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

JUN 27 2017

REPLY TO THE ATTENTION OF

WW-16J

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

Dear Mr. Skuta:

The U.S. Environmental Protection Agency has conducted a complete review of the final Total Maximum Daily Loads (TMDLs) for the Sand Hill River Watershed in northwest Minnesota, including supporting documentation and follow up information submitted by the Minnesota Pollution Control Agency (MPCA). The Sand Hill River Watershed (09020301) is located in portions of Polk, Norman, and Mahnomen Counties, Minnesota, and flows generally westward toward the Red River of the North. The waterbodies include lakes and streams classified as Class 2B waters, defined as and protected for aquatic life (warm and cool water fisheries and associated biota) and recreation (all water recreation activities including bathing). Seven TMDLs are being approved from the MPCA submittal:

- Sand Hill River-Kittleson Creek to Unnamed Creek for *E. coli* (09020301-536 and -537) (2 segments)
- Sand Hill River-Kittleson Creek to Unnamed Creek for turbidity (09020301-537)
- Sand Hill River-CD 17 to Kittleson Creek for *E. coli* (09020301-542)
- Uff Lake, Unnamed Lake, and Kittleson Lake for excess nutrients (60-0119-00, 60-0236-00, and 60-0237-00, respectively) (3 lakes)

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 TMDLs. This approval addresses three lakes for total phosphorus, three creeks for *E. coli*, and one creek for TSS, for a total of seven TMDLs. The statutory and regulatory requirements, and EPA's review of Minnesota's compliance with each requirement, are described in the enclosed decision document.

wq-iw5-10g

We wish to acknowledge Minnesota's effort in submitting these TMDLs, and look forward to future TMDL submissions by the State of Minnesota. If you have any questions, please contact Mr. Peter Swenson, Chief of the Watersheds and Wetlands Branch, at 312-886-0236.

Sincerely,

Linda Holst

for Christopher Korleski
Director, Water Division

Enclosure

cc: Celine Lyman, MPCA
Cary Hernandez, MPCA

TMDL: Sand Hill River Watershed TMDL, Minnesota
Date: June 2017

DECISION DOCUMENT FOR THE APPROVAL OF THE SAND HILL RIVER WATERSHED TMDL, MINNESOTA

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

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

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

The TMDL submittal should include an identification of the point and nonpoint sources of the pollutant of concern, including location of the source(s) and the quantity of the loading, e.g., lbs/per day. The TMDL should provide the identification numbers of the 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.

Comment:
Location Description/Spatial Extent: The Minnesota Pollution Control Agency (MPCA) has submitted the Sand Hill River Watershed TMDL located in northwest Minnesota in Polk, Norman and Mahnomen counties, which generally flows westward into North Dakota. Sections 1.1 and 1.2 of the TMDL states that the watershed includes the municipalities of Beltrami, Climax, Fertile, Fosston, Nielsville and Winger.

There are 15 impairment listings by MPCA in Table 1-1 of the TMDL. The table shows a subset of nine impairments addressed by MPCA in the development of the TMDL, but two of the nine waterbodies are on the White Earth reservation and cannot be included in the State TMDL approval (Sand Hill River–Headwaters to CD 17, and Ketchum Lake). This approval of the TMDLs for this decision document is for seven impairments in the state of Minnesota:

- Sand Hill River-Kittleson Creek to Unnamed Creek for *E. coli* (09020301-536)
- Sand Hill River-Kittleson Creek to Unnamed Creek for *E. coli* (09020301-537)
- Sand Hill River-Kittleson Creek to Unnamed Creek for turbidity (09020301-537)
- Sand Hill River-CD 17 to Kittleson Creek for *E. coli* (09020301-542)
- Uff Lake for excess nutrients (60-0119-00)
- Unnamed Lake for excess nutrients (60-0236-00)
- Kittleson Lake for excess nutrients (60-0237-00)

The contaminants addressed are *E. coli* (3 TMDLs), turbidity via Total Suspended Solids (TSS) (1 TMDL), and excess nutrients via phosphorus (3 TMDLs). Note that the turbidity standard in Minnesota was changed to TSS in 2015. This TMDL was completed using TSS but the impairment is listed as turbidity.

Land use: The watersheds are located in the Lake Agassiz Plain (LAP) and the North Central Hardwood Forest (NCHF) Ecoregion. The plain was formed by glacial Lake Agassiz and had thick beds of lake sediments on top of glacial till which were historically covered by a tall grass prairie, replaced by row crops. The NCHF Ecoregion is transitional between forests to the north and agricultural regions in the south, and includes forests, wetlands and lakes, cropland agriculture, pasture and dairy operations. The land use for the watershed is described in Section 3.4 of the TMDL. Overall, the percentage of land use across the entire watershed drainage area is cropland 69.8%, wetland 8.3%, grass/pasture/hay 7.3%, forest/shrub 6.3%, urban 5.2%, and open water 3.0%.

Problem Identification:
Excess Nutrients - Section 3.6.1.1 of the TMDL states that there are excess nutrients (phosphorus) in all three lakes, and phosphorus is one of several stressors contributing to the impairment of aquatic life and aquatic recreational use. The lakes are considered impaired for the aquatic recreation designated use of fishing, swimming, canoeing, including bathing, when nutrients and one other indicator, either Chlorophyll-a or Secchi depth, are not meeting standards.

E. coli - All three streams are impaired for aquatic recreational use by *E. coli*. Section 3.6.2.2 of the TMDL describes the problems occurring from excess *E. coli* in water. Malfunctioning sewage treatment systems can be a threat to public health through contamination of surface waters, or may contaminate groundwater systems. Surface waters may also be contaminated by a myriad of sources besides treatment failures, such as livestock, other animals and wildlife, and application of manure. Factors affecting the delivery of bacteria from its origin to the streams include the proximity to surface waters, landscape slope, imperviousness, bacteria die-off and travel time.

Turbidity – One stream is impaired for aquatic life use by turbidity, and is addressed by a TSS TMDL. Section 3.6.3 states that the area is inherently prone to problems due to several factors, including very fine sediment size, clays and silt, from glacial moraines and beach ridge zones, especially in the eastern and central portion of the watershed. Streams have been modified for better drainage for agricultural purposes and can rapidly move sediment. The geology of the soils, and topography (gradient) contribute to the impairment:

- The till plain/moraine region in the eastern half of the watershed has rolling topography with small lakes and wetlands, with varied texture in the soils;
- Beach ridges are in a 10-mile wide north/south corridor to the west of the till plain/moraine and there is a 176-foot drop in elevation toward the lake plain to the west;
- The ancient lake plain soils in the remaining western portion of the watershed are coarse textured sand and gravel deposits with significant soil and bank erosion.

