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

REPLY TO THE ATTENTION OF

WW-16J

June 17, 2021

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

RE: Approval of the Final Lake of the Woods Excess Nutrients Total Maximum Daily Load

Dear Mr. Skuta:

The U.S. Environmental Protection Agency has conducted a complete review of the two final Total Maximum Daily Loads (TMDLs) for the portions of the Lake of the Woods within Minnesota's jurisdiction adjacent to Roseau and Lake of the Woods Counties, MN. The TMDLs are calculated for Total Phosphorus (TP), and address impairments to the Aquatic Recreation Use.

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 two TMDLs for the MN jurisdiction of the Lake of the Woods. The statutory and regulatory requirements, and EPA's review of Minnesota's compliance with each requirement, are described in the enclosed decision document.

We wish to acknowledge Minnesota's effort in submitting these TMDLs and look forward to future submissions by the State of Minnesota. If you have any questions, please contact James Ruppel of the Watersheds and Wetlands Branch at ruppel.james@epa.gov or 312-886-1823.

Sincerely,

Digitally signed by TERA FONG
Date: 2021.06.17 15:01:39 -05'00'

Tera L. Fong
Division Director, Water Division

Enclosure

cc: Celine Lyman, MPCA

wq-iw10-14g

U.S. Environmental Protection Agency (EPA)

Final Review and Decision

Of The

Minnesota Final Lake of the Woods Excess Nutrients

Total Maximum Daily Load (TMDL)

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40C.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.

This document is a final review of the Minnesota (MN) TMDL document titled:

Final Lake of the Woods Excess Nutrients Total Maximum Daily Load, May 2021

Section 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 of this decision document).

The TMDL submittal should include an identification of the point and nonpoint sources of the pollutant of concern, including location of the source(s) and the quantity of the loading, e.g., lbs/per day. The TMDL should provide the identification numbers of the National Pollutant Discharge Elimination System (NPDES) permits within the 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:

The waterbody(s) are identified as they appear on the 303(d) list.

A comparison of the impairment information for the Lake of the Woods (LoW) found in Table 1-1 of the final TMDL document matches information found on the MN 2020 303d list. This TMDL addresses Aquatic Recreation Beneficial Use impairment to two LoW Assessment Unit IDs (AUID). This approval only applies to the waters under the jurisdiction of Minnesota; this TMDL approval does not apply to any waters in Canada or Tribal lands, nor to any pollutant sources in those jurisdictions.

> *The LoW consists of two distinct AUIDs: one for Four Mile Bay and one for the main portion of the lake comprising the portions of Big Traverse, Little Traverse, and Muskeg Bays within the U.S.*
> *[Excerpted from the TMDL document]*

Table 1-1. Water quality impairments addressed by this TMDL study.

Lake Name	Lake ID	Lake Classification	Beneficial Use	Year Listed	Impairment
Lake of the Woods (Main)	39-0002-01	Deep	1B, 2Bd, 3A	2008	Nutrient/eutrophication biological indicators
Lake of the Woods (4 Mile Bay)	39-0002-02	Shallow	1B, 2Bd, 3A	2008	Nutrient/eutrophication biological indicators

Excerpted from the TMDL document

The portion of the Lake of the Woods Basin addressed by this TMDL is located downstream of Rainy Lake, and includes only the lands under the jurisdiction of Minnesota. Minnesota defines this as the TMDL Restoration Area (Section 1.1 and Figure 1.3 of the TMDL document). As further noted in Section 3 of this decision document, Minnesota Pollution Control Agency (MPCA) calculated one Loading Capacity for both AUIDs.

In Section 1.2 of the TMDL document the MPCA discusses the priority ranking of the waterbodies.

> *The MPCA's schedule for TMDL study completions, as indicated on the 303(d) impaired waters list, reflects Minnesota's priority ranking of this TMDL study. The MPCA developed a state plan for Minnesota's TMDL Priority Framework Report to meet the needs of the U.S. Environmental Protection Agency's (EPA) national measure (WQ-27) under the EPA's Long-term Vision for Assessment, Restoration and Protection under the CWA 303(d) Program. As part of these efforts, the MPCA identified water quality-impaired segments that will be addressed by TMDL studies by 2022. This TMDL study is part of that MPCA prioritization plan to meet the EPA's national measure.*
> *[Excerpted from the TMDL document]*

The TMDL identifies the pollutant for which the TMDL is being established.

Section 1.1 of the TMDL document identifies Total Phosphorus (TP) as the pollutant of concern.

> *The goal of this TMDL study is to quantify the pollutant reductions needed to meet state water quality standards and the appropriate endpoint for nutrients in the lake. This TMDL study quantifies existing [T]P loads, defines the LoW loading capacity, and allocates P loads to point and nonpoint sources.*
> *[Excerpted from the TMDL document]*

The link between the pollutant of concern and the water quality impairment is specified.

Section 1.1 of the TMDL document discusses how TP is contributing to water quality impairments in the Lake of the Woods.

> *In 2008, the LoW (Assessment Unit Identification [AUID] numbers 39-0002-01 and 39-0002-02) was added to Minnesota's 303(d) list of impaired waterbodies as being impaired for aquatic recreation due to excessive TP and Chl-a concentrations (related to nuisance algal blooms) and violation of the Secchi disk (transparency) standard. Three years (1999, 2005, and 2006) of growing season water quality data were available at that time, and growing season mean TP concentrations exceeded the water quality standard in all three years; growing season mean Chl-a concentrations exceeded the standard in 1999 and 2006. The MPCA's assessment of nonsupport was corroborated by remote sensing imagery from August 2006, which showed a severe algal bloom in the Minnesota portion of the LoW. These factors led to the recreational use impairment declaration.*
> *[Excerpted from the TMDL document]*

Section 2.2 of the TMDL document discusses how meeting the TP Water Quality Standard (WQS) is expected to result in meeting the Chl-a and Secchi disk WQSs as well.

> *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 (Heiskary and Wilson 2005). Clear relationships were established between the causal factor TP and the response variables Chl-a and Secchi transparency. Based on these relationships, it is expected that by meeting the TP target, the Chl-a and Secchi transparency standards will*

likewise be met.
[Excerpted from the TMDL document]

Waters within Indian Country, (as defined in 18 U.S.C. Section 1151) are identified and discussed.

Section 3.3.6 of the TMDL document discuss the locations and areas of tribal lands within the Lake of the Woods watershed. Figure 3-13 of the TMDL identifies the watershed and location of Tribal lands in the in or near the TMDL area in the US.

Portions of lands owned by the Bois Forte Band of Chippewa, the Leech Lake Band of Ojibwe, the Minnesota Chippewa Tribe, and the Red Lake Nation are within the LoW Basin. First Nations lands are included in the Canadian portion of the TMDL Study Area. Tribal areas within the U.S. are shown in Figure 3-13. The Bois Forte Band of Chippewa has tribal land in the Vermilion, Little Fork, and Big Fork Hydrologic Unit Code (HUC) -8 Watersheds. The Leech Lake Band of Ojibwe has tribal land in the Big Fork Watershed. The Minnesota Chippewa Tribe has lands within the Vermilion and Little Fork HUC-8 Watersheds. The Red Lake Nation has tribal lands in the Lower Rainy River, Rapid River, and LoW HUC-8 watersheds. Tribal lands are outside the jurisdiction of the state of Minnesota; therefore, no reductions are required from sources within these lands.
[Excerpted from the TMDL document]

The location and quantity of point and non-point sources are identified.

Section 3.10 of the TMDL document provides a summary of the sources of TP in the contributing watershed. An additional detailed TP source summary is also included in the document as Appendix E. Figure E-1 provides a pie chart of the relative contributions of TP to the lake of the woods for the different categories of sources.

Point Sources

Permitted point sources identified and addressed in the study include;

- domestic wastewater,
- industrial wastewater,
- municipal Separate Storm Sewer Systems (MS4s),
- industrial stormwater, and
- construction stormwater.

NPDES Permitted Domestic Wastewater Sources

Table 4-6 of the TMDL document (shown in Section 5 of this decision document) provides a listing of NPDES permitted domestic Wastewater Treatment Plants (WWTPs) that discharge into the Restoration Area, including NPDES permit numbers. Table 4-5 of the TMDL document provides a list of acknowledged Canadian domestic WWTP loads that discharge within the study area. Canadian loads are accounted for during the development of the TMDL, however, Waste Load Allocations (WLAs) are not assigned.

NPDES Permitted Industrial Wastewater Sources

Section 3.10.1.2 of the TMDL document discusses NPDES permitted industrial wastewater discharges. The total U.S. and Canadian industrial waste loads are shown in Table 4-7 of the TMDL document (shown in Section 5 of this decision document) The five U.S. industrial wastewater sources within the Restoration Area are shown in Table 4-9 of the TMDL document (also shown in Section 5 of this decision document) along with their respective NPDES permit numbers. Canadian loads are accounted for during the development of the TMDL, however, WLAs are not assigned.

> *Industrial wastewater discharges to waters of Minnesota are also subject to NPDES/SDS permits. Five industrial wastewater sources exist within the TMDL Restoration Area, including a paper mill in International Falls, Minnesota, and taconite mines in the headwaters of the Little Fork River. One of the five U.S. permitted industrial wastewater sources (Berger Horticultural Products – Pine Island Bog) has not yet discharged. Berger Horticultural Products original permit was issued in 2003. When reissued, Berger's permit will contain a P effluent limit consistent with the TMDL study's LA. The pulp and paper mill in Fort Frances, Canada, is the only industrial wastewater source within the Canadian portion of the TMDL Study Area that is below the upper boundary condition. Although this mill has been idle since November of 2012, periodic discharges of the wastewater pond occur as a result of stormwater, sumps, and landfill leachate. An additional Canadian industrial wastewater source, New Gold Mine, has not yet discharged and is included in the RC portion of this study. As reported to the MPCA, New Gold Mine intends to recycle all their water and plans only to discharge during unusual operating circumstances. The New Gold Mine is permitted by Ontario Ministry of Energy, Northern Development and Mines. [Excerpted from the TMDL document]*

Municipal Separate Storm Sewer Systems (MS4s)

Sections 3.10.1.6 and Section E.2.6 of Appendix E of the TMDL document discuss TP originating from MS4s. Although a portion of the City of Hibbing, MN MS4 lies within the Study Area, no stormwater discharges occur within that area and therefore no WLA is provided for this MS4. The City of International Falls, MN is not currently covered by an MS4 permit. However, it is expected by MPCA to be included in a future MS4 designation, therefore an area weighted WLA was calculated and reserved for this purpose by MPCA. Note that this load (228.6 kg/yr) appears in the TMDL summary as a WLA rather than included within the reserve capacity.

> *The Hibbing, Minnesota, MS4 is the only regulated MS4 located in the TMDL Restoration Area and is located in the headwaters of the Little Fork River. The city of Hibbing covers an area of 482 km^2 (186 mi^2) and approximately 41 km^2 (16 mi^2) are located within the TMDL Restoration Area. Approximately 30 km^2 (11 mi^2) of this area is covered by the Hibbing Taconite Company Tailings Basin Area, which is a regulated point source. As such, the load from the tailings basin area has already been explicitly accounted for in this TMDL study as an industrial wastewater source that discharges to the Little Fork River through its tributaries. The remaining 11 km^2 (5 mi^2) outside the tailings basin, but within the TMDL*

Restoration Area, is largely forested and undeveloped. There are no discharges to the city of Hibbing's stormwater conveyance system that are within the 11 km$_2$ area. Thus, no WLA was assigned to the City of Hibbing MS4.
[Excerpted from the TMDL document]

The city of International Falls is expected to be subject to an MS4 permit in the future as it is a city with a population greater than 5,000 people that drains to an impaired water (LoW); as a result, a WLA was assigned to the city of International Falls to account for coverage under a future MS4 NPDES/SDS permit.
[Excerpted from the TMDL document]

Industrial Stormwater Sources.

Sections 3.10.1.3 and E.2.3 of Appendix E of the TMDL document discuss TP loads from industrial stormwater sources. NPDES permit information is included. Table E-11 of the TMDL document provides a list of the 14 industrial stormwater sources within the study area. MPCA did not identify any of these facilities as being under Canadian jurisdiction.

Industrial stormwater runoff is a regulated source as defined by the MPCA's reissued Multi-Sector Industrial Stormwater NPDES/SDS General Permit (MNR050000), which applies to facilities with Standard Industrial Classification Codes in ten categories of industrial activities with the potential for significant materials and activities exposed to stormwater and that may leak, leach, or decompose and be carried off site. Facilities can obtain a no exposure exclusion if the site's operations occur under-roof. The permittee is required to develop and implement a stormwater pollution prevention plan (SWPPP) that details stormwater best management practices (BMP) implemented to manage stormwater at the facility. Permitted facilities are also required to perform runoff sampling. The MPCA's (2017a) records were reviewed, and 14 permitted facilities not covered under no exposure exclusions were identified within the TMDL Restoration Area; these facilities are listed in Appendix E. [Excerpted from the TMDL document]

Table E-11. Permitted Industrial Stormwater Locations in the TMDL Study Area.

Facility Name	Area (ac)	Area (ha)
Marvin Windows and Doors	33	13
Warroad International Memorial Airport	9	4
Erickson Timber Products	15	6
Baudette/Lake of the Woods International Airport	374	151
Hasbargen Logging Inc	2	1
Falls International Airport	760	308
Einarson Flying Service Inc.	10	4
Green Forest Inc	17	7
Boise White Paper LLC - International Falls	342	138
Boise White Paper LLC - Remote Site 17 Landfill	20	8
Hancock Fabrication Inc.	1	0
Cook Transfer Station	5	2
Cook Municipal Airport	375	152
Hill Wood Products Inc.	9	4
Total	**1,972**	**798**

Construction Stormwater Sources.

Sections 3.10.1.4 and E.2.4 of Appendix E of the TMDL document discuss TP loads from construction stormwater sources. NPDES permit information is included. Table E-12 of the TMDL document provides a listing of construction stormwater sources within the study area. MPCA did not identify any of these facilities as being under Canadian jurisdiction.

> *Runoff from construction sites is a regulated source as defined by the MPCA's General Permit Authorization to Discharge Stormwater Associated with Construction Activity under the NPDES/SDS Program (Permit MNR100001). Exposed soil surfaces from construction sites can be eroded, and particle-bound P can be carried away from construction sites. Permits are required for construction activities that disturb the following:*
> *1. One acre or more of soil; or*
> *2. less than one acre if:*
> *a. The area is part of a 'larger common plan of development or sale' larger than one acre.*
> *b. The MPCA determines that the activity poses a risk to water resources.*
> *[Excerpted from the TMDL document]*

Table E-12. Construction Stormwater Locations in the TMDL Study Area.

County	Mean Annual Permitted Area		Fraction of County in LoW Basin	Mean Annual Permitted Area Within the LoW Basin (ha)
	ac	ha		
Beltrami	212.1	85.8	0.0710	6.1
Cook	55.8	22.6	0.2025	4.6
Itasca	682.3	276.1	0.4221	116.6
Koochiching	102.8	41.6	0.9041	37.6
Lake	92.6	37.5	0.5898	22.1
Lake of the Woods	84.4	34.2	0.9764	33.4
Roseau	298.6	120.8	0.1354	16.4
Saint Louis	757.3	306.5	0.4983	152.7
Total	**2285.9**	**925.1**		**389.4**

Excerpted from the TMDL document

Non-Permitted (NPS) Sources

Sections 3.10.2.1 through 3.10.2.7 of the TMDL document discuss the nonpermitted sources of TP considered in the study. Sources discussed include;

- tributary loading,
- direct lakeshed loading,
- shoreline erosion loading,
- subsurface sewage treatment systems (SSTSs),
- atmospheric deposition,
- internal P loading, and
- natural background loads.

Table 4-11 of the TMDL document shows the contribution of each of the non-NPDES permitted loads to the Lake of the Woods. Loads from Canadian sources are not given a load allocation but are shown as acknowledged loads by MPCA. While the TMDL does not rely upon the reduction of Canadian sources to achieve WQS targets, some naturally occuring reduction in internal loading is expected to occur as overall loads to the Lake of the Woods are implemented.

Table 4-11. Study period mean annual loads, load allocations, and acknowledged loads by source category.

Source Category	Study Period Mean Annual TP Load ($kg\ y^{-1}$)		Load Allocation (TP Load ($kg\ y^{-1}$))	Acknowledged Load from Canadian Sources TP Load ($kg\ y^{-1}$)
	US	Canada		
Tributary Loading 🍁	201,273.4	118,107.9	168,265.7	118,107.9
Direct Lakeshed Loading 🍁	2,340.7	14,771.5	2,340.7	14,771.5
Shoreline Erosion Loading	72,000.0	0.0	60,480.0	0.0
SSTS Loading 🍁	311.0	410.7	0.0	410.7
Atmospheric Deposition Loading 🍁	23,602.4	27,804.9	23,602.4	27,804.9
Internal P Loading 🍁	184,281.9	97,712.7	138,211.4	73,284.6
Total	**483,809.3**	**258,807.7**	**392,900.2**	**234,379.5**

🍁 denotes that all or part of the load from this source originates in Canada.

