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

FEB 1 6 2017

REPLY TO THE ATTENTION OF:
WW-16J

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

Dear Mr. Skuta:

The U.S. Environmental Protection Agency has conducted a complete review of the final Total Maximum Daily Loads (TMDL) for segments within the Buffalo River Watershed (BRW), including support documentation and follow up information. The BRW is in western Minnesota in Becker, Clay, Wilkin and Ottertail Counties. The BRW TMDLs address impaired aquatic recreation due to excessive nutrients (phosphorus) and excessive bacteria and impaired aquatic life due to excessive sediment.

EPA has determined that the BRW TMDLs meet the requirements of Section 303(d) of the Clean Water Act and EPA's implementing regulations set forth at 40 C.F.R. Part 130. Therefore, EPA approves Minnesota's fourteen phosphorus TMDLs, twenty-one bacteria TMDLs and twelve sediment (total suspended solids) TMDLs. 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 efforts 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,

Christopher Korleski
Director, Water Division

Enclosure

cc: Celine Lyman, MPCA

wq-iw5-06g

TMDL: Buffalo River Watershed bacteria, phosphorus & TSS TMDLs, Becker, Clay, Otter Tail and Wilkin Counties, Minnesota
Date: February 16, 2017

DECISION DOCUMENT
FOR THE BUFFALO RIVER WATERSHED TMDLS, BECKER, CLAY, OTTERTAIL & WILKIN COUNTIES, 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 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 Water body, Pollutant of Concern, Pollutant Sources, and Priority Ranking

The TMDL submittal should identify the water body as it appears on the State's/Tribe's 303(d) list. The water body 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 water body and specify the link between the pollutant of concern and the water quality standard (see Section 2 below).

The TMDL submittal should include an identification of the point and nonpoint sources of the pollutant of concern, including location of the source(s) and the quantity of the loading, e.g., lbs/per day. The TMDL should provide the identification numbers of the NPDES permits within the water body. 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 water body 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 Buffalo River Watershed (BRW) (HUC-8 #09020106) is located in the Red River of the North Basin in northwestern Minnesota. The BRW is approximately 1,100 square miles (704,000 acres) and spans portions of Becker, Clay, Otter Tail and Wilkin counties. Waters in the BRW generally flow from east to west where the surface waters of the BRW empty into the main stem of the Red River. The Red River flows northward into the province of Manitoba in Canada and contributes to Lake Winnipeg.

The BRW TMDLs address twenty-two (22) impaired segments due to excessive bacteria, fourteen (14) impaired lakes due to excessive nutrients, and thirteen (13) impaired segments due to excessive sediment inputs (Table 1 of this Decision Document). The BRW spans three ecoregions, the North Central Hardwood Forest (NCHF) ecoregion, the Northern Glaciated Plain (NGP) (i.e., Lake Agassiz Plain) ecoregion and the Northern Lakes and Forests (NLF) ecoregion.

Table 1: Buffalo River Watershed impaired waters addressed by these TMDL efforts

AUID	Water body Name	Beneficial Use	Pollutant or Stressor	TMDLs
09020106-501	Buffalo River (S Branch Buffalo River to Red River)	Aquatic Life	Excess turbidity (sediment)	TSS TMDL
		Aquatic Recreation	Excess bacteria	Bacteria TMDL
09020106-502	Stony Creek (Hay Creek to S Branch Buffalo River	Aquatic Life	Excess turbidity (sediment)	TSS TMDL
		Aquatic Recreation	Excess bacteria	Bacteria TMDL
09020106-503	Buffalo River (S Branch Stony Creek to Buffalo River)	Aquatic Life	Excess turbidity (sediment)	TSS TMDL
		Aquatic Recreation	Excess bacteria	Bacteria TMDL
09020106-504	Buffalo River (S Branch Whisky Creek to Stony Creek)	Aquatic Life	Excess turbidity (sediment)	TSS TMDL
		Aquatic Recreation	Excess bacteria	Bacteria TMDL
09020106-505	Buffalo River (S Branch Deehorn Creek to Whisky Creek)	Aquatic Life	Excess turbidity (sediment)	TSS TMDL
		Aquatic Recreation	Excess bacteria	Bacteria TMDL
09020106-507	Deerhorn Creek (Headwaters to S Branch Buffalo River)	Aquatic Life	Excess turbidity (sediment)	TSS TMDL
		Aquatic Recreation	Excess bacteria	Bacteria TMDL
09020106-508	Buffalo River (S Branch Headwaters to Deerhorn Creek)	Aquatic Life	Excess turbidity (sediment)	TSS TMDL
		Aquatic Recreation	Excess bacteria	Bacteria TMDL
09020106-509	Whisky Creek (T137 R47W S14, east line to S Branch Buffalo River)	Aquatic Life	Excess turbidity (sediment)	TSS TMDL
		Aquatic Recreation	Excess bacteria	Bacteria TMDL

09020106-511	Hay Creek (Headwaters to Stinking Lake)	Aquatic Recreation	Excess bacteria	Bacteria TMDL
09020106-515	Becker County Ditch 15 (Unnamed Ditch to Buffalo River)	Aquatic Recreation	Excess bacteria	Bacteria TMDL
09020106-519	Hay Creek (Unnamed Creek to Spring Creek)	Aquatic Recreation	Excess bacteria	Bacteria TMDL
09020106-520	Hay Creek (Spring Creek to Stony Creek)	Aquatic Recreation	Excess bacteria	Bacteria TMDL
09020106-521	Whisky Creek (Headwaters to T137 R46W S18, west line)	Aquatic Life	Excess turbidity (sediment)	TSS TMDL
		Aquatic Recreation	Excess bacteria	Bacteria TMDL
09020106-523	Stony Creek (T137 R45W S3, north line to T137 R46W S5, north line)	Aquatic Life	Excess turbidity (sediment)	TSS TMDL
		Aquatic Recreation	Excess bacteria	Bacteria TMDL
09020106-531	State Ditch 14 (Wilkin County Ditch 40 to Deerhorn Creek)	Aquatic Recreation	Excess bacteria	Bacteria TMDL
09020106-534	Spring Creek (Unnamed Creek to Hay Creek)	Aquatic Recreation	Excess bacteria	Bacteria TMDL
09020106-556	County Ditch 2 (Unnamed Creek to Buffalo River)	Aquatic Recreation	Excess bacteria	Bacteria TMDL
09020106-559	County Ditch 39 (Headwaters to Buffalo River)	Aquatic Recreation	Excess bacteria	Bacteria TMDL
09020106-562	County Ditch 10 (Headwaters to Buffalo River)	Aquatic Recreation	Excess bacteria	Bacteria TMDL
09020106-594	Buffalo River (Becker Co. Ditch 15 to Hay Creek)	Aquatic Life	Excess turbidity (sediment)	TSS TMDL
		Aquatic Recreation	Excess bacteria	Bacteria TMDL
09020106-595	Buffalo River (Hay Creek to S Branch Buffalo River)	Aquatic Life	Excess turbidity (sediment)	TSS TMDL
		Aquatic Recreation	Excess bacteria	Bacteria TMDL
03-0579-00	Boyer Lake	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
03-0624-00	Forget-Me-Not Lake	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
03-0528-00	Gottenberg Lake	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
03-0635-00	Gourd Lake	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
56-1039-00	Jacobs Lake	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
03-0646-00	Lime Lake	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
14-0099-00	Lake Maria	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
03-0526-00	Marshall Lake	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
03-0659-00	Sand (Stump) Lake	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
03-0625-00	Sorenson Lake	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL

03-0631-00	Stakke Lake	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
03-0647-00	Stinking Lake	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
03-0619-00	Talac (Lee) Lake	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL
03-0645-00	West LaBelle Lake	Aquatic Recreation	Excess Nutrients (total phosphorus)	TP TMDL

MPCA's TMDL submittal letter explained that two waterbodies, Mission Lake (03-0471-00) and a portion of the Buffalo River (09020106-593) are wholly or partially within the tribal boundaries of White Earth Nation. MPCA submitted nutrient loadings for Mission Lake and bacteria and TSS loadings for the Buffalo River segment (09020106-593) as part of its final TMDL submittal to EPA on December 19, 2016. Absent a specific authorization, states do not have the authority to implement federal programs in Indian country. Therefore, EPA is not considering the MPCA nutrient TMDL for Mission Lake and is not considering the bacteria and TSS TMDLs for the Buffalo River segment (09020106-593) during its review of the BRW TMDLs.

