sources of phosphorus to Bennett Lake and Wakefield Lake. Section 4.3.1.1 of the TMDL document discusses how the P8 Urban Catchment Model (Version 2.4) was used to estimate watershed runoff and phosphorus loads from the Bennett and Wakefield Lake watersheds. Table 4-6 provides a summary of the P8 modeling results.

Table 4-6 Summary of P8 modeled water and phosphorus loads

| Waterbody | Critical Year | Water Year Water Load (ac-ft) | Growing Season Water Load (ac-ft) | Water Year TP Load (lbs) | Growing Season TP Load (lbs) |
|---|---|---|---|---|---|
| Bennett lake | 2005 | 436 | 250 | 113.3 | 70.1 |
| Wakefield Lake | 2004 | 536 | 232 | 254.8 | 127.7 |

*Excerpted from the TMDL document*

Section 4.3.1.2 of the TMDL document discusses how atmospheric deposition of P to the lake surfaces is quantified based on the estimated lake surface area and a deposition rate of 0.2615 kg/ha/yr (0.000639 lb/ac/d - established in the Detailed Assessment of Phosphorus Sources to Minnesota Watersheds (Barr 2005)).

Table 4-7 Summary of estimated atmospheric deposition phosphorus load

| | | TP load from Atmospheric Deposition (lbs) | |
|---|---|---|---|
| Waterbody | Critical Year | Water Year | Growing Season |
| Bennett Lake | 2005 | 7.0 | 2.3 |
| Wakefield Lake | 2004 | 4.8 | 1.4 |

*Excerpted from the TMDL document*

Section 4.3.1.3 of the TMDL document discusses how internal loading of phosphorous from lake bottom sediments is estimated as the remaining load not accounted for by other sources.

> *The net internal loading of phosphorus in Bennett and Wakefield Lake was calculated by deduction, using the difference between the predicted water quality using the in-lake mass balance model and the observed water quality data after all other phosphorus inputs to and losses from each lake were estimated (see Section 4.3.1.7 for additional details). To verify that the predicted internal load is reasonable, internal loading was checked against available sediment core data from Bennett and Wakefield Lake.*
> *[Excerpted from the TMDL Document]*

Table 4-8 of the TMDL document shows the estimated growing season internal phosphorus release rate for both lakes.

Table 4-8 Estimated growing season internal phosphorus release rate

| Waterbody | Critical Year | Sediment Core TP Release Range ($mg/m^2/d$) | Sediment Core TP Release Range w/ 0.1% daily recycling rate ($mg/m^2/d$) | Estimated Growing Season Internal Loading Rate ($mg/m^2/d$) | Estimated Total Growing Season Phosphorus Load From Internal Sources (lbs) |
|---|---|---|---|---|---|
| Bennett Lake | 2005 | 0.2 - 0.4 | 2.1 – 2.8 | 3.4 | 78.1 |
| Wakefield Lake | 2004 | 2.4 – 3.0 | - - | 3.0 | 60.4 |

*Excerpted from the TMDL document*

Section 4.3.1.4 of the TMDL document discusses how plant growth in the lakes affects in-lake P concentrations, with die off of curly leaf pondweed early in the growing season acting as a source of P to Bennet Lake and coontail uptake of P acting as a P sink for both lakes. Table 4-9 shows the loading and uptake of P calculated for both aquatic vegetation species.

Table 4-9 Estimate growing season curly-leaf Pondweed TP loading and TP uptake by coontail

| Waterbody | Critical Year | Estimated Growing Season TP Load from Curly-leaf Pondweed (lbs) | Estimated Growing Season TP Uptake by Coontail (lbs) |
|---|---|---|---|
| Bennett Lake | 2005 | 12.3 | 1.2 |
| Wakefield Lake | 2004 | - - | 16.9 |

*Excerpted from the TMDL document*

Table 4-11 of the TMDL document provides a summary of the sources of phosphorus from the Bennett Lake and Wakefield Lake watersheds.

Table 4-11 Growing season load capacity for Bennett Lake and Wakefield Lake

| Waterbody | Critical Year | Watershed Runoff | Atmospheric Deposition | Internal Loading[1] | Curly-leaf Pondweed | Total |
|---|---|---|---|---|---|---|
| **Existing Conditions Total Phosphorus Load (lbs)** | | | | | | |
| Bennett Lake | 2005 | 70.1 | 2.3 | 78.1 | 12.3 | 162.8 |
| Wakefield Lake | 2004 | 127.7 | 1.4 | 60.4 | -- | 189.5 |
| **Estimated Load Capacity Total Phosphorus Load (lbs)** | | | | | | |
| Bennett Lake | 2005 | 27.4 | 2.3 | 15.6 | 2.5 | 47.8 |
| Wakefield Lake | 2004 | 106.7 | 1.4 | 12.1 | -- | 120.2 |

[1] Residual internal loading from all internal sources excluding P release from Curly-leaf Pondweed.

*Excerpted from the TMDL document*

Table 4-12 of the TMDL document identifies the MS4 areas that contribute P loads to Bennett and Wakefield Lakes.

Table 4-12 MS4 summary for Bennett Lake and Wakefield Lake

| Waterbody | MS4 Name | MS4 ID Number | MS4 Area within the Contributing Watershed (acres)[1] |
|---|---|---|---|
| Bennett Lake | City of Roseville | MS400047 | 632 |
| | Ramsey County | MS400191 | 45 |
| | MnDOT Metro District | MS400170 | 55 |
| Wakefield Lake | City of Maplewood | MS400032 | 664 |
| | Ramsey County | MS400191 | 181 |
| | City of St. Paul | MN0061263 | 47 |
| | City of North St. Paul | MS400041 | 27 |

[1] Open water area removed from total MS4 contributing watershed area (open water summary in Table 3-2).

*Excerpted from the TMDL document*

Failing Septic Systems are not identified as a source of P to either Bennett or Wakefield Lakes.

> *"All properties within the Bennett Lake and Wakefield Lake subwatersheds are served by the sanitary sewer and that no active septic systems remain in those areas. We obtained septic system data from the City of Maplewood as well as the City of St. Paul and there are no known septic systems within the Wakefield Lake*

*subwatershed. We confirmed with Ryan Johnson (Environmental Specialist, City of Roseville Public Works/Engineering) that there are no SSTS systems in the City of Shoreview."*
*[Excerpted from the TMDL Document]*

MS4 ID numbers are provided in Table 4-1 for Battle Creek, Table 4-3 for Fish Creek, and Table 4-12 for Bennett and Wakefield Lakes.

Section 3 of the TMDL document provides an extensive discussion of the watershed characteristics, including existing land use, for the two streams and two lakes under study. Section 3.1 of the TMDL includes a discussion of the physical characteristics of Battle Creek and Fish Creek including a discussion of the physical characteristic of their respective drainage areas. Also discussed is the impact of past restoration efforts in the watersheds. Table 3-2 of the TMDL document provides a summary of the land use characteristics of the overall Ramsey Washington Metro TMDL study area.

Table 3-2 Met Council 2010 Land Use Classification of the RWMWD TMDL study areas

| | Land Use Area (acres) | | | | | |
|---|---|---|---|---|---|---|
| 2010 Generalized Land Use | Battle Creek | Fish Creek | Bennett Lake | Wakefield Lake | Total (ac) | Percent of Study Area (%) |
| Agricultural | 62.5 | 183.4 | -- | -- | 245.8 | 5% |
| Golf Course | 0.2 | -- | 15.1 | 105.5 | 120.7 | 2% |
| Institutional | 208.5 | 7.2 | 93.7 | 114.2 | 423.6 | 8% |
| Major Highway | 112.1 | 46.5 | 47.3 | 0.6 | 206.5 | 4% |
| Manufactured Housing Parks | -- | -- | 12.6 | -- | 12.6 | 0% |
| Park, Recreational, or Preserve | 661.2 | 153.7 | 76.5 | 65.5 | 956.8 | 18% |
| Retail and Other Commercial | 168.0 | 15.2 | 20.2 | 80.2 | 283.6 | 5% |
| Mixed Use Industrial and Utility | 277.7 | -- | 9.3 | 9.1 | | |
| Mixed Use Residential and Multifam | 122.4 | -- | 28.0 | 37.3 | | |
| Single Family | 1053.2 | 191.0 | 414.5 | 447.7 | 2106.3 | 39% |
| Undeveloped | 170.6 | 186.3 | 15.4 | 58.8 | 431.1 | 8% |
| Water | 66.8 | -- | 39.6 | 25.7 | 132.2 | 2% |
| Total (ac) | 2903 | 783 | 772 | 945 | 5403 | 100% |

[1] Green bars indicate the relative percent of total land area within each generalized land use group.

*Excerpted from the TMDL document*

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.

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.