Tributary Loading

Sections 3.10.2.1 and E.3.1 of Appendix E of the TMDL document discuss TP contributions from tributaries to Rainy River and the Lake of the Woods. Table E-14 of the TMDL document provides a summary of the tributary loads during the study period.

It should be noted that in the context of the TMDL study, tributary loads are understood to include only the non-NPDES permitted (non-point) portion of the total TP load of a given tributary. NPDES permitted waste loads are categorized and analyzed separately.

MPCA noted that tributary loads are the largest source of phosphorus to the Lake of the Woods with the Rainy River accounting for approximately 90% of those loads. The Hydrological Simulation Program - FORTRAN (HSPF) model (described further in Section 3.9 of the TMDL document and Section 3 of this decision document) was used by MPCA to estimate mean annual tributary loadings.

> *While tributaries carry P from both nonpoint sources (i.e., watershed runoff) and upstream point sources (permitted sources) to the LoW, tributary loading as discussed in this section is only the nonpoint portion of that load (i.e., excluding loads that originate from permitted sources). Nonpoint loading occurs as a result of rainfall-runoff processes that can detach and transport sediment and associated P and transport dissolved P to downstream waters. Susceptibility to detachment and erosion by rainfall-runoff processes dependent on land use because of more disturbed land uses (e.g., agriculture) will generally produce more runoff and P loads than more natural land uses (e.g., forest). Soil types also play a role in the amount of runoff and P delivered to a stream and carried downstream. Tributary loading can also include P loading associated with channel bed and bank sediment loads. Tributary loading is the largest source of P to the LoW, with the Rainy River accounting for approximately 90% of the tributary load. Study period mean annual tributary loading was taken from HSPF-modeled output. Table E-14 lists the HSPF-modeled tributaries that discharge directly to the LoW along with study period mean annual loads, LAs, and proposed*

reductions for each tributary. Loads in Table E-14 are presented at the mouth of the tributary and, thus, correspond directly to the loading entering the LoW from tributaries. [Excerpted from the TMDL document]

Table E-14. Study period mean annual loads (Lupo 2015b) and LAs to the LoW. Note that these tributary loads only include that portion of discharge attributable to nonpoint sources (LA) and thus do not include loads attributable to point sources (WLAs).

Tributary	Study Period Mean Annual TP Load (kg y^{-1})	Load Allocation (Acknowledged Load for Canadian Sources) TP Load to LoW (kg y^{-1})	Proposed Reduction (kg y^{-1})
Rainy River 🍁	290,692.9	264,923.3	25,769.6
Sabaskong River 🍁	2,232.6	2,232.6	0
Splitrock River 🍁	1,228.0	1,228.0	0
Thompson Creek 🍁	779.8	779.8	0
Obabikon Lake 🍁	457.7	457.7	0
Big Grassy River 🍁	1,108.2	1,108.2	0
Little Grassy River 🍁	2,333.7	2,333.7	0
Bostic River (231)	1,783.9	1,283.8	500.1
Williams Creek (County Ditch 1; 211)	1,101.8	617.4	484.4
South Branch Zippel Creek (213)	744.0	214.9	529.1
West Branch Zippel Creek (203)	1,887.6	879.3	1,008.3
Judicial Ditch 24 (201)	420.2	259.4	160.8
Judicial Ditch 24 (191)	1,256.2	465.5	790.7
Judicial Ditch 22 (181)	708.3	333.3	375.1
Reach 171	164.5	52.5	112.0
Willow Creek (161)	1,352.6	641.7	711.0
County Ditch 26 (151)	272.9	102.7	170.2
County Ditch 26 (141)	457.7	193.3	264.4
County Ditch 26 (131)	295.1	83.8	211.3
County Ditch 20 (121)	460.5	193.4	267.1
County Ditch 25 (113)	1,003.7	341.7	662.0
Warroad River 🍁 †	6,565.7	5,574.2	991.5
Stony Creek 🍁	746.0	746.0	0
Northwest Angle Inlet 🍁	1,327.7	1,327.7	0
Total	**319,381.2**	**286,373.6**	**33,007.60**

🍁 denotes that all or part of the load from this source originates in Canada

Excerpted from the TMDL document

Table G-5 of the TMDL document shows the existing characteristics of the tributaries flowing into the Lake of the Woods. MPCA determined that the Rainy River is the dominant tributary source of TP.

Table G-5. BATHTUB tributary characteristics for the existing conditions BATHTUB model.

Tributary	HSPF Reach	Drainage Area (km^2)	Study Period Mean Annual Discharge (hm^3)	Study Period Flow-weighted Mean TP Concentration ($\mu g\ L^{-1}$)	Study Period Mean Annual TP Load (t)
Sabaskong River 🍁	45	483.0	69.5	32.1	2.23
Splitrock River 🍁	49	176.0	23.3	52.7	1.23
Thompson Creek 🍁	17	110.9	21.8	35.8	0.78
Obabikon Lake 🍁	14	96.1	20.5	22.4	0.46
Big Grassy River 🍁	13	153.9	21.4	51.8	1.11
Little Grassy River 🍁	11	307.5	37.5	62.3	2.33
Rainy River 🍁	430	54,686.1	12,738.7	28.5	362.68
Bostick River	231	142.0	25.7	69.5	1.78
Williams Creek (County Ditch 1; 211)	211	80.2	14.1	80.5	1.13
S. Branch Zippel Creek	213	21.2	4.3	173.1	0.74
W. Branch Zippel Creek	203	99.7	17.6	107.3	1.89
Judicial Ditch 24 (201)	201	33.2	5.2	81.0	0.42
Judicial Ditch 24 (191)	191	57.4	9.3	134.9	1.26
Judicial Ditch 22	181	40.4	6.7	106.3	0.71
Reach 171	171	5.9	1.1	156.7	0.16
Willow Creek	161	71.6	12.8	105.4	1.35
County Ditch 26 (151)	151	12.1	2.1	132.8	0.27
County Ditch 26 (141)	141	24.8	3.9	118.4	0.46
County Ditch 26 (131)	131	10.0	1.7	176.1	0.30
County Ditch 20	121	24.7	3.9	119.0	0.46
County Ditch 25	113	38.4	6.8	146.9	1.00
Warroad River 🍁 †	70	716.3	111.5	58.9	6.57
Stony Creek 🍁	301	176.3	24.1	31.0	0.75
Northwest Angle Inlet 🍁	312	378.9	46.4	28.6	1.33

🍁 denotes that all or part of the load from this source originates in Canada

† HSPF model boundaries show that a portion of the modeled Warroad River Subwatershed extends into Canada and the runoff from that portion of the subwatershed drains directly to the lake

Excerpted from the TMDL document

Direct Lakeshed Loading.

Sections 3.10.2.2 and E.3.2 of Appendix E of the TMDL document discuss the contribution of TP coming directly from the watershed surrounding the Lake of the Woods. Table E-16 of the TMDL document provides a listing of the contributions from the direct runoff from the watersheds adjacent to each of the bays. Figure 3-28 shows the drainage area of the direct watershed.

> *Direct lakeshed loading is similar to tributary loading but occurs at a smaller scale and closer to the lakeshore than much of the tributary loading. Direct lakeshed loading is typically carried either over land to the lake or through streams smaller than those included in the tributary loading category, which were explicitly modeled in HSPF. Direct lakeshed*

loading is similar in nature to tributary loading in that it depends on land use and soil types. Direct lakeshed loading was taken from HSPF-modeled output and averaged over the study period (Table E-16). Because of HSPF model reach (subwatershed) boundaries, both Sabaskong and Little Traverse direct lakeshed loading are split into two loads, one for each HSPF model reach in its direct lakeshed loading area. No direct lakeshed loading reductions are proposed.
[Excerpted from the TMDL document]

Table E-16. Direct lakeshed loading to the LoW.

Direct Lakeshed Drainage Area by Bay	Study Period Mean Annual TP Load (kg y^{-1})	Load Allocation (Acknowledged Load for Canadian Sources) TP Load to LoW (kg y^{-1})	Proposed Reduction (kg y^{-1})
Sabaskong East	2,058.1	2,058.1	0
Sabaskong West	1,824.3	1,824.3	0
Four Mile	1,988.5	1,988.5	0
Big Traverse	6,140.9	6,140.9	0
Muskeg	364.2	364.2	0
Little Traverse South	2,804.3	2,804.3	0
Little Traverse North	1,931.9	1,931.9	0
Total	**17,112.1**	**17,112.1**	**0**

Excerpted from the TMDL document

Shoreline Erosion Loads

TP inputs from shoreline erosion are addressed in Sections 3.10.2.3 and E.3.3 of Appendix E of the TMDL document.

Shoreline erosion loading is P loading associated with shoreline erosion. Shoreline erosion can be caused by various factors, including wave action, runoff, ice, and wind.
[Excerpted from the TMDL document]

A study of shoreline erosion loading was performed by Houston Engineering and the LoW SWCD (2013) for the southern portion of the LoW that extends east from Warroad, Minnesota, to Four Mile Bay. The mean annual load of 72,000 kg was apportioned to the three bays (Four Mile, Big Traverse, and Muskeg) between Warroad, Minnesota, and the Rainy River based on shoreline length. Load by bay is shown in Table E-17. This study only evaluated shoreline erosion for this particular area of shoreline. Erosion in other areas of the lake are implicitly included in the BATHTUB model.
[Excerpted from the TMDL document]

Table E-17. Shoreline erosion phosphorus loading to the LoW.

Shoreline Erosion by Bay	Study Period Mean Annual TP Load (kg y^{-1})	Load Allocation (Acknowledged Load for Canadian Sources) TP Load to LoW (kg y^{-1})	Proposed Reduction (kg y^{-1})
Four Mile	9,395.4	7,892.2	1,503.3
Big Traverse	36,000.0	30,240.0	5,760.0
Muskeg	26,604.6	22,347.8	4,256.7
Total	**72,000.0**	**60,480.0**	**11,520.0**

Excerpted from the TMDL document

Subsurface Sewage Treatment Systems (SSTSs)

Sections 3.10.2.4, 4.7.4, and E.3.4 of Appendix E of the TMDL document discuss the role of failing septic systems as a source of TP to the Lake of the Woods. Existing septic system loads were modeled by MPCA using HSPF. MPCA determined that properly operating septic systems are not a source of TP in the waterbodies and are therefore assigned a load allocation of zero for MN sources as it is assumed that all failing septic systems will eventually be brought into compliance. Canadian septic system loads are included as acknowledged loads to account for their existing contribution of TP to the system. Additional review and comment can be found in Section 4 of this decision document. Table 4-16 of the TMDL document (shown in Section 4 of this decision document) provides a summary of SSTS sources to the lake.

> *The SSTS loading was taken from HSPF-modeled output and is described in detail in Appendix E. Study period mean annual loads from (failing) SSTSs were included in the models for direct lakeshed loading areas. Septic system loading directly to the LoW is summarized in Table 4-16. Total study period mean annual septic loading is 721.7 kg y_{-1}, the LA is 0 kg y_{-1}, and the acknowledged load is 410.7 kg y_{-1}. The LA is based on the assumption that all failing septics will be brought into compliance and that future loading from septic systems will be indistinguishable from background groundwater loading. Because the MPCA does not have jurisdiction over Canadian sources, the proposed reduction applies only to U.S. SSTSs; no reduction is proposed for Canadian SSTS loading.*
> *[Excerpted from the TMDL document]*

Atmospheric Deposition

Sections 3.10.2.5 and E.3.5 of the TMDL document discuss atmospheric deposition as a source of TP to the lake.

> *Atmospheric deposition of P on the lake surface is an important part of the LoW P budget. Atmospheric deposition occurs in both wet (carried by precipitation) and dry (dry particles carried as dust) forms. Unlike other nonpoint sources, such as watershed runoff or septic loading, atmospheric P deposition originates outside of the watershed and cannot be controlled. An atmospheric P deposition rate of 19.3 mg $m_{-2}y_{-1}$ (reported by Twarowski et al. [2007] for the Rainy River Basin) for average precipitation years was used in this TMDL study. The total atmospheric P load to the LoW within the TMDL Study Area is*

51,407.3 kg y^{-1}.
[Excerpted from the TMDL document.]

Internal TP Loading from Lakebed Sediments

Sections 3.10.2.6 and Appendix F of the TMDL document discuss the role of internal loads of TP from lake bottom sediments. Appendix F of the TMDL includes a thorough description of the processes and factors involved with the recycling of TP from lake bottom sediments, a discussion of past efforts to quantify internal loads, and an explanation of how internal loads were estimated as part of this study. Internal loads are expected by MPCA to naturally decrease over time.

Lake nutrient cycling (or internal loading) refers to several processes that can result in P release into the water column where it can be available for algal growth. Internal loading is caused by natural sources and enhanced over time from accumulated sediment P that results from anthropogenic activity. The P is released from lake sediments in both aerobic and anaerobic conditions as moderated by amounts of available iron and other factors, such as legacy loading (natural background and accumulation of anthropogenic effects). Sediment resuspension that is caused by wind mixing may cause resuspension of particulate and loosely associated P. Small particles (clay and silt) that dominate Big Traverse Bay's sediments (James 2012) are most vulnerable to resuspension. Specific area (surface area per unit mass) increases with decreasing particle size; thus, clay and silt can have a higher P-holding capacity than sand. Tributary discharges of total P (TP) and dissolved P (DP) can contribute to elevated in-lake concentrations and increased algal growth.
[Excerpted from the TMDL document]

As part of this TMDL study, an analysis was performed to develop an estimate of mean, annual internal P loading to the LoW. The analysis merged HSPF model results with observed in-lake data to assess bay by bay water and TP budgets, as well as monthly water balance, inter-bay flow, and advective TP exchange between bays. Unless otherwise noted, input data were consistent with BATHTUB input data described in Appendix G. Unlike the TMDL Study Area and BATHTUB model boundaries, this analysis included the entire LoW surface area, which allowed for a full mass balance of LoW accounting for outflow from the lake at Kenora.
[Excerpted from the TMDL document]

Natural Background Loads

Section 3.10.2.7 of the TMDL document discusses natural background sources of TP. Natural background loads are reflected in the other categories of NPS loads to the lake and are not individually quantified as part of the TMDL effort by MPCA.

"Natural background" (natural causes) is defined in the Minnesota Rules as "the multiplicity of factors that determine the physical, chemical, or biological conditions that would exist in the absence of measurable impacts from human activity or influence" (Minn. R. 7050.0150). Natural background is also defined in the Clean Water Legacy Act as

"characteristics of the water body resulting from the multiplicity of factors in nature, including climate and ecosystem dynamics, that affect the physical, chemical, or biological conditions in a water body, but does not include measurable and distinguishable pollution that is attributable to human activity or influence" (Minn. Stat. § 114D.10). Natural background sources include surface runoff from the natural landscape, background stream channel erosion, groundwater discharge, and atmospheric deposition, including windblown particulate matter from the natural landscape. Internal P loading can be of both anthropogenic and natural origin.
[Excerpted from the TMDL document]

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of Section 1.

Section 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:

Applicable WQS are identified, described, and a numerical water quality target is included.

Section 2.2 of the TMDL document discusses the applicable water quality standard of ≤ 30 µg/l summer average TP. The section also discusses how, when the TP target is met it is expected to assure that WQS for the response variables of Chl-a and Secchi depth disk are also achieved.

A lake is considered impaired if summer-average TP concentrations exceed the applicable

TP standard and one or both eutrophication response standards (Chl-a and Secchi transparency) are exceeded (Minn. R. 7050.0150, subp. 5a). Minn. R. 7050.0150, subp. 4, defines summer-average as "a representative average of concentrations or measurements of nutrient enrichment factors, taken over one summer season," where the summer season is defined as "a period annually from June 1 through September 30." 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 (Heiskary and Wilson 2005). Clear relationships were established between the causal factor TP and the response variables Chl-a and Secchi transparency. Based on these relationships, it is expected that by meeting the TP target, the Chl-a and Secchi transparency standards will likewise be met. Applicable water quality standards for the LoW are listed in Table 2-1.
[Excerpted from the TMDL document]

Table 2-1. Lake nutrient/eutrophication standards for lakes, shallow lakes, and reservoirs in the Northern Lakes and Forest Ecoregion (Minn. R. 7050.0222, subp. 4).