To adhere with its eutrophication standards in the NCHF and NGP ecoregions the Minnesota Pollution Control Agency (MPCA) classifies lakes as either shallow or deep lakes. MPCA explained that a lake is considered shallow if its maximum depth is less than 15 feet, or if the littoral area (area where depth is less than 15 feet) covers at least 80% of the lake's surface area (Table 1-2 of the final TMDL document).

Table 2: Buffalo River Watershed lake classification and eutrophication water quality standard information

Lake AUID	Lake Name	Eutrophication Criteria	TP WQS	chl-a WQS	Secchi Disk Depth WQS
			(µg/L)	(µg/L)	(m)
North Central Hardwood Forest (NCHF) deep lake eutrophication criteria					
03-0579-00	Boyer Lake	NCHF deep lake WQS	40	14	1.4
56-1039-00	Jacobs Lake	NCHF deep lake WQS	40	14	1.4
03-0526-00	Marshall Lake	NCHF deep lake WQS	40	14	1.4
03-0659-00	Sand (Stump) Lake	NCHF deep lake WQS	40	14	1.4
North Central Hardwood Forest (NCHF) shallow lake eutrophication criteria					
03-0624-00	Forget-Me-Not Lake	NCHF shallow lake WQS	60	20	1.0
03-0528-00	Gottenberg Lake	NCHF shallow lake WQS	60	20	1.0
03-0635-00	Gourd Lake	NCHF shallow lake WQS	60	20	1.0
03-0646-00	Lime Lake	NCHF shallow lake WQS	60	20	1.0
03-0625-00	Sorenson Lake	NCHF shallow lake WQS	60	20	1.0
03-0631-00	Stakke Lake	NCHF shallow lake WQS	60	20	1.0
03-0619-00	Talac (Lee) Lake	NCHF shallow lake WQS	60	20	1.0
03-0645-00	West LaBelle Lake	NCHF shallow lake WQS	60	20	1.0
Northern Glaciated Plains (NGP) shallow lake eutrophication criteria					
14-0099-00	Lake Maria	NGP shallow lake	90	30	0.7
03-0647-00	Stinking Lake	NGP shallow lake	90	30	0.7

Land Use:

Land use in the BRW is predominantly agricultural (over 70% of the BRW area), especially in the western and central areas of the BRW. The eastern areas of the BRW are mostly forested areas. The

BRW is comprised of cropland (65.9%), forested lands (9.5%), pasture/hay/grasslands (9.0%), wetlands (6.9%), urban lands (4.8%), open water (3.9%) and barren lands (0.03%) (Table 2-1 of the final TMDL document). Significant development is not expected in the BRW. The land use within the watershed is primarily agricultural and according to MPCA is expected to remain agricultural for the foreseeable future. There may be a shift in crop usage within the watershed (i.e. pasture/hay land uses to row crop land uses) but MPCA does not believe that this will have a significant impact on pollutant loading to water bodies within the BRW.

Problem Identification:
Bacteria TMDLs: Bacteria impaired segments identified in Table 1 of this Decision Document were included on the draft 2014 Minnesota 303(d) list due to excessive bacteria. Water quality monitoring within the BRW indicated that these segments were not attaining their designated aquatic recreation uses due to exceedances of bacteria criteria. Bacteria exceedances can negatively impact recreational uses (i.e., swimming, wading, boating, fishing) and public health. At elevated levels, bacteria may cause illness within humans who have contact with or ingest bacteria laden water. Recreation-based contact can lead to ear, nose, and throat infections, and stomach illness.

Phosphorus TMDLs: Lakes identified in Table 1 of this Decision Document were included on the draft 2014 Minnesota 303(d) list due to excessive nutrients (phosphorus). Total phosphorus (TP), chlorophyll-*a* (chl-a) and Secchi depth (SD) measurements in the BRW indicated that lakes addressed via these TMDL efforts were not attaining their designated aquatic recreation uses due to exceedances of nutrient criteria. Water quality monitoring within the BRW was completed at several locations and the data collected during these efforts was the foundation for modeling efforts completed in this TMDL study.

While TP is an essential nutrient for aquatic life, elevated concentrations of TP can lead to nuisance algal blooms that negatively impact aquatic life and recreation (swimming, boating, fishing, etc.). Algal decomposition depletes dissolved oxygen levels within the water column. The decreases in dissolved oxygen can stress benthic macroinvertebrates and fish. Depletion of oxygen in the water column can also lead to conditions where phosphorus is released from bottom sediments (i.e. internal loading). Also, excess algae can shade the water column which limits the distribution of aquatic vegetation. Aquatic vegetation stabilizes bottom sediments, and also is an important habitat for macroinvertebrates and fish.

Sediment (Total Suspended Solids) TMDLs: Sediment (turbidity) impaired segments identified in Table 1 of this Decision Document were included on the draft 2014 Minnesota 303(d) list due to excessive sediment within the water column. Water quality monitoring within the BRW indicated that these segments were not attaining their designated aquatic life uses due to high turbidity measurements and the negative impact of those conditions on aquatic life (i.e., fish and macroinvertebrate communities).

Total suspended solids (TSS) is a measurement of the sediment and organic material that inhibits natural light from penetrating the surface water column. Excessive sediment and organic material within the water column can negatively impact fish and macroinvertebrates within the ecosystem. Excess sediment and organic material may create turbid conditions within the water column and may increase the costs of treating surface waters used for drinking water or other industrial purposes (ex. food processing).

Excessive amounts of fine sediment in stream environments can degrade aquatic communities. Sediment can reduce spawning and rearing areas for certain fish species. Excess suspended sediment can clog the gills of fish, stress certain sensitive species by abrading their tissue, and thus reduce fish health. When in suspension, sediment can limit visibility and light penetration which may impair foraging and predation activities by certain species.

Excessive fine sediment also may degrade aquatic habitats, alter natural flow conditions in stream environments and add organic materials to the water column. The potential addition of fine organic materials may lead to nuisance algal blooms which can negatively impact aquatic life and recreation (swimming, boating, fishing, etc.). Algal decomposition depletes oxygen levels which stresses benthic macroinvertebrates and fish. Excess algae can shade the water column and limit the distribution of aquatic vegetation. Established aquatic vegetation stabilizes bottom sediments and provides important habitat areas for healthy macroinvertebrates and fish communities.

Degradations in aquatic habitats or water quality (ex. low dissolved oxygen) can negatively impact aquatic life use. Increased turbidity, brought on by elevated levels of nutrients within the water column, can reduce dissolved oxygen in the water column, and cause large shifts in dissolved oxygen and pH throughout the day. Shifting chemical conditions within the water column may stress aquatic biota (fish and macroinvertebrate species). In some instances, degradations in aquatic habitats or water quality have reduced fish populations or altered fish communities from those communities supporting sport fish species to communities which support more tolerant rough fish species.

Excess siltation and flow alteration in streams impacts aquatic life by altering habitats. Excess sediment can fill pools, embed substrates, and reduce connectivity between different stream habitats. The result is a decline in habitat types that, in healthy streams, support diverse macroinvertebrate communities. Excess sediment can reduce spawning and rearing habitats for certain fish species. Flow alterations in the BRW have resulted from drainage improvements on or near agricultural lands. Specifically, tile drains and land smoothing have increased surface and subsurface flow to streams. This results in higher peak flows during storm events and flashier flows which carry sediment loads to streams and erode streambanks. As a result, TSS surrogate TMDLs were completed to directly address waters impaired by excess sediment.

Priority Ranking:
The water bodies addressed by the BRW TMDLs were given a priority ranking for TMDL development due to: the impairment impacts on public health and aquatic life, the public value of the impaired water resource, the likelihood of completing the TMDL in an expedient manner, the inclusion of a strong base of existing data, the restorability of the water body, the technical capability and the willingness of local partners to assist with the TMDL, and the appropriate sequencing of TMDLs within a watershed or basin. Areas within the BRW are popular locations for aquatic recreation. Water quality degradation has led to efforts to improve the overall water quality within the BRW, and to the development of TMDLs for these water bodies.

Pollutants of Concern:
The pollutants of concern are bacteria, nutrients (TP) and sediment (TSS).

Source Identification (point and nonpoint sources):

Point Source Identification: The potential point sources to the BRW are:

<u>BRW bacteria TMDLs:</u>

National Pollutant Discharge Elimination Systems (NPDES) permitted facilities: NPDES permitted facilities may contribute bacteria loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge wastewater according to their NPDES permit. MPCA determined that there are eight wastewater treatment facilities (WWTFs) in the BRW which contribute bacteria from treated wastewater releases (Table 3 of this Decision Document). MPCA assigned each of these facilities a portion of the bacteria wasteload allocation (WLA).