Pollutant of Concern: The pollutants of concern are phosphorus, *E. coli* and TSS. Phosphorus was identified as causing eutrophication of the lakes, which show high values of phosphorus, chlorophyll-a, and Secchi transparency depths below the standards. *E. coli* was identified as the pollutant causing bacteria exceedance in the streams, and TSS is a measure of the turbidity impairment in the streams.

Source Identification for Phosphorus: Section 3.6.1 of the TMDL states that only nonpoint sources contribute to elevated phosphorus conditions in the lakes. Section 3.6.1.2 of the TMDL states the nonpoint sources include overland runoff, livestock/animals, atmospheric deposition, septic systems, and internal loading from sediments in the lakes. Both surface runoff and tributary total phosphorus loads to the lakes were taken into account. Small amounts of additional phosphorus is from construction stormwater for the lakes, but no other point sources for the lakes, as described in Section 4.1.3. The construction and industrial stormwater discharges were combined and addressed using a categorical allocation.

- Overland runoff – runoff varies based on land use, and is described in detail in Section 3 of this document.
- Livestock/animals – may contribute phosphorus directly to streams or lakes if they have access or via manure application to fields.
- Atmospheric deposition – calculated using regional values and sources. May include pollen, soil erosion, oil and coal combustion and fertilizers.
- Subsurface Sewage Treatment Systems (SSTS) – county compliance rates are used to determine the failure/compliance of SSTS, and the compliance rates show a 14-16% failure rate of the locations that were investigated. These failing systems contribute to the phosphorus load.
- Internal loading – the evaluation concluded that only Kittleson Lake and Unnamed Lake had internal loading of phosphorus.
- Construction – there is a small amount of phosphorus from construction stormwater regulated by stormwater permit MNR100001. A 0.1% land use disturbance is assumed in calculations.

Source Identification for Bacteria: Section 3.6.2 of the TMDL states that both point and nonpoint sources contribute to elevated *E. coli* in the streams, but the watersheds are dominated by nonpoint sources. There are animal feeding operations in the watershed but are not large enough to be under CAFO regulations requiring NPDES permits.

Point sources of E. coli found in Section 3.6.2.1 of the TMDL include:

- Wastewater Treatment Facilities (WWTF) – there are three WWTFs, considered "minor" by MPCA, that have primary and secondary treatment lagoons, and they discharge treated waste water into the surface water system in spring/early summer and again in late fall. The facilities are at Climax, Fertile, and Winger, Minnesota.

Nonpoint sources of E. coli found in Section 3.6.2.2 of the TMDL were evaluated and include:

- SSTS/Humans – failing SSTSs can be an Imminent Public Health Threat (IPHT) by discharging sewage to surface water, or sewage may discharge to ground water. 14.2% of the population in the watershed has inadequate treatment of their household waste. Estimates from Norman County were used for Mahnomen County, which had no data. Population estimates from 2010 Census data were used.
- Companion Animals - Dog waste estimates were taken from 2010 Census data. An estimated 34.3% of households own dogs and each household has 1.4 dogs used for calculation purposes. An estimated 38% of dog owners do not dispose of waste properly.
- Livestock – county wide livestock populations were distributed across the watershed in an area-weighted basis. Populations were estimated for cattle, chickens, goats, horses, and sheep. Where the livestock are small, such as pullets, the numbers are listed by farm rather than livestock population.

- Grazing – the number of grazing cattle were assumed to be the total cattle population from the Census of Agriculture, minus the cattle on feed.
- Animal Feeding Operations (AFOs) – AFOs have between 50 and 1000 animal units and are registered under the MPCA if they are located within a shoreland area defined as "land within 1,000 feet of the normal high-watermark of lakes, ponds, or flowages; land within 300 feet of a river or stream; and designated floodplains" (Minn. Stat. §103F.205).
- Land Application of Manure – the surface application of manure is used as fertilizer and soil amendment and has the potential to be a substantial source of bacteria.

- Small livestock operations – bacteria production is estimated from livestock production estimates where manure is stockpiled or spread from small, partially housed or open lot operations. Livestock are the same as mentioned above, but the operations are small.
- Wildlife – wildlife includes deer, ducks, geese and others. Bacteria loads were calculated based on population, and the bacteria production rates of wildlife; transport may be from the land or directly into water. Waterfowl are considered to contribute the most bacteria either directly into waterbodies or runoff from wetlands and fields adjacent to the waterbodies that are feeding grounds.
- Natural Background – there is some indigenous *E. coli* in soils, ditch sediment and water, as shown by DNA fingerprinting. Approximately 36% of the *E. coli* is considered to be a background level, whereas about 64% is from anthropogenic sources.

Source identification for TSS: Section 3.6.3 of the TMDL states that both point and nonpoint sources contribute to elevated turbidity in the streams, but the watersheds are dominated by nonpoint sources.

Point sources of TSS found in Section 3.6.3.1 of the TMDL include:

- WWTF – there are three WWTFs, as stated above in the discussion of permitted sources for *E. coli*. These facilities are considered "minor" facilities by MPCA, that have primary and secondary treatment ponds, and discharge treated waste water into the surface water system in spring/early summer and again in late fall. The facilities are at Climax, Fertile, and Winger, Minnesota.

Nonpoint sources of TSS found in Section 3.6.3.2 of the TMDL were evaluated and include:

- Upland field erosion – the field erosion occurs primarily where the soil is not protected, and 69.8% of the watershed is cultivated agricultural lands which makes the soils more vulnerable.
- Altered stream processes – alteration has occurred with the modification of lands for better agricultural drainage, reduced riparian land cover, and increased impervious land cover. Changes for better drainage includes ditching, tiling and channelization. Ditch networks have hydrologically connected areas that were not formerly connected. Alteration causes stream channel instability and streambank erosion.

Implicit characteristics in this watershed also make it more vulnerable to turbidity and TSS impairment. The gradient changes as lower elevations are encountered when going from the eastern portion of the watershed toward the west, with a drop of 176 feet from the highest beach ridge soils in the center portion of the watershed to the lake plain toward the west. The gradient (slope) can vary in different portions of the watershed from 1.2 ft/mile to 11.6 ft/mile. In the areas with steeper slope, the degradation occurs with erosion of fine sediment; in lower gradient plateau areas, aggradation of the sediment occurs as sediment is deposited. Soil types from glacial deposits are also very erodible, and they become more vulnerable as water is channelized and fields are tiled, increasing flow and allowing for greater soil and bank erosion. Indices have been developed and used in this TMDL that delineate where in-stream versus field erosion processes dominate.