TP (ppb)	Chl-*a* (ppb)	Secchi Depth (m)
≤ 30	≤ 9	≥ 2.0m

Excerpted from the TMDL document

The Lake of the Woods was assessed by MPCA against the Northern Lakes and Forest (NLF) Ecoregion standards, as there are no eutrophication standards developed by MPCA for the Northern Minnesota Wetlands Ecoregion (in which the lake geographically resides). Justification for this decision is provided in Section 2.2 of the TMDL document.

While the LoW geographically lies within the Northern Minnesota Wetlands Ecoregion, the MPCA assessed the lake against the Northern Lakes and Forest (NLF) Ecoregion standards because most of the drainage basin lies within the NLF Ecoregion. Minn. R. 7050.0222, subp. 2a.(E), states, "Eutrophication standards applicable to lakes and reservoirs that lie on the border between two ecoregions or that are in the Red River Valley (also referred to as Lake Agassiz Plains), Northern Minnesota Wetlands, or Driftless Area Ecoregion must be applied on a case-by-case basis. The commissioner shall use the standards applicable to adjacent ecoregions as a guide."
[Excerpted from the TMDL document]

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of Section 2.

Section 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 additionally 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:

The loading capacity is presented for the pollutant of concern (including daily loads).

Section 4.9 of the TMDL document discusses the TP loading capacity of the Lake of the Woods. TMDL Review Table 4-17a includes a breakdown of the TP loading capacity in terms of both kg/yr and kg/d. Sources originating in Canada are shown as acknowledged loads for informational purposes and do not reflect a load allocation under the CWA TMDL process. The TMDL address both of the impaired assessment units by calculating one overall load to the Lake of the Woods that will allow the lake to meet WQS in the

portion of the lake within the jurisdiction of MN, which contains the impaired lake assessment units.

The total annual loading capacity for the Lake of the Woods is 709,522.4 kg/y of TP. Of that total loading capacity, 241,447.0 kg/y originate from acknowledged Canadian sources. The remaining 468,075.4 kg/y are allocated to U.S. sources. TMDL Review Table 1 provides a summary of how the total loading capacity for the Lake of the Woods is accounted for between U.S. and Canadian sources.

TMDL Review Table 1 - Loading Capacity Summary

Load Description	TP Load (kg/d)	TP Load (kg/yr)
Subtotal of U.S. Load and Waste Load Allocations	1,184.4	432,300.3
Reserve Capacity (U.S. Sources)	0.5	167.0
MOS (5%)	97.6	35,608.1
Loading capacity (U.S. Portion)	**1,282.5**	**468,075.4**
Subtotal of all Canadian Acknowledged Loads	661.5	241,447.0
Total Lake of the Woods Loading Capacity	1,943.9	709,522.4

A more detailed summary of the loading capacity is also presented in Appendix C of the document (shown in Appendix DD1 of this decision document) including individual waste load allocations for NPDES permitted sources. Loads or portions of loads that originate in Canada are included in the Appendix for informational purposes and do not reflect an allocation of load under the CWA, nor do they require any reductions from Canadian sources under the TMDL

TMDL Review Table 4-17a (derived from Table 4-17 in the TMDL document)

LoW Load Allocation		Study Period Mean Annual TP Load		Load/Wasteload Allocation TP Load		Acknowledged TP Load for Canadian Sources		Estimated Load Reduction[a]	
		kg y^{-1}	kg d^{-1}	kg y^{-1}	kg d^{-1}	kg y^{-1}	kg d^{-1}	kg y^{-1}	kg d^{-1}
Wasteload	Total WLA	89,189.00	244.4	39,400.00	**107.9**	6,347.50	17.4	43,441.40	119
	Domestic Wastewater	9,474.00	26	5,221.00	**14.3**	1,167.50	3.2	3,085.50	8.5
	Industrial Wastewater	79,426.50	217.6	33,662.00	**92.2**	5,180.00	14.2	40,584.50	111.2
	MS4	0	0	228.6	**0.6**	0	0	-228.6	-0.6
	Industrial Stormwater	193.9	0.5	193.9	**0.5**	0	0	0	0
	Construction Stormwater	94.6	0.3	94.6	**0.3**	0	0	0	0
Load	Total LA	742,617.00	2,034.00	392,900.20	**1,076.40**	234,379.50	642.1	115,337.30	316
	Tributary Loading	319,381.20	874.4	168,265.70	**461**	118,107.90	323.6	33,007.60	90.4
	Direct	17,112.10	46.9	2,340.70	**6.4**	14,771.50	40.5	0	0
	Lakeshed								
	Loading								
	Shoreline	72,000.00	197.3	60,480.00	**165.7**	0	0	11,520.00	31.6
	Erosion								
	Loading								
	SSTS[b]	721.7	2	0	**0**	410.7	1.1	311	0.9
	Atmospheric Deposition	51,407.30	140.8	23,602.40	**64.7**	27,804.90	76.2	0	0
	Internal load	281,994.70	772.6	138,211.40	**378.7**	73,284.60	200.8	70,498.70	193.1
Reserve Capacity				167	**0.5**	720	2	-887	-2.4
Subtotal				432,467.30	**1,184.80**	241,447.00	661.5		
MOS (5%)[c]				35,608.10	**97.6**				
Total U.S. Load				468,075.40	**1,282.50**				
Total Load		831,806.00	2,278.40	709,522.4[d]	1,943.9[d]			157,891.70	432.5

(a) Estimated Load Reduction is the difference between the Study Period Mean Annual TP load and the sum of the following: LA/WLA TP Load from US sources and Acknowledged TP Load for Canadian sources

(b) The U.S. (Minnesota) LA for SSTS loading is zero; 410.7 kg y^{-1} of SSTS loading is acknowledged load from Canada (see Table 4-16 for more detail).

(c) A single margin of safety load was assigned for the entire TMDL drainage area and is reported in the LA/WLA column but applies to the entire TMDL drainage area due to the need to assign a single margin of safety load

(d) Total load reported in this cell is the sum of load and WLAs from US sources and acknowledged loads from Canadian sources

Note: EPA is approving the daily load numbers shown in bold text in Review Table 4-17a.

EPA notes that Appendix C of the TMDL document includes both loads at upstream sources as well as loads at the Lake of the Woods. The difference between these two loads reflects a theoretical attenuated TP load that may be occurring between upstream sources and the point at which those loads enter the Lake of the Woods. EPA is not reviewing nor approving the upstream "at source" loads as part of this review. Nor does EPA's approval of this document reflect a tacit agreement that such attenuation is in fact taking place.

TMDL Review Table 2 - EPA Approved Load and Wasteload Allocations

Source	NPDES Permit Number(s)	WLA/LA (kg/d)	WLA/LA (kg/yr)
Anchor Bay Mobile Home Park	MN0046213	1.1(a)	44.0
Baudette WWTP	MN0029599	9.6(a)	367.0
Big Falls WWTP	MNG580135	2.5(a)	119.0
Bigfork WWTP	MN0022811	4.4(a)	215.0
Cook WWTP	MNG580179	10.9(a)	509.0
Effie WWTP	MN0067555	0.3	102.0
ISD 2142 Pre-Kindergarten to Grade 12 N School	MN0069850	0.1	44.0
ISD 363 - Indus School	MN0049263	0.1	34.0
Littlefork WWTP	MNG580081	5.6(a)	229.0
DNR Scenic State Park	MN0049891	0.1(a)	21.0
NKASD WWTP	MN0020257	9.1	3318.0
Northome WWTP	MNG580185	3.0(a)	122.0
Springsteel Island Sanitary District	MN0068322	0.03	10.0
Williams WWTP	MN0021679	2.1(a)	87
Berger Horticultural Products – Pine Island Bog	MN0066052	0.8	30
Boise White Paper LLC – Intl Falls	MN0001643	90.6	33100.0
Marvin Windows & Doors	MN0055026	0.01	4.0
US Steel – Minntac Tailings Basin Area	MN0057207	0.1	30.0
Hibbing Taconite Co. – Tails Basin Area	MN0049760	1.4	498.0
Industrial Stormwater	MNR050000	0.5	193.9
Construction Stormwater	MNR100001		94.6
International Falls MS4	Reserved	0.6(b)	228.6(b)
Reserve Capacity	Reserved	0.5	167.0
Tributary Loading	NPS	461.0	168,265.7
Direct Lakeshed Loading	NPS	6.4	2,340.7
Shoreline Erosion Loading	NPS	165.7	60,480.0
SSTS	NPS	0©	0.0
Atmospheric Deposition	NPS	64.7	23,602.4
Internal load	NPS	378.7	138,211.4
MOS (5%)	N/A	97.6	35,608.1

(a) Daily WLAs for sites not operating under continuous discharge are greater than 1/365th of the annual WLA because of limited periods of discharge.

(b) International Falls MN is not currently covered under an MS4 permit, however it is expected to be covered at a future date. Therefore an MS4 WLA was reserved to accommodate this anticipated load.

(c) Subsurface Sewage Treatment Systems (SSTS) are not allowed to discharge to surface waters and are therefore assigned a WLA of zero in anticipation of all SSTS eventually being brought into compliance.

EPA's review and approval is based on the TP load allocations entering the Lake of the Woods and presented in TMDL Review Table 2 of this decision document. Additional investigation and study will likely be necessary before such theoretical attenuation should be relied upon when planning upstream load reduction activities designed to achieve the allocated loading strategy at the Lake of the Woods.

For several domestic WWTPs, the MPCA calculates the daily waste load allocation based on the actual discharge periods of the WWTP and notes that "(a) Daily WLAs for sites not operating under continuous discharge are greater than 1/365th of the annual WLA because of limited periods of discharge," in a footnote to Table 4-6 of the TMDL document. EPA notes that while calculating the daily WLAs in this manner may result in a relatively larger daily loading rate, the annual WLA still applies and the daily WLA may require recalculation should the discharge period of those WWTP change in the future.

The method to establish a cause and effect relationship between the pollutant of concern and the numerical target is described, and the TMDL analysis is documented and supported

The BATHTUB lake eutrophication model, described in Section 4.2 of the TMDL document, was used by MPCA to predict the effect of the phosphorus loads within the Lake of the Woods.

> *The BATHTUB lake eutrophication model (Version 6.14d) (Walker 2006), developed for the U.S. Army Corps of Engineers (USACE), was used to predict the in-lake response to nutrient loading. The BATHTUB model uses steady-state water and nutrient mass balances to model advective transport, diffusive transport, and nutrient sedimentation (Walker 2006). Lake response (expressed as summer-average TP and Chl-a concentrations and Secchi disk depth) is predicted by empirical relationships that relate total annual P load to lake summer-average conditions (Walker 1985; Walker 1996). The BATHTUB model allows users to specify single lake segments or multiple segments with complicated flow routing; lake response is calculated for each lake segment based on user-entered characteristics, and results are reported for each bay and on an area-weighted basis for the entire lake.*
> *[Excerpted from the TMDL document]*

Additional extensive discussion of the BATHTUB model and its use to predict water quality in the Lake of the Woods in response to TP loading is presented in Sections 4.2, 4.3, and Appendices G, H, and I of the TMDL document.

The HSPF model was used by MPCA to identify, quantify and predict loads from the watershed to the Lake of the Woods. The HSPF model is described in Section 3.9 of the TMDL document and discussed in greater detail throughout the TMDL document whenever model parameterization input data and model output results are discussed.

> *An HSPF model is a comprehensive watershed computer model of hydrology and water quality that includes modeling surface and subsurface hydrologic and water quality processes, which are linked and closely integrated with corresponding stream and reservoir processes. The HSPF framework can be used to determine the critical*

> *environmental conditions (e.g., certain flows or seasons) in a watershed by providing continuous flows and pollutant loads at any point within the system. An HSPF model simulates the fate and transport of modeled pollutants and can simulate subsurface concentrations in addition to surface concentrations (where appropriate).*
> *[Excerpted from the TMDL document]*

The critical conditions for meeting WQS are described and accounted for.

Critical conditions are addressed in Section 4.8 of the TMDL document. Critical conditions and seasonality are accounted for within the State's water quality standards by targeting the criterion to the summer season when the effects of TP on response variables are the most pronounced.

> *This seasonal variation has been factored into the development of Minnesota's lake standards, based on swimmable and fishable beneficial uses, for the summer critical recreation period of June through September (Heiskary and Wilson 2005). This TMDL study's targeted allocations are based on Minnesota's lake standards and summer critical conditions*
> *[Excerpted from the TMDL document]*

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of Section 3.

Section 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

The load allocations for existing NPS are accounted for (and future if applicable).

Tributary Loadings

Tributary load allocations of TP are predicted through HSPF modeling and are discussed in Section 4.7.1 of the TMDL document. Individual load allocations for each tributary

are shown in Table 4-12 of the TMDL document. Loadings originating from Canada are included as acknowledged loads for informational purposes.

> *Table 4-12 lists the HSPF-modeled tributaries that discharge directly to the LoW along with study period mean annual loads and LAs. Study period mean annual tributary loading was taken from HSPF model output. Loads in Table 4-12 are presented at the mouth of the tributary and, thus, correspond directly to loads entering the LoW from tributaries. Study period mean annual tributary loading to the LoW totals 319,381.2 kg y_{-1}. The LA totals 286,373.6 kg y_{-1}, which corresponds to a reduction of 33,007.6 kg y_{-1} or 10.3%. The LAs were developed with the assumption that all upstream tributaries meet the northern river eutrophication standard of 50 µg L–1 TP. The LAs were reduced further in three cases (Big Fork River, Little Fork River, and Williams Creek) to ensure that the flow weighted mean concentration (FWMCs) corresponding to total LA and WLA carried at the mouth of a tributary would not exceed the northern river eutrophication standard.*
> *[Excerpted from the TMDL document]*

Table 4-12 of the TMDL document shows that the Rainy River accounts for greater than 90% of the tributary loading to the Lake of the Woods.

> *The Rainy River constitutes a large portion of the tributary inflow; therefore, a detailed account of the tributaries that drain to the Rainy River is presented in Table 4-13. Further detail regarding the load at the source (tributary mouth) and load to the LoW is provided because these upstream tributaries do not drain to the LoW directly. The largest components of the Rainy River LA are Rainy Lake (119,669.7 kg y_{-1}), Big Fork River (39,668.9 kg y_{-1}), Little Fork River (38,440.5 kg y_{-1}), Rapid River (19,986.1 kg y_{-1}), and Direct Drainage to Rainy River (19,405.9 kg y_{-1}).*
> *[Excerpted from the TMDL document]*

Table 4-13 of the TMDL document provides additional breakdown of the modeled loads included in the Rainy River tributary load.

Table 4-12. Study period mean annual loads (Lupo 2015b), load allocations, and acknowledged loads for the LoW tributaries. Note that these loads do not include wasteloads that are delivered to the LoW by tributaries.

Tributary	Study Period Mean Annual TP Load ($kg\ y^{-1}$)		Load Allocation TP Load ($kg\ y^{-1}$)	Acknowledged TP Load from Canadian Sources ($kg\ y^{-1}$)
	US	Canada		
Rainy River 🍁	182,447.6	108,245.3	156,677.9	108,245.3
Sabaskong River 🍁	-	2,232.6	-	2,232.6
Splitrock River 🍁	-	1,228.0	-	1,228.0
Thompson Creek 🍁	-	779.8	-	779.8
Obabikon Lake 🍁	-	457.7	-	457.7
Big Grassy River 🍁	-	1,108.2	-	1,108.2
Little Grassy River 🍁	-	2,333.7	-	2,333.7
Bostic River (231)	1,783.9	-	1,283.8	-
Williams Creek (County Ditch 1; 211)	1,101.8	-	617.4	-
South Branch Zippel Creek (213)	744.0	-	214.9	-
West Branch Zippel Creek (203)	1,887.6	-	879.3	-
Judicial Ditch 24 (201)	420.2	-	259.4	-
Judicial Ditch 24 (191)	1,256.2	-	465.5	-
Judicial Ditch 22 (181)	708.3	-	333.3	-
Reach 171	164.5	-	52.5	-
Willow Creek (161)	1,352.6	-	641.7	-
County Ditch 26 (151)	272.9	-	102.7	-
County Ditch 26 (141)	457.7	-	193.3	-
County Ditch 26 (131)	295.1	-	83.8	-
County Ditch 20 (121)	460.5	-	193.4	-
County Ditch 25 (113)	1,003.7	-	341.7	-
Warroad River 🍁 †	6,345.4	220.3	5,353.9	220.3
Stony Creek 🍁	307.3	438.7	307.3	438.7
Northwest Angle Inlet 🍁	264.0	1,063.7	264.0	1,063.7
Total	**201,273.4**	**118,107.9**	**168,265.7**	**118,107.9**

🍁 denotes that all or part of the load from this source originates in Canada

† HSPF model boundaries show that a portion of the modeled Warroad River Subwatershed extends into Canada and the runoff from that portion of the subwatershed drains directly to the lake

Excerpted from the TMDL document

Table 4-13. Study period mean annual loads (Lupo 2015b), load allocations, and acknowledged loads for tributaries above the lower boundary condition at Wheelers Point. Note that these loads do not include wasteloads that are delivered to the LoW by tributaries.