### Section 2 Review Comments:

The TMDL document identifies and discusses the applicable water quality standards (WQS) for each of the four waterbodies addressed in the document. Review Table 1 presents a summary of each of the impairments, applicable WQS, and numerical criteria for each of the four waterbodies.

The numerical water quality targets relevant to each of the four waterbody pollutant combinations addressed are identified in the TMDL document and summarized in Review Table 1 in Section 1 of this review.

*Battle Creek - (07010206-592) - Suspended Sediment (TSS)*

*Battle Creek is classified as a Class 2B water (cool/warm water) and is located in the Central River Nutrient Region. The TSS standard applicable to Battle Creek as defined by Minn. R. 7050.0222 is outlined below:*

- *TSS Standard (Class 2B, Central River Nutrient Region) = 30 mg/L*
- *TSS standards for the Class 2B North, Central, and South River Nutrient*

*regions and the Red River main stem may be exceeded for no more than 10% of the time. This standard applies April 1 through September 30.*

*[Excerpted from the TMDL Document]*

*Fish Creek - (07010206-606)-E-coli*

Section 2.3 of the TMDL document discusses the applicable E. coli standards for Fish Creek.

*Fish Creek is classified as Class 2C water (indigenous fish and associated aquatic life and habitat). Narrative and numeric standards for E. coli applicable to Class 2C streams are outlined below. The narrative standard for Class 2B waters (also applicable to Class 2C waters) is defined in Minn. R. 7050.0222:*

*The quality of Class 2B surface waters shall be such as to permit the propagation and maintenance of a healthy community of cool or warm water sport or commercial fish and associated aquatic life, and their habitats. These waters shall be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable.*

*The numeric standard for Class 2C waters is in terms of E. coli:*

*Not to exceed 126 organisms per 100 milliliters as a geometric mean of not less than five samples representative of conditions within any calendar month, nor shall more than 10% of all samples taken during any calendar month individually exceed 1,260 organisms per 100 milliliters. The standard applies only between April 1 and October 31.*

*[Excerpted from the TMDL Document]*

*Bennett Lake and Wakefield Lake Total Phosphorus (P) TMDL*

Section 2.4 of the TMDL document discusses the shallow lake eutrophication standards applicable to Bennet and Wakefield Lakes.

*According to Minn. R. ch. 7050.0150 and Minn. R. ch. 7050.0222, subp. 4, Bennett Lake and Wakefield Lake are located in the NCHF ecoregion and both are considered shallow lakes. To demonstrate compliance with the MPCA lake eutrophication standards, in addition to meeting phosphorus limits, Chl-a and Secchi disc transparency standards must also be met. In developing the lake nutrient standards for Minnesota lakes (Minn. R. 7050), the MPCA evaluated data from a large cross-section of lakes within each of the state's ecoregions (MPCA 2005). Clear relationships were established between the causal factor TP and the response variables Chl-a and Secchi disc transparency. Based on these relationships it is expected that by meeting the phosphorus target in each lake, the Chl-a and Secchi disc transparency standards will likewise be met.*

*[Excerpted from the TMDL Document]*

Table 2-2 of the TMDL document shows the water quality standards for the Bennett and Wakefield Lake TMDLs. The Total Phosphorus standard of 60 mg/l serves as the target for the TMDLs.

Table 2-2 Numeric water quality standards for shallow lakes in the North Central Hardwood Forest Ecoregion

| Parameters | Shallow[1] Lake Standard |
|---|---|
| Total Phosphorus µg/L | ≤ 60 |
| Chlorophyll *a* (µg/L) | ≤ 14 |
| Secchi Disc (meters) | ≥ 1.0 |

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

*Excerpted from the TMDL document*

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.

## Section 3 Review Comments

*Battle Creek - (07010206-592) - Suspended Sediment (TSS)*

Figure 4-2 of the TMDL document identifies the TSS loading capacity in lbs/day as a continuous function of discharge in the form of a load duration curve. Load duration curves account for both critical conditions and seasonal effects by directly determining the loading capacity for all flow conditions.

Table 4-2 of the TMDL document identifies the TSS loading capacity of Battle Creek expressed in the form of lbs/day for each of the five flow regimes identified in the flow duration curve.

The relationship between the sources of sediment to Battle Creek and in stream TSS concentrations is discussed in Section 4.1 of the TMDL document. Additional background describing how TSS was identified as the primary stressor causing the impairments to Battle Creek is presented in a previous separate study referenced in the document, Battle Creek Stressor Identification Report, MPCA, December 2015 (https://www.pca.state.mn.us/sites/default/files/wq-iw11-07n.pdf)

Section 3.5.1.1 provides a brief overview of how excess sediment causes stress on fish and aquatic macroinvertebrates.

> *Excess TSS loading can adversely affect biota by four main pathways: (1) impairment of filter feeding, by filter clogging or reduction of food quality; (2) reduction of light penetration and visibility in the stream, which may alter interactions between visually-cued predators and prey, as well as reduce photosynthesis and growth by submerged aquatic plants, phytoplankton, and periphyton; (3) physical abrasion by sediments, which may scour food sources (e.g., algae) or directly abrade exposed surfaces (e.g., gills) of fishes and invertebrates; and (4) increased heat absorption, leading to increased water temperatures (Cormier 2007).*
> *[Excerpted from the TMDL Document]*

A flow duration curve and load duration curve were developed to determine the daily maximum load of sediment that Battle Creek can assimilate while still attaining water quality standards under all flow conditions.

*The applicable water quality standard for TSS applies to the months of April through September. Therefore, a flow duration curve was developed by calculating the average daily flow in Battle Creek for the months of April through September and ranking the resulting values from highest to lowest. Flow measurements were collected at the Battle Creek WOMP station (Figure 3-5) from 1996 through 2013. The flow-duration curve for Battle Creek shown in Figure 4-1 depicts the percentage of time that the average daily flow in any given month between April and September exceeds a particular flow rate value…..*
*Similar to the flow duration curve, the load duration curve relates TSS loading at a given flow to how often that flow value is exceeded in the stream. The load duration curve is calculated by multiplying the flow duration curve (Figure 4-1) by the MPCA TSS water quality standard for Class 2B streams (30 mg/L; see Section 2.2) and converting to a daily loading in terms of pounds (lbs) of TSS per day. The resulting TSS load is then plotted relative flow duration interval. The final TSS load duration curve (Figure 4-2) represents the TMDL for Battle Creek for any given flow rate observed in the available data set.*
*[Excerpted from the TMDL Document]*

Load duration curves account for both critical conditions and seasonal effects by directly determining the loading capacity for all flow conditions.

Table 4-2 of the TMDL document provides a summary of the existing loads, allocated loads, and the reductions needed to achieve the allocated loads for each of the 5 flow regimes identified for the flow duration curve.

Table 4-2 Battle Creek TMDL summary

| | Flow Zone | | | | |
|---|---|---|---|---|---|
| | Very High | High | Mid | Low | Very Low |
| | TSS Loading (lbs/day) | | | | |
| **Wasteload Allocation** | **1,876** | **723** | **395** | **141** | **13** |
| Maplewood | 1,763 | 679 | 371 | 133 | 12 |
| Ramsey County | | | | | |
| St. Paul | | | | | |
| Washington County | | | | | |
| Woodbury | | | | | |
| Construction / Industrial | 31 | 12 | 7 | 2 | 0 |
| MnDOT Metro District | 82 | 32 | 17 | 6 | 1 |
| Load Allocation | 2,551 | 982 | 537 | 193 | 17 |
| Margin of Safety (10%) | 492 | 189 | 104 | 37 | 3 |
| Total Load Capacity (TMDL) | 4,919 | 1,893 | 1,036 | 372 | 32 |
| Existing Load, Permitted[1] | 22,059 | 6,555 | 3,173 | 470 | 52 |
| Existing Load, Non-Permitted[1] | 29,992 | 8,912 | 4,314 | 639 | 70 |
| Total Existing Load[1] | 52,051 | 15,466 | 7,487 | 1,109 | 122 |
| Required Load Reduction | 47,132 | 13,573 | 6,451 | 737 | 90 |
| Required Load Reduction (%) | 91% | 88% | 86% | 66% | 73% |

[1] Loading reported for all existing condition sources represents the 90th percentile of observed loading.

Section 4.1 of the TMDL document describes the development of a TSS load duration curve for Battle Creek and identifies the amount of reduction in sediment load that is necessary to achieve the TSS water quality standard. The load duration curve is presented in Figure 4-2 of the TMDL document and represents the TMDL target for Battle Creek which is set at the water quality standard of 30 mg/l.