Priority Ranking: Section 1.3 of the TMDL submittal states that the priority ranking is implicit in the TMDL schedule included in Minnesota's 303(d) list. Ranking criteria include the impairment impacts on public health and aquatic life, public value of the impaired water, likelihood of completing the TMDL and restoring the water, local technical capability and willingness to assist with the TMDL, and sequencing of TMDLs within a watershed.

Future growth for phosphorus: Section 4.1.6 of the TMDL states that changes may occur in the TMDL for phosphorus in the future when certain conditions change in the watershed, such as potential MS4 communities, but these changes are not currently underway.

Future growth for TSS and *E. coli* – Section 4.2.6 of the TMDL states that new or expanding wastewater effluent discharges to a waterbody that has an approved TMDL may involve a permit reissuance or modification when a request or application for reissuance is submitted. A permit may be issued after it is determined that the discharge is consistent with applicable WQS, and comments are addressed, then updates to a TMDL WLA will be made.

Surrogate measures: The Sand Hill River-Kittleson Creek to Unnamed Creek is impaired for aquatic life use due to turbidity, addressed by a TSS TMDL. The relationships between turbidity and TSS have been explored and well-developed and are discussed in the TSS methodology section of this document (Section 3).

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

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

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

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

Comment:
Designated Use: Section 2 of the TMDL states that the listed lakes and rivers are classified as Class 2B or Class 2C waters to protect the use of aquatic life and aquatic recreation.

Class 2B is defined in Minnesota Rules 7050.0222, Subp. 4: "The quality of Class 2B surface waters shall be such as to permit the propagation and maintenance of a healthy community of cool or warm water sport or commercial fish and associated aquatic life, and their habitats. These waters shall be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable. This class of surface water is not protected as a source of drinking water."

Class 2C is defined in Minnesota Rules 7050.0222, Subp. 5: "The quality of Class 2C surface waters shall be such as to permit the propagation and maintenance of a healthy community of indigenous fish and associated aquatic life, and their habitats. These waters shall be suitable for boating and other forms of aquatic recreation for which the waters may be usable."

Standards for Phosphorus in Lakes: The lakes in this TMDL are considered Class 2B waters, and three criteria are included in the nutrient standards for the lakes, total phosphorus (the causal factor) and chlorophyll-a and Secchi disc depth (response variables). The MPCA considers a lake impaired when TP and at least one of the response variables do not meet the standards, applicable in the growing season from June 1 – September 30 (Minnesota Rules 7050.0150, Subp. 5). All of the lakes in this TMDL are classified as shallow so the standards are **TP 60 µg/L, and Chl-a 20 µg/L and Secchi depth > 1m^2**. These numeric criteria are also found in Table 2-1 below and used for TMDL development.

Minnesota Narrative WQS for all class 2 waters (Minn. R 7050.0150, Subp. 3) states: "The aquatic habitat, which includes the waters of the state and stream bed, shall not be degraded in any material manner, there shall be no material increase in undesirable slime growths or aquatic plants, including algae, nor shall there be any significant increase in harmful pesticide or other residues in the waters, sediments, and aquatic flora and fauna; the normal fishery and lower aquatic biota upon which it is dependent and the use thereof shall not be seriously impaired or endangered, the species composition shall not be altered materially, and the propagation or migration of the fish and other biota normally present shall not be prevented or hindered by the discharge of any sewage, industrial waste, or other wastes to the waters."

Standards for E. coli: the three streams are impaired for the aquatic recreation use by bacteria and Minnesota uses *E. coli* as the bacteria indicator. The standards for *E. coli* are shown in Table 2-2 below from the TMDL and are **not to exceed 126 *E. coli* org/100ml as a monthly geomean of not less than five samples representative of conditions within any calendar month, nor shall more than 10% of all samples taken during any calendar month individually exceed 1,260 *E. coli* org/100ml.** The standard applies only between April 1 and October 31 (Minnesota Rules 7050.0222). MPCA has established NPDES permit limits based on previous standards for fecal coliform, but has used a conversion factor to adjust for the new standards since they were established in 2013. (A conversion factor of 126 *E. coli* org/100 ml for every 200 fecal coliform/100 ml is used.)

Standards for TSS: Table 2-2 below in the TMDL document shows that the standards are the targets for TSS TMDL development, and apply from April 1 – September 30. The TSS standard is **65 mg/L**. The TSS value was converted from the previous turbidity standard of 25 Nephelometric Turbidity Units (NTUs).

Table 2-1: Lake water quality standards for SHRW lakes addressed in this report.

Ecoregion	Total Phosphorus (ug/L)	Chl-*a* (ug/L)	Secchi Disk Depth (m)[2]	Period of Time Standard Applies
North Central Hardwood Forest[1]				
- Deep lakes and reservoirs	40	14	1.4	June 1-Sept. 30
- Shallow Lakes	60	20	1	June 1-Sept. 30

[1]: Deep lakes are classified as having a maximum depth greater than 15 feet whereas shallow lakes have a maximum depth less than 15 feet or greater than 80% of the lake is part of the littoral zone.
[2]: Standard for Secchi disk depth is the minimum transparency value (i.e., values must be greater than the standard)

Table 2-2: Surface water quality standards for SHRW stream reaches addressed in this report.

Parameter	Water Quality Standard	Units	Criteria	Period of Time Standard Applies
Escherichia coli (*E. coli*)	Not to exceed 126	org/100 mL	Monthly geometric mean	April 1-October 31
	Not to exceed 1,260	org/100 mL	Upper 10th percentile	
Total suspended solids (TSS)-Southern Nutrient Region	Not to exceed 65	mg/L	Upper 10th percentile	April 1 – September 30

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

3. Loading Capacity - Linking Water Quality and Pollutant Sources

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

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

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

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

Comment:
TMDL = Loading Capacity (LC) = WLA + LA + MOS. The loading capacities were calculated for:

1) phosphorus in each of the three lakes in Tables 4-3, 4-4 and 4-5 below (Section 4.1 of the TMDL);
2) *E. coli* in three stream reaches in Tables 4-11, 4-12, and 4-13 below (Section 4.2 of the TMDL); and,
3) TSS in one stream reach in Table 4-18 below (Section 4.3 of the TMDL).