Tributary	Study Period Mean Annual TP Load ($kg\ y^{-1}$)		Load Allocation TP Load ($kg\ y^{-1}$)	Acknowledged TP Load from Canadian Sources ($kg\ y^{-1}$)
	US	Canada		
Rainy Lake 🍁	36,176.6	83,493.1	36,176.6	83,493.1
Little Fork River	60,607.7	-	38,440.5	-
Big Fork River	41,002.4	-	39,668.9	-
Rapid River	19,986.1	-	19,986.1	-
La Vallee River 🍁	-	3,037.3	-	3,037.3
Black River	9,695.9	-	9,695.9	-
Sturgeon River 🍁	-	2,838.4	-	2,838.4
McCloud Creek	352.9	-	221.6	-
Whitefish Creek	531.2	-	320.8	-
Pinewood River 🍁	-	5,316.7	-	5,316.7
Silver Creek	1,114.2	-	631.1	-
Unnamed (391)	457.1	-	352.0	-
Baudette River	1,611.5	-	1,287.0	-
Miller Creek	420.4	-	215.3	-
Winter Road River	3,280.7	-	3,139.9	-
Wabanica Creek	1,364.8	-	696.2	-
Direct Drainage 🍁	5,846.1	13,559.8	5,846.1	13,559.8
Total (Rainy River)	**182,447.6**	**108,245.3**	**156,677.9**	**108,245.3**

🍁 denotes that all or part of the load from this source originates in Canada

Excerpted from the TMDL document

The TMDL document notes that specific load allocations for each individual tributary are to be considered flexible as implementation efforts may require that specific allocations may need to be changed to most efficiently and cost effectively achieve the overall combined total reductions needed from tributary TP loads.

> *Tributary loading and allocations provided in Table 4-12 and Table 4-13 are modeled values and are not intended to be prescriptive or represent attainability for each specific tributary.*
> *[Excerpted from the TMDL document]*

Direct Loads from Lakeshed Runoff

Direct lakeshed loading is addressed in Section 4.7.2 of the TMDL document. Direct lakeshed loads are shown by MPCA along with load allocations in Table 4-14 of the

TMDL document. Direct lakeshed loads are included as a categorical load in both units of kg/d and kg/yr in TMDL Review Table 4-17a (shown in Section 3 of this decision document).

> *Study period mean annual direct lakeshed loading, from all contributing land areas regardless of jurisdiction, was taken from HSPF model output. Table 4-14 lists the study period mean annual loads and LAs for each direct lakeshed loading area. Sabaskong and Little Traverse Bays' direct lakeshed loading areas are both split across two HSPF-modeled reaches (subwatersheds), and loads are reported by reach. The study period mean annual direct lakeshed loading to the LoW is 17,112.1 kg y_{-1}. No direct lakeshed loading reductions are proposed.*
> *[Excerpted from the TMDL document]*

As with other load assessment and load allocation tables, loads originating in Canada are included as acknowledged TP loads for information purposes and do not represent assigned allocations.

Table 4-14. Study period mean annual direct lakeshed loading, load allocations, and acknowledged loads.

Direct Lakeshed Drainage Area by Bay	Study Period Mean Annual TP Load (kg y^{-1})		Load Allocation TP Load (kg y^{-1})	Acknowledged TP Load for Canadian Sources (kg y^{-1})
	US	Canada		
Sabaskong East 🍁	-	2,058.1	-	2,058.1
Sabaskong West 🍁	-	1,824.3	-	1,824.3
Four Mile 🍁	-	1,988.5	-	1,988.5
Big Traverse 🍁	614.1	5,526.8	614.1	5,526.8
Muskeg	218.5	145.7	218.5	145.7
Little Traverse South 🍁	1,121.7	1,682.6	1,121.7	1,682.6
Little Traverse North 🍁	386.4	1,545.5	386.4	1,545.5
Total	**2,340.7**	**14,771.5**	**2,340.7**	**14,771.5**

🍁 denotes that all or part of the load from this source originates in Canada
Excerpted from the TMDL document

Shoreline Erosion Loading

Loads originating from shoreline erosion are discussed in Section 4.7.3 of the TMDL document. TP load allocations are shown for the US portion of the Lake of the Woods shoreline in Table 4-15 of the TMDL document.

> *Houston Engineering and the LoW Soil and Water Conservation District (SWCD 2013) conducted a shoreline erosion study for the southern portion of the LoW*

extending east from Warroad, Minnesota, to Four Mile Bay. This study was used to provide the shoreline erosion estimates that are explicitly accounted for in the allocation table. The mean annual load of 72,000 kg as determined by this study was apportioned to the three bays (Four Mile, Big Traverse, and Muskeg) between Warroad, Minnesota, and the Rainy River based on shoreline length, as shown in Table 4-15. A reduction of 16% is proposed based on the length of shoreline protection projects already in place; these shoreline protection practices are assumed to be maintained in the future. Shoreland erosion rates are not available for the remaining shoreline areas; however, these sources are implicitly accounted for in the BATHTUB model through internal loading. The unexplained residual loading to the LoW (the loading that is calculated as the difference in increases in in-lake TP mass and the sum of the known or explicitly modeled external loads) that is entered as internal loading in BATHTUB reflects loading from sources that are not explicitly modeled in BATHTUB.
[Excerpted from the TMDL document]

Table 4-15.Study period shoreline erosion phosphorus loading and load allocations.

Shoreline Erosion by Bay	Study Period Mean Annual TP Load (kg y^{-1})	Load Allocation TP Load (kg y^{-1})
Four Mile	9,395.4	7,892.2
Big Traverse	36,000.0	30,240.0
Muskeg	26,604.6	22,347.8
Total	**72,000.0**	**60,480.0**

Excerpted from the TMDL document

Subsurface Treatment (Septic) Systems Loads (SSTS)

Loads from septic systems are addressed in Sections 4.7.4 and E.3.4 of the TMDL document. Loads from Canadian septic sources are acknowledged for information purposes, while loads from US septic sources are assumed to be eventually brought into compliance with zero discharge requirements. Therefore, no allowable load is provided for any SSTS loading orginating in the U.S. Load allocations are presented in both units of kg/d and kg/yr in TMDL Review Table 4-17a (shown in Section 3 of this decision document).

The SSTS loading was taken from HSPF-modeled output and is described in detail in Appendix E. Study period mean annual loads from (failing) SSTSs were included in the models for direct lakeshed loading areas. Septic system loading directly to the LoW is summarized in Table 4-16. Total study period mean annual septic loading is 721.7 kg y_{-1}, the LA is 0 kg y_{-1}, and the acknowledged load is 410.7 kg y_{-1}. The LA is

based on the assumption that all failing septics will be brought into compliance and that future loading from septic systems will be indistinguishable from background groundwater loading. Because the MPCA does not have jurisdiction over Canadian sources, the proposed reduction applies only to U.S. SSTSs; no reduction is proposed for Canadian SSTS loading.
[Excerpted from the TMDL document]

Lake of the Woods Nutrient TMDL - Revised Table 4-16 Study period mean annual direct septic loading, load allocations, and acknowledged loads. (Revised 6-2-21)

Bay/Lakeshed	Study Period Mean TP Load ($kg\ y^{-1}$)		Load Allocation TP Load ($kg\ y^{-1}$)	Acknowledged TP Load for Canadian Sources ($kg\ y^{-1}$)
	Load Originating in US	Load Originating in Canada		
Sabaskong East 🍁	0.0	22.4	0	22.4
Sabaskong West 🍁	0.0	130.4	0	130.4
Four Mile 🍁	85.9	21.5	0	21.5
Muskeg	19.7	0.0	0	0.0
Big Traverse 🍁	165.9	165.9	0	165.9
Little Traverse South 🍁	34.9	52.4	0	52.4
Little Traverse North 🍁	4.5	18.1	0	18.1
Total	**311.0**	**410.7**	**0**	**410.7**

🍁 denotes that all or part of the load from this source originates in Canada
Revised Table 4-16 provided by MPCA to EPA via Email on 6/2/2021

Atmospheric Deposition Loads

The TP load from atmospheric sources is discussed in Section 4.7.5 of the TMDL document. The atmospheric deposition of TP to the Lake of the Woods is estimated based on previous studies, with the load allocation being set equal to the current estimated load.

An atmospheric P deposition rate of 19.3 mg $m^{-2}y^{-1}$ (reported by Twarowski et al. [2007] for the Rainy River Basin) for average precipitation years was used in this TMDL study. The total atmospheric P load to the LoW within the TMDL Study Area is 51,407.3 kg y^{-1}. No reduction in atmospheric loading is proposed because it originates outside the basin and is not controllable.
[Excerpted from the TMDL document]

Internal Phosphorus Loading

Internal P loading from benthic sediments within the lake is discussed in Section 4.7.6 and Appendix F of the TMDL document. It is estimated based on the difference between

the expected and actual concentration of TP determined using a mass balance approach that accounts for all other TP loads.

> *Internal P loading was estimated by using a detailed mass and water balance approach to determine monthly differences (by bay) between expected changes in in-lake TP concentrations, as estimated from external P loading, and actual changes in in-lake TP concentration, as estimated from water quality monitoring data. A detailed description of the analysis is included in Appendix F. The existing internal P load for the LoW within the TMDL Study Area is 281,994.7 kg y_{-1}.*
> *[Excerpted from the TMDL document]*

Load Allocations Summary with Daily Loads

TMDL Review Table 4-17a (shown in Section 3 of this decision document) presents the load allocations for the above discussed categories in both terms of kg/yr and kg/d.

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of Section 4.

Section 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.

Section 5 Review Comments

The waste load allocations are properly assigned

A discussion of the WLAs are provided in Section 4.4 of the TMDL document. Table 4-2 of the TMDL document provides a summary of the WLAs for each allocation category. Appendix C of the TMDL document (shown in Appendix DD1 of this decision document) provides a more detailed breakdown of WLAs.

The study period mean annual P load from permitted sources is 89,189.0 kg y^{-1}, and the WLA and acknowledged loads (from Canadian sources) are 39,400.0 kg y^{-1} and 6,347.5 kg y^{-1}, respectively, which correspond to a reduction of 43,441.4 kg y^{-1} or 48.7% of the study period mean annual load. Study period mean annual loads, WLAs, and acknowledged loads by permitted source category are included in Table 4-2. Study period mean annual loads are from the calibrated HSPF model (Lupo 2015b). Excerpted from the TMDL document]

Table 4-2. Study period mean annual loads (Lupo 2015b), wasteload allocations, and acknowledged loads for permitted sources.

Permitted Source Category	Study Period Mean Annual TP Load (kg y^{-1})		Wasteload Allocation TP Load (kg y^{-1})	Acknowledged TP Load from Canadian Sources (kg y^{-1})
	US	Canada		
Domestic Wastewater	8,306.5	1,167.5	5,221.0	1,167.5
Industrial Wastewater	35,912.8	43,513.7	33,662.0	5,180.0
Industrial Stormwater	193.9	0	193.9	0
Construction Stormwater	94.6	0	94.6	0
CAFOs	0	0	0	0
MS4s	0	0	228.6	0
Total	**44,507.8**	**44,681.2**	**39,400.0**	**6,347.5**

Excerpted from the TMDL document

NPDES Permitted Domestic Wastewater Sources

Section 4.4.1 of the TMDL document discusses the waste load allocations for domestic wastewater NPDES permitted facilities.

Total study period mean annual loads, WLAs, and acknowledged loads are shown in

Table 4-3. The total study period mean annual load was 9,474.0 kg y^{-1}. The WLA and acknowledged loads are 5,221.0 kg y^{-1} and 1,167.5 kg y^{-1}, respectively, which correspond to a reduction of 1,918.0 kg y^{-1} or 23.1%. Study period mean annual loads were taken from the HSPF output. The WLAs and acknowledged loads were determined as the product of each facility's design discharge and permitted P concentration.
[Excerpted from the TMDL document]

Table 4-3 of the TMDL document provides a comparison of overall U.S. WLAs and Canadian acknowledged loads.

Table 4-3. Study period mean annual domestic WWTP loads (Lupo 2015b), wasteload allocations, and acknowledged loads from sources not above the upper boundary condition.

Source Country	Study Period Mean Annual TP Load (kg y^{-1})	Wasteload Allocation TP Load (kg y^{-1})	Acknowledged TP Load from Canadian Sources (kg y^{-1})
US	8,306.5	5,221.0	-
Canada	1,167.5	-	1,167.5
Total	**9,474.0**	**5,221.0**	**1,167.5**

Excerpted from the TMDL document

Table 4-6 of the TMDL document shows the individual permitted U.S. domestic WWTP sources including permit numbers and TP WLAs in terms of both annual (kg/yr) and daily (kg/d) loading rates. The values in the "Effluent TP WLA (kg/d) are the approved WLAs under this TMDL.

Table 4-6. U.S. domestic WWTP wasteload allocations in the TMDL Restoration Area.

Domestic WWTP	NPDES/SDS Permit Number	Permit Issuance Date	Permit Expiration Date	HUC-8	Receiving Water	Effluent Type	Effluent TP WLA ($kg\ d^{-1}$)	Effluent TP WLA ($kg\ y^{-1}$)
Anchor Bay Mobile Home Park	MN0046213	10/30/2012	9/30/2017	Rainy River - Baudette	Rainy River	Intermittent	1.1[a]	44
Baudette WWTP	MN0029599	10/6/2011	8/31/2015	Rainy River - Baudette	Rainy River	Controlled	9.6[a]	367
Big Falls WWTP	MNG580135	4/25/2003	8/31/2015	Big Fork River	Big Fork River	Controlled	2.5[a]	119
Bigfork WWTP	MN0022811	10/22/2010	5/31/2016	Big Fork River	Big Fork River	Intermittent	4.4[a]	215
Cook WWTP	MNG580179	6/9/2011	8/31/2015	Little Fork River	Little Fork River	Controlled	10.9[a]	509
Effie WWTP	MN0067555	11/19/2010	1/31/2017	Big Fork River	Wetland	Continuous	0.3	102
ISD 2142 Pre-Kindergarten to Grade 12 N School	MN0069850	2/14/2012	12/31/2015	Little Fork River	Flint River	Continuous	0.1	44
ISD 363 - Indus School	MN0049263	5/9/2014	12/31/2016	Rainy River - Baudette	Rainy River	Continuous	0.1	34
Littlefork WWTP	MNG580081	1/18/2011	8/31/2015	Little Fork River	Beaver Brook	Controlled	5.6[a]	229
DNR Scenic State Park	MN0049891	11/4/2010	12/31/2023	Big Fork River	Cedar Lake	Periodic/ Seasonal	0.1[a]	21
NKASD WWTP	MN0020257	6/25/2012	12/31/2016	Rainy River - Baudette	Rainy River	Continuous	9.1	3,318
Northome WWTP	MNG580185	2/1/2019	8/31/2015	Big Fork River	Caldwell Brook	Controlled	3.0[a]	122
Springsteel Island Sanitary District	MN0068322	10/1/2014	3/31/2017	Lake of the Woods	Lake of the Woods	Continuous	0.03	10
Williams WWTP	MN0021679	11/19/2010	5/31/2016	Lake of the Woods	Williams Creek	Controlled	2.1[a]	87

(a) Daily WLAs for sites not operating under continuous discharge are greater than 1/365th of the annual WLA because of limited periods of discharge.

Excerpted from the TMDL document

NPDES Permitted Industrial Wastewater Sources

Section 4.4.2 of the TMDL document discusses the methodology used to determine waste load allocations for industrial wastewater sources.

> *Total industrial wastewater study period loads, WLAs, and acknowledged loads are summarized by country in Table 4-7. The total study period mean annual load is 79,426.5 kg y_{-1}. The WLA and acknowledged loads are 33,662.0 kg y_{-1} and 5,180.0 kg y_{-1}, corresponding to a reduction of 40,584.5 kg y_{-1} or 51.1%. Study period mean annual loads were taken from HSPF output and WLAs for U.S. sources were determined from permitted loads. A detailed breakdown of study period mean annual loads and WLAs from the five U.S. industrial wastewater sources in the TMDL Restoration Area is presented in Table 4-8. The total study period mean annual load from U.S. industrial wastewater sources is 35,912.8 kg y_{-1}. The total WLA is 33,662.0 kg y_{-1}, a decrease of 2,250.8 kg y_{-1} or 6.3%. [Excerpted from the TMDL document]*

Table 4-7. Study period mean annual industrial wastewater loads, wasteload allocation, and acknowledged load from sources not above the upper boundary condition.