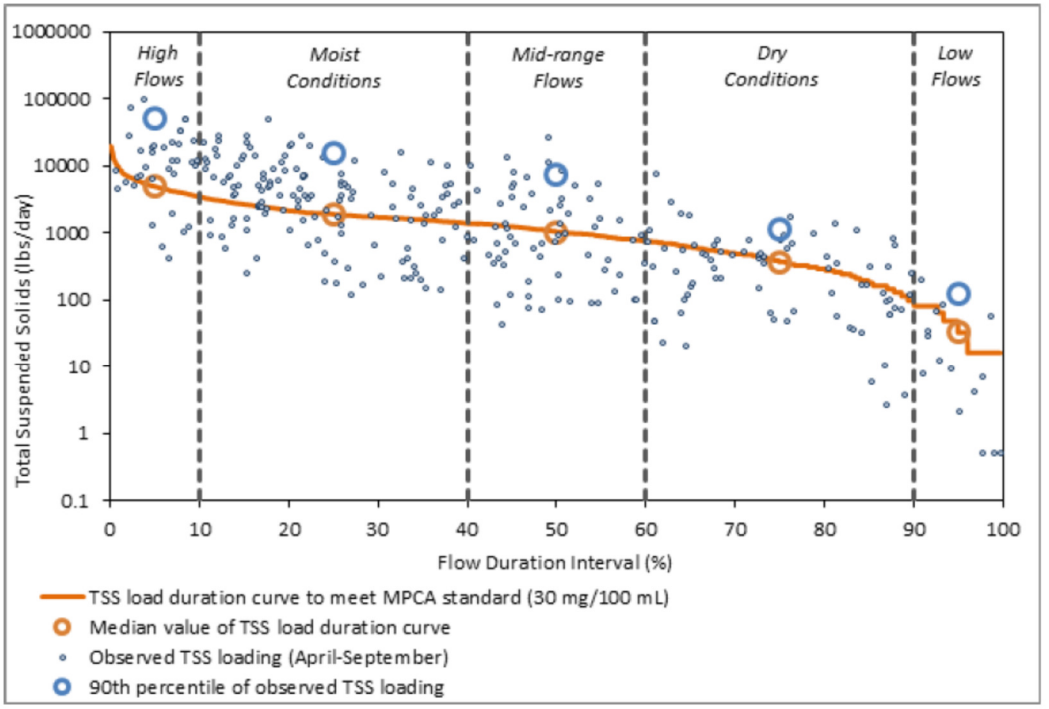


Figure 4-2 Battle Creek TSS load duration curve

*Excerpted from the TMDL document*

## *Fish Creek - (07010206-606)-E-coli*

Figure 4-5 of the TMDL document identifies the *E. coli* loading capacity in organisms/day as a continuous function of discharge in the form of a load duration curve. Load duration curves account for both critical conditions and seasonal effects by directly determining the loading capacity for all flow conditions.

Table 4-4 of the TMDL document identifies the *E. coli* loading capacity in organisms/day for each of the five flow regimes identified in the flow duration curve.

Section 3.6.2 of the TMDL document discusses the sources of *E. coli* in the Fish Creek

watershed and how the concentrations of bacteria in Fish creek are impairing the aquatic recreation designated use.

> *….a stream is considered impaired by bacteria if the monthly geometric mean value of one or more months (from April through October) exceeds 126 organisms per 100 mL (the MPCA chronic standard) based on a minimum of five aggregated samples, and/or if 10% of the individual samples exceed 1260 organisms per 100 mL (the MPCA acute standard).*
> *[Excerpted from the TMDL Document]*

A flow duration curve and load duration curve were developed to determine the daily maximum load of E. coli that Fish Creek can assimilate while still attaining water quality standards under all flow conditions.

> *The applicable water quality standard for bacteria applies to the months of April through October. Therefore, a flow duration curve was developed by calculating the average daily flow in Fish Creek for the months of April through October and ranking the resulting values from highest to lowest. Flow measurements were collected at the Fish Creek WOMP station (Figure 3-7) from 1996 through 2013. The flow-duration curve for Fish Creek shown in Figure 4-4 depicts the percentage of time that the average daily flow in any given month between April and October exceeds a particular flow rate value. …*
> *Similar to the flow duration curve, the load duration curve relates bacteria loading at a given flow to how often that flow value is exceeded in the stream. The load duration curve is calculated by multiplying the flow duration curve (Figure 4-4) by the chronic E. coli standard for Class 2C streams (126 cfu / 100 mL) and converting to a daily loading in terms of billions of organisms per day. The resulting bacteria load is then plotted relative flow duration interval. The final chronic load duration curve (Figure 4-5) represents the TMDL for Fish Creek for any given flow rate observed in the available data set.*
> *[Excerpted from the TMDL Document]*

Section 4.2 of the TMDL document describes the development of an *E. coli* load duration curve for Fish Creek and identifies the amount of reduction in *E. coli* load that is necessary to achieve the water quality standard. The load duration curve is presented in Figure 4-5 of the TMDL document and represents the E. coli TMDL target for Fish Creek which is established as the WQS of 126 organisms per 100 ml. Although the TMDL calculations are for the chronic portion of the WQS (126 cfu/100 mL), both the acute and chronic portions of the WQS apply.

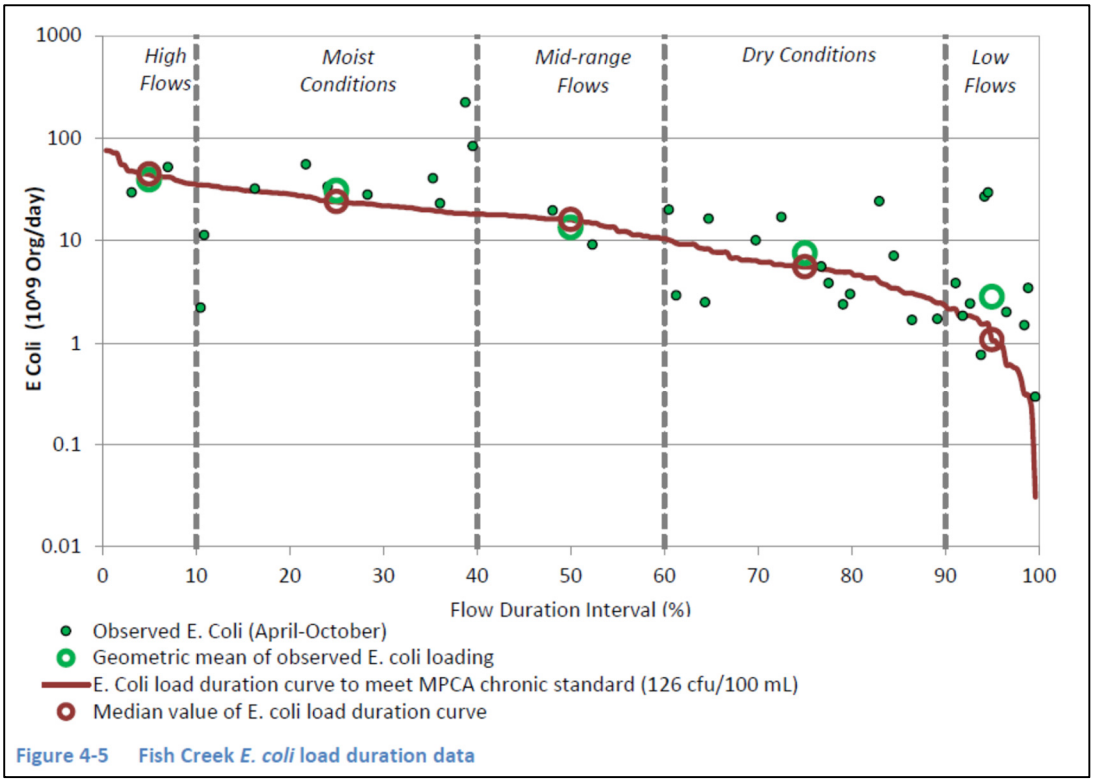


**Figure 4-5 Fish Creek *E. coli* load duration data**

*Excerpted from the TMDL document 1*

Table 4.4 of the TMDL document provides a summary of the existing loads, allocated loads, and the reductions needed to achieve the allocated loads for each of the 5 flow regimes identified for the flow duration curves.