Table 3: NPDES permitted facilities receiving a bacteria WLA

Facility	Permit Number	Impaired Segment (HUC-12)
Audubon WWTF	MNG580148	-501, -515, -594, -595
Barnesville WWTF	MN0022501	-501, -503 -504, -509, -521
Callaway WWTF	MNT022985	-501, -515, -594, -595
Glyndon WWTF	MN0020630	-595
Hawley WWTF	MN0020338	-501, -595
Hitterdahl WWTF	MNG580178	-501
Lake Park WWTF	MNG580157	-501, -511, -594, -595
Spring Prairie Hutterite Colony WWTF	MN0070467	-501, -556

Municipal Separate Storm Sewer System (MS4) communities: Stormwater from MS4s can transport bacteria to surface water bodies during or shortly after storm events. MPCA determined that the BRW does not have MS4 communities which contribute bacteria WLA to the BRW bacteria TMDLs.

Combined Sewer Overflows (CSOs) and Sanitary Sewer Overflows (SSOs): MPCA determined that the BRW does not have CSOs nor SSOs which contribute bacteria to the bacteria impaired segments of the BRW.

Concentrated Animal Feedlot Operations (CAFOs): MPCA recognized the presence of seven CAFOs in the BRW (Table 4 of this Decision Document). CAFO facilities must be designed to contain all surface water runoff (i.e., have zero discharge from their facilities) and have a current manure management plan. MPCA explained that these facilities do not discharge effluent and therefore were not assigned a portion of the WLA (WLA = 0).

Table 4: CAFOs within the Buffalo River Watershed

Facility	Permit Number
Baers Poultry Co. - Old Barn Site	MNG441163
Jona Baer Inc.	MNG441148
Baers Poultry Co. - New Barn Site	MNG441162
Highlevel Egg	MNG441114
J & A Farms LLC	MNG441159
Taves Turkey Farm Inc.	MNG441136
Spring Prairie Colony - Hawley	MNG440000

BRW phosphorus TMDLs:
NPDES permitted facilities: NPDES permitted facilities may contribute phosphorus loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge wastewater according to their NPDES permit. MPCA identified one NPDES permit holder which contributes nutrient loads to an impaired water within the BRW. The Lake Park WWTF (MNG580157) contributes nutrient loads to Stinking Lake (03-0647-00) and was assigned a nutrient WLA.

MS4 communities: MPCA determined that the BRW does not have MS4 communities which contribute nutrient loads WLA to the BRW phosphorus TMDLs.

CSOs and SSOs: MPCA determined that the BRW does not have CSOs nor SSOs which contribute nutrients to the nutrient impaired segments of the BRW.

Stormwater runoff from permitted construction and industrial areas: Construction and industrial sites may contribute phosphorus via sediment runoff during stormwater events. These areas within the BRW must comply with the requirements of the MPCA's NPDES Stormwater Program. The NPDES program requires construction and industrial sites to create a Stormwater Pollution Prevention Plan (SWPPP) that summarizes how stormwater will be minimized from the site.

BRW TSS TMDL:
NPDES permitted facilities: NPDES permitted facilities may contribute sediment loads to surface waters through wastewater discharges. Permitted facilities must discharge wastewater according to their NPDES permit. MPCA determined that there are eight WWTF which contribute sediment from treated wastewater releases (Table 5 of this Decision Document). MPCA also found that there is one industrial site, Aggregate Industries – Pit 21, which contributes sediment loads via process wastewater segments -501 and -595 in the BRW. MPCA assigned each of these facilities a portion of the sediment wasteload allocation (WLA).

Table 5: NPDES permitted facilities receiving a TSS WLA

Facility	Permit Number	Impaired Segment (HUC-12)
Audubon WWTF	MNG580148	-501, -594, -595
Barnesville WWTF	MN0022501	-501, -503, -504, -509, -521
Callaway WWTF	MNT022985	-501, -594, -595
Glyndon WWTF	MN0020630	-595
Hawley WWTF	MN0020338	-501, -595
Hitterdahl WWTF	MNG580178	-501
Lake Park WWTF	MNG580157	-501, -594, -595
Spring Prairie Hutterite Colony WWTF	MN0070467	-501
Aggregate Industries – Pit 21	MN0069515	-501, -595

MS4 communities: MPCA determined that the BRW does not have MS4 communities which contribute sediment loads to the BRW.

Stormwater runoff from permitted construction and industrial areas: Construction and industrial sites may contribute sediment via stormwater runoff during precipitation events. These areas within the BRW must comply with the requirements of the MPCA's NPDES Stormwater Program. The NPDES program requires construction and industrial sites to create a SWPPP that summarizes how stormwater will be minimized from the site.

Nonpoint Source Identification: The potential nonpoint sources to the BRW are:

BRW bacteria TMDLs:

Non-regulated urban runoff: Runoff from urban areas (urban, residential, commercial or industrial land uses) can contribute bacteria to local water bodies. Stormwater from urban areas, which drain impervious surfaces, may introduce bacteria (derived from wildlife or pet droppings) to surface waters.

Stormwater from agricultural land use practices and feedlots near surface waters: Animal Feeding Operations (AFOs) in close proximity to surface waters can be a source of bacteria to water bodies in the BRW. These areas may contribute bacteria via the mobilization and transportation of pollutant laden waters from feeding, holding and manure storage sites. Runoff from agricultural lands may contain significant amounts of bacteria which may lead to impairments in the BRW. Feedlots generate manure which may be spread onto fields. Runoff from fields with spread manure can be exacerbated by tile drainage lines, which channelize the stormwater flows and reduce the time available for bacteria to die-off.

Unrestricted livestock access to streams: Livestock with access to stream environments may add bacteria directly to the surfaces waters or resuspend particles that had settled on the stream bottom. Direct deposition of animal wastes can result in very high localized bacteria counts and may contribute to downstream impairments. Smaller animal facilities may add bacteria to surface waters via wastewater from these facilities or stormwater runoff from near-stream pastures.

Discharges from Subsurface Sewage Treatment Systems (SSTS) or unsewered communities: Failing septic systems are a potential source of bacteria within the BRW. Septic systems generally do not discharge directly into a water body, but effluents from SSTS may leach into groundwater or pond at the surface where they can be washed into surface waters via stormwater runoff events. Age, construction and use of SSTS can vary throughout a watershed and influence the bacteria contribution from these systems.

Failing SSTS are specifically defined as systems that are failing to protect groundwater from contamination, while those systems which discharge partially treated sewage to the ground surface, road ditches, tile lines, and directly into streams, rivers and lakes are considered an imminent threat to public health and safety (ITPHS). ITPHS systems also include illicit discharges from unsewered communities.

Wildlife: Wildlife is a known source of bacteria in water bodies as many animals spend time in or around water bodies. Deer, geese, ducks, raccoons, and other animals all create potential sources of bacteria. Wildlife contributes to the potential impact of contaminated runoff from animal habitats, such as urban park areas, forest, and rural areas.

BRW phosphorus TMDLs:

Internal loading: The release of phosphorus from lake sediments, the release of phosphorus from lake sediments via physical disturbance from benthic fish (rough fish, ex. carp), the release of phosphorus from wind mixing the water column, and the release of phosphorus from decaying curly-leaf pondweeds, may all contribute internal phosphorus loading to the lakes of the BRW. Phosphorus may build up in the bottom waters of the lake and may be resuspended or mixed into the water column when the thermocline decreases and the lake water mixes.

Stormwater runoff from agricultural land use practices: Runoff from agricultural lands may contain significant amounts of nutrients, organic material and organic-rich sediment which may lead to impairments in the BRW. Manure spread onto fields is often a source of phosphorus, and can be exacerbated by tile drainage lines, which channelize the stormwater. Tile lined fields and channelized ditches enable particles to move more efficiently into surface waters. Phosphorus, organic material and organic-rich sediment may be added via surface runoff from upland areas which are being used for Conservation Reserve Program (CRP) lands, grasslands, and agricultural lands used for growing hay or other crops. Stormwater runoff may contribute nutrients and organic-rich sediment to surface waters from livestock manure, fertilizers, vegetation and erodible soils.

Unrestricted livestock access to streams: Livestock with access to stream environments may add nutrients directly to the surface waters or resuspend particles that had settled on the stream bottom. Direct deposition of animal wastes can result in very high localized nutrient concentrations and may contribute to downstream impairments. Smaller animal facilities may add nutrients to surface waters via wastewater from these facilities or stormwater runoff from near-stream pastures.