Source Country	Study Period Mean Annual TP Load (kg y^{-1})	Wasteload Allocation TP Load (kg y^{-1})	Acknowledged TP Load from Canadian Sources (kg y^{-1})
US	35,912.8	33,662.0	-
Canada	43,513.7	-	5,180.0
Total	**79,426.5**	**33,662.0**	**5,180.0**

Excerpted from the TMDL document

Table 4-9 of the TMDL document provides detailed information for the five WLAs for the U.S. industrial wastewater sources, including NPDES permit numbers and daily loading values.

Table 4-9. U.S. industrial WWTP WLAs.

Industrial WWTP	NPDES/SDS Permit Number	HUC-8	Receiving Water	Effluent Type	Effluent TP WLA (kg d^{-1})	Effluent TP WLA (kg y^{-1})
Berger Horticultural Products – Pine Island Bog	MN0066052	Big Fork River	Black River	Periodic/ Seasonal	0.8[a]	30[a]
Boise White Paper LLC – Intl Falls	MN0001643	Rainy River – Baudette	Rainy River	Continuous	90.6[b]	33,100[b]
Marvin Windows & Doors	MN0055026	Lake of the Woods	Lake of the Woods	Continuous	0.01	4
US Steel – Minntac Tailings Basin Area	MN0057207	Little Fork River	Dark River	Seep	0.1[c]	30[c]
Hibbing Taconite Co. – Tails Basin Area	MN0049760	Little Fork River	Shannon River	Continuous	1.4	498

MS4s

Waste load allocations for MS4s are discussed in Section 4.4.6 of the TMDL document. No allocations are provided for current MS4s, however a WLA is provided in anticipation of a future MS4 load.

MPCA noted that a small portion of the Hibbing MN MS4 is located within the study area but does not have conveyances or discharges within that portion.

> *The Hibbing, Minnesota, MS4 is the only regulated MS4 located in the TMDL Restoration Area and is located in the headwaters of the Little Fork River. The city of Hibbing covers an area of 482 km^2 (186 mi^2) and approximately 41 km^2 (16 mi^2) are located within the TMDL Restoration Area. Approximately 30 km^2 (11 mi^2) of this*

> *area is covered by the Hibbing Taconite Company Tailings Basin Area, which is a regulated point source. As such, the load from the tailings basin area has already been explicitly accounted for in this TMDL study as an industrial wastewater source that discharges to the Little Fork River through its tributaries. The remaining 11 km^2 (5 mi^2) outside the tailings basin, but within the TMDL Restoration Area, is largely forested and undeveloped. There are no discharges to the city of Hibbing's stormwater conveyance system that are within the 11 km^2 area. Thus, no WLA was assigned to the City of Hibbing MS4.*
> *[Excerpted from the TMDL document]*

A WLA is provided by MPCA for the City of International Falls MN. Although the city it is not currently covered under an MS4 permit, it is expected to be subject to an MS4 permit in the future. Load allocations are presented in both units of kg/d and kg/yr in TMDL Review Table 4-17a (shown in Section 3 of this decision document).

> *The City of International Falls is expected to be subject to an MS4 permit in the future as it is a city with a population greater than 5,000 people that drains to an impaired water (the LoW). The City of International Falls MS4 was determined as the portion of the LoW loading capacity equal to the ratio of the area of the city of International Falls to the total TMDL Study Area. In other words, if the city of International Falls MS4 occupied 1% of the TMDL Study Area, it would be assigned a WLA equal to 1% of the LoW loading capacity. The city of International Falls covers 16.2 km^2 (6.3 mi^2) within the 62,654 km^2 (24,191 mi^2) TMDL Study Area (0.026%) and thus, was assigned a WLA of 228.6 kg y^{-1}.*
> *[Excerpted from the TMDL document]*

Industrial Stormwater Sources

Industrial site stormwater TP loads are discussed by MPCA in Section 4.4.3 of the TMDL document. TMDL Review Table 4-17a (shown in Section 3 of this decision document) includes an industrial stormwater WLA in both 193.9 kg/yr and 0.5 kg/d of TP. MPCA calculated the industrial stormwater WLA as an overall categorical WLA.

> *The P loading from permitted industrial stormwater sites within the LoW Basin was estimated from MPCA permit data (MCPA 2017a). Fourteen permitted facilities not covered under no exposure exclusions were identified within the TMDL Restoration Area; these facilities are listed in Appendix E. The total area of these sites is 798 ha (1,972 ac). The industrial stormwater WLA is categorical (i.e., all industrial stormwater locations are included as a single WLA in the TMDL Allocations table). The percentage of industrial acres in the TMDL Restoration Area was multiplied by the TMDL allowable load to determine the industrial stormwater WLA, which resulted in an annual load of 193.9 kg yr^{-1}. No load reduction is proposed for*

industrial stormwater.
[Excerpted from the TMDL document]

Additional detail on how the load was calculated is provided in Appendix E.

Industrial stormwater runoff is a regulated source as defined by the MPCA's reissued Multi-Sector Industrial Stormwater NPDES/SDS General Permit (MNR050000), which applies to facilities with Standard Industrial Classification Codes in ten categories of industrial activities with the potential for significant materials and activities exposed to stormwater and that may leak, leach, or decompose and be carried offsite. Facilities can obtain a No Exposure exclusion if the site's operations occur under-roof. The permittee is required to develop and implement a SWPPP) that details stormwater BMP implemented to manage stormwater at the facility. Permitted facilities are also required to perform runoff sampling. The MPCA's records (MCPA 2017a) identified 14 permitted facilities not covered under a no exposure exclusion within the TMDL Study Area. These 14 facilities are listed in Table E-11. These areas total 798 ha (1,972 ac). The industrial stormwater WLA was determined as the TMDL loading capacity multiplied by the portion of the watershed lying within permitted industrial stormwater sites, which results in an estimated existing (study period) load and a WLA of 193.9 kg yr^{-1}. No change in loading is proposed for industrial stormwater. The industrial stormwater WLA included in this TMDL study is categorical (i.e., all industrial stormwater locations are included as a single WLA in the LA table).
[Excerpted from the TMDL document]

Table E-10. U.S. Industrial Wastewater Discharges in the TMDL Study Area.

Industrial Wastewater Source	Receiving Water	Study Period Mean Annual TPLoad (kg y^{-1})		Wasteload Allocation TP Load (kg y^{-1})		Percent Change
		At Source	At LoW	At Source	At LoW	
Marvin Windows and Doors	Lake of the Woods	4.0	4.0	4.0	4.0	0
Berger Horticultural Products Pine Island Bog (not yet operational)	Big Fork River	0	0	30.0	30.0	–
US Steel – Minntac Tailings Basin Area	Little Fork River	27.1	10.9	30.0	30.0	175.2
Hibbing Taconite Co. – Tailings Basin Area	Little Fork River	340.5	118.2	498.0	498.0	321.3
Boise White Paper LLC – Intl Falls	Lower Rainy River	35,541.2	28,679.2	33,100.0	33,100.0	15.4
Total		**–**	**28,812.3**	**–**	**33,662.0**	**16.8**

Construction Stormwater Sources.

Construction site stormwater P loads are discussed by MPCA in Section 4.4.4 of the TMDL document. TMDL Review Table 4-17a (shown in Section 3 of this decision

document) includes a construction site stormwater WLA in both 94.6 kg/yr and 0.3 kg/d of TP.

> *The P loading from permitted construction stormwater sites within the LoW Basin was estimated from the MPCA permit data from 2005 to 2014 (MPCA 2015d). The total area of permitted construction sites that drain to the LoW was estimated by county as the product of the total permitted area by county and the portion of the county within the LoW Basin. Permitted construction sites were assumed to be evenly distributed throughout each county. The estimated permitted construction site area within the TMDL Study Area is 389.4 ha. The percentage of construction acres in the TMDL Restoration Area was multiplied by the TMDL allowable load to determine the construction stormwater WLA, which resulted in an annual load of 94.6 kg yr^{-1}. Detailed information that support these calculations is included in Appendix E. The construction stormwater WLA included in this TMDL study is categorical (i.e., all construction stormwater locations are included as a single WLA in the TMDL Allocations table). No change in loading is proposed for construction stormwater sites in this TMDL study.*
> *[Excerpted from the TMDL document]*

Table E-12 of the TMDL document (shown in Section 1 of this decision document) provides information on the relevant areas of constructions sites within the study area. The methodology used to calculate the construction site stormwater WLA is described further in Section E.2.4 of the TMDL document.

> *Construction site data from the study period (MPCA 2015d) were used to estimate the area of construction activity within the LoW Basin. The mean annual area subject to construction stormwater permits was determined by county and is listed in Table E-12. The mean annual total area under construction across the 8 counties in the LoW Basin was 925.1 ha (2,285.9 ac), but these counties are not entirely within the LoW Basin. The portion of each county within the LoW Basin was determined and used to estimate the construction area within each county that was also within the LoW Basin. As shown in Table E-12, the mean annual total construction (permitted) area is 389.4 ha (962.2 ac). The study period construction stormwater load and construction stormwater WLA were determined as the TMDL loading capacity multiplied by the ratio of the mean annual total permitted construction area to the total watershed area. No load reduction is proposed for construction stormwater and thus, the WLA is equal to the estimated study period mean annual load of 94.6 kg yr. The construction stormwater WLA included in this TMDL study is categorical (i.e., all of the construction stormwater locations are included as a single WLA in the TMDL LAs table).*
> *[Excerpted from the TMDL document]*

Reserve Capacity (RC)

A portion of the load was reserved by MPCA in anticipation of the need for future waste load allocations for communities within the study area that are currently unsewered. Additional capacity was also reserved in anticipation of two Canadian sites that are not yet discharging, but for which Canada has acknowledged that they do anticipate future TP loads from these two planned facilities. These loads are shown in Table 4-10 of the TMDL document.

> *The RC was developed for three sites within the TMDL Study Area that are either proposed or not yet discharging: unsewered communities in the TMDL Restoration Area, New Gold Mine, and Fort Frances, Canada. The RC or acknowledged load (Canadian sources) for each location and the total RC (887.0 kg y_{-1}) are shown in Table 4-10. An RC was included for potential discharge from areas within the TMDL Restoration Area that are currently not served by WWTPs. The New Gold Mine is a Canadian gold mine located approximately 20 km (12 mi) north of the Rainy River approximately halfway between Fort Frances, Canada, and Four Mile Bay. New Gold Mine is not yet discharging, but an acknowledged load (added as a RC) was assigned to the site based on permit information. An acknowledged load (added as a RC) was also assigned to potential development in Fort Frances, Canada.*
> *[Excerpted from the TMDL document]*

Table 4-10. RC Loads by Source.

Source	Reserve Capacity TP Load ($kg\ y^{-1}$)	Acknowledged TP Load from Canadian Sources ($kg\ y^{-1}$)
Unsewered Communities[a]	167.0	-
Fort Frances	-	300.0
New Gold Mine	-	420.0
Total	**167.0**	**720.0**

[a] Birch Beach, Sandy Beach, etc.

Excerpted from the TMDL document

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of Section 5.

Section 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:

A MOS is provided and justified. If an implicit MOS is used, conservative assumptions are identified, and their relative impacts discussed.

An MOS of safety of 5% (35,608.1 kg/y, 97.6 kg/d) is set aside by MPCA to account for potential errors in the TMDL calculations and models. The level of rigor in characterizing the two largest sources of TP and the extensive past and present study of the basin and the Lake of the Woods itself are cited as justification for the MOS chosen.

> *In this TMDL study, an explicit 5% MOS (35,608.1 kg y^{-1}) was chosen based on the basin-wide mass balances developed via use of calibrated HSPF models for characterizing the TMDL Restoration Area and quantifying streamflow and nutrient loads. The TMDL allocations described herein have been based on the best available information for the study period, including land cover that was incorporated into updated LoW Basin HSPF models and subject to rigorous state oversight. The dominant water and P source to the LoW is the Rainy River and its tributaries. The Rainy River's discharge and nutrient loading were calibrated to monitoring data, recent climate data, land use, and gauged flows using the HSPF model. Lake modeling was accomplished by using widely accepted standard assessment and quality control methods. Additional research that provided necessary background information included monitoring (US Geological Survey), BATHTUB and Flux modeling (St. Cloud State University), and paleolimnology assessment (Natural Resources Research Institute). Internal sediment generated P, the second largest P source, has been studied extensively by William James of UW-Stout University and the St. Croix Watershed Research Station (SCWRS) of the Science Museum of Minnesota (SCWRS) (James 2012, 2015, 2017a, 2017b, and Edlund et al. 2017). The SCWRS concluded from their sediment chemical and phyto-historical*

reconstruction of historical P loadings that the LoW sediment P mass (or internal loading) is projected to continue to decline and move toward a new equilibrium with a net loss of approximately 1% per year.
[Excerpted from the TMDL document]

The EPA wants to clarify that the State cites the choice not to rely on attenuation to achieve the necessary loads as an additional implicit margin of safety. EPA notes that additional information will need to be submitted regarding the validity and scale of the concept of attenuation of TP as it is applied under the circumstances of this TMDL and this particular river system. Therefore, for this TMDL decision, EPA did not consider attenuation to provide additional implicit MOS until further study is done to further document and characterize the movement of P though the system.

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of Section 6.

Section 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:

Seasonal variation in loads and/or effects are described and accounted for.

Seasonal variation is discussed by MPCA in Section 4.8 of the TMDL document. Seasonal variation is accounted for by focusing the WQS in the summer months when the impacts of elevated TP concentrations are more pronounced.

Lake water quality varies more seasonally (intra-year) than year-to-year (inter-year) because of temperature and precipitation cycles. In this annual cycle, the majority of annual watershed P loading is typically associated with the peak-flow events of spring and large storms that can set the stage for summer conditions. Hence, a greater monitoring emphasis is usually placed on characterizing the nature of P loading during higher flow periods. Lakes with large fetches, such as the LoW, are subject to fluctuations of P concentrations because of wind mixing and resuspension, fluctuating Rainy River flows and flushing rates, and major runoff events that occur over the

> *summer season. However, warmer summer temperatures can result in periodic, higher algal growth rates and higher Chl-a concentrations. Warmer summer lake temperatures can also increase the potential for lake internal P release or loading that can also contribute to increased algal Chl-a. This seasonal variation has been factored into the development of Minnesota's lake standards, based on swimmable and fishable beneficial uses, for the summer critical recreation period of June through September (Heiskary and Wilson 2005). This TMDL study's targeted allocations are based on Minnesota's lake standards and summer critical conditions.*
> *[Excerpted from the TMDL document]*

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of Section 7.

Section 8. Reasonable Assurances

When a TMDL is developed for waters impaired by point sources only, the issuance of a NPDES permit(s) provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 C.F.R. 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with "the assumptions and requirements of any available wasteload allocation" in an approved TMDL.

When a TMDL is developed for waters impaired by both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur, EPA's 1991 TMDL Guidance states that the TMDL should provide reasonable assurances that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable. This information is necessary for EPA to determine that the TMDL, including the load and wasteload allocations, has been established at a level necessary to implement water quality standards.

EPA's August 1997 TMDL Guidance also directs Regions to work with States to achieve TMDL load allocations in waters impaired only by nonpoint sources. However, EPA cannot disapprove a TMDL for nonpoint source-only impaired waters, which do not have a demonstration of reasonable assurance that LAs will be achieved, because such a showing is not required by current regulations.

Section 8 Review Comments:

Mechanisms for International Cooperation

Section 6 of the TMDL document discusses reasonable assurance. Given that the State of MN does not have jurisdiction over Canadian sources, it is important that the State be able to rely on international agreements and cooperation in order to show the acknowledged loads from Canada do not contribute more TP to the system than the TMDL has accounted for. Table 6-1 of the TMDL document provides information from a number of international workgroups that the State will utilize to show that it is aware of any significant changes to the acknowledged Canadian sources.

Table 6-1 of the TMDL document - Lake of the Woods International Partnerships

Name	Membership	Charge
International Joint Commission (IJC)	Three IJC commissioners from Canada and three from the US.	To review and approve projects that affect water levels and flows across the international boundary and investigate and recommend solutions to transboundary issues.
International Multi-agency Arrangement (IMA)	Manager-level staff at federal, state, provincial, Tribal, First Nations, and county governments with land and water authorities in the LoW Basin.	To foster trans-jurisdictional coordination and collaboration on science and or management activities to enhance/restore water quality in the LoW Watershed.
IMA – Technical Advisory Committee(IMA-TAC)	Technical staff from the agencies who are signatories of the IMA as well as experts from other agencies who have mandates that align with the purpose of the IMA, or support the TAC's subcommittees	The purpose of the TAC is to provide technical advice and expertise to the IMA Working Group in support of the objectives of the 2009 Arrangement.