Table 4-4 Fish Creek TMDL Summary

| | Flow Zone | | | | |
|---|---|---|---|---|---|
| | Very High | High | Mid | Low | Very Low |
| | billion organisms per day (b-org/day) | | | | |
| **Wasteload Allocation** | **39.6** | **21.3** | **14.2** | **4.9** | **1.0** |
| Maplewood | 37.3 | 20.1 | 13.4 | 4.6 | 0.9 |
| Ramsey County | | | | | |
| St. Paul | | | | | |
| Washington County | | | | | |
| Woodbury | | | | | |
| MnDOT Metro District* | 2.3 | 1.2 | 0.8 | 0.3 | 0.1 |
| Load Allocation | **0.6** | **0.3** | **0.2** | **0.1** | **0.0** |
| Margin of Safety (10%) | **4.5** | **2.4** | **1.6** | **0.6** | **0.1** |
| Total Load Capacity (TMDL) | **44.7** | **24.0** | **16.0** | **5.5** | **1.1** |
| Existing Load, Permitted | 17.8 | 13.9 | 6.1 | 3.4 | 1.3 |
| Existing Load, Non-Permitted | 21.5 | 16.8 | 7.3 | 4.1 | 1.5 |
| Total Existing Load | 39.3 | 30.7 | 13.4 | 7.5 | 2.8 |
| Required Load Reduction | 0 | 6.7 | 0 | 2.0 | 1.7 |
| Required Load Reduction (%) | 0% | 22% | 0% | 26% | 62% |

* MnDOT is currently loading below its wasteload allocation, and will not be required to further reduce bacteria loading (as noted in Section 4.2.8). For this reason, no portion of the required load reduction noted in Table 4-4 applies to the MnDOT Metro District.

*Excerpted from the TMDL document*

## *Bennett Lake - (62-0048-00)-Total Phosphorus (P) & Wakefield Lake - (62-0011-00)-Total Phosphorus (P)*

Section 4.3.1 of the TMDL document discusses how the P loading capacity of Bennett and Wakefield lakes were determined.

> *Water quality modeling provided the means to estimate the TP sources to each lake and estimate the effects on lake water quality. Water quality modeling was a two-fold effort, involving:*
> *• A stormwater runoff computer model (P8 Urban Catchment Model) that estimated the water and TP loads from the lake's tributary watershed; and*
> *• An in-lake mass balance model that took the water and TP loads from the lake's*

*external and internal sources, and generated the resultant lake TP concentration. [Excerpted from the TMDL Document]*

Section 4.3.1.1 of the TMDL document provided additional detail on the P8 watershed model.

*The P8 Model (Version 2.4) was used to estimate watershed runoff and TP loads from the Bennett and Wakefield Lake Watersheds. The model and its supporting information can be downloaded from the internet at http://www.wwwalker.net/p8/.....*
*The P8 model tracks stormwater runoff as it carries phosphorus across watersheds and incorporates the treatment effect of detention ponds, infiltration basins, flow splitters, etc. on the TP loads that ultimately reach downstream water bodies. P8 accounts for phosphorus attached to a range of particulate sizes, each with their own settling velocity, tracking their removal by treatment features accordingly…. The P8 models used in this TMDL were developed and updated for this study and reflect the natural wetlands and other stormwater management practices constructed throughout each watershed. The P8 model was used to generate a range of water and phosphorus loadings from each lake's watershed during the critical water quality period.*
*[Excerpted from the TMDL Document]*

The P8 model provides estimates of watershed P loadings that serve as inputs to an internal P mass balance model developed for each of the lakes. The results of the P8 model were combined with water balance models developed for each of the lakes and used to develop a mass balance model to determine the resulting concentration of P in each of the lakes for any given P loading condition. Additional factors considered in the mass balance models are discussed in Section 3 of Appendix A of the TMDL document and include upstream loads (not utilized for Bennett and Wakefield Lakes as there are no upstream waterbodies), atmospheric deposition, the uptake and release of P from aquatic plants, and the loss of P to surface water and ground water outflows. Once calibrated, the mass balance models are then used to predict the P concentrations and resulting water quality in each of the lakes.

*Once the in-lake mass balance model was calibrated for each lake, the models were used in a predictive manner to evaluate the impact of changes in water and phosphorus loading on the lake water quality. Additionally, the mass balance was used to estimate the TMDL load capacity and required phosphorus load reduction that would result in the expected in-lake water quality that would meet the MPCA water quality standards during the GS period.*
*[Excerpted from the TMDL Document]*

The movement of storm water inputs through and within Wakefield Lake required additional modeling to account for flow patterns that resulted in a portion of the stormwater bypassing the lake and flowing directly to the outlet resulting in the "short circuiting" of P moving into and through Wakefield Lake. The Adaptive Hydraulics (Version 4.2) model, developed by the Coastal and Hydraulic Laboratory (CHL), was used to model the effects of this flow pattern.

Appendix D of the TMDL document discusses the need for and development of the AdH 2d model.

> *There are three storm sewer inlets to Wakefield Lake, including discharges from the subwatersheds PHAL-03a (northwest inlet), PHAL-03b (northeast inlet), and PHAL-03c (southeast inlet, also known as the "Larpenteur Avenue storm sewer", see Figure 3-4 of this TMDL study). However, during the development of the Wakefield Lake Strategic Lake Management Plan (Barr 2008), it was suspected that much of the runoff coming from the area drained by the Larpenteur Avenue storm sewer (including subwatersheds PHAL 03c and upstream PHAL 01, PHAL 02a and PHAL 02b) may not significantly influence the observed water quality of Wakefield Lake. Because the flows from Larpenteur Avenue enter on the southeast end of the lake directly across from the lake's outlet on the southwest corner of the lake, it was suspected that flow may be effectively bypassing the lake (short-circuiting). Water quality in the southern part of the lake has not historically been monitored (historic monitoring location is in the center of the lake, see Figure D-1), so the impact of PHAL 03c flows on Wakefield Lake's water quality in the southern end of the lake are unknown. However, if short-circuiting occurs, it must be accounted for as part of the in-lake modeling to appropriately quantify the watershed phosphorus loads to Wakefield Lake that influence the water quality (as observed) and to deduce the lake's internal phosphorus loads (see Section 4.3.1.7 for additional discussion of the in-lake mass balance modeling). In order to better understand the mixing dynamics of Wakefield Lake and to estimate the contribution of the runoff from the Larpenteur Avenue storm sewer to the observed water quality in the main body of the lake, a 2-dimensional (2D) hydraulic model of inflows and mixing patterns in Wakefield Lake was developed.*
> *[Excerpted from the TMDL Document]*

Table 4-13 of the TMDL document identifies the Total Phosphorus loading capacity of Bennet Lake in lbs/day for the applicable growing season (June 1 through September 30).

Table 4-14 of the TMDL document identifies Total Phosphorus loading capacity of Wakefield Lake in lbs/day for the applicable growing season (June 1 through September 30).

The criteria used for determining impairments are outlined in the MPCA's Guidance Manual for Assessing the Quality of Minnesota Surface Waters for the Determination of Impairment: 305(b) Report and 303(d) List (MPCA 2014a) referenced in the document. Table 2-2 of the TMDL document shows the numerical water quality criteria determined to be protective of designated uses for shallow lakes in the Northern Hardwood Forest Ecoregion

Critical conditions for Bennett and Wakefield lakes are discussed in Sections 3.5.4 and 4.3, and summarized in Table 3-12 of the TMDL document. Critical conditions are addressed by targeting the TMDLs to the years which produced the highest growing season concentration of TP.

Table 4-13 of the TMDL document presents a summary of the existing loads, allocated

loads, and percent reduction needed to achieve the allocated loads for Bennet Lake.

Table 4-13 Bennett Lake TMDL Summary

| Total Phosphorus Source | Existing Conditions (lbs/GS[2]) | Existing Conditions (lbs/day) | TMDL Allocation (lbs/GS[2]) | TMDL Allocation (lbs/day) | Required Load Reduction (lbs/GS[2]) | Percent Reduction (%) |
|---|---|---|---|---|---|---|
| **Wasteload Allocation (Permitted Sources)** | | | | | | |
| City of Roseville *MS400047*<br>Ramsey County *MS400191* | 60.0 | 0.4915 | 20.1 | 0.1650 | 39.8 | 66% |
| NPDES-Permitted Construction and Industrial Stormwater | 0.9 | 0.0071 | 0.9 | 0.0071 | 0 | 0% |
| MnDOT Metro District *MS400170* | 9.2 | 0.0758 | 1.6 | 0.0133 | 7.6 | 82% |
| Total Wasteload Sources | 70.1 | 0.5744 | 22.6 | 0.1854 | 47.4 | 67.7% |
| **Load Allocations (Non-Permitted Sources)** | | | | | | |
| Atmospheric Deposition | 2.3 | 0.0191 | 2.3 | 0.0191 | 0 | 0% |
| Internal Sources[3] | 90.3 | 0.7405 | 18.1 | 0.1481 | 72.3 | 80% |
| Total Load Sources | 92.7 | 0.7596 | 20.4 | 0.1672 | 72.3 | 78% |
| **Margin of Safety[1]** | | | 4.8 | 0.0392 | | |
| **Total** | 162.7 | 1.3339 | 47.8 | 0.3918 | 119.7 | 74% |

[1] Margin of safety implicitly included in modeling assumptions (see Section 4.3.4).