TP loading capacity in lakes (Section 4.1.7 of the TMDL) - The nonpoint source phosphorus loading for the lakes is from direct watershed runoff, livestock/animals, atmospheric deposition, septic systems, and internal lake loading; the only point sources are construction and industrial stormwater.

Table 4-3: Kittleson Lake TP TMDL and Allocations.

		Existing TP Load		Maximum Allowable TP Load		Estimated Load Reduction Needed	
		lbs/yr	lbs/day	lbs/yr	lbs/day	lbs/yr	%
TOTAL LOAD CAPACITY		1863	5.10	540	1.48	1324	71%
Wasteload Allocations	Total WLA	0.539	0.0015	0.539	0.0015	0	0
	Construction/Industrial Stormwater	*0.539*	*0.0015*	*0.539*	*0.0015*	*0*	*0*
Load Allocations	Total LA	1862	5.11	485.1	1.33	1377	74%
	Direct runoff	*623*	*1.71*	*31.1*	*0.09*	*592*	*95%*
	Failing SSTS	*0*	*0*	*0*	*0*	*0*	*NA*
	Upstream lakes	*0*	*0*	*0*	*0*	*0*	*NA*
	Atmospheric deposition	*79*	*0.22*	*79*	*0.21*	*0*	*0*
	Groundwater	*0*	*0*	*0*	*0*	*0*	*NA*
	Internal load	*1160*	*3.18*	*375*	*1.03*	*785*	*68%*
MOS				53.9	0.15		

Table 4-4: Uff Lake TP TMDL and Allocations.

		Existing TP Load		Maximum Allowable TP Load		Estimated Load Reduction Needed	
		lbs/yr	lbs/day	lbs/yr	lbs/day	lbs/yr	%
TOTAL LOAD CAPACITY		105	0.287	40	0.101	65	62%
Wasteload Allocations	Total WLA	0.037	0.0001	0.037	0.0001	0	0
	Construction/Industrial Stormwater	*0.037*	*0.0001*	*0.037*	*0.0001*	*0*	*0*
Load Allocations	Total LA	105	0.29	38	0.10	67	67%
	Non-MS4 runoff	*70*	*0.20*	*3*	*0.01*	*67*	*96%*
	Failing SSTS	*0*	*0*	*0*	*0*	*0*	*NA*
	Upstream lakes	*0*	*0*	*0*	*0*	*0*	*NA*
	Atmospheric deposition	*35*	*0.09*	*35*	*0.09*	*0*	*0*
	Groundwater	*0*	*0*	*0*	*0*	*0*	*NA*
	Internal load	*0*	*0*	*0*	*0*	*0*	*NA*
MOS				2	0.005		

Table 4-5: Unnamed Lake TP TMDL and Allocations.

		Existing TP Load		Maximum Allowable TP Load		Estimated Load Reduction Needed	
		lbs/yr	lbs/day	lbs/yr	lbs/day	lbs/yr	%
TOTAL LOAD CAPACITY		287	0.79	205	0.56	82	29%
Wasteload Allocations	Total WLA	0.205	0.0006	0.205	0.0006	0	0
	Construction/Industrial Stormwater	*0.205*	*0.0006*	*0.205*	*0.0006*	*0*	*0*
Load Allocations	Total LA	287	0.79	184.5	0.51	102.3	36%
	Non-MS4 runoff	*135*	*0.37*	*77*	*0.21*	*58.3*	*43%*
	Failing SSTS	*0*	*0*	*0*	*0*	*0*	*0*
	Upstream lakes	*0*	*0*	*0*	*0*	*0*	*NA*
	Atmospheric deposition	*31*	*0.09*	*31*	*0.09*	*0*	*0*
	Groundwater	*0*	*0*	*0*	*0*	*0*	*NA*
	Internal load	*121*	*0.33*	*77*	*0.21*	*44.0*	*36%*
MOS				20.5	0.06		

TP Methodology for Lakes - The approach for the phosphorus TMDLs in the lakes is found in Section 4.1.1 of the TMDL and incorporates several models depending on the lake. There are no MS4s, NPDES permitted feedlots, or WWTFs draining into any of the impaired lakes. The only WLA are the construction and industrial stormwater discharges, which are minimal. The LA is

- Internal loading – release from resuspension of sediments occurs through wave action, rough fish, wildlife activity, boating and bio-chemical processes. There were no measurements taken in the lakes for this load so it was implicitly accounted for in the modeling processes using a mass balance approach developed by Nürnberg. As stated previously, the evaluation concluded that only Kittleson Lake and Unnamed Lake had internal loading of phosphorus.

TP Point Sources in Lakes - Section 4.1.3 of the TMDL states that the phosphorus wasteload from regulated construction stormwater and regulated industrial stormwater are given a categorical WLA of 0.1%, and accounts for 0.1% of the land use in the watershed. The state's NPDES/State Disposal System (SDS) General Stormwater Permits for Construction Activity (MNR1000001) are intended to protect water from mobilization of sediment and other pollutants, and the stormwater discharges associated with construction sites are expected to meet WQS. Industrial sites use the NPDES/SDS Industrial Stormwater Multi-Sector General Permit (MNR050000) or General Permit for Construction Sand & Gravel, Rock Quarrying, and Hot Mix Asphalt Production facilities (MNG490000), which identify BMPs to be implemented to protect water resources from pollutant discharges.

***E. coli* Loading Capacity for Streams**

Loading capacities for Wastewater Treatment Plants (WWTPs) are the only WLAs for *E. coli* in streams, found in Section 4.2.7 of the TMDL. The LAs for *E. coli* are for the remaining load when the WLA and MOS is subtracted from the loading capacity. MPCA states in Section 4.2.7 that: "An unallocated load is only provided if the existing load is lower than the loading capacity. The estimated load reduction is required load reduction, as a percentage of existing load, to meet the loading capacity. A load reduction is only provided if the loading capacity is less than the existing load."

An example in Table 4-11, under high flow, the existing load of 158.00 is below the LA + MOS of 223.82 so 0% reduction is needed. Under mid-flow conditions in the same table, the existing load of 126.17 is above the LA + MOS of 76.32 + 9.14 = 85.46, which is 35% above the LA plus MOS.

Table 4-11: Bacteria loading capacities and allocations for AUID 09020301-542.