International Rainy-Lake of the Woods Watershed Board (IRLWWB)	Ten members from Canada and ten members from the US representing all levels of government, indigenous communities, and local community interests.	To monitor and report on ecological health of the LoW and Rainy Lake boundary waters' aquatic ecosystem, including water quality, and to assist the IJC in preventing and resolving disputes regarding the watershed's boundary waters.

Excerpted from the TMDL document

Table 6-1. Lake of the Woods International Partnerships (continued)

Name	Membership	Charge
IRLWWB Water Levels Committee	Four members from Canada and four members from the US, representing IJC, ECCC, local members, and ACOE.	To act as a technical advisor to the IJC on matters of water level regulation and review flow and level changes, maintenance issues, and other level and flow matters regarding the Rainy and Namakan Lakes.
IRLWWB Aquatic Ecosystem Health Committee	Membership is from relevant research and monitoring agencies within the Lake of the Woods Basin.	Assist the IJC's Rainy Lake of the Woods Watershed Board to fulfill its responsibilities under its directives with respect to water quality and aquatic ecosystem health monitoring, reporting, objectives and alerts, and other activities related to the Board's charge.
IRLWWB Engagement Committee	Five members from Canada and five members from US, representing local stakeholders, Red Lake DNR, and IAG.	To involve the public in the issues of water quality and quantity within the basin.

Excerpted from the TMDL document

In Section 6 of the TMDL document, the State affirms its commitment to reviewing and revising the TMDL allocation strategy should it become aware of any significant previously unaccounted for loading coming from outside of its jurisdiction.

> *In the event that Minnesota became aware that significant additional loads were to be added outside of its jurisdiction, the TMDL allocation strategy would be reviewed and revised if necessary.*
> *[Excerpted from the TMDL document]*

Reasonable Assurance that point source load reductions will occur is provided in the document.

For U.S. based point sources NPDES permit requirements provide reasonable assurance that waste load allocations will be met.

Section 6.2 of the TMDL document provides an extensive description of the regulatory mechanisms for ensuring that MS4 point source allocations are met.

> *The MPCA is responsible for applying federal and state regulations to protect and enhance water quality in Minnesota. The MPCA oversees stormwater management accounting activities for all MS4 entities listed in this TMDL study. The Small MS4 General Permit requires regulated municipalities to implement BMPs that reduce pollutants in stormwater to the maximum extent practicable. A critical component of permit compliance is the requirement for the owners or operators of a regulated MS4 conveyance to develop a SWPPP.*
> *[Excerpted from the TMDL document]*

Reasonable Assurance that NPS load reductions will occur is provided in the document.

The parties responsible for implementation are identified:

Section 6 of the TMDL document provides a discussion of the parties expected to lead restoration efforts along with the mechanisms that will be used to define and coordinate restoration efforts.

> *The TMDL goals defined by this study are consistent with objectives defined in local county water plans that will be further refined by the MPCA's Watershed Restoration and Protection Strategy (WRAPS) program, as well as the Minnesota Board of Water and Soil Resources' (BWSR) One Watershed, One Plan program. Together, these two locally-led programs, conducted on a HUC-8 watershed level, will result in the assessment of watershed conditions and a 10-year implementation plan that prioritizes implementation actions for water quality improvement towards long-term goals. The WRAPS reports for the LoW, Big Fork, and Little Fork HUC-8 Watersheds are complete and the 1W1P is complete for the LoW Watershed. The eight LoW Basin counties and the tribal representatives have been active participants in the TMDL study planning and development process, and most have decades of water quality management experience.*

> *Stakeholder meetings have been conducted to provide comment/feedback and support, including local governmental units and NPDES/SDS permit holders who receive TMDL allocations.*
> *[Excerpted from the TMDL document]*

Section 8 of the TMDL document includes additional discussion on the coordination of implementation efforts. MPCA noted that the local Soil and Water Conservation Districts (SWCD) will serve as the primary local entity addressing TMDL implementation.

> *Implementing the LoW TMDL study will be a collaborative effort between individuals and local, state, federal, provincial, and tribal governments. The overall effort will be led by the LoW and Koochiching SWCDs as the majority of the TMDL Restoration Area is located in these two counties. These SWCDs will provide technical support, funding coordination and local leadership. The SWCDs can leverage existing relationships and regulatory frameworks to generate support for the TMDL study implementation. These existing governmental programs and services will provide efficiency and related cost savings to the maximum extent possible.*
> *[Excerpted from the TMDL document]*

Potential measures to achieve load reductions are identified.

Section 8.2 of the TMDL document discusses the variety of measures that will be needed to achieve load reductions from non-permitted sources.

Section 8.2.1 of the TMDL document discusses how failing septic systems will be discovered through future surveys and are subject to county ordinances.

> *Because of the LoW Basin's rural nature, most homes and many businesses in the LoW Basin are served by SSTSs. Both LoW and Koochiching Counties have subsurface treatment system ordinances with detailed requirements and enforcement procedures. Future SSTS surveys will aid in obtaining 100% compliance and reducing nutrient loading from noncompliant systems.*
> *[Excerpted from the TMDL document]*

Section 8.2.2 of the TMDL document discusses the use of Best Managment Practices (BMPs)to reduce loads from agricultural lands.

> *The Agricultural BMP Handbook for Minnesota (Miller et al. 2012) provides information on the types of BMPs to be implemented in the watershed. Encouraging implementation of agricultural BMPs will substantially reduce agricultural lands'*

> *pollutants. The Minnesota Agricultural Water Quality Certification Program, implemented by the Minnesota Department of Agriculture (MDA), may be an important tool for increasing the adoption of agricultural BMPs. The NRCS and local SWCDs may be able to provide technical and financial services. Proper site designs, construction, and maintenance are key components for effective performance of agricultural best practices. Previous attempts to increase agricultural production in the watershed resulted in extensive ditching in the upstream areas of the LoW HUC-8. For these areas, agricultural drainage practices that reduce erosion, such as side inlets, will be implemented. Where agricultural production is not viable, efforts should be made to restore hydrology.*
> *[Excerpted from the TMDL document]*

Section 8.2.3 of the TMDL document discusses the use of BMPs to reduce loads from forestry lands.

> *Forestry operations of all sizes should adopt forest stewardship planning and follow the Minnesota Forest Resources Council* Forest Management Guidelines *(Minnesota Forest Resources Council 2012). Enrollment in Minnesota's Sustainable Forest Incentive Act (SFIA) will be encouraged. This program provides property owners with a payment for each acre of qualifying forest land that is enrolled. The qualifying enrollment criteria are agreeing not to develop land for a period of years and following a forest management plan.*
> *[Excerpted from the TMDL document]*

Section 8.2.4 of the TMDL document discusses how the implementation of BMPs in the Minnesota Stormwater Manual can be used to reduce loads from Urban areas not currently covered by MS4s.

> *Developed land use areas only account for 1.7% of the LoW basin and include the cities of Warroad, Baudette, and International Falls. Encouraging and tracking implementation of urban BMPs, as detailed by the Minnesota Stormwater Manual (MPCA 2016c) and minimal impact design standard (MIDS) will cover the spectrum of source, rate, and volume controls that will substantially reduce developed land's pollutant loading. In addition to the cities in the watershed, shoreland areas are subject to increasing land use pressure that could have reduced stormwater impacts by implementing urban BMPs.*
> *[Excerpted from the TMDL document]*

Section 8.5.2 of the TMDL document discusses programs in place to aid shoreland property owners in the design and implementation of measures intended to reduce shoreline erosion and the consequent TP loads.

> *The LoW SWCD offers programs to help landowners acquire professional design-build landscaping services to provide landscape designs. Lake shore residents can develop individualized plans with the landscape services contractor who can begin installations as feasible with a phased implementation to increase efficiencies and reduce unit costs. The contractor could conduct site reviews, prepare designs with property owners, design specifications, complete installation per specifications, and provide long-term maintenance checklists. Education and partnered demonstration plots with community organizations or schools may be beneficial. A 50-foot average riparian buffer width with a 30-foot minimum width has been recently required along public waters (Minn. Stat. 103F.48, Riparian Protection and Water Quality Practices). The LoW and Koochiching SWCDs are the point of contact for requirements and technical assistance for implementing buffers along public waters and shore lands. The Clean Water Legacy Fund included five million dollars available for local government implementation through BWSR. The SWCDs will identify and prioritize placement of perennial vegetation buffers along small streams and headwater areas.*
> *[Excerpted from the TMDL document]*

Section 8.5.6 of the TMDL document discusses how internal loads coming from lake bottom sediment are considered to be the result of TP enriched sediments from historically high TP inputs and are expected to continue to decline in response to recent and future load reductions to the lake.

> *Because of the size and nature of this lake, management actions aimed at controlling the internal release of P are not possible. However, the internal P loading is the result of excessive historical watershed loading, which has been greatly reduced over the past 50 years and continues to decline. The SCWRS estimates that, with continued decreases in watershed loading, the internal load will decrease approximately 1% per year.*
> *[Excerpted from the TMDL document]*

Potential resource needs for implementation are identified.

A detailed implementation cost estimate is anticipated as part of the restoration plan to be developed subsequent to the approval of this TMDL.

> *A detailed analysis of the cost to implement the LoW TMDL study was not conducted, as the restoration efforts will be addressed through the development of the individual HUC-8 TMDL studies, WRAPS reports, and One Watershed, One Plan process local water plans.*
> *[Excerpted from the TMDL document]*

A current cost estimate of $117,000/square mile is derived by MPCA based on previous implementation cost estimates on HUC-8 level watersheds.

> *The WRAPS reports and TMDL studies have already been concluded for the LoW HUC-8 Watershed, Little Fork River Watershed, and Big Fork River Watershed. These watersheds are identified as large loading sources to the LoW. The LoW HUC-8 TMDL study provided a preliminary estimate of $2.5 to $3 million dollars to implement planned activities. The LoW HUC-8 1W1P provides approximately $620,000 in implementation funding, every two years for the life of the Clean Water Fund with 10-year updates to the 1W1P. No other cost estimates for implementation projects in the remaining HUC-8 watersheds exists. The Little Fork TMDL study has an estimated cost of $56.4 million for the 482 mi^2 of TSS impaired stream watersheds. This estimate is based on an interagency work group (BWSR, MDA, MPCA, Association of SWCDs, Association of Watershed Districts, National Oceanic and Atmospheric Administration) that assessed restoration costs for several TMDLs, with an average cost estimate of $117,000/square mile for a watershed-based treatment approach.*
> *[Excerpted from the TMDL document]*

The Clean Water Legacy Act (CWLA): 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. (Min. Stat. § 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 subd. 1(b)(5)(iv); 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.

Additional potential funding sources are discussed in Section 6 of the TMDL document.

> *Future water quality restoration efforts will be led by local and county entities and tribes within the LoW Basin. Funding resources may be obtained from the following state and/or federal programs:*
> - *Minnesota Clean Water, Land, and Legacy Funds*
> - *EPA funding, such as CWA Section 319 grants*
> - *State Clean Water Partnership Loans*
> - *Natural Resources Conservation Services (NRCS) cost-share funds*
> - *Local governmental funds and utility fees*
> - *Local and lake association and nonprofit-related resources*
>
> *[Excerpted from the TMDL document]*

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of Section 8.

Section 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

An effectiveness monitoring plan is provided.

Section 7 of the TMDL document provides a discussion of the follow up monitoring to ensure the measures needed to reduce pollutant loads are implemented and effective.

> *The MPCA is scheduled to begin its Cycle II intensive water quality monitoring efforts in the LoW Watershed in 2023. Evaluating progress toward achieving TMDL load reductions will rely primarily on monitoring surface waters and tracking implementation activities. Monitoring climate conditions and invasive species is also an important consideration in evaluating and understanding changes to lake and stream water quality and the dynamics of this large lake system.*
> *[Excerpted from the TMDL document.]*

Section 7.1 of the TMDL document provides additional recommendations for monitoring the Lake of the Woods, the Rainy River, and other tributaries.

> *Surface water monitoring, subject to funding availability and priorities, will include the LoW, the Rainy River, and each major watershed to evaluate lake and stream water quality patterns. Lake and river monitoring will be conducted by a combination of county/SWCD technicians, researchers, state, federal, and international partners as part of the LoW restoration plan. Details of the lake and stream monitoring, including tiered and core monitoring programs, are outlined in the POS (IJC 2015). An internationally agreed-upon network of long-term, fixed-site monitoring stations should be established. Additional U.S. HUC-8 level monitoring efforts will be specified by the WRAPS reports. Use of complimentary and emerging technologies, such as remote sensing, should be used in addition to infield monitoring efforts.*
> *[Excerpted from the TMDL document]*

Section 8.4 of the TMDL document provides a thorough description of the adaptive management process that will be utilized to make adjustments to the implementation process based on the monitoring results.

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of Section 9.

Section 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

NPDES WWTP and Industrial Waste Loads.

WLA for NPDES permitted sources are implemented by MPCA through the issuance of discharge permits that reflect the WLA assigned as part of the TMDL.

Non-permitted NPS Loads.

Sections 8.2.1 through 8.2.6 of the TMDL document discuss potential implementation measures to reduce non-permitted NPS loads. Each of these s is reviewed in greater detail in Section 8 of this decision document.

Subsurface Sewage Treatment Systems (Septic Systems) reductions.

Section 8.2.1 of the TMDL document discusses the reduction of P loads from non-compliant subsurface sewage treatment systems.

Watershed NPS TP load reductions.

Sections 8.2.2 through 8.2.4 of the TMDL document discuss the potential measures that could be taken to reduce NPS P sources from agriculture, forestry, and urban areas outside of MS4 regulated areas.

Shoreline TP load reductions.

Section 8.2.5 of the TMDL document discusses the measures needed to reduce P loading from riparian land and shoreline erosion.

Internal TP load reductions from bottom lake bottom sediments.

Section 8.2.6 of the TMDL document discusses why no additional measures are planned for the reduction of internal P loads from lake bottom sediments. These loads are considered to be the result of historically elevated P inputs, have been decreasing due to recent reductions,

and are anticipated to continue to do so in the future.

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of Section 10.

Section 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

TMDL development provided for adequate public participation.

Public Participation Process is described.

Section 9 of the TMDL document provides a summary of the numerous opportunities for public participation during the development of the TMDL. A Technical Advisory Committee (TAC) was also created to represent a variety of governmental and non-governmental stakeholders.

The LoW TMDL Study TAC was comprised of representatives from stakeholder groups including:

- *U.S. Geological Survey*
- *Red Lake Nation Department of Natural Resources*

- *LoW Sustainability Foundation*
- *Ontario Ministry of Environment and Climate Change (OMECC)*
- *Environment and Climate Change Canada*
- *Minnesota BWSR*
- *Minnesota Department of Health*
- *Minnesota Department of Natural Resources (DNR).*

[Excerpted from the TMDL document]

Annual forums and conferences provided additional opportunities for the general public to learn about and express opinions on the development of the TMDL.

In addition to the TAC, the MPCA has involved the broader public through annual forums and conferences. The MPCA and LoW SWCD staff members have given updates via presentations and newsletters to many organizations and audiences.
[Excerpted from the TMDL document.]

The MPCA informed and held meetings with point-source permit holders that were subject to WLAs. Multiple meetings were held with Boise Paper (International Falls), which was subject to the largest load reduction.
[Excerpted from the TMDL document.]

A number of public meetings with local watershed groups as well as two virtual meetings held during the public notice period provided additional opportunities for public education and involvement in the process.

Efforts to facilitate public education, review, and comment with development of the LoW TMDL included meetings with local watershed groups to discuss the assessment findings, a 30-day public notice period for public review and comment of the draft TMDL study, and two virtual public meetings - held during the public notice period – to discuss the draft TMDL study and answer questions. All input, comments, responses, and suggestions from public meetings and the public notice period were addressed or were taken into consideration in developing the TMDL study. A complete list of public participation activities is included in Table 9-1.
[Excerpted from the TMDL document.]

Table 9-1. Public participation.