Stream channelization and stream erosion: Eroding streambanks and channelization efforts may add nutrients, organic material and organic-rich sediment to local surface waters. Nutrients may be added if there is particulate phosphorus bound with eroding soils. Eroding riparian areas may be linked to soil inputs within the water column and potentially to changes in flow patterns. Changes in flow patterns may also encourage down-cutting of the streambed and streambanks. Stream channelization efforts can increase the velocity of flow (via the removal of the sinuosity of a natural channel) and disturb the natural sedimentation processes of the streambed.

Atmospheric deposition: Phosphorus and organic material may be added via particulate deposition. Particles from the atmosphere may fall onto lake surfaces or other surfaces within the BRW. Phosphorus can be bound to these particles which may add to the phosphorus inputs to surface water environments.

Groundwater discharge: Phosphorus can be added to the lake's water column through groundwater discharge. Phosphorus concentrations in groundwater are usually below the water quality standards for phosphorus. In those instances where significant groundwater discharge into lake environments is occurring, phosphorus inputs can impact the phosphorus budgeting of the water body.

Discharges from SSTS or unsewered communities: Failing septic systems are a potential source of nutrients within the BRW. Septic systems generally do not discharge directly into a water body, but effluents from SSTS may leach into groundwater or pond at the surface where they can be washed into surface waters via stormwater runoff events. Age, construction and use of SSTS can vary throughout a watershed and influence the nutrient contribution from these systems.

Urban/residential sources: Nutrients, organic material and organic-rich sediment may be added via runoff from urban/developed areas near the lakes of the BRW. Runoff from urban/developed areas can include phosphorus derived from fertilizers, leaf and grass litter, pet wastes, and other sources of anthropogenic derived nutrients.

Wetland and Forest Sources: Phosphorus, organic material and organic-rich sediment may be added to surface waters by stormwater flows through wetland and forested areas in the BRW. Storm events may mobilize phosphorus through the transport of suspended solids and other organic debris.

Wildlife: Wildlife is a known source of nutrients in water bodies as many animals spend time in or around water bodies. Deer, geese, ducks, raccoons, and other animals all create potential sources of nutrients. Wildlife contributes to the potential impact of contaminated runoff from animal habitats, such as urban park areas, forest, and rural areas.

BRW TSS TMDL:
Stream channelization and streambank erosion: Eroding streambanks and channelization efforts may add sediment to local surface waters. Eroding riparian areas may be linked to soil inputs within the water column and potentially to changes in flow patterns. Changes in flow patterns may also encourage down-cutting of the streambed and streambanks. Stream channelization efforts can increase the velocity of flow (via the removal of the sinuosity of a natural channel) and disturb the natural sedimentation processes of the streambed. Unrestricted livestock access to streams and streambank areas may lead to streambank degradation and sediment additions to stream environments.

Stormwater runoff from agricultural land use practices: Runoff from agricultural lands may contain significant amounts of sediment which may lead to impairments in the BRW. Sediment inputs to surface waters can be exacerbated by tile drainage lines, which channelize the stormwater flows. Tile lined fields and channelized ditches enable particles to move more efficiently into surface waters.

Wetland Sources: Sediment may be added to surface waters by stormwater flows through wetland areas in the BRW. Storm events may mobilize particulates through the transport of suspended solids and other organic debris.

Forest Sources: Sediment may be added to surface waters via runoff from forested areas within the watershed. Runoff from forested areas may include debris from decomposing vegetation and organic soil particles.

Atmospheric deposition: Sediment may be added via particulate deposition. Particles from the atmosphere may fall onto lake surfaces or other surfaces within the BRW.

Future Growth:
MPCA outlined its expectations for potential growth in the BRW in Section 2.4 of the final TMDL document. Significant development is not expected in the BRW, though there is expected to be some expansion of vacation homes in the eastern area of the BRW. The WLA and load allocations for the BRW TMDLs were calculated for all current and future sources. Any expansion of point or nonpoint sources will need to comply with the respective WLA and LA values calculated in the BRW TMDLs.

The EPA finds that the TMDL document submitted by 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 water body, 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 Uses:

Water quality standards (WQS) are the fundamental benchmarks by which the quality of surface waters are measured. Within the State of Minnesota, WQS are developed pursuant to the Minnesota Statutes Chapter 115, Sections 03 and 44. Authority to adopt rules, regulations, and standards as are necessary and feasible to protect the environment and health of the citizens of the State is vested with the MPCA. Through adoption of WQS into Minnesota's administrative rules (principally Chapters 7050 and 7052), MPCA has identified designated uses to be protected in each of its drainage basins and the criteria necessary to protect these uses.

Minnesota Rule Chapter 7050 designates uses for waters of the state. The segments addressed by the BRW TMDLs are designated as Class 2 waters for aquatic recreation use (fishing, swimming, boating, etc.) and aquatic life use. The Class 2 designated use is described in Minnesota Rule 7050.0140 (3):

> *"Aquatic life and recreation includes all waters of the state that support or may support fish, other aquatic life, bathing, boating, or other recreational purposes and for which quality control is or may be necessary to protect aquatic or terrestrial life or their habitats or the public health, safety, or welfare."*

Standards:

Narrative Criteria: Minnesota Rule 7050.0150 (3) set forth narrative criteria for Class 2 waters of the State:

> *"For all Class 2 waters, 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."

Numeric criteria:

Bacteria TMDLs: The bacteria water quality standards which apply to BRW TMDLs are:

Table 6: Bacteria Water Quality Standards Applicable to the BRW TMDLs

Parameter	Units	Water Quality Standard
E. coli [1]	# of organisms / 100 mL	The geometric mean of a minimum of 5 samples taken within any calendar month may not exceed 126 organisms
		No more than 10% of all samples collected during any calendar month may individually exceed 1,260 organisms

[1] = Standards apply only between April 1 and October 31

Bacteria TMDL Targets: The bacteria TMDL targets employed for the MRWW bacteria TMDLs are the *E. coli* standards as stated in Table 6 of this Decision Document. The focus of bacteria TMDLs is on the 126 organisms (orgs) per 100 mL (126 orgs/100 mL) portion of the standard (Table 6 of this Decision Document). MPCA believes that using the 126 orgs/100 mL portion of the standard for TMDL calculations will result in the greatest bacteria reductions within the BRW and will result in the attainment of the 1,260 orgs/100 mL portion of the standard. While the bacteria TMDLs will focus on the geometric mean portion of the water quality standard, attainment of both parts of the water quality standard is required.

Phosphorus TMDLs: Numeric criteria for TP, chlorophyll-*a*, and Secchi Disk depth are set forth in Minnesota Rules 7050.0222. These three parameters form the MPCA eutrophication standard that must be achieved to attain the aquatic recreation designated use. The numeric eutrophication standards which are applicable to the BRW lake TMDLs are found in Table 7 of this Decision Document.

Table 7: Minnesota Eutrophication Standards, NCHF and NGP ecoregions

Parameter	NCHF Eutrophication Standard, Deep Lakes	NCHF Eutrophication Standard, Shallow Lakes	NGP Eutrophication Standard, Shallow Lakes
TP (µg/L)	TP < 40	TP < 60	TP < 90
Chlorophyll-a (µg/L)	chl-*a* < 14	chl-*a* < 20	chl-*a* < 30
Secchi depth (m)	SD > 1.4	SD > 1.0	SD > 0.7
Lakes	See Table 2 of this Decision Document		

In developing the lake nutrient standards for Minnesota lakes, MPCA evaluated data from a large cross-section of lakes within each of the State's ecoregions. Clear relationships were established between the causal factor, TP, and the response variables, chl-*a* and SD depth. MPCA anticipates that by meeting the TP concentrations of 40 µg/L, 60 µg/L and 90 µg/L the response variables chl-*a* and SD will be attained and the lakes addressed by the BRW lake TMDLs will achieve their designated beneficial uses. For lakes to achieve their designated beneficial use, the lake must not exhibit signs of eutrophication and must allow water-related recreation, fishing and aesthetic enjoyment. MPCA views the control of eutrophication as the lake enduring minimal nuisance algal blooms and exhibiting desirable water clarity.

Phosphorus TMDL criteria: MPCA employed TP criteria of 40 μg/L, 60 μg/L and 90 μg/L (Table 2 of this Decision Document outlines which targets apply to individual lakes in the BRW) to address eutrophication problems because of the interrelationships between TP and chl-*a*, and TP and SD depth. Algal abundance is measured by chl-*a*, which is a pigment found in algal cells. As more phosphorus becomes available, algae growth can increase. Increased algae in the water column will decrease water clarity that is measured by SD depth. EPA finds the nutrient targets employed in the BRW lake TMDLs to be reasonable.