[2] GS = Growing Season of 2005 (June 1 through September 30).

[3] Reflects the sum of all internal sources of phosphorus (e.g., Curly-leaf Pondweed, sediment release, sediment resuspension due to wind and carp activity, etc.).

*Excerpted from the TMDL document*

*Wakefield Lake - (62-0011-00)-Total Phosphorus (P)*

Table 4-14 of the TMDL document presents of summary of the existing loads, allocated loads, and percent reduction needed to achieve the allocated loads for Wakefield Lake.

Table 4-14 Wakefield Lake TMDL Summary

| Total Phosphorus Source | Existing Conditions (lbs/GS[2]) | Existing Conditions (lbs/day) | TMDL Allocation (lbs/GS[2]) | TMDL Allocation (lbs/day) | Required Load Reduction (lbs/GS[2]) | Percent Reduction (%) |
|---|---|---|---|---|---|---|
| **Wasteload Allocation (Permitted Sources)** | | | | | | |
| City of Maplewood *MS400047* | 126.1 | 1.0335 | 93.1 | 0.7629 | 33.0 | 26% |
| City of St. Paul *MN0061263* | | | | | | |
| City of North St. Paul *MS400041* | | | | | | |
| Ramsey County *MS400191* | | | | | | |
| NPDES-Permitted Construction and Industrial Stormwater | 1.6 | 0.0130 | 1.6 | 0.0130 | 0.0 | 0% |
| Total Wasteload Sources | 127.7 | 1.0465 | 94.7 | 0.7759 | 33.0 | 26% |
| **Load Allocations (Non-Permitted Sources)** | | | | | | |
| Atmospheric Deposition | 1.4 | 0.0115 | 1.4 | 0.0115 | 0 | 0% |
| Internal Sources[3] | 60.4 | 0.4947 | 12.1 | 0.0989 | 48.3 | 80% |
| Total Load Sources | 61.8 | 0.5062 | 13.5 | 0.1104 | 48.3 | 78% |
| **Margin of Safety[1]** | | | 12.0 | 0.0985 | | |
| **Total** | 189.4 | 1.5527 | 120.2 | 0.9848 | 81.3 | 43% |

1 Margin of safety implicitly included in modeling assumptions (see Section 4.3.4).

2 GS = Growing Season of 2004 (June 1 through September 30).

3 Reflects the sum of all internal sources of phosphorus (e.g., Curly-leaf Pondweed, sediment release, sediment resuspension due to wind, etc.).

*Excerpted from the TMDL document*

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.

## Section 4 Review Comments

*Battle Creek - (07010206-592) - Suspended Sediment (TSS)*

Table 4-2, Battle Creek TMDL Summary, provides a load allocation of TSS in the form of lbs/day for each of the 5 flow regimes identified in the load duration curve. The strategy for determining the load allocation is discussed in Section 4.1.5 of the TMDL document.

> *The LA is the remaining load after the MOS and WLA are subtracted from the total load capacity of each flow zone. For this TMDL, the LA includes loading from upstream waterbodies (i.e., Battle Creek Lake), and loading from sources within the stream and stream corridor (e.g., sediment resuspension within the stream channel, erosion and bank failure within the stream corridor, in-channel algal production, etc.).*
> *[Excerpted from the TMDL Document]*

MPCA did not subdivide the LA into additional subcategories.

*Fish Creek - (07010206-606)-E-coli*

Table 4-4, Fish Creek TMDL Summary, provides a load allocation of *E. coli* in the form of organisms per day for each of the 5 flow regimes identified in the load duration curve. The strategy for determining the load allocation is discussed in section 4.2.5 of the TMDL document.

> *The LA is the remaining load after the MOS and WLA are subtracted from the total load capacity of each flow zone. For this TMDL, the existing non-permitted bacterial load includes loads from non-compliant SSTS, sanitary sewer exfiltration, and bacteria loading from wildlife. By law, septic systems cannot discharge to surface waters, hence, for this TMDL, septic systems are assigned an allowable load of zero billion organisms per day. Likewise, exfiltration from sanitary sewer systems are assigned an allowable load of zero billion organisms per day.*
> *[Excerpted from the TMDL Document]*

MPCA did not subdivide the LA into additional subcategories.

*Bennett Lake - (62-0048-00) & Wakefield Lake - (62-0011-00)-Total Phosphorus (P)*

Table 4-13, Bennet Lake TMDL Summary, provides a load allocation of Total P in lbs/day. Table 4-14, Wakefield Lake TMDL Summary, provides a load allocation of Total P in lbs/day. The strategy for determining the load allocation is discussed in Section 4.3.5 of the

TMDL document.

> *Existing phosphorus loads from non-permitted sources to Bennett and Wakefield Lake include direct atmospheric deposition to the lake surface and internal loading. The phosphorus LA for direct deposition to the lake surface and groundwater inflows is the same as existing conditions. Internal loading of phosphorus is a large proportion of TP load to both lakes. Based on identified implementation options, attainable percent reductions were applied to the internal load of Bennett Lake and Wakefield Lake.*
> *[Excerpted from the TMDL Document]*

MPCA divided the LA for TP for the lakes into internal loading and atmospheric loading. MPCA determined that atmospheric loading cannot be reduced, but that significant internal loading reductions will be necessary to attain WQS in the two lakes.

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of the forth 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 permitees 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.

No non-MS4 permitted NPDES facilities are identified in the document for any of the 4 waterbody pollutant combinations studied and therefore no WLA (WLA = 0) are calculated for WWTP or other point source discharges.

*Battle Creek - (07010206-592) - Suspended Sediment (TSS)*

Table 4-2 of the TMDL document, Battle Creek TMDL Summary, provides a waste load allocation of TSS in the form of lbs/day for each of the 5 flow regimes identified in the load duration curve to account for MS4 loads and also provides a waste load allocation of TSS in the form of lbs/day to account for construction and industrial stormwater loadings for each of the 5 flow regimes identified in the load duration curve. The methodology used to determine waste loads for Battle Creek is discussed in Section 4.1.4 of the TMDL document.

> *There are portions of six MS4s within the Battle Creek Watershed (Figure 4-3). Table 4-1 summarizes the total area of each MS4 within the Battle Creek Watershed. The MS4 WLAs were calculated by multiplying the municipalities' percent watershed coverage by the total watershed loading capacity after the MOS and permitted source discharge allocations were subtracted. Permitted sources of TSS include all TSS mobilized by watershed runoff and discharged into the stream through MS4 storm sewer infrastructure.*
> *[Excerpted from the TMDL Document]*

MPCA calculated the WLAs on a categorical basis (MS4 stormwater). As noted in Section 4.1.8 of the TMDL document, the Ramsey Washington Metro Watershed District is developing an implementation plan, and a categorical WLA for the MS4 will allow flexibility in implementing the plan.

The WLAs for the construction and industrial stormwater permits are based on estimates of the average annual percentage of the county area under an MPCA Construction or Industrial Stormwater Permit (0.7%).

*Fish Creek - (07010206-606)-E-coli*

Table 4-4 of the TMDL document, Fish Creek TMDL Summary, provides a waste load allocation of *E. coli* in the form of organisms per day for each of the 5 flow regimes identified in the load duration curve to account for MS4 loads. The methodology used to determine waste loads for Fish Creek is discussed in Section 4.2.4 of the TMDL document.

> *There are portions of seven MS4s within the Fish Creek Watershed (Figure 4-6). Table 4-3 summarizes the total area of each MS4 within the Fish Creek Watershed.*

*The MS4 WLAs were calculated by multiplying the municipalities' percent watershed coverage by the total watershed loading capacity after the MOS and permitted point source discharge allocations were subtracted. E. coli from improperly managed pet waste mobilized by stormwater runoff was the only point source of E. coli identified in the Fish Creek Watershed.*
*[Excerpted from the TMDL Document]*

WLAs for construction and industrial site *E. coli* were not provided. Section 4.2.4 provides the following rationale.

*The WLAs for regulated construction stormwater (permit #MNR100001) were not developed, since E. coli is not a typical pollutant from construction sites. The WLAs for regulated industrial stormwater were also not developed. Industrial stormwater must receive a WLA only if the pollutant is part of benchmark monitoring for an industrial site in the watershed of an impaired water body. There are no bacteria or E. coli benchmarks associated with any of the Industrial Stormwater Permit (permit #MNR050000).*
*[Excerpted from the TMDL Document]*

MPCA calculated the WLAs on a categorical basis (MS4 stormwater). As noted in Section 4.2.9 of the TMDL document, the Ramsey Washington Metro Watershed District is developing an implementation plan, and a categorical WLA for the MS4 will allow flexibility in implementing the plan.