Date	Activity	Location	Target Group	No. of Participants
October 2, 2015	Organizational Meeting	Baudette, MN	Federal, state, local, and tribal agency partners	18
November 23, 2015	Project overview	Webinar	TAC	11
December 21, 2015	Watershed Model Review	Webinar	TAC	11
March 8, 2016	Study Update	International Falls, MN	IJC, IAG, and CAF groups	
March 8, 2016	Lake Model Review	International Falls, MN	TAC	14
March 10, 2016	Study Update	International Falls, MN	Annual Conference	
August 2016	Study Update		Mike H and Cary gave an update in Kenora (IJC?)	
October 24, 2016	Kick-off Meeting	International Falls, MN	General Public	9
October 25, 2016	Kick-off Meeting	Baudette, MN	General Public	8
October 25, 2016	Kick-off Meeting	Warroad, MN	General Public	1
October 31, 2016	Kick-off Meeting	Webinar	General Public	14
November 23, 2016	Preliminary Results	Webinar	TAC	16
March 8, 2017	Internal Loading	Webinar	TAC	17
March 9, 2017	Study Update	International Falls, MN	Annual Conference	
November 21, 2017	Internal loading	Webinar	TAC	18
February 28, 2018	Preliminary Load Allocations	Webinar	OME, ECCC	
March 6, 2018	Study review	International Falls, MN	TAC	9
March 8, 2018	Study Update	International Falls, MN	Annual Conference	
August 13, 2019	Study Update	Baudette, MN	IJC Board	
January 14, 2020	Study Update	Webinar	ECCC	
March 11, 2020	Study Update	International Falls, MN	Annual Conference	
August 17, 2020	Study Update	Webinar	IRLWWB Board	
October 2, 2020	Study Update	Webinar	IRLWWB Public Meeting	
March 4, 2021	Informational Meeting	Webinar	All Stakeholders	28

An opportunity for public comment was provided and a summary of significant comments and the State's responses is included in/with the final TMDL submission.

> *An opportunity for public comment on the draft TMDL study was provided via a public notice in the State Register from February 22, 2021, through March 24, 2021. There were two comment letters received and responded to as a result of the public comment period.*
> *[Excerpted from the TMDL document.]*

Two letters with public comments were received by the State during the public comment period.

Both the public comment letters as well as the State's responses were included in the final TMDL submittal package for EPA to review.

The first letter was from the Roseau County Soil and Water Conservation District (SWCD). The district was confused by Table 4-12 of the TMDL document indicating that a portion of the Warroad River watershed load originated in Canada.

The State responded that in fact the HSPF model did indicate that a portion of the watershed does originate in Canada but drains directly to the Lake of the Woods. The State added a footnote to Table 4-12 of the TMDL document to clarify this point.

> *HSPF model boundaries show that a portion of the modeled Warroad River Subwatershed extends into Canada and the runoff from that portion of the subwatershed drains directly to the lake*
> *[Excerpted from a footnote to Table 4-12 of the TMDL document]*

The second letter included three comments. The first two comments pointed to some discrepancies between the figures in two different tables in the draft TMDL document that should represent the same values.

The State responded that the discrepancies the commentor found were errors that resulted from a failure to update one of the tables after responding to recent EPA comments and that they would take action to ensure both tables reflected the accurate information in the final TMDL. The State also reviewed additional tables in the draft TMDL and found one additional discrepancy and updated that one to the correct value as well.

> ***Response #1 & #2:*** *As we discussed during our call, you were correct in identifying the discrepancies between the values in Table 4-2 and 4-17. It appears that we failed to update Table 4-17 after we addressed the last round of comments from the U.S. Environmental Protection Agency. The values in Table 4-2 are the correct values. Additionally, and prompted by your comments, we have also identified two values in Table 4-12 that were incorrect.*
> *[Excerpted from the State's response to the second commentor]*

The third comment was seeking clarification as to whether or not Canadian domestic and industrial sources north of the study area were considered in the TMDL.

The State responded by clarifying that only sources with the study area were specifically considered as part of the TMDL study.

> ***Response #3:*** *You are correct that the TMDL only considers those sources found within the study area.*
> *[Excerpted from the State's response to the second commentor]*

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of Section 11.

Section 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:

Submittal Letter is provided if formal review is desired.

The final TMDL was submitted to EPA along with a letter from the MPCA indicating that the Lake of the Woods Excess Nutrients TMDL was being submitted to EPA for final review and approval. MPCA submitted the TMDL and transmittal letter on May 21, 2021.

The EPA finds that the TMDL document submitted by the MPCA satisfies the requirements of Section 12.

Section 13: Conclusions

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

EPA's approval of this TMDL extends to the water bodies identified in TMDL Review Table 3, 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.

TMDL Review Table 3 - Approved TMDLs

Water body name	AUID	Affected designated use	Pollutant
Lake of the Woods (Main)	39-0002-01	Aquatic Recreation	Total Phosphorus
LAKE OF THE WOODS(4 MI BAY)	39-0002-02	Aquatic Recreation	Total Phosphorus

As further noted in Section 3 of this decision document, MPCA calculated one Loading Capacity for both AUIDs. EPA is approving the loadings in table 14-7a, and values in Review Table 2 identified in Section 3 of this Decision Document.

EPA sent a letter of invitation to consult on this TMDL to the Bois Forte Band of Chippewa, the Leech Lake Band of Ojibwe, the Minnesota Chippewa Tribe, and the Red Lake Nation. Representatives from the Tribes did not respond to EPA's invitation to consult on EPA's review and decision of the LoW TMDLs. EPA understood this as Tribes declining EPA's invitation to consult.

Appendix DD1: Detailed Table of TMDL allocations

Appendix C of the TMDL document is included on the following two pages.

Lake of the Woods Load Allocation Table (May 20, 2021)		Detailed Background Information and Source Loading Information used in TMDL Development														Final Allocations/Acknowledged Load		
		Existing Load (at Source)			Delivery to Lake of the Woods			Existing Load (at Lake of the Woods)			Proposed Load		Estimated Load Reduction			Total Allowable Load (US and Canada)	Load/Wasteload Allocation (US)	Acknowledged Load (Canada)[1]
		Total Load	Originating in Canada[1]	Originating in US	Delivery to Rainy River	Delivery along Rainy River to LoW	Total Delivery to LoW	Total Load	Originating in Canada[1]	Originating in US	Load at Source	Load to Lake	Load at Source	Load to Lake	Percent Change[2]			
		kg/yr	kg/yr	kg/yr				kg/yr	kg/yr	kg/yr	kg/yr	kg/yr	kg/yr	kg/yr		kg/yr	kg/yr	kg/yr
	Total Load	**885,951.9**	**326,453.3**	**559,498.6**				**814,914.9**	**294,886.8**	**520,028.2**	**723,385.1**	**673,914.3**	**162,566.8**	**141,000.6**	**-17.3%**	**673,914.3**	**432,467.3**	**241,447.0**
Wasteload	**Total WLA**	**89,189.0**	**44,681.2**	**44,507.7**				**72,297.9**	**36,079.1**	**36,218.9**	**45,747.6**	**45,747.6**	**43,441.4**	**26,550.4**	**-48.7%**	**45,747.6**	**39,400.0**	**6,347.5**
	Wastewater[3]	**88,900.5**	**44,681.2**	**44,219.3**				**72,009.5**	**36,079.1**	**35,930.4**	**45,230.5**	**45,230.5**	**43,670.0**	**26,779.0**	**-49.1%**	**45,230.5**	**38,883.0**	**6,347.5**
	Point Sources in Lake of the Woods HUC 8	**62.4**	-	**62.4**				**42.3**	-	**42.3**	**101.0**	**101.0**	**(38.6)**	**(58.7)**	**61.8%**	**101.0**	**101.0**	-
	Marvin Windows & Doors	*4.0*	-	*4.0*	*N/A*	*N/A*	*100%*	*4.0*	-	*4.0*	*4.0*	*4.0*	-	-	-	*4.0*	*4.0*	-
	Springsteel Island Sanitary District	*5.4*	-	*5.4*	*N/A*	*N/A*	*100%*	*5.4*	-	*5.4*	*10.0*	*10.0*	*(4.6)*	*(4.6)*	*84.0%*	*10.0*	*10.0*	-
	Williams WWTP	*53.0*	-	*53.0*	*N/A*	*N/A*	*62%*	*32.8*	-	*32.8*	*87.0*	*87.0*	*(34.0)*	*(54.2)*	*64.2%*	*87.0*	*87.0*	-
	Point Sources Discharging to Rainy River	**88,838.1**	**44,681.2**	**44,156.9**				**71,967.2**	**36,079.1**	**35,888.1**	**45,129.5**	**45,129.5**	**43,708.5**	**26,837.7**	**-49.2%**	**45,129.5**	**38,782.0**	**6,347.5**
	Point Sources Discharging to Big Fork River	**388.0**	-	**388.0**				**240.5**	-	**240.5**	**609.0**	**609.0**	**(221.0)**	**(368.5)**	**57.0%**	**609.0**	**609.0**	-
	Big Falls WWTP	*19.7*	-	*19.7*	*86%*	*85%*	*73%*	*14.5*	-	*14.5*	*119.0*	*119.0*	*(99.3)*	*(104.5)*	*504.5%*	*119.0*	*119.0*	-
	Bigfork WWTP	*251.5*	-	*251.5*	*69%*	*85%*	*59%*	*147.2*	-	*147.2*	*215.0*	*215.0*	*36.5*	*(67.8)*	*-14.5%*	*215.0*	*215.0*	-
	Effie WWTP	*33.8*	-	*33.8*	*75%*	*85%*	*64%*	*21.7*	-	*21.7*	*102.0*	*102.0*	*(68.2)*	*(80.3)*	*202.2%*	*102.0*	*102.0*	-
	MDNR Scenic State Park	*14.4*	-	*14.4*	*105%*	*85%*	*89%*	*12.9*	-	*12.9*	*21.0*	*21.0*	*(6.6)*	*(8.1)*	*46.0%*	*21.0*	*21.0*	-
	Northome WWTP	*68.7*	-	*68.7*	*76%*	*85%*	*65%*	*44.3*	-	*44.3*	*122.0*	*122.0*	*(53.3)*	*(77.7)*	*77.6%*	*122.0*	*122.0*	-
	Berger Horticultural Products - Pine Island Bog	-	-	-	*73%*	*85%*	*63%*	-	-	-	*30.0*	*30.0*	*(30.0)*	*(30.0)*	-	*30.0*	*30.0*	-
	Point Sources Discharging to Little Fork River	**924.5**	-	**924.5**				**528.7**	-	**528.7**	**1,310.0**	**1,310.0**	**(385.5)**	**(781.3)**	**41.7%**	**1,310.0**	**1,310.0**	-
	Cook WWTP	*398.4*	-	*398.4*	*82%*	*84%*	*69%*	*274.5*	-	*274.5*	*509.0*	*509.0*	*(110.6)*	*(234.5)*	*27.8%*	*509.0*	*509.0*	-
	ISD 2142 Pre-Kindergarten to Grade 12 N School	*11.8*	-	*11.8*	*66%*	*84%*	*55%*	*6.5*	-	*6.5*	*44.0*	*44.0*	*(32.2)*	*(37.5)*	*272.1%*	*44.0*	*44.0*	-
	Littlefork WWTP	*146.7*	-	*146.7*	*97%*	*84%*	*81%*	*118.6*	-	*118.6*	*229.0*	*229.0*	*(82.3)*	*(110.4)*	*56.1%*	*229.0*	*229.0*	-
	US Steel - Minntac Tailings Basin Area	*27.1*	-	*27.1*	*48%*	*84%*	*40%*	*10.9*	-	*10.9*	*30.0*	*30.0*	*(2.9)*	*(19.1)*	*10.7%*	*30.0*	*30.0*	-
	Hibbing Taconite Co - Tails Basin Area	*340.5*	-	*340.5*	*42%*	*84%*	*35%*	*118.2*	-	*118.2*	*498.0*	*498.0*	*(157.5)*	*(379.8)*	*46.3%*	*498.0*	*498.0*	-
	Point Sources Discharging Directly to Rainy River	**87,525.6**	**44,681.2**	**42,844.3**				**71,198.0**	**36,079.1**	**35,118.9**	**43,210.5**	**43,210.5**	**44,315.0**	**27,987.4**	**-50.6%**	**43,210.5**	**36,863.0**	**6,347.5**
	Anchor Bay Mobile Home Park	*68.7*	-	*68.7*	*100%*	*97%*	*97%*	*66.7*	-	*66.7*	*44.0*	*44.0*	*24.7*	*22.7*	*-35.9%*	*44.0*	*44.0*	-
	Barwick WWTP ♣	*6.0*	*6.0*	-	*100%*	*90%*	*90%*	*5.4*	*5.4*	-	*6.0*	*6.0*	-	*(0.6)*	-	*6.0*	-	*6.0*
	Baudette WWTP	*3,244.5*	-	*3,244.5*	*100%*	*97%*	*97%*	*3,152.6*	-	*3,152.6*	*367.0*	*367.0*	*2,877.5*	*2,785.6*	*-88.7%*	*367.0*	*367.0*	-
	Boise White Paper LLC - Intl Falls	*35,541.2*	-	*35,541.2*	*100%*	*81%*	*81%*	*28,679.2*	-	*28,679.2*	*33,100.0*	*33,100.0*	*2,441.2*	*(4,420.8)*	*-6.9%*	*33,100.0*	*33,100.0*	-
	Emo WWTP ♣	*353.9*	*353.9*	-	*100%*	*86%*	*86%*	*304.9*	*304.9*	-	*353.9*	*353.9*	-	*(49.0)*	-	*353.9*	-	*353.9*
	Fort Frances WWTP ♣	*779.6*	*779.6*	-	*100%*	*81%*	*81%*	*629.1*	*629.1*	-	*779.6*	*779.6*	-	*(150.5)*	-	*779.6*	-	*779.6*
	ISD 363 - Indus School	*13.6*	-	*13.6*	*100%*	*86%*	*86%*	*11.7*	-	*11.7*	*34.0*	*34.0*	*(20.4)*	*(22.3)*	*149.6%*	*34.0*	*34.0*	-
	NKASD WWTP	*3,976.3*	-	*3,976.3*	*100%*	*81%*	*81%*	*3,208.6*	-	*3,208.6*	*3,318.0*	*3,318.0*	*658.3*	*(109.4)*	*-16.6%*	*3,318.0*	*3,318.0*	-
	Rainy River WWTP ♣	*28.0*	*28.0*	-	*100%*	*97%*	*97%*	*27.2*	*27.2*	-	*28.0*	*28.0*	-	*(0.8)*	-	*28.0*	-	*28.0*
	Resolute (Abitibi) ♣	*43,513.7*	*43,513.7*	-	*100%*	*81%*	*81%*	*35,112.5*	*35,112.5*	-	*5,180.0*	*5,180.0*	*38,333.7*	*29,932.5*	*-88.1%*	*5,180.0*	-	*5,180.0*
	MS4	-	-	-				-	-	-	**228.6**	**228.6**	**(228.6)**	**(228.6)**	-	**228.6**	**228.6**	-
	City of International Falls MS4[4]	-	-	-	*100%*	*81%*	*81%*	-	-	-	*228.6*	*228.6*	*(228.6)*	*(228.6)*	-	*228.6*	*228.6*	-
	Industrial Stormwater	**193.9**	-	**193.9**	**N/A**	**N/A**	**100%**	**193.9**	-	**193.9**	**193.9**	**193.9**	-	-	-	**193.9**	**193.9**	-
	Construction Stormwater	**94.6**	-	**94.6**	**N/A**	**N/A**	**100%**	**94.6**	-	**94.6**	**94.6**	**94.6**	-	-	-	**94.6**	**94.6**	-
Load	**Total LA**	**796,763.0**	**281,772.1**	**514,990.9**				**742,617.0**	**258,807.7**	**483,809.3**	**676,750.5**	**627,279.7**	**120,012.5**	**115,337.3**	**-15.5%**	**627,279.7**	**392,900.2**	**234,379.5**
	Tributaries	**373,527.2**	**141,072.3**	**232,455.0**				**319,381.2**	**118,107.9**	**201,273.4**	**335,844.4**	**286,373.6**	**37,682.8**	**33,007.6**	**-10.3%**	**286,373.6**	**168,265.7**	**118,107.9**
	Rainy River Drainage	**344,838.9**	**131,209.7**	**213,629.2**				**290,692.9**	**108,245.3**	**182,447.6**	**314,394.1**	**264,923.3**	**30,444.8**	**25,769.6**	**-8.9%**	**264,923.3**	**156,678.0**	**108,245.3**
	Rainy Lake Drainage	**148,302.6**	**103,470.2**	**44,832.4**				**119,669.7**	**83,493.1**	**36,176.6**	**148,302.6**	**119,669.7**	-	-	-	**119,669.7**	**36,176.6**	**83,493.1**
	Rainy Lake ♣	*148,302.6*	*103,470.2*	*44,832.4*	*100%*	*81%*	*81%*	*119,669.7*	*83,493.1*	*36,176.6*	*148,302.6*	*119,669.7*	-	-	-	*119,669.7*	*36,176.6*	*83,493.1*
	Little Fork River HUC8	**72,512.8**	-	**72,512.8**				**60,607.7**	-	**60,607.7**	**45,991.3**	**38,440.5**	**26,521.5**	**22,167.2**	**-36.6%**	**38,440.5**	**38,440.5**	-
	Little Fork River	*72,512.8*	-	*72,512.8*	*100%*	*84%*	*84%*	*60,607.7*	-	*60,607.7*	*45,991.3*	*38,440.5*	*26,521.5*	*22,167.2*	*-36.6%*	*38,440.5*	*38,440.5*	-
	Big Fork River HUC8	**48,120.8**	-	**48,120.8**				**41,002.4**	-	**41,002.4**	**46,555.8**	**39,668.9**	**1,565.0**	**1,333.5**	**-3.3%**	**39,668.9**	**39,668.9**	-
	Big Fork River	*48,120.8*	-	*48,120.8*	*100%*	*85%*	*85%*	*41,002.4*	-	*41,002.4*	*46,555.8*	*39,668.9*	*1,565.0*	*1,333.5*	*-3.3%*	*39,668.9*	*39,668.9*	-
	Rapid River HUC8	**20,876.0**	-	**20,876.0**				**19,986.1**	-	**19,986.1**	**20,876.0**	**19,986.1**	-	-	-	**19,986.1**	**19,986.1**	-
	Rapid River	*20,876.0*	-	*20,876.0*	*100%*	*96%*	*96%*	*19,986.1*	-	*19,986.1*	*20,876.0*	*19,986.1*	-	-	-	*19,986.1*	*19,986.1*	-
	Lower Rainy HUC8	**55,026.6**	**27,739.4**	**27,287.2**				**49,427.1**	**24,752.2**	**24,674.9**	**52,668.3**	**47,158.1**	**2,358.3**	**2,268.9**	**-4.6%**	**47,158.1**	**22,405.9**	**24,752.2**
	La Vallee River ♣	*3,633.9*	*3,633.9*	-	*100%*	*84%*	*84%*	*3,037.3*	*3,037.3*	-	*3,633.9*	*3,037.3*	-	-	-	*3,037.3*	-	*3,037.3*
	Black River	*11,253.3*	-	*11,253.3*	*100%*	*86%*	*86%*	*9,695.9*	-	*9,695.9*	*11,253.3*	*9,695.9*	-	-	-	*9,695.9*	*9,695.9*	-
	Sturgeon River ♣	*3,155.9*	*3,155.9*	-	*100%*	*90%*	*90%*	*2,838.4*	*2,838.4*	-	*3,155.9*	*2,838.4*	-	-	-	*2,838.4*	-	*2,838.4*
	McCloud Creek	*382.0*	-	*382.0*	*100%*	*92%*	*92%*	*352.9*	-	*352.9*	*239.8*	*221.6*	*142.2*	*131.4*	*-37.2%*	*221.6*	*221.6*	-
	Whitefish Creek	*569.0*	-	*569.0*	*100%*	*93%*	*93%*	*531.2*	-	*531.2*	*343.7*	*320.8*	*225.3*	*210.3*	*-39.6%*	*320.8*	*320.8*	-
	Pinewood River ♣	*5,695.6*	*5,695.6*	-	*100%*	*93%*	*93%*	*5,316.7*	*5,316.7*	-	*5,695.6*	*5,316.7*	-	-	-	*5,316.7*	-	*5,316.7*
	Silver Creek	*1,163.8*	-	*1,163.8*	*100%*	*96%*	*96%*	*1,114.2*	-	*1,114.2*	*659.2*	*631.1*	*504.6*	*483.1*	*-43.4%*	*631.1*	*631.1*	-
	Unnamed (391)	*470.4*	-	*470.4*	*100%*	*97%*	*97%*	*457.1*	-	*457.1*	*362.3*	*352.0*	*108.2*	*105.1*	*-23.0%*	*352.0*	*352.0*	-
	Baudette River	*1,658.5*	-	*1,658.5*	*100%*	*97%*	*97%*	*1,611.5*	-	*1,611.5*	*1,324.5*	*1,287.0*	*334.0*	*324.5*	*-20.1%*	*1,287.0*	*1,287.0*	-
	Miller Creek	*432.6*	-	*432.6*	*100%*	*97%*	*97%*	*420.4*	-	*420.4*	*221.6*	*215.3*	*211.0*	*205.0*	*-48.8%*	*215.3*	*215.3*	-
	Winter Road River	*3,376.4*	-	*3,376.4*	*100%*	*97%*	*97%*	*3,280.7*	-	*3,280.7*	*3,231.4*	*3,139.9*	*145.0*	*140.9*	*-4.3%*	*3,139.9*	*3,139.9*	-
	Wabanica Creek	*1,404.6*	-	*1,404.6*	*100%*	*97%*	*97%*	*1,364.8*	-	*1,364.8*	*716.5*	*696.2*	*688.1*	*668.7*	*-49.0%*	*696.2*	*696.2*	-
	Direct Drainage ♣	*21,830.6*	*15,254.1*	*6,576.5*	*100%*	*89%*	*89%*	*19,405.9*	*13,559.8*	*5,846.1*	*21,830.6*	*19,405.9*	-	-	-	*19,405.9*	*5,846.1*	*13,559.8*