E. coli		Flow Condition				
		Very High	High	Mid	Low	Very Low
		Geometric Mean (Billion organisms per day)				
Loading Capacity		1,046.2	229.7	91.4	43.4	20.6
Waste Load Allocation	Total WLA	5.9	5.9	5.9	5.9	5.9
	Fertile WWTF	4.7	4.7	4.7	4.7	4.7
	Winger WWTF	1.2	1.2	1.2	1.2	1.2
Load Allocation	Total LA	935.6	200.85	76.32	33.2	12.6
Margin of Safety (MOS)		104.6	22.97	9.14	4.34	2.06
Existing Load		---	158.00	126.17	24.66	15.47
Unallocated Load		---	48.75	0.00	14.44	3.05
Estimated Load Reduction		---	0%	35%	0%	0%

the remaining portion of the TMDL after the WLA and MOS is subtracted from the loading capacity.

- CNET was used to estimate TP reductions in the lakes to achieve water quality eutrophication standards. CNET is a modified spreadsheet version of BATHTUB used for the internal lake loading, and values were calibrated for the average TP, chl-a and Secchi depth conditions. The Monte Carlo approach was used within the CNET approach to determine a statistical distribution that reflects the variability of model parameters and results in prediction in in-lake eutrophication conditions (to reduce contaminants to meet standards, to attain the designated aquatic recreation use, and to develop TMDLs); the Monte Carlo simulation was implemented using Crystal Ball (proprietary software developed by Oracle).
- Lake morphometry and drainage areas were determined from data at DNR websites, GIS online data, and the Sand Hill Monitoring and Assessment Report (2014b).[1]
- The Hydrologic Simulation Program FORTRAN (HSPF) model generated annual precipitation depths, evaporation depths, surface runoff flows and loadings, and tributary flows and loadings, but does not represent in-lake processes as CNET does.
  - o Kittleson Lake was explicitly modeled in HSPF, extracting loads and flows entering the lake from the model.
  - o The other two lakes, Uff and Unnamed, had loads calculated using land use, and total loads were estimated by using the portion of the land use within the total contributing drainage area.
- HSPF model outputs were used to calibrate to CNET, using average values and simulation periods with similar hydrology as the observed in-lake water quality (1996, 2001, 2003).

TP Nonpoint Sources in Lakes - Sections 3.6.1.2 and 4.1.2 of the TMDL describes the various nonpoint sources.

- Direct Drainage Watershed Runoff – land use is used to determine runoff. Forested runoff can include decomposing vegetation and organic soils; cropland runoff can include livestock waste, fertilizers, soil particles and organic material from crops; pasture runoff can deliver phosphorus from livestock and wildlife wastes; urban runoff can include fertilizer, grass/leaf litter, and pet waste; wetland areas can deliver phosphorus via suspended solids and organic debris that flows through waterways.
- Livestock/animals – may contribute directly to streams or lakes if they have access, or via manure application to fields. Loading was implicitly included in the HSPF modeling effort.
- Atmospheric Deposition – calculated using regional values and sources, may include pollen, soil erosion, oil and coal combustion and fertilizers.
- SSTS – county compliance rates measure from 84-86%. SSTS input was implicitly accounted for in the modeling process.

[1] https://www.pca.state.mn.us/sites/default/files/wq-ws3-09020301b.pdf

Table 4-12: Bacteria loading capacities and allocations for AUID 09020301-536.

E. coli		Flow Condition (Geomean Standard)				
		Very High	High	Mid	Low	Very Low
		Geometric Mean (Billion organisms per day)				
Loading Capacity		1,595.7	346.1	133.5	63.0	29.9
Wasteload Allocation	**Total WLA**	5.9	5.9	5.9	5.9	5.9
	Fertile WWTF	4.7	4.7	4.7	4.7	4.7
	Winger WWTF	1.2	1.2	1.2	1.2	1.2
Load Allocation	**Total LA**	1,430.2	305.6	114.3	50.8	21.0
Margin of Safety (MOS)		159.6	34.6	13.3	6.3	3.0
Existing Load		--	659.6	240.7	72.3	23.1
Unallocated Load		--	0.0	0.0	0.0	3.8
Estimated Load Reduction		--	53%	50%	22%	0%

Table 4-13: Bacteria loading capacities and allocations for AUID 09020301-537.

E. coli		Flow Condition				
		Very High	High	Mid	Low	Very Low
		Geometric Mean (Billion organisms per day)				
Loading Capacity		2,371.3	475.5	209.6	104.8	55.5
Wasteload Allocation	**Total WLA**	7.2	7.2	7.2	7.2	7.2
	Climax WWTF	1.3	1.3	1.3	1.3	1.3
	Fertile WWTF	4.7	4.7	4.7	4.7	4.7
	Winger WWTF	1.2	1.2	1.2	1.2	1.2
Load Allocation	**Total LA**	2127.00	420.80	181.40	87.10	42.80
Margin of Safety (MOS)		237.1	47.5	21.0	10.5	5.5
Existing Load		--	121.9	282.4	159.3	100.5
Unallocated Load		--	306.1	0.0	0.0	0.0
Estimated Load Reduction		--	0%	33%	41%	50%

E. coli Methodology for Streams

The approach for the *E. coli* TMDLs in the streams is found in Sections 3.6.2 and 4.2.1 of the TMDL. First, the bacteria load is quantified by source. The potential populations of human, animal, and wildlife production is determined, assigned a production rate and a delivery factor (based on die-off and travel time), then the total bacteria load is estimated by summing the production and delivery factor to get a bacterial load for each identified source.

Section 4.2.1 describes the methodology for developing the allocations for bacteria using the Load Duration Curve (LDC). Flow data is multiplied by standards to develop the LDC. Values above the curve are exceeding standards, and below the curve are in achieving standards and do not need reduction. Flow data were from MPCA streamflow gages, and *E. coli* standards were used for bacteria values. Figure 2 below is taken from the TMDL Appendix and illustrates the five flow regimes, very high, high, mid-range, low and very low flow. The points above the top curve exceed the maximum value standard of 1260 org/100ml, and the points above the lower curve exceed the *E. coli* geomean standard of 126 org/100ml, used in this TMDL. Most exceedences occur in the mid-range to low flow regimes.