*Bennett Lake - (62-0048-00) & Wakefield Lake (62-0011-00) Total Phosphorus (P)*

Table 4-13 Bennet Lake TMDL Summary, provides a waste load allocations of total phosphorus in lbs/day to account for MS4 loads and a WLA for NPDES permitted construction and industrial stormwater loads.

Table 4-14 Wakefield Lake TMDL Summary, provides a waste load allocations of total phosphorus in lbs/day to account for MS4 loads and a WLA for NPDES permitted construction and industrial stormwater loads.

The methodology used to determine waste loads for Battle Creek is discussed in Section 4.3.3 of the TMDL document.

*To determine the WLAs assigned to each individual MS4 in the Bennett Lake Subwatershed, the fraction of the watershed phosphorus wasteload for each MS4 was allocated proportional to the area of each MS4's contributing watershed. For example, the city of Roseville comprises 86% of the total land area in Bennett Lake, and receives 86% of the estimated load capacity for watershed sources of*

*phosphorus. The WLA calculation for MS4s in the Wakefield Lake Watershed was based on a similar methodology, but accounts for the fact that 2D modeling in AdH (see Section 4.3.1.5) showed that subwatersheds PHAL-03a, PHAL-03b, and PHAL-03c located in the southern portion of the watershed short-circuit, and only 30% of the soluble phosphorus load from these subwatersheds contributes to water quality in Wakefield Lake. To account for short-circuiting, the portion of the WLA assigned to subwatersheds PHAL-03a, PHAL-03b, and PHAL-03c was adjusted based on the effective loading of 30% of the total soluble phosphorus loads from these areas. The WLA allocation for all other subwatersheds was based on the total contributing area of each MS4 within each subwatershed.*
*[Excerpted from the TMDL Document]*

The WLAs for the construction and industrial stormwater permits are based on estimates of the average annual percentage of the county area under an MPCA Construction or Industrial Stormwater Permit (1.24%).

MPCA calculated the WLAs on a categorical basis (MS4 stormwater). As noted in Section 4.3.6 of the TMDL document, the Ramsey Washington Metro Watershed District is developing an implementation plan, and a categorical WLA for the MS4 will allow flexibility in implementing the plan.

Reserve Loading Capacity.

Section 4.4 of the TMDL document addresses how the State will accommodate future growth in MS4s and potential new or expanding NPDES discharges. No existing loading capacity is being held in reserve to accommodate future increased wasteload or non-point source loads. In the event of an increase in the area covered under an MS4 permit, or a new MS4 district is created, loading capacity will be taken from the Load Allocation and reallocated to accommodate the additional Wasteload needed for the MS4. In the event that one MS4 acquires land from another, Wasteload will be reallocated accordingly.

To accommodate a new or expanded NPDES point source discharge, MPCA will follow standard procedures for reallocating loading capacity from the Load Allocation to the Wasteload Allocation agreed upon between EPA Region 5 and MPCA.

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

## 6. Margin of Safety (MOS)

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

## Section 6 Review Comments:

*Battle Creek - (07010206-592) - Suspended Sediment (TSS)*

Table 4-2 of the TMDL document, Battle Creek TMDL Summary, provides a MOS in the form of lbs of TSS per day for each of the 5 flow regimes identified in the load duration curve. The MOS selected equates to 10% of the total loading capacity at each of the midpoints of the 5 flow regimes. The document justifies the choice of a 10% MOS as follows.

> *A 10% MOS was considered to be appropriate because the load duration curve minimizes uncertainties that can arise through other approaches. Load duration curves are simply a function of average daily flow multiplied by numerical water quality standards.*
> *[Excerpted from the TMDL Document]*

*Fish Creek - (07010206-606)-E-coli*

Table 4-4 of the TMDL document, Fish Creek TMDL Summary, provides a MOS allocation of *E. coli* in the form of organisms per day for each of the 5 flow regimes identified in the load duration curve. The MOS selected equates to 10% of the total loading capacity at each of the midpoints of the 5 flow regimes. The document justifies the choice of a 10% MOS as follows.

> *A 10% MOS was considered to be appropriate because the load duration curve minimizes uncertainties that can arise through other approaches. Load duration curves are simply a function of average daily flow multiplied by numerical water quality standards.*
> *[Excerpted from the TMDL Document]*

*Bennett Lake - (62-0048-00)-Total Phosphorus (P) & Wakefield Lake - (62-0011-00)-Total Phosphorus (P)*

Section 4.3.4 discusses the MOS for Bennet and Wakefield Lakes. A MOS of 10% is applied prior to subtraction of the waste load allocation and load allocation.

*For the Bennett and Wakefield TMDLs, an explicit MOS was calculated to account for variability in the water quality data and uncertainty in the watershed and lake water quality models. A 10% MOS is considered to be sufficient based on the robust, long-term data records and the generally good agreement between the observed lake water quality and the water quality predicted by the lake response models. The watershed loading models and lake response models reasonably reflect the watershed and lake conditions.*[1]

Additional information on the calibration of the in-lake mass balance model is provided in Table 4-10 of the TMDL document.

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

## 7. Seasonal Variation

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

### Section 7 Review Comments:

*Battle Creek - (07010206-592) - Suspended Sediment (TSS) & Fish Creek - (07010206-606)-E-coli*

Sections 4.1.7 and 4.2.7 of the TMDL document discuss how seasonal variation is accounted for through the utilization of flow duration curves to establish the TMDL loading rates, thereby incorporating the seasonal variability into the load duration curve. Since load duration curves directly calculate the loading capacity throughout the entire hydrograph, seasonal variation is directly accounted for in the derivation of the load duration curve.

*Bennett Lake - (62-0048-00)-Total Phosphorus (P) and Wakefield Lake - (62-0011-00)-Total Phosphorus (P)*

Section 4.3.5 discusses how seasonal variation is accounted for by targeting the TMDL to address the growing season.

*The TP concentrations in Bennett Lake and Wakefield Lake vary during the growing*

[1] Quoted language is not part of the final TMDL submission but was later provided to EPA Region 5 as part of an Email from MPCA (email - 8/29/2017 11:25 A.M. from Brooke Asleson of MPCA)

*season, typically peaking in late summer. The TMDL guideline for TP is defined as the growing season (June through September) mean concentration (MPCA 2014a). This critical period (growing season) was used to estimate the required reduction of watershed and internal sources of phosphorus so that the predicted growing season average would meet the MPCA lake standard (see additional discussion in Section 4.3.1.7) for the critical year. Additionally, the WLAs and LAs for Bennett and Wakefield Lake were developed for the year that produced the worst water quality in each lake over the last 10 years of data analyzed (i.e., the critical year) rather than the average water quality condition over the last 10 years.*
*[Excerpted from the TMDL Document]*

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.

### Section 8 Review Comments:

*Clean Water Legacy Act:*

The CWLA was passed in Minnesota in 2006 for the purposes of protecting, restoring, and preserving Minnesota water. The CWLA provides the protocols and practices to be followed in order to protect, enhance, and restore water quality in Minnesota.

The CWLA outlines how MPCA, public agencies and private entities should coordinate in their efforts toward improving land use management practices and water management. The CWLA anticipates that all agencies (i.e., MPCA, public agencies, local authorities and private entities, etc.) will cooperate regarding planning and restoration efforts. Cooperative efforts would likely include informal and formal agreements to jointly use technical, educational, and financial resources.

The CWLA also provides details on public and stakeholder participation, and how the funding will be used. In part to attain these goals, the CWLA requires MPCA to develop Watershed Restoration and Protection Strategies (WRAPS). The WRAPS are required to contain such elements as the identification of impaired waters, watershed modeling outputs, point and nonpoint sources, load reductions, etc. (Chapter 114D.26; CWLA). The WRAPS also contain an implementation table of strategies and actions that are capable of achieving the needed load reductions, for both point and nonpoint sources (Chapter 114D.26, Subd. 1(8); CWLA). Implementation plans developed for the TMDLs are included in the table, and are considered "priority areas" under the WRAPS process (Watershed Restoration and Protection Strategy Report Template, MPCA). This table includes not only needed actions but a timeline for achieving water quality targets, the reductions needed from both point and nonpoint sources, the governmental units responsible, and interim milestones for achieving the actions. MPCA has developed guidance on what is required in the WRAPS (Watershed Restoration and Protection Strategy Report Template, MPCA). The WRAPS for the Ramsey-Washington Metro Watershed District was approved by MPCA on August 14, 2017.

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 2014 Clean Water Fund Competitive Grants Request for Proposal (RFP); Minnesota Board of Soil and Water Resources, 2014).

*MS4s*

Municipal Separate Storm Sewer System (MS4) Permits are regulated by the State of MN. All regulated municipalities are required to implement BMPs to reduce pollutants in stormwater runoff to the Maximum Extent Practicable.