LoW Final Allocations Table

Page 1 of 2

Corrected Appendix C provided by MPCA via Email on 6/3/2021

Lake of the Woods Load Allocation Table (May 20, 2021)		Detailed Background Information and Source Loading Information used in TMDL Development														Final Allocations/Acknowledged Load		
		Existing Load (at Source)			Delivery to Lake of the Woods			Existing Load (at Lake of the Woods)			Proposed Load		Estimated Load Reduction			Total Allowable Load (US and Canada)	Load/Wasteload Allocation (US)	Acknowledged Load (Canada)[1]
		Total Load	Originating in Canada[1]	Originating in US	Delivery to Rainy River	Delivery along Rainy River to LoW	Total Delivery to LoW	Total Load	Originating in Canada[1]	Originating in US	Load at Source	Load to Lake	Load at Source	Load to Lake	Percent Change[2]			
		kg/yr	kg/yr	kg/yr				kg/yr	kg/yr	kg/yr	kg/yr	kg/yr	kg/yr	kg/yr		kg/yr	kg/yr	kg/yr
Load	Lake of the Woods HUC8	28,688.3	9,862.6	18,825.8				28,688.3	9,862.6	18,825.8	21,450.3	21,450.3	7,238.0	7,238.0	-25.2%	21,450.3	11,587.8	9,862.6
	Sabaskong River ♣	2,232.6	2,232.6	-	N/A	N/A	100%	2,232.6	2,232.6	-	2,232.6	2,232.6	-	-	-	2,232.6	-	2,232.6
	Splitrock River ♣	1,228.0	1,228.0	-	N/A	N/A	100%	1,228.0	1,228.0	-	1,228.0	1,228.0	-	-	-	1,228.0	-	1,228.0
	Thompson Creek ♣	779.8	779.8	-	N/A	N/A	100%	779.8	779.8	-	779.8	779.8	-	-	-	779.8	-	779.8
	Obabikon Lake ♣	457.7	457.7	-	N/A	N/A	100%	457.7	457.7	-	457.7	457.7	-	-	-	457.7	-	457.7
	Big Grassy River ♣	1,108.2	1,108.2	-	N/A	N/A	100%	1,108.2	1,108.2	-	1,108.2	1,108.2	-	-	-	1,108.2	-	1,108.2
	Little Grassy River ♣	2,333.7	2,333.7	-	N/A	N/A	100%	2,333.7	2,333.7	-	2,333.7	2,333.7	-	-	-	2,333.7	-	2,333.7
	Bostic River (231)	1,783.9	-	1,783.9	N/A	N/A	100%	1,783.9	-	1,783.9	1,283.8	1,283.8	500.1	500.1	-28.0%	1,283.8	1,283.8	-
	Williams Creek (County Ditch 1; 211)	1,101.8	-	1,101.8	N/A	N/A	100%	1,101.8	-	1,101.8	617.4	617.4	484.4	484.4	-44.0%	617.4	617.4	-
	South Branch Zippel Creek (213)	744.0	-	744.0	N/A	N/A	100%	744.0	-	744.0	214.9	214.9	529.1	529.1	-71.1%	214.9	214.9	-
	West Branch Zippel Creek (203)	1,887.6	-	1,887.6	N/A	N/A	100%	1,887.6	-	1,887.6	879.3	879.3	1,008.3	1,008.3	-53.4%	879.3	879.3	-
	Judicial Ditch 24 (201)	420.2	-	420.2	N/A	N/A	100%	420.2	-	420.2	259.4	259.4	160.8	160.8	-38.3%	259.4	259.4	-
	Judicial Ditch 24 (191)	1,256.2	-	1,256.2	N/A	N/A	100%	1,256.2	-	1,256.2	465.5	465.5	790.7	790.7	-62.9%	465.5	465.5	-
	Judicial Ditch 22 (181)	708.3	-	708.3	N/A	N/A	100%	708.3	-	708.3	333.3	333.3	375.1	375.1	-53.0%	333.3	333.3	-
	Reach 171	164.5	-	164.5	N/A	N/A	100%	164.5	-	164.5	52.5	52.5	112.0	112.0	-68.1%	52.5	52.5	-
	Willow Creek (161)	1,352.6	-	1,352.6	N/A	N/A	100%	1,352.6	-	1,352.6	641.7	641.7	711.0	711.0	-52.6%	641.7	641.7	-
	County Ditch 26 (151)	272.9	-	272.9	N/A	N/A	100%	272.9	-	272.9	102.7	102.7	170.2	170.2	-62.4%	102.7	102.7	-
	County Ditch 26 (141)	457.7	-	457.7	N/A	N/A	100%	457.7	-	457.7	193.3	193.3	264.4	264.4	-57.8%	193.3	193.3	-
	County Ditch 26 (131)	295.1	-	295.1	N/A	N/A	100%	295.1	-	295.1	83.8	83.8	211.3	211.3	-71.6%	83.8	83.8	-
	County Ditch 20 (121)	460.5	-	460.5	N/A	N/A	100%	460.5	-	460.5	193.4	193.4	267.1	267.1	-58.0%	193.4	193.4	-
	County Ditch 25 (113)	1,003.7	-	1,003.7	N/A	N/A	100%	1,003.7	-	1,003.7	341.7	341.7	662.0	662.0	-66.0%	341.7	341.7	-
	Warroad River ♣ †	6,565.7	220.3	6,345.4	N/A	N/A	100%	6,565.7	220.3	6,345.4	5,574.2	5,574.2	991.5	991.5	-15.1%	5,574.2	5,353.9	220.3
	Stony Creek ♣	746.0	438.7	307.3	N/A	N/A	100%	746.0	438.7	307.3	746.0	746.0	-	-	-	746.0	307.3	438.7
	Northwest Angle Inlet ♣	1,327.7	1,063.7	264.0	N/A	N/A	100%	1,327.7	1,063.7	264.0	1,327.7	1,327.7	-	-	-	1,327.7	264.0	1,063.7
	Lakeshed	17,112.1	14,771.5	2,340.7				17,112.1	14,771.5	2,340.7	17,112.1	17,112.1	-	-	-	17,112.1	2,340.7	14,771.5
	Sabaskong East ♣	2,058.1	2,058.1	-	N/A	N/A	100%	2,058.1	2,058.1	-	2,058.1	2,058.1	-	-	-	2,058.1	-	2,058.1
	Sabaskong West ♣	1,824.3	1,824.3	-	N/A	N/A	100%	1,824.3	1,824.3	-	1,824.3	1,824.3	-	-	-	1,824.3	-	1,824.3
	Four Mile ♣	1,988.5	1,988.5	-	N/A	N/A	100%	1,988.5	1,988.5	-	1,988.5	1,988.5	-	-	-	1,988.5	-	1,988.5
	Big Traverse ♣	6,140.9	5,526.8	614.1	N/A	N/A	100%	6,140.9	5,526.8	614.1	6,140.9	6,140.9	-	-	-	6,140.9	614.1	5,526.8
	Muskeg ♣	364.2	145.7	218.5	N/A	N/A	100%	364.2	145.7	218.5	364.2	364.2	-	-	-	364.2	218.5	145.7
	Little Traverse South ♣	2,804.3	1,682.6	1,121.7	N/A	N/A	100%	2,804.3	1,682.6	1,121.7	2,804.3	2,804.3	-	-	-	2,804.3	1,121.7	1,682.6
	Little Traverse North ♣	1,931.9	1,545.5	386.4	N/A	N/A	100%	1,931.9	1,545.5	386.4	1,931.9	1,931.9	-	-	-	1,931.9	386.4	1,545.5
	Septic Systems	721.7	410.7	311.0				721.7	410.7	311.0	410.7	410.7	311.0	311.0	-43.1%	410.7	-	410.7
	Sabaskong East ♣	22.4	22.4	-	N/A	N/A	100%	22.4	22.4	-	22.4	22.4	-	-	-	22.4	-	22.4
	Sabaskong West ♣	130.4	130.4	-	N/A	N/A	100%	130.4	130.4	-	130.4	130.4	-	-	-	130.4	-	130.4
	Four Mile ♣	107.4	21.5	85.9	N/A	N/A	100%	107.4	21.5	85.9	21.5	21.5	85.9	85.9	-80.0%	21.5	-	21.5
	Big Traverse ♣	331.8	165.9	165.9	N/A	N/A	100%	331.8	165.9	165.9	165.9	165.9	165.9	165.9	-50.0%	165.9	-	165.9
	Muskeg	19.7	-	19.7	N/A	N/A	100%	19.7	-	19.7	-	-	19.7	19.7	-100.0%	-	-	-
	Little Traverse South ♣	87.4	52.4	34.9	N/A	N/A	100%	87.4	52.4	34.9	52.4	52.4	34.9	34.9	-40.0%	52.4	-	52.4
	Little Traverse North ♣	22.6	18.1	4.5	N/A	N/A	100%	22.6	18.1	4.5	18.1	18.1	4.5	4.5	-20.0%	18.1	-	18.1
	Shoreline Erosion	72,000.0	-	72,000.0				72,000.0	-	72,000.0	60,480.0	60,480.0	11,520.0	11,520.0	-16.0%	60,480.0	60,480.0	-
	Four Mile	9,395.4	-	9,395.4	N/A	N/A	100%	9,395.4	-	9,395.4	7,892.2	7,892.2	1,503.3	1,503.3	-16.0%	7,892.2	7,892.2	-
	Big Traverse	36,000.0	-	36,000.0	N/A	N/A	100%	36,000.0	-	36,000.0	30,240.0	30,240.0	5,760.0	5,760.0	-16.0%	30,240.0	30,240.0	-
	Muskeg	26,604.6	-	26,604.6	N/A	N/A	100%	26,604.6	-	26,604.6	22,347.8	22,347.8	4,256.7	4,256.7	-16.0%	22,347.8	22,347.8	-
	Atmospheric Deposition ♣	51,407.3	27,804.9	23,602.4	N/A	N/A	100%	51,407.3	27,804.9	23,602.4	51,407.3	51,407.3	-	-	-	51,407.3	23,602.4	27,804.9
	Internal Load ♣	281,994.7	97,712.7	184,281.9	N/A	N/A	100%	281,994.7	97,712.7	184,281.9	211,496.0	211,496.0	70,498.7	70,498.7	-25.0%	211,496.0	138,211.4	73,284.6
Reserve Capacity	Total Reserve Capacity	-	-	-				-	-	-	887.0	887.0	(887.0)	(887.0)	-	887.0	167.0	720.0
	Unsewered Communities	-	-	-	N/A	N/A	100%	-	-	-	167.0	167.0	(167.0)	(167.0)	-	167.0	167.0	-
	Fort Frances ♣	-	-	-	100%	81%	81%	-	-	-	300.0	300.0	(300.0)	(300.0)	-	300.0	-	300.0
	New Gold Mine ♣	-	-	-	35%	93%	32%	-	-	-	420.0	420.0	(420.0)	(420.0)	-	420.0	-	420.0
TOTAL		885,951.9	326,453.3	559,498.6	-	-	-	814,914.9	294,886.8	520,028.2	723,385.1	673,914.3	162,566.8	141,000.6	-17.3%	673,914.3	432,467.3	241,447.0
MOS (5%)												35,608.1				35,608		
LOADING CAPACITY												709,522.4				709,522		

1: Loads originating in Canada are assigned neither load allocations nor wasteload allocations, but are instead considered acknowledged loads, which are included to provide a full accounting of loads to Lake of the Woods.

2: For all wasteload allocations, percent change is calculated from end of pipe loads (at source) for consistency with permitting; percent change for all other items is based on the existing load at Lake of the Woods and thte proposed load at Lake of the Woods

3: Point source loads for First Nations wastewater treatment plants in Canada are not reflected in the wasteload allocation due to insufficient discharge information. Loads from these populations are reflected in septic system loading, which was developed based on populations not served by modeled WWTPs.

4: Not currently permitted but expected to come under permit coverage in the future.

† HSPF modeling boundaries show that a portion of the Warroad River Subwatershed extends into Canada and the runoff from that portion of the subwatershed drains directly to the lake

♣ denotes that all or a portion of the designated load originates in Canada

LoW Final Allocations Table

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Corrected Appendix C provided by MPCA via Email on 6/3/2021