TSS TMDLs: On January 23, 2015, EPA approved MPCA's regionally-based TSS criteria for rivers and streams. The TSS criteria replaced Minnesota's statewide turbidity criterion (measured in Nephelometric Turbidity Units (NTU)). The TSS criteria provide water clarity targets for measuring suspended particles in rivers and streams.

TSS TMDL Targets: MPCA employed the regional TSS criterion for the South River Nutrient Region (SRNR) of **65 mg/L**.

The EPA finds that the TMDL document submitted by 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 water body for the applicable pollutant. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).

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

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

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

<u>Comment:</u>
<u>BRW bacteria TMDLs:</u>
MPCA used the geometric mean portion (**126 orgs/100 mL**) of the *E. coli* water quality standard to calculate loading capacity values for the bacteria TMDLs. MPCA believes the geometric mean portion of the WQS provides the best overall characterization of the status of the watershed. EPA agrees with this assertion, as stated in the preamble of, *"The Water Quality Standards for Coastal and Great Lakes Recreation Waters Final Rule"* (69 FR 67218-67243, November 16, 2004) on page 67224, "…the geometric mean is the more relevant value for ensuring that appropriate actions are taken to protect and improve water quality because it is a more reliable measure, being less subject to random variation, and more directly linked to the underlying studies on which the 1986 bacteria criteria were based." MPCA stated that the bacteria TMDLs will focus on the geometric mean portion of the water quality standard (126 orgs/100 mL) and that it expects that by attaining the 126 orgs/100 mL portion of the *E. coli* WQS the 1,260 orgs/100 mL portion of the *E. coli* WQS will also be attained. EPA finds these assumption to be reasonable.

Typically loading capacities are expressed as a mass per time (e.g. pounds per day). However, for *E. coli* loading capacity calculations, mass is not always an appropriate measure because *E. coli* is expressed in terms of organism counts. This approach is consistent with the EPA's regulations which define "load" as "an amount of matter that is introduced into a receiving water" (40 CFR §130.2). To establish the loading capacities for the BRW bacteria TMDLs, MPCA used Minnesota's WQS for *E. coli* (126 orgs/100 mL). A loading capacity is, "the greatest amount of loading that a water can receive without violating water quality standards." (40 CFR §130.2). Therefore, a loading capacity set at the WQS will assure that the water does not violate WQS. MPCA's *E. coli* TMDL approach is based upon the premise that all discharges (point and nonpoint) must meet the WQS when entering the water body. If all sources meet the WQS at discharge, then the water body should meet the WQS and the designated use.

Separate flow duration curves (FDCs) were created for the each of the bacteria TMDLs in the BRW. The BRW FDCs were developed using daily simulated flows generated from Soil and Water Assessment Tool (SWAT) hydrologic model runs. SWAT hydrologic models were developed to simulate daily flow characteristics within the BRW from 1995-2009. SWAT modeling was validated and calibrated using data from USGS stations in Hawley, MN (USGS #0506100), Sabin, MN (USGS #05061500) and Dilworth, MN (USGS #05062000). Flow data focused on dates within the recreation season (April 1 to October 31). Daily stream flows were necessary to implement the load duration curve approach.

FDCs graphs have flow duration interval (percentage of time flow exceeded) on the X-axis and discharge (flow per unit time) on the Y-axis. The FDC were transformed into LDC by multiplying individual flow values by the WQS (126 orgs/100 mL) and then multiplying that value by a conversion factor. The resulting points are plotted onto a load duration curve graph. LDC graphs, for the BRW bacteria TMDLs, have flow duration interval (percentage of time flow exceeded) on the X-axis and *E. coli* concentrations (number of bacteria per unit time) on the Y-axis. The BRW LDC used *E. coli* measurements in billions of bacteria per day. The curved line on a LDC graph represents the TMDL of the respective flow conditions observed at that location.

Water quality monitoring was completed within the BRW between 2006 and 2010. Water quality monitoring station information and bacteria data summaries were presented Tables 3-1 and 4-3 of the final TMDL document. Measured *E. coli* concentrations were converted to individual sampling loads by multiplying the sample concentration by the instantaneous flow measurement observed/estimated at the time of sample collection and then by a conversion factor which allows the individual samples to be plotted on the same figure as the LDCs (e.g., Figure 2 of Appendix C of the final TMDL document). Individual LDCs are found in Appendix C of the final TMDL document.

The LDC plots were subdivided into five flow regimes; high flow conditions (exceeded 0–10% of the time), moist flow conditions (exceeded 10–40% of the time), mid-range flow conditions (exceeded 40–60% of the time), dry flow conditions (exceeded 60–90% of the time), and low flow conditions (exceeded 90–100% of the time). LDC plots can be organized to display individual sampling loads with the calculated LDC. Watershed managers can interpret LDC graphs with individual sampling points plotted alongside the LDC to understand the relationship between flow conditions and water quality exceedances within the watershed. Individual sampling loads which plot above the LDC represent violations of the WQS and the allowable load under those flow conditions at those locations. The difference between individual sampling loads plotting above the LDC and the LDC, measured at the same flow, is the amount of reduction necessary to meet WQS.

The strengths of using the LDC method are that critical conditions and seasonal variation are considered in the creation of the FDC by plotting hydrologic conditions over the flows measured during the recreation season. Additionally, the LDC methodology is relatively easy to use and cost-effective. The weaknesses of the LDC method are that nonpoint source allocations cannot be assigned to specific sources, and specific source reductions are not quantified. Overall, MPCA believes and EPA concurs that the strengths outweigh the weaknesses for the LDC method.

Implementing the results shown by the LDC requires watershed managers to understand the sources contributing to the water quality impairment and which Best Management Practices (BMPs) may be the most effective for reducing bacteria loads based on flow magnitudes. Different sources will contribute bacteria loads under varying flow conditions. For example, if exceedances are significant during high flow events this would suggest storm events are the cause and implementation efforts can target BMPs that will reduce stormwater runoff and consequently bacteria loading into surface waters. This allows for a more efficient implementation effort.

Bacteria TMDLs for the BRW were calculated and those results are found in Table 8 (Attached) of this Decision Document. The load allocations were calculated after the determination of the WLA, and the Margin of Safety (MOS) (10% of the loading capacity). Load allocations (ex. stormwater runoff from agricultural land use practices and feedlots, SSTS, wildlife inputs etc.) were not split among individual nonpoint contributors. Instead, load allocations were combined together into a categorical LA value to cover all nonpoint source contributions.

Table 8 (Attached) of this Decision Document reports five points (the midpoints of the designated flow regime) on the loading capacity curve. However, it should be understood that the components of the TMDL equation could be illustrated for any point on the entire loading capacity curve. The LDC method can be used to display collected bacteria monitoring data and allows for the estimation of load reductions necessary for attainment of the bacteria water quality standard. Using this method, daily loads were developed based upon the flow in the water body. Loading capacities were determined for the segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Table 8 (Attached) of this Decision Document identifies the loading capacity for the water body at each flow regime. Although there are numeric loads for each flow regime, the LDC is what is being approved for this TMDL.

Table 8: Bacteria (*E. coli*) TMDLs for the Buffalo River Watershed is attached

Table 9 of the Decision Document presents MPCA's loading reduction estimates for each of the bacteria TMDLs in the BRW. These loading reductions were calculated from field sampling data collected in the BRW. MPCA explained that its load reduction estimates are likely more conservative since they are based on a limited water quality data set.

Table 9: Reductions for bacterial TMDLs in the Buffalo River Watershed

AUID	Bacteria TMDL
	Maximum Percent Reduction to meet WQS (%)
09020106-501	55%
09020106-502	69%
09020106-503	57%
09020106-504	47%
09020106-505	64%
09020106-507	77%
09020106-508	61%
09020106-509	62%
09020106-511	75%
09020106-515	71%
09020106-519	94%
09020106-520	93%
09020106-521	83%
09020106-523	90%
09020106-531	90%
09020106-534	79%
09020106-556	67%
09020106-559	72%
09020106-562	64%
09020106-593	88%
09020106-594	62%
09020106-595	57%

EPA concurs with the data analysis and LDC approach utilized by MPCA in its calculation of loading capacities, wasteload allocations, load allocations and the margin of safety for the BRW bacteria TMDLs. The methods used for determining the TMDL are consistent with U.S. EPA technical memos.[1]

BRW phosphorus TMDLs: MPCA used the U.S. Army Corps of Engineers (USACE) BATHTUB/CNET (CNET) spreadsheet model to calculate the loading capacities for each of the nutrient

[1] U.S. Environmental Protection Agency. August 2007. *An Approach for Using Load Duration Curves in the Development of TMDLs*. Office of Water. EPA-841-B-07-006. Washington, D.C.

impaired lakes in Table 1 of this Decision Document. CNET is a modified, spreadsheet version of the BATHTUB model. The CNET model was utilized to link observed phosphorus water quality conditions and estimated phosphorus loads to in-lake water quality estimates. MPCA has previously employed CNET successfully in other lake TMDLs in Minnesota.