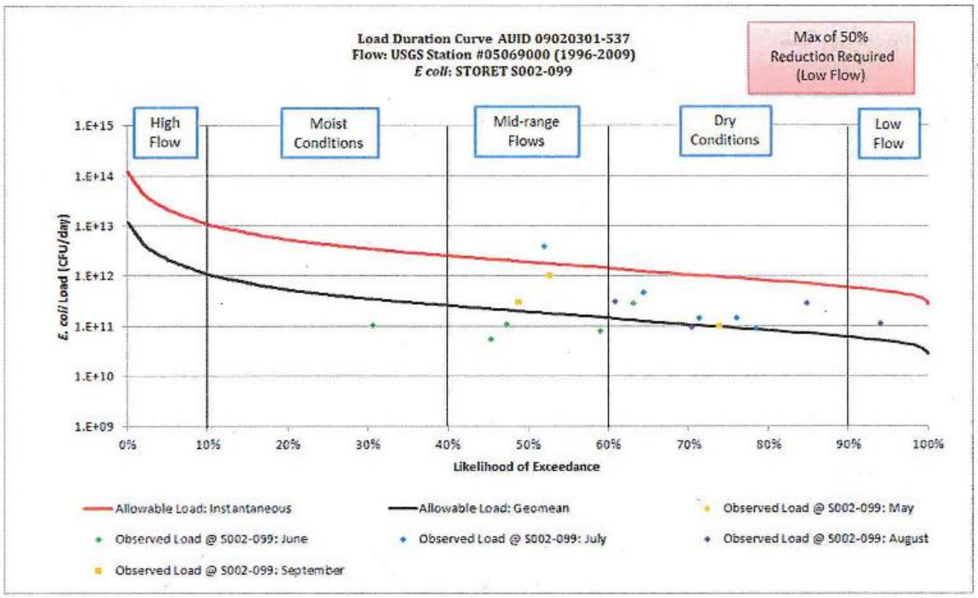

Figure 2. Example bacterial LDC (AUID 09020301-537)

Long term flow data are used to represent a wide range of flows, then loading capacities are determined for five flow regimes from high flows through low flows. Flow records were used from MPCA gages at the Sand Hill River, but were very sparse. There were data from AUID 09020301-537 for Climax, Minnesota at USGS gage 05069000 but the other AUs used the Hydrologic Simulation Program FORTRAN (HSPF) model to simulate flows, from 1996-2009, for consistency amongst all three AUs. Conversion factors were also applied as shown below in Table 4-6, taken from the TMDL, to calculate loading from the flow and concentration.

Table 4-6: Converting flow and concentration into bacterial load.

Load (org/day) = Concentration (organisms/100mL) * Flow (cfs) * Factor			
Multiply by **28.316** to convert	ft^3 per second	→	L/sec
Multiply by **1000** to convert	Liters per second	→	mL/sec
Divide by **100** to convert	mLs per second	→	organisms/sec
Multiply by **86,400** to convert	organisms per second	→	organisms/day

TSS Loading Capacity for Streams (Section 4.3.1)

The WLAs for TSS are for construction and industrial stormwater permits and WWTPs. The LAs TSS are for the remaining load when the WLA and MOS is subtracted from the loading capacity. MPCA states that: "An unallocated load is only provided if the existing load is lower than the loading capacity. The estimated load reduction is required load reduction, as a percentage of existing load, to meet the loading capacity. A load reduction is only provided if the loading capacity is less than the existing load." (Section 4.2.7 of the TMDL.)

As an example in Table 4-18, under very high flow conditions, the existing load of 1,680 is above the LA + MOS of 140.61 + 15.7 = 156.31, which is 92% above the LA plus MOS.

Table 4-18: TSS loading capacities and allocations for AUID 09020301-537.

Total Suspended Solids		Flow Condition				
		Very High	High	Mid	Low	Very Low
		Tons per day				
Loading Capacity		156.7	30.3	13.7	6.5	3.16
Wasteload Allocation	Total WLA	0.42	0.31	0.29	0.29	0.28
	Climax WWTF	0.05	0.05	0.05	0.05	0.05
	Fertile WWTF	0.18	0.18	0.18	0.18	0.18
	Winger WWTF	0.05	0.05	0.05	0.05	0.05
	Construction/Industrial Stormwater	0.14	0.03	0.01	0.006	0.003
Load Allocation	Total LA	140.61	26.96	12.04	5.56	2.55
Margin of Safety (MOS)		15.7	3.0	1.4	0.7	0.3
Existing Load		1,680	181	30	9.0	4.2
Unallocated Load		0.0	0.0	0.0	0.0	0.0
Estimated Load Reduction		92%	85%	59%	35%	32%

TSS Methodology for Streams

Section 3.5.5.2 of the TMDL describes the methodology for converting the previous turbidity standards in Nephelometric Turbidity Units (NTU) under which the waters were listed to TSS (the current standard). TSS values were used as the preferred value for calculating loading, and turbidity data were used where TSS values were sparse. The TSS and turbidity values were paired and a regression analysis was used to develop the relationship as follows:

$$TSS = -0.0001 * Turbidity^2 + 0.9691 * Turbidity + 9.6733$$

This method yielded a TSS value of 33.8 mg/L as a surrogate for the Minnesota Class 2B turbidity WQS of 25 NTU. Figure 3.15 shows a very strong relationship between turbidity and TSS, with an R^2 value of 0.946.

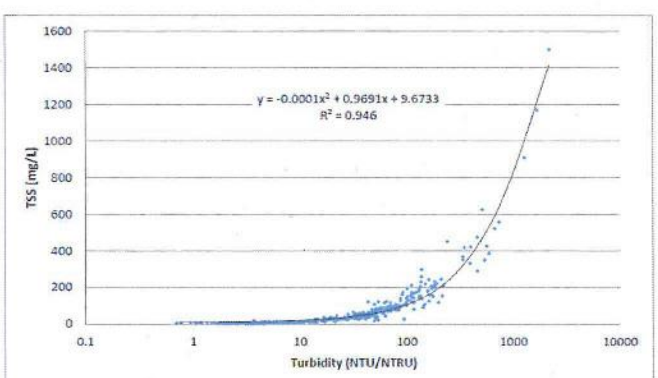

Figure 3-15: Relationship between TSS and Turbidity in the SHRW.

Critical Conditions: Loading changes greatly over the course of a year, including runoff from snowmelt in the spring, the summer growing season, periodic storm events, and changing agricultural landscapes in the fall.

Section 4.1.5 of the TMDL states that the critical condition for phosphorus is accounted for in the allocations in the summer growing season, when there is internal phosphorus loading from shallow lakes, and increased temperature resulting in greater algal growth which increases chlorophyll-a; eutrophication standards are developed based on the critical conditions in the growing season, June through September.

Section 4.2.5 of the TMDL states that the critical condition is accounted for in the modeling effort for *E. coli* because all seasonal conditions were incorporated into the process, and the *E. coli* standards are applicable for the critical times when recreation occurs in April through October. *E. coli* standards are exceeded the most when summer temperatures influence warmer water temperatures.