> *"All owners or operators of regulated MS4s (also referred to as "permittees") are required to satisfy the requirements of the MS4 General Permit. The MS4 General Permit requires each permittee to develop a Stormwater Pollution Prevention Plan*

*(SWPPP) that addresses all permit requirements, including the following six minimum control measures:*
*· Public education and outreach*
*· Public participation*
*· Illicit Discharge Detection and Elimination Program*
*· Construction-site runoff controls;*
*· Post-construction runoff controls; and*
*· Pollution prevention and municipal good housekeeping measures*
*[Excerpted from the TMDL Document]*

*Stormwater*

Sections 5.2 and 5.3 address reasonable assurance that both construction site and industrial site stormwater WLAs will be met. Construction and Industrial site stormwater discharges are regulated by the State of MN.

*All construction activities disturbing one acre or more are required to obtain a Construction General Permit through the MPCA.*
*[Excerpted from the TMDL Document]*

*All industrial stormwater dischargers are required to obtain permit coverage under the State's NPDES/SDS Industrial Stormwater Multi- Sector General Permit (MNR050000), or NPDES/SDS General Permit for Construction Sand & Gravel, Rock Quarrying and Hot Mix Asphalt Production facilities (MNG490000). Compliance with permit standards assures that stormwater discharge will also be consistent with WLAs established in this study.*
*[Excerpted from the TMDL Document]*

*Non-Point Source Load Reductions*

Section 5.4 of the TMDL document discusses the role of the Ramsey Washington Metro Watershed District (RWMWD) in providing resources and authorities that can be called upon to implement measures to achieve the necessary load reductions. The RWMWD was established in 1975 and serves as a coordinating body with local government units through the watershed district. The RWMWD recently adopted an updated watershed management plan effective 2017 through 2026 which will serve as a framework for coordination of regulatory and non-regulatory efforts at targeted load reductions with local government units within the district.

*Prior to the development of this TMDL, the RWMWD has pursued water quality improvement projects within the TMDL study area boundaries. These efforts include various watershed studies, establishment of consistent and protective regulations, and targeted load reduction strategies. Additionally, in 2006 the District adopted*

*volume reduction rules for all development and redevelopment within the watershed. The RWMWD plans to continue these types of efforts, and use this TMDL study to help strengthen targeted load reduction efforts throughout the RWMWD, including the reduction of internal phosphorus loads to impaired lakes. With the completion of the TMDLs, the RWMWD will serve to coordinate implementation efforts among LGUs and help ensure progress toward the TMDL targets. [Excerpted from the TMDL Document]*

*Financial Resources*

Section 5.5 of the TMDL document discusses the financial resources available for implementing the measures needed to achieve the necessary load reductions.

*The CWLA also provides details on the overall TMDL process and follow-up implementation strategy development, and how the funding will be used. The Minnesota Board of Soil and Water Resources administers most of the portion of the CWF for restoration and protection grants, and has developed a detailed grants policy explaining what is required to be eligible to receive CWF money (FY15 Clean Water Fund Competitive Grants Policy; Minnesota Board of Soil and Water Resources 2014).*

*The various programs and sponsoring agencies related to clean water funding and others are:*

- *Agriculture BMP Loan Program (MDA)*
- *Clean Water Fund Grants (BWSR)*
- *Clean Water Partnership (MPCA)*
- *Environment and Natural Resources Trust Fund (Legislative-Citizen-Commission on Minnesota Resources)*
- *Environmental Assistance Grants Program (MPCA)*
- *Phosphorus Reduction Grant Program (Minnesota Public Facilities Authority)*
- *Section 319 Grant Program (MPCA)*
- *Small Community Wastewater Treatment Construction Loans & Grants (Minnesota Public Facilities Authority)*
- *Source Water Protection Grant Program (Minnesota Department of Health)*
- *Surface Water Assessment Grants (MPCA)*
- *TMDL Grant Program (Minnesota Public Facilities Authority)*
- *Wastewater and storm water financial assistance (MPCA)*
- *Minnesota Agricultural Water Quality Certification Program (MAWQCP)*

*[Excerpted from the TMDL Document]*

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.

### Section 9 Review Comments

*Battle Creek - (07010206-592) - Suspended Sediment (TSS)*

Section 6.1 of the TMDL document "Battle Creek Monitoring Plan", addresses monitoring plans for Battle Creek. Plans include ongoing monitoring of TSS in the stream, additional focused monitoring to better identify TSS sources, and monitoring of the fish and macroinvertebrate communities.

*The RWMWD plans to continue to collect water chemistry and flow data from continuous monitoring at this station. Additionally, the RWMWD plans to perform a detailed sediment study to more accurately identify sources of sediment to the stream (Section 7.3.1). Due to the biological impairment addressed in this study, continued monitoring of the fish and macroinvertebrate assemblage within Battle Creek will be required to track impairment as TMDLs and associated activities are implemented. Historically, fish and macroinvertebrate populations in Battle Creek have been assessed by several agencies, including the RWMWD, the United States Geological Survey (USGS), DNR, and the MPCA. More recent surveys (2004, 2010, and 2012) were performed by the MPCA. The MPCA is required to asses 10% of waters in the state annually, resulting in 100% coverage over a 10-year period. For this reason, it is anticipated that biological monitoring of Battle Creek will be performed every 10 years.*
*[Excerpted from the TMDL Document]*

*Fish Creek - (07010206-606)-E-coli*

Section 6.2 of the TMDL document, "Fish Creek Monitoring Plan" addresses monitoring plans for Fish Creek.

*The RWMWD plans to continue to collect water chemistry, E. coli and flow data*

*through a continuous water monitoring station, in cooperation with other entities and will report the results of its stream monitoring. The continued collection of flow and monthly E. coli data will be essential to track water quality trends, assess progress towards implementation goals, and make adaptive management decisions. [Excerpted from the TMDL Document]*

*Bennett Lake - (62-0048-00)-Total Phosphorus (P) & Wakefield Lake - (62-0011-00)-Total Phosphorus (P)*

Section 6.3 of the TMDL document discusses plans for future monitoring of Bennett and Wakefield Lakes, including plans to continue the regular collection of water quality and macrophyte data. Water quality measurements include Secchi disc transparency depth, TP, chlorophyll-*a* (Chl-*a*), and other lake eutrophication parameters. Additional more detailed monitoring may also be conducted if a degradation of water quality is detected.

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.

## Section 10 Review Comments

Section 7 of the TMDL document provides a general discussion of strategies that may be developed and implemented to achieve the load reductions outlined for each of the four TMDLs discussed in the document.

Section 7.1.1 of the TMDL document discusses the Adaptive Management process that will be utilized during the implementation of the TMDL.

*Proposed projects will be implemented in a phased manner, selecting specific projects for construction/implementation followed by a period of monitoring to evaluate the impact of the projects on the water quality of the impaired resources. Depending on the resulting water quality, additional projects may be evaluated and selected for implementation, or it may be determined that the water quality meets the MPCA standards and the management approach may change from*

*improvement to anti-degradation/protection.*
*[Excerpted from the TMDL Document]*

Section 7.2 of the TMDL document addresses implementation of permitted sources. Progress toward the reduction of loads from MS4s will be measured against a baseline year.

*For the purposes of this TMDL, the baseline year for implementation will be the critical year for the lake nutrient TMDLs and the mid-range year of the data years used for the development of the TSS and bacteria load duration curves (Table 7-1). The rationale for establishing a baseline year is that projects undertaken recently may take a few years to influence water quality. Any point source load-reducing BMP implemented since the baseline year will be eligible to "count" toward a MS4's load reductions. If a BMP was implemented during or just prior to the baseline year, the MPCA is open to presentation of evidence by the MS4 Permit holder to demonstrate that it should be considered as a credit.*
*[Excerpted from the TMDL Document]*

Table 7-1 Implementation Baseline Years

| Water body | ID | Baseline Year |
|---|---|---|
| Battle Creek | 07010206-592 | 2007 |
| Fish Creek | 07010206-606 | 2011 |
| Bennett Lake | 62-0048-00 | 2005 |
| Wakefield Lake | 62-0011-00 | 2004 |

*Excerpted from the TMDL document*

Table 7-2 of the TMDL document, "Potential TSS reduction strategies", presents a listing of potential TSS reduction strategies and Best Management Practices (BMPs) that could be utilized in the Battle Creek watershed along with cost estimates for each.