CNET employs a Monte Carlo approach, resulting in stochastic simulations. The Monte Carlo approach allowed selected modeling inputs to vary, based upon known or assumed statistical distributions, and result in distributions of in-lake eutrophication conditions based on the distributions of the input parameters. The stochastic modeling approach reflects the variability in model parameters inherent in natural systems (e.g., climate) and allows for a more realistic prediction of long-term water quality condition. The lake models were used to estimate the TP load reductions necessary to meet current water quality lake eutrophication standards in each lake.

CNET requires lake morphometric characteristics (mean depth, surface area) drainage area, climate/hydrologic information (precipitation, evaporation, runoff, and atmospheric deposition), and nutrient (TP) loadings (surface runoff loads, tributary loads, and any point sources). Lake surface area, lake average depth, total drainage area for each lake and other morphometric characteristics were the primary data sources for CNET. Annual precipitation depths, evaporation depths, surface runoff flows and loadings, and tributary flows and loadings were extracted from the BRW SWAT models for subwatersheds containing the drainage basins of the lakes in the BRW. The data extracted was for the period 1996-2009. The depths, flows, and loadings were extracts in unit form (i.e. inches per year, cubic meters per hectare per year, kilograms per hectare per year). Total flows and loads were calculated by taking the drainage areas times the unit flows and loads.

The CNET lakes models were calibrated to the average TP, chl-*a*, and Secchi disk depths of ambient water quality data from 2002 to 2011. The loading capacity of each lake was determined via CNET and then allocated to the WLA, LA, and MOS. The loading capacity is the maximum phosphorus load which each of these water bodies can receive over an annual period and still meet the deep and shallow lake nutrient WQS (Table 7 of this Decision Document). Loading capacities on the annual scale (lbs/year) were calculated to meet the WQS during the growing season (June 1 through September 30). The time period of June to September was chosen by MPCA as the growing season because it corresponds to the eutrophication criteria, contains the months that the general public typically uses the BRW lakes for aquatic recreation, and is the time of the year when water quality is likely to be impaired by excessive nutrient loading. Loading capacities were divided by 365 to calculate the daily loading capacities.

MPCA subdivided the loading capacity among the WLA, LA, and MOS components of the TMDL These calculations were based on the critical condition, the summer growing season, which is typically when the water quality in each lake is typically degraded and phosphorus loading inputs are the greatest. TMDL allocations assigned during the summer growing season will protect the BRW lakes during the worst water quality conditions of the year. MPCA assumed that the loading capacities established by the TMDL will be protective of water quality during the remainder of the calendar year (October through May).

Table 10 of this Decision Document is attached

Table 11: Reductions for TP Lake TMDLs in the Buffalo River Watershed

AUID	Phosphorus TMDL
	Maximum Percent Reduction to meet WQS (%)
Boyer Lake (03-0579-00)	40%
Forget-Me-Not Lake (03-0624-00)	42%
Gottenberg Lake (03-0528-00)	15%
Gourd Lake (03-0635-00)	68%
Jacobs Lake (56-1039-00)	78%
Lime Lake (03-0646-00)	80%
Lake Maria (14-0099-00)	72%
Marshall Lake (03-0526-00)	0%
Sand (Stump) Lake (03-0659-00)	93%
Sorenson Lake (03-0625-00)	73%
Stakke Lake (03-0631-00)	3%
Stinking Lake (03-0647-00)	84%
Talac (Lee) Lake (03-0619-00)	52%
West LaBelle Lake (03-0645-00)	45%

Table 11 of this Decision Document communicates MPCA's estimates of the reductions required for lakes in the BRW to meet their water quality targets. These loading reductions (i.e., the percentage column) were estimated from existing and TMDL load calculations. MPCA expects that these reductions will result in the attainment of the water quality targets and the lake water quality will return to a level where the designated uses are no longer considered impaired.

EPA supports the data analysis and modeling approach utilized by MPCA in its calculation of wasteload allocations, load allocations and the margin of safety for the BRW phosphorus TMDLs. Additionally, EPA concurs with the loading capacities calculated by the MPCA in these phosphorus TMDLs. EPA finds MPCA's approach for calculating the loading capacity to be reasonable and consistent with EPA guidance.

BRW TSS TMDLs: MPCA developed LDCs to calculate sediment TMDLs for the thirteen impaired segments of the BRW. The same LDC development strategies were employed for the sediment and bacteria TMDLs (ex. the incorporation of SWAT model simulated flows to develop FDCs, water quality monitoring information collected within the BRW informing the LDC, etc.). The FDC were transformed into LDC by multiplying individual flow values by the SRNR TSS WQS (65 mg/L) and then multiplying that value by a conversion factor.

TSS TMDLs were calculated (Table 12 of this Decision Document). The load allocation was calculated after the determination of the WLA, and the MOS. Load allocations (ex. stormwater runoff from agricultural land use practices) was not split among individual nonpoint contributors. Instead, load allocations were combined together into one value to cover all nonpoint source contributions. Table 12 of this Decision Document reports five points (the midpoints of the designated flow regime) on the loading capacity curve. However, it should be understood that the components of the TMDL equation could be illustrated for any point on the entire loading capacity curve.

The LDC method can be used to display collected sediment monitoring data and allows for the estimation of load reductions necessary for attainment of the SRNR TSS water quality standard. Using this method, daily loads were developed based upon the flow in the water body. Loading capacities were determined for each segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Table 12 of this Decision Document identifies the loading capacity for each segment at each flow regime. Although there are numeric loads for each flow regime, the LDC is what is being approved for this TMDL.

Table 12 of this Decision Document is attached

Table 13 of the Decision Document presents MPCA's loading reduction estimates for each of the TSS TMDLs in the BRW. These loading reductions were calculated from field sampling data collected in the BRW. MPCA explained that its load reduction estimates are likely more conservative since they are based on a limited water quality data set.

Table 13: Reductions for TSS TMDLs in the Buffalo River Watershed

AUID	TSS TMDL
	Maximum Percent Reduction to meet WQS (%)
09020106-501	94%
09020106-502	71%
09020106-503	65%
09020106-504	44%
09020106-505	84%
09020106-507	66%
09020106-508	46%
09020106-509	59%
09020106-521	69%
09020106-523	71%
09020106-594	91%
09020106-595	93%

EPA supports the data analysis and modeling approach utilized by MPCA in its calculation of wasteload allocations, load allocations and the margin of safety for the TSS TMDLs. Additionally, EPA concurs with the loading capacities calculated by the MPCA in the TSS TMDLs. EPA finds MPCA's approach for calculating the loading capacity for the TSS TMDLs to be reasonable and consistent with EPA guidance.

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

4. Load Allocations (LA)

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:
MPCA determined the LA calculations for each of the TMDLs based on the applicable WQS. MPCA recognized that LAs for each of the individual TMDLs addressed by the BRW TMDLs can be attributed to different nonpoint sources.

BRW bacteria TMDLs: The calculated LA values for the bacteria TMDLs are applicable across all flow conditions in the BRW (Table 8 of this Decision Document). MPCA identified several nonpoint sources which contribute bacteria loads to the surface waters of the BRW, including; non-regulated urban stormwater runoff, stormwater from agricultural and feedlot areas, failing septic systems, and wildlife (deer, geese, ducks, raccoons, turkeys and other animals). MPCA did not determine individual load allocation values for each of these potential nonpoint source considerations, but aggregated the nonpoint sources into a categorical LA value.

BRW phosphorus TMDLs: MPCA identified several nonpoint sources which contribute nutrient loading to the lakes of the BRW (Table 10 of this Decision Document). These nonpoint sources included: watershed contributions from each lake's direct watershed, watershed contributions from upstream watersheds, internal loading, atmospheric deposition, and groundwater contributions. MPCA did not determine individual load allocation values for each of these potential nonpoint source considerations, but aggregated the nonpoint sources into a categorical LA value.