Section 4.3.5 states that the TSS critical condition varies by flow regime and location (rather than season), it is in the low flow regime in AU 09020301-541 and in high flow regime for AU 09020301-537. The critical conditions vary due to the varied characteristics of the watersheds, such as gradient, land use and soil types. Segment -541 is still used for modeling purposes though it does not receive an allocation in this TMDL.

EPA finds MPCA's approach for calculating the LC to be reasonable and consistent with EPA guidance. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this third element.

4. Load Allocations (LAs)

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity attributed to existing and future nonpoint sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. §130.2(g)). Where possible, load allocations should be described separately for natural background and nonpoint sources.

Comment:
The Load Allocations for phosphorus are presented above in the tables in Section 3 for direct watershed runoff, non-MS4 runoff, failing septics (given a zero), and internal loading.

LAs for *E. coli* are for the remainder of the allocation after the WLA for the WWTPs and MOS are subtracted from the loading capacity.

LAs for TSS are for the remainder of the allocation after the WLA for the WWTPs and MOS are subtracted from the loading capacity.

EPA finds MPCA's approach for calculating the LA to be reasonable and consistent with EPA guidance. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this fourth element.

5. Wasteload Allocations (WLAs)

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

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

Comment:
Wasteload Allocations are presented above in the tables in Section 3, Loading Capacity. The WLAs for phosphorus are aggregated stormwater industrial and construction sites. The average annual fraction of the watershed under construction over the past five years was calculated using construction permit data, area weighted based on the fraction of the subwatershed located in each county. This percentage was multiplied by the watershed runoff load component to determine the construction stormwater WLA (Section 4.1.3.1 of the TMDL). Industrial stormwater was set equal to the construction stormwater since they are both such a small fraction of the watershed area.

The WLAs for *E. coli* are for three WWTPs, calculated using flow multiplied by the water quality effluent limit from the NPDES permits for *E. coli*.

The WLAs for TSS are from three WWTPs, calculated using the flow multiplied by the water quality effluent limit from the NPDES permits (45 mg/L).

EPA finds MPCA's approach for calculating the WLA to be reasonable and consistent with EPA guidance. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this fifth element.

6. Margin of Safety (MOS)

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

Comment:
Section 4.1.4 of the TMDL states that an explicit 10% MOS was used in the modeling effort for phosphorus allocations. MPCA set aside 10% of the loading capacity for each of the lakes for the MOS. MPCA states in TMDL that the explicit 10% MOS is supported by the good agreement of simulated and observed values for TP loading and flow.

Section 4.2.4 states that the MOS for the *E. coli* TMDLs is an explicit 10% that accounts for uncertainty in: data collection, lab analysis, data analysis, modeling error, implementation, observed daily flow record, in the water quality data, regrowth in the sediment, die-off, and natural background.

Section 4.3.4 of the TMDL states that the MOS for the TSS TMDL is an explicit 10% that accounts for uncertainty in the daily flow record, in the water quality data, in the transformation of the turbidity to a TSS surrogate, and in the flow variability.

EPA finds MPCA's approach for calculating the MOS to be reasonable and consistent with EPA guidance. EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this sixth element.

7. Seasonal Variation

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

Comment:

Seasonal variation was considered as described in Section 4.1.5, 4.2.5, and 4.3.5 of the TMDL. In an average year, there is a large influx of phosphorus into the lakes in the spring. If there are not many runoff events during the growing season months of June through September, a great increase in chlorophyll-a in the warm waters in August or September may occur due to higher temperatures yielding greater algal growth. Increased phosphorus internal loading may occur in shallow lakes. The MPCA takes this seasonal variation into account and load reductions are to meet standards over the course of the growing season from June through September.

For *E. coli*, the seasonal variation was described previously: spring snowmelt, summer growing season, and landscape changes in the fall, and are all included in developing the allocations. Further, all flow conditions were included in the analyses, including baseflow.

For TSS, the seasonal variation is similar to that found in the other pollutants considered in this TMDL, and was considered in the allocation methodology and loading allocations based on using five different flow regimes that could capture changes in flow through all the seasons.

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

8. Reasonable Assurances

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

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

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

Comment:

Section 5 of the TMDL submittal states that there is reasonable assurance that the TMDL will be implemented through both non-regulatory and regulatory means. WLAs are assured through the issuance and regulation of NPDES permits. Nonpoint source implementation strategies are reasonably assured by past collaborations in the watershed amongst agencies, local governments, counties, and Soil and Water Conservation Districts. The Sand Hill River Watershed District (SHRWD) is involved with volunteer citizen monitoring, through the Sand Hill River Watch Program and the Red River Watershed Management Board (RRWMD), the Agassiz Environmental Learning Center, and public schools in the SHRWD. The SHRWD will take a lead role in implementation, and has received grants to add water and sediment control basins. Strategies and activities are found in the District's watershed management plan.

Clean Water Legacy Act: The CWLA was passed in Minnesota in 2006 for the purposes of protecting, restoring, and preserving Minnesota water. The CWLA provides the protocols and practices to be followed in order to protect, enhance, and restore water quality in Minnesota. The CWLA outlines how MPCA, public agencies and private entities should coordinate in their efforts toward improving land use management practices and water management. The CWLA anticipates that all agencies (i.e., MPCA, public agencies, local authorities and private entities, etc.) will cooperate regarding planning and restoration efforts. Cooperative efforts would likely include informal and formal agreements to jointly use technical, educational, and financial resources.

The CWLA also provides details on public and stakeholder participation, and how the funding will be used. In part to attain these goals, the CWLA requires MPCA to develop Watershed Restoration and Protection Strategies (WRAPS). The WRAPS are required to contain such elements as the identification of impaired waters, watershed modeling outputs, point and nonpoint sources, load reductions, etc. (Chapter 114D.26; CWLA). The WRAPS also contain an implementation table of strategies and actions that are capable of achieving the needed load reductions, for both point and nonpoint sources (Chapter 114D.26, Subd. 1(8); CWLA). Implementation plans developed for the TMDLs are included in the table, and are considered "priority areas" under the WRAPS process (Watershed Restoration and Protection Strategy Report Template, MPCA). This table includes not only needed actions but a timeline for achieving water quality targets, the reductions needed from both point and nonpoint sources, the governmental units responsible, and interim milestones for achieving the actions. MPCA has developed guidance on what is required in the WRAPS (Watershed Restoration and Protection Strategy Report Template, MPCA). The Sand Hill River WRAPS plan was on public notice until June, 2016, and is being finalized.