Table 7-2 Potential TSS reduction strategies

| Reduction Target | Potential BMP/Reduction Strategy | Total Estimated Associated Cost |
|---|---|---|
| N/A | **Sediment Study** – sediment chemical composition study and/or particle scale analysis to help identify sources of sediment to Battle Creek. | $30,000 |
| Permitted | **Education Programs** – Provide educational and outreach opportunities about responsible land management practices and other BMPs to encourage good individual property management practices to reduce soil loss and upland erosion. | $2,000 - $10,000 |
| | **Retrofit BMPs** – A variety of BMPs may be implemented throughout the watershed. New and improved technologies will be evaluated and implemented if determined to be practicable. Examples of retrofit BMPs considered include:<br>- Incorporation on infiltration BMPs throughout watershed, including water quality projects which take advantage of RWMWD's cost-share program.<br>- Retrofit commercial, school, and church properties with green infrastructure practices.<br>- Partnering with Ramsey County Parks and Recreation to retrofit stormwater management features on park properties tributary to Battle Creek.<br>Continue enforcement of the District's Permit Program (including the volume reduction rule) in redeveloping areas. | $3,000,000 - $8,000,000 |
| Non-Permitted | **Streambank Stabilization** – Repair and stabilize actively eroding sections of bank along the stream channel. Extend stabilization practices through stream corridor when necessary. | $50,000 - $200,000 |
| | **Dredging** – dredge accumulated sediment from McKnight Basin as well as portions of the stream where sediment has accumulated. | $200,000 - $300,000 |

*Excerpted from the TMDL document*

Table 7-3 of the TMDL document, "Potential bacteria reduction strategies", presents a listing of potential bacteria reduction strategies and BMPs that could be utilized in the Fish Creek watershed along with cost estimates for each.

Table 7-3 Potential bacteria reduction strategies

| Reduction Target | Potential BMP/Reduction Strategy | Total Estimated Associated Cost |
|---|---|---|
| Permitted | **Education Programs** – Provide education and outreach on proper fertilizer use and proper pet waste management. | $2,000 - $10,000 |
| | **Pet Waste Management** – Review member cities' local ordinances and associated enforcement for residents who do not practice proper pet waste management. | $5,000 - $15,000 |
| Non-Permitted | **Septic System Inspection Program Review** – Review ordinances pertaining to inspection and maintenance of septic systems in the watershed. This could include a survey to homeowners inquiring about SSTS maintenance. | $25,000 - $30,000 |
| | **Streambank Buffer Enhancement** – Stabilize native vegetation to filter runoff from land adjacent to the stream. A recommended goal is buffer enhancement on 25%-50% of each impaired reach. Enhancements should include at least 50 feet of buffer on both sides of the stream. | $300,000 - $1,500,000 |
| | **Sanitary Sewer Inspection** – Inspect sanitary sewer within Fish Creek Subwatershed. Identify damaged sections where exfiltration is possible. | $40,000 – $80,000 |
| | **Sanitary Sewer Repair**- Repair damaged sections to prevent exfiltration. | $10,000 - $100,000 |

*Excerpted from the TMDL document*

Table 7-4 of the TMDL document, "Potential nutrient reduction strategies", presents a listing of potential bacteria reduction strategies and BMPs that could be utilized in the Bennet and Wakefield Lake watersheds along with cost estimates for each.

Table 7-4 Potential nutrient reduction strategies

| Reduction Target | Potential BMP/Reduction Strategy | Total Estimated Associated Cost |
|---|---|---|
| Permitted | **Education Programs** – Provide education and outreach on proper fertilizer use, low-impact lawn care practices, installation of native shoreline buffers, etc. | $2,000 - $10,000/lake<br>$4,000 - $20,000 total cost |
| | **Street Sweeping Program Review/Implementation** – Identify target areas for increased frequency of street sweeping and consider upgrades to traditional street sweeping equipment. | $100,000 - $200,000/lake<br>$200,000 - $400,000 total cost |
| | **Retrofit BMPs** – A variety of BMPs may be implemented in both watersheds. New and improved technologies will be evaluated and implemented if determined to be practicable. Examples of retrofit BMPs considered include:<br>- Outlet modification (e.g., Iron-enhanced sand or spent lime filtration, etc.).<br>- Incorporation of infiltration BMPs throughout watershed, including water quality projects which take advantage of RWMWD's Cost-Share program.<br>- Partnering with cities to retrofit stormwater management features on park properties tributary to lakes.<br>- Retrofit commercial, school, and church properties with green infrastructure practices.<br>- Continue enforcement of the District's Permit Program (including the volume reduction rule) in redeveloping areas. | $1,500,000 - $2,500,000/lake<br>$3,000,000 - $5,000,000 total cost |
| Non-Permitted | **Drawdown to Consolidate Sediments** – Draw water down in the winter to consolidate sediments, and to reduce regrowth of curly-leaf pondweed and carp populations. | $10,000-$20,000 |
| | **Dredging** – Dredge accumulated sediment from ponds, existing wetlands, and/or tributary grit chambers. | $1,000,000 - $2,500,000/lake<br>$2,000,000 - $5,000,000 total cost |
| | **Shoreline Restoration** – Encourage property owners to restore their shoreline with native plants and install/enhance shoreline buffers. | $50,000 to $250,000/lake<br>$120,000 - $350,000 total cost |
| | **In-Lake Phosphorus Treatment** – Take measures to reduce internal cycling of phosphorus within the lake:<br>- Alum treatment to bind and remove phosphorus from the water column.<br>- Herbicide treatment to eliminate invasive curly-leaf Pondweed from Bennett Lake.<br>- Carp management (reduce sediment and phosphorus resuspension caused by activity of carp). | $250,000 - $1,500,000/lake<br>$500,000 - $3,000,000 total cost |

*Excerpted from the TMDL document*

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of the tenth criterion. The EPA reviews but does not approve implementation plans.

## 11. Public Participation

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

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

### Section 11 Review Comments

Section 8.1 of the TMDL document, provides a description of public outreach and public participation opportunities. Three community conversation meetings and six TMDL technical stakeholder meetings were held both before and during the TMDL development process.

The TMDL study was made available for public comments from April 3rd, 2017 to May 3rd, 2017. The draft TMDL was posted online by the MPCA at (http://www.pca.state.mn.us/water/tmdl).

MPCA received two comments from the Minnesota Department of Agriculture (MnDOA). The first comment expressed concern that potential sources of *E. coli* and nutrient loads from livestock grazing may not have been properly accounted for, and the second comment wanted to ensure that the Minnesota Agricultural Water Quality Certification Program (MAWQCP) was listed as a potential source of funding for implementation activities. MPCA addressed the first comment by noting that though there is agricultural land use in the Battle Creek and Fish Creek watersheds, the Battle Creek watershed is not impaired for either *E. coli* or nutrients. While there is no evidence of livestock grazing in the Fish Creek

watershed, they did however investigate the possibility that manure application by Bailey's Nursery may be contributing elevated *E. coli* loadings. A review of the water quality sampling data downstream of the nursery found this not to be the case. The second comment was addressed by adding text to Section 5.5 of the TMDL document to ensure that the MAWQCP is listed as a potential source of implementation resources.

MPCA responded adequately to MnDOA's comments.

Three additional comments were received from the Minnesota Department of Transportation (MnDOT). The first comment expressed MnDOT's concern that the WLA for the other 5 MS4 districts contributing TSS to Battle Creek were lumped together rather than determined separately for each MS4. MnDOT was concerned that they may be required to have a larger percentage reduction in load even though they comprise only 4% of the overall land area within the watershed. MPCA responded by noting that the magnitude of the WLA, not the percentage reduction, is set proportional to contributing land area. The second comment expressed MnDOT's concern about their WLA and percent reduction for the Fish Creek *E. Coli* TMDL. MPCA responded by noting that since current MnDOT *E. coli* loads are already below the wasteload allocation, they would not be required to achieve any reductions from their current load of *E. coli*. The third comment expressed MnDOT's concern about MnDOT's percent reduction of P load required for the Bennett Lake P TMDL. MPCA responded that similar to the case in comment number 1, the magnitude of WLA's, not percent reductions, are assigned proportional to land area.

MPCA responded adequately to MnDOT's comments.

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.

### Section 12 Review Comments:

The final TMDL was submitted to EPA accompanied by a formal letter dated August 14th, 2017 requesting review and approval of the document under section 303d of the Clean Water Act.

The EPA finds that the accompanying submittal letter satisfies the requirements of the twelfth criterion.

## 13. Conclusion

After a full and complete review, EPA finds that the TMDL study satisfies all of the elements of an approvable TMDL.

This TMDL approval is for a total of 4 TMDLs, addressing;

1. Total Suspended Sediment (TSS) in Battle Creek - (07010206-592),
2. *E. Coli* in Fish Creek - (07010206-606),
3. Total Phosphorus (P) in Bennett Lake - (62-0048-00), and
4. Total Phosphorus (P) in Wakefield Lake - (62-0011-00)

EPA's approval of this TMDL extends to the water body identified above with the exception of any portions of the water body that is 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.