BRW TSS TMDLs: The calculated LA values for the TSS TMDL are applicable across all flow conditions (Table 12 of this Decision Document). MPCA identified several nonpoint sources which contribute sediment loads to the surface waters in the BRW. Load allocations were recognized as originating from many diverse nonpoint sources including; stormwater contributions from agricultural lands, stream channelization and streambank erosion, wetland and forest sources, and atmospheric deposition. MPCA did not determine individual load allocation values for each of these potential nonpoint source considerations, but aggregated the nonpoint sources into one LA value.

EPA finds MPCA's approach for calculating the LA to be reasonable.

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

5. Wasteload Allocations (WLAs)

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

The individual WLAs may take the form of uniform percentage reductions or individual mass based limitations for dischargers where it can be shown that this solution meets WQSs and does not result in localized impairments. These individual WLAs may be adjusted during the NPDES permitting process. If the WLAs are adjusted, the individual effluent limits for each permit issued to a discharger on the impaired water must be consistent with the assumptions and requirements of the adjusted WLAs in the TMDL. If the WLAs are not adjusted, effluent limits contained in the permit must be consistent with the individual WLAs specified in the TMDL. If a draft permit provides for a higher load for a discharger than the corresponding individual WLA in the TMDL, the State/Tribe must demonstrate that the total WLA in the TMDL will be achieved through reductions in the remaining individual WLAs and that localized impairments will not result. All permittees should be notified of any deviations from the initial individual WLAs contained in the TMDL. EPA does not require the establishment of a new TMDL to reflect these revised allocations as long as the total WLA, as expressed in the TMDL, remains the same or decreases, and there is no reallocation between the total WLA and the total LA.

Comment:

BRW bacteria TMDLs: MPCA identified NPDES permitted facilities within the BRW and assigned those facilities a portion of the WLA (Table 8 of this Decision Document). The WLAs for each of these individual facilities were calculated based on the facility's wet weather design flow and the *E. coli* WQS (126 orgs /100 mL). MPCA explained that the WLA for each individual WWTP was calculated based on the *E. coli* WQS but WWTF permits are regulated for the fecal coliform WQS (200 orgs /100 mL) and that if a facility is meeting its fecal coliform limits, which are set in the facility's discharge permit, MPCA assumes the facility is also meeting the calculated *E. coli* WLA from the BRW TMDLs. The WLA was therefore calculated using the assumption that the *E. coli* standard of 126 orgs/100 mL provides equivalent protection from illness due to primary contact recreation as the fecal coliform WQS of 200 orgs/100 mL.

Table 14: NPDES permitted facilities receiving a bacteria WLA

Facility	Permit Number	WLA (billions of bacteria/day)
Audubon WWTF	MNG580148	6.80
Barnesville WWTF	MN0022501	18.70
Callaway WWTF	MNT022985	2.70
Glyndon WWTF	MN0020630	7.90
Hawley WWTF	MN0020338	10.30
Hitterdahl WWTF	MNG580178	2.30
Lake Park WWTF	MNG580157	6.30
Spring Prairie Hutterite Colony WWTF	MN0070467	1.00

MPCA acknowledged the presence of CAFOs in the BRW in Section 2.3 of the final TMDL document. CAFOs and other feedlots are generally not allowed to discharge to waters of the State (Minnesota Rule 7020.2003). CAFOs were assigned a WLA of zero (WLA = 0) for the BRW bacteria TMDLs.

BRW phosphorus TMDLs: MPCA identified one NPDES permit holder which contributed nutrient loads to an impaired water within the BRW. The Lake Park WWTF (MNG580157) contributes nutrient loads to Stinking Lake (03-0647-00) and was assigned a nutrient WLA of 1.27 lbs. of TP per day (derived from a 365-day discharge) and 462.40 lbs. of TP per year (Table 10 of this Decision Document). The TP WLA was calculated based on the facility average wet weather design flow and the permitted TP concentration of 1 mg/L (Section 3.3.1.1 of the final TMDL document).

MPCA calculated a portion of the WLA and assigned it to construction and industrial stormwater. MPCA's calculation for the construction stormwater WLA was based on an MPCA estimation of 0.1% of the total area of the BRW being covered under a construction or industrial stormwater permit. MPCA explained that its review of historical land use information in the BRW support the 0.1% estimation. MPCA explained that BMPs and other stormwater control measures should be implemented at active construction sites to limit the discharge of pollutants of concern. BMPs and other stormwater control measures which should be implemented at construction sites are defined in the State's NPDES/SDS General Stormwater Permit for Construction Activity (MNR100001). In the final TMDL document MPCA explained that if a construction site owner/operator obtains coverage under the NPDES/SDS General Stormwater Permit (MNR100001) and properly selects, installs and maintains all BMPs required under MNR1000001 and applicable local construction stormwater ordinances, including those related to impaired waters discharges and any applicable additional requirements found in Appendix A of the Construction General Permit, the stormwater discharges would be expected to be consistent with the WLA in this TMDL.

The NPDES program requires construction sites to create SWPPPs which summarize how stormwater pollutant discharges will be minimized from construction and industrial sites. Under the MPCA's Stormwater General Permit (MNR100001) and applicable local construction stormwater ordinances, managers of sites under construction or industrial stormwater permits must review the adequacy of local SWPPPs to ensure that each plan complies with the applicable requirements in the State permits and local ordinances. As noted above, MPCA has explained that meeting the terms of the applicable permits will be consistent with the WLAs set in the BRW TMDLs. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified.

MPCA determined that there were CAFO facilities in the BRW. CAFOs and other feedlots are generally not allowed to discharge to waters of the State (Minnesota Rule 7020.2003). CAFOs were assigned a WLA of zero (WLA = 0) for the BRW phosphorus TMDLs.

EPA finds the MPCA's approach for calculating the WLA for the BRW phosphorus TMDLs to be reasonable and consistent with EPA guidance.

BRW TSS TMDLs: MPCA identified NPDES permitted facilities within the BRW and assigned those facilities a portion of the WLA (Table 12 of this Decision Document). The WLAs for each of these individual facilities were calculated based on the maximum daily discharge and a TSS permitted concentration (see Table 3-6 of the final TMDL document for individual facility permitted TSS concentrations). There is one industrial discharger permitted for TSS in the BRW, Aggregate Industries – Pit 21 (MN0069515). This facility is permitted to discharge a maximum flow of 1.7 mgd and has a maximum monthly average TSS concentration of 30 mg/L. For the purposes of computing a WLA for this facility, it was assumed by MPCA that the maximum daily value equates to the maximum monthly average. The annual loading was computed assuming that the facility discharges 365 days per year (Table 3-9 of the final TMDL document).

Table 15: NPDES permitted facilities receiving a TSS WLA

Facility	Permit Number	WLA (tons / day)
Audubon WWTF	MNG580148	0.27
Barnesville WWTF	MN0022501	0.73
Callaway WWTF	MNT022985	0.11
Glyndon WWTF	MN0020630	0.31
Hawley WWTF	MN0020338	0.40
Hitterdahl WWTF	MNG580178	0.09
Lake Park WWTF	MNG580157	0.25
Spring Prairie Hutterite Colony WWTF	MN0070467	0.04
Aggregate Industries – Pit 21	MN0069515	0.21

MPCA calculated a portion of the WLA and assigned it to construction and industrial stormwater. MPCA's calculation for the construction stormwater WLA was based on an MPCA estimation of 0.1% of the total area of the BRW being covered under a construction or industrial stormwater permit. MPCA explained that its review of historical land use information in the BRW support the 0.1% estimation. MPCA explained that BMPs and other stormwater control measures should be implemented at active construction sites to limit the discharge of pollutants of concern. BMPs and other stormwater control measures which should be implemented at construction sites are defined in the State's NPDES/SDS General Stormwater Permit for Construction Activity (MNR100001). In the final TMDL document MPCA explained that if a construction site owner/operator obtains coverage under the NPDES/SDS General Stormwater Permit (MNR100001) and properly selects, installs and maintains all BMPs required under MNR1000001 and applicable local construction stormwater ordinances, including those related to impaired waters discharges and any applicable additional requirements found in Appendix A of the Construction General Permit, the stormwater discharges would be expected to be consistent with the WLA in this TMDL.

The NPDES program requires construction sites to create SWPPPs which summarize how stormwater pollutant discharges will be minimized from construction and industrial sites. Under the MPCA's Stormwater General Permit (MNR100001) and applicable local construction stormwater ordinances, managers of sites under construction or industrial stormwater permits must review the adequacy of local SWPPPs to ensure that each plan complies with the applicable requirements in the State permits and local ordinances. As noted above, MPCA has explained that meeting the terms of the applicable permits will be consistent with the WLAs set in the BRW TMDLs. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified.