The Minnesota Board of Soil and Water Resources administers the Clean Water Fund as well, and has developed a detailed grants policy explaining what is required to be eligible to receive Clean Water Fund money (FY 2014 Clean Water Fund Competitive Grants Request for Proposal (RFP); Minnesota Board of Soil and Water Resources, 2014).

Section 7.3 of the TMDL includes implementation cost estimates as part of the CWLA requirements of a TMDL. Reduction of sediment and phosphorus is estimated to cost $10 - $20 million over 10 years. Residential practices to reduce phosphorus and bacteria will occur with reduction of runoff, the addition of shoreland buffers and rain gardens, the reduction of lawn fertilizer, vegetation management, and addition of permeable pavement. For example, estimates for a rain garden are $500, and $5000 for permeable pavement.

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

9. Monitoring Plan to Track TMDL Effectiveness

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

Comment:
Section 6 of the TMDL states that stream monitoring will occur primarily through the SHRWD, including a citizen group with the RRWMD, the Agassiz Environmental Learning Center, and public schools in the District to develop baseline water quality data. MPCA will coordinate with two programs to supplement monitoring via the Citizen Lake Monitoring Program and the Citizen Stream Monitoring Program. MPCA also does long-term ongoing monitoring at the SHRW outlet, and the lakes are monitored on a 10-year intensive monitoring cycle, scheduled again for 2021 and 2022.

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

10. Implementation

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

Comment:

Section 7 of the TMDL states that the implementation is generally applicable throughout the watershed, but there would be some specific controls such as residue management where applicable, inlet controls (in the Lake Plain region) or water and sediment control basins in the central and eastern watershed.

Section 7 of the TMDL also summarizes the Watershed Restoration and Protection Strategy with the following bullets. Within the strategy are details, where appropriate and possible, to:
· Modify the grade control structures to restore fish passage and streambank erosion;
· Mitigate activities that will alter the hydrology of the watershed and improve storage capacity;
· Attenuate peak flows and augment base flows in streams;
· Re-establish natural functioning stream channels;
· Increase the quantity and quality of instream habitat;
· Establish and/or protect riparian corridors;
· Implement agricultural BMPs to reduce soil erosion and sedimentation;
· Ensure all septic systems are compliant.

Permitted sources (Section 7.1.2 in the TMDL) would include the construction stormwater permits (usually for less than a one-acre disturbance). There are BMPs and other stormwater controls within the general stormwater permits. The permits would be consistent with the Wasteload Allocations within this TMDL. The possible control measures for the sites are defined in the State's NPDES/State Disposal System (SDS) General Stormwater Permit for Construction Activity (MNR100001).

Section 7.1.3 in the TMDL states that permitted sources would also include Industrial Stormwater Multi-Sector General Permit (MNR050000), or NPDES/SDS General Permit for Construction Sand & Gravel, Rock Quarrying and Hot Mix Asphalt Production facilities (MNG490000). It is expected if the operator would maintain the BMPs, the stormwater discharges would be consistent with the WLAs in this TMDL. Wastewater Treatment Facilities should also be consistent with the WLA in this TMDL (Section 7.1.4).

For nonpoint sources, discussed in Section 7.2, in 2010 the SWCDs received funding for BMPs, which were installed and, based on their success, more funding was requested. In 2011-2014, the SHRWD received several grants to install water and sediment basins in each of several years, as well as in-channel riffle structures, with landowners on a waiting list for assistance. These basins reduce the sediment loading and reduce the turbidity throughout the watershed, and reduce hydrology stressors. Other grants went toward stabilization of channels and coulees.

Funds were made available to the SHRWD and the West Polk SWCD from a Clean Water Funds grant and Enbridge, Inc. to install rock riffles used to assist with grade stabilization and facilitate fish passage for 3.5 miles of the channelized reach of the Sand Hill River. The objective is to reduce sediment loss from the channelized bed and banks, and to reduce the incision of the channel bed. These actions will reduce the turbidity and TSS impairment. Grade control measures will be installed in a reach of the Polk County Ditch 122, and stabilization measures to control head-cutting in a tributary to the Sand Hill River and at Union Lake, a popular recreational lake.

Retrofitting of Corps of Engineers' drop structures and rip rap in the upper reaches of the Sand Hill River, to assist in fish passage, is ongoing. Easement areas are to be completed in 2016-2017 to enhance habitat and reduce contaminant loading and reduce runoff. Existing programs will continue to install side water inlets and establish vegetated buffer strips. Cost estimates were included in Section 7.3 of the TMDL.

EPA reviews, but does not approve, implementation plans. EPA finds that this criterion has been adequately addressed.

11. Public Participation

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

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

Comment:
The TMDL was public noticed from May 31, 2016 to June 29, 2016. Copies of the draft TMDL were made available upon request and on the Internet web site. The draft/public noticed TMDL and WRAPS webpage is located at, https://www.pca.state.mn.us/water/watersheds/red-river-north-%E2%80%94-sand-hill-river#overview, or at the MPCA office address listed under Cary Hernandez. MPCA received two comments during the public comment period, both from the Minnesota Department of Agriculture requesting clarification of the NPS agricultural drainage tile sources' role in the modeling process, and regarding restricting livestock access to waterways, which was already discussed by MPCA in another section of the TMDL. MPCA adequately addressed the comments and these responses are included in its submittal to EPA.

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

12. Submittal Letter

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

Comment:
The EPA received the final Sand Hill River Watershed TMDL on April 17, 2017 accompanied by a submittal letter dated April 14, 2017. In the submittal letter, MPCA states that the submission includes the final TMDLs for phosphorus, *E. coli*, and TSS. The lakes and streams are impaired for aquatic life and recreational use by excess nutrients, bacteria, and turbidity. Two of the TMDLs in the original submittal by MPCA are not included in this approval because the allocations are on tribal lands of the White Earth Reservation.

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

13. Conclusion

After a full and complete review, EPA finds that the phosphorus, *E. coli*, and TSS TMDLs for the Sand Hill River Watershed TMDL satisfy all of the elements of an approvable TMDL. This approval addresses three lakes for phosphorus, three stream segments for *E. coli*, and one stream segment for TSS, for a total of seven TMDLs.

EPA's approval of this TMDL does not extend to those waters that are within Indian Country, as defined in 18 U.S.C. Section 1151. EPA is taking no action to approve or disapprove TMDLs for those waters at this time. EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under the CWA Section 303(d) for those waters.

EPA sent a letter to the White Earth Band of Ojibwe in Minnesota. In the letter, EPA offered the Tribal representatives the opportunity to consult with the EPA regarding these TMDLs. EPA received no responses.