EPA finds the MPCA's approach for calculating the WLA for the BRW TSS TMDLs to be reasonable and consistent with EPA guidance.

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

6. Margin of Safety (MOS)

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

Comment:
The final TMDL submittal outlines the determination of the Margin of Safety for the bacteria and TSS TMDLs and the phosphorus TMDLs. The bacteria and TSS TMDLs employed an explicit MOS set at 10% of the loading capacity. The phosphorus TMDLs employed an explicit MOS set at 5% of the loading capacity.

BRW bacteria and TSS TMDLs: The bacteria and TSS TMDLs incorporated a 10% explicit MOS applied to the total loading capacity calculation for each flow regime of the LDC. Ten percent of the total loading capacity was reserved for MOS with the remaining load allocated to point and nonpoint sources (Tables 8 and 12 of this Decision Document). MPCA explained that the explicit MOS was set at 10% due to the following factors discovered during the development of the BRW bacteria and TSS TMDLs:

- Environmental variability in pollutant loading;
- Variability in water quality data (i.e., collected water quality monitoring data, field sampling error, etc.); and
- Calibration and validation processes of LDC modeling efforts, uncertainty in modeling outputs, and conservative assumptions made during the modeling efforts.

Challenges associated with quantifying *E. coli* loads include the dynamics and complexity of bacteria in stream environments. Factors such as die-off and re-growth contribute to general uncertainty that makes quantifying stormwater bacteria loads particularly difficult. The MOS for the BRW bacteria TMDLs also incorporated certain conservative assumptions in the calculation of the TMDLs. No rate of decay, or die-off rate of pathogen species, was used in the TMDL calculations or in the creation of load duration curves for *E. coli*. Bacteria have a limited capability of surviving outside their hosts, and normally a rate of decay would be incorporated. MPCA determined that it was more conservative to use the WQS (126 orgs/100 mL) and not to apply a rate of decay, which could result in a discharge limit greater than the WQS.

As stated in *EPA's Protocol for Developing Pathogen TMDLs* (EPA 841-R-00-002), many different factors affect the survival of pathogens, including the physical condition of the water. These factors include, but are not limited to sunlight, temperature, salinity, and nutrient deficiencies. These factors vary depending on the environmental condition/circumstances of the water, and therefore it would be difficult to assert that the rate of decay caused by any given combination of these environmental variables was sufficient to meet the WQS of 126 orgs/100 mL. Thus, it is more conservative to apply the State's WQS as the bacteria target value, because this standard must be met at all times under all environmental conditions.

BRW phosphorus TMDLs: The phosphorus TMDLs employed an explicit MOS set at 5% of the loading capacity. The explicit MOS was applied by reserving 5% of the total loading capacity, and then allocating the remaining loads to point and nonpoint sources (Table 10 of this Decision Document). MPCA explained that the explicit MOS was set at 5% due to the following factors discovered during the development of the BRW phosphorus TMDLs:

- Environmental variability in pollutant loading;
- Variability in water quality data (i.e., collected water quality monitoring data);
- The agreement between water quality models' predicted and observed values;
- Conservative assumptions made during the modeling efforts; and
- MPCA's confidence in the CNET model's performance during the development of phosphorus TMDLs.

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

7. Seasonal Variation

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

Comment:

BRW bacteria TMDLs: Bacterial loads vary by season, typically reaching higher numbers in the dry summer months when low flows and bacterial growth rates contribute to their abundance, and reaching relatively lower values in colder months when bacterial growth rates attenuate and loading events, driven by stormwater runoff events aren't as frequent. Bacterial WQS need to be met between April 1st to October 31st, regardless of the flow condition. The development of the LDCs utilized simulated SWAT flows which were validated and calibrated with USGS flow gage data. Modeled flow measurements represented a variety of flow conditions from the recreation season. LDCs developed from these modeled flow conditions represented a range of flow conditions within the BRW and thereby accounted for seasonal variability over the recreation season.

Critical conditions for *E. coli* loading occur in the dry summer months. This is typically when stream flows are lowest, and bacterial growth rates can be high. By meeting the water quality targets during the summer months, it can reasonably be assumed that the loading capacity values will be protective of water quality during the remainder of the calendar year (November through March).

BRW phosphorus TMDLs: Seasonal variation was considered for the BRW phosphorus TMDLs as described in Section 5.3 of the final TMDL document. The nutrient targets employed in the BRW phosphorus TMDLs were based on the average nutrient values collected during the growing season (June 1 to September 30). The water quality targets were designed to meet the NCHF and NGP eutrophication WQS during the period of the year where the frequency and severity of algal growth is the greatest.

The Minnesota eutrophication standards state that total phosphorus WQS are defined as the mean concentration of phosphorus values measured during the growing season. In the BRW phosphorus TMDL efforts, the LA and WLA estimates were calculated from modeling efforts which incorporated mean growing season total phosphorus values. Nutrient loading capacities were set in the TMDL development process to meet the WQS during the most critical period. The mid-late summer time period is typically when eutrophication standards are exceeded and water quality within the BRW is deficient. By calibrating the modeling efforts to protect these water bodies during the worst water quality conditions of the year, it is assumed that the loading capacities established by the TMDLs will be protective of water quality during the remainder of the calendar year (October through May).

BRW TSS TMDLs: The TSS WQS applies from April to September which is also the time period when high concentrations of sediment are expected in the surface waters of the BRW. Sediment loading to surface waters in the BRW varies depending on surface water flow, land cover and climate/season. Typically, in the BRW, sediment is being moved from terrestrial source locations into surface waters during or shortly after wet weather events. Spring is typically associated with large flows from snowmelt, the summer is associated with the growing season as well as periodic storm events and receding streamflows, and the fall brings increasing precipitation and rapidly changing agricultural landscapes.

Critical conditions that impact loading, or the rate that sediment is delivered to the water body, were identified as those periods where large precipitation events coincide with periods of minimal vegetative cover on fields. Large precipitation events and minimally covered land surfaces can lead to large runoff volumes, especially to those areas which drain agricultural fields. The conditions generally occur in the spring and early summer seasons.

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

8. Reasonable Assurance

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.

Comment:

The BRW bacteria, phosphorus, and TSS TMDLs provide reasonable assurance that actions identified in the implementation section of the final TMDL (i.e., Section 8.0 of the final TMDL document), will be applied to attain the loading capacities and allocations calculated for the impaired reaches within the BRW. The recommendations made by MPCA will be successful at improving water quality if the appropriate local groups work to implement these recommendations. Those mitigation suggestions, which fall outside of regulatory authority, will require commitment from state agencies and local stakeholders to carry out the suggested actions.

MPCA has identified several local partners which have expressed interest in working to improve water quality within the BRW. Implementation practices will be implemented over the next several years. The following groups are expected to work closely with one another to ensure that pollutant reduction efforts via BMPs are being implemented within the BRW: the Buffalo-Red River Watershed District (BRRWD), Soil and Water Conservation Districts (SWCDs) in Becker, Clay, Otter Tail and Wilkin Counties, and the Minnesota Department of Natural Resources (DNR).

The BRRWD is a stakeholder group which is actively engaged in water quality improvement activities in the BRW (http://www.brrwd.org). The BRRWD has engaged with local farmers to identify appropriate BMPs with aims of maximizing water quality gains in the BRW. This effort is in concert with local Board of Water and Soil Resources (BWSR) and SWCD initiatives to improve BMPs and overall agricultural drainage to reduce flooding and sediment contributions in the BRW. BRRWD along with the Wilkin County SWCD (http://www.co.wilkin.mn.us/) and the Clay County SWCD (http://claycountymn.gov/272/Soil-Water-Conservation-District) has developed strategies to improve water quality, reduce sediment load and mitigate flood potential in western Minnesota. These strategies focused on installing sediment BMP controls, expanding riparian buffers and improving channel stability.

The Clay County SWCD has various ongoing programs which target erosion control and water management programs. The Clay County SWCD efforts focus on alleviating water quality challenges due to altered hydrology, controlling gully, rill and sheet erosion, controlling nutrient and sediment runoff during storm events, diversion of agricultural runoff during storm events to protect water quality, and reduction of wind erosion. The SWCD works with local farmers to identify appropriate state cost-sharing programs for BMP installation and upkeep. The Clay County SWCD also has water resource programming which focus on protecting local wetland resources and adhering to goals of Minnesota's Wetlands Conservation Act (WCA).

The ongoing efforts of the BRWWD and local SWCDs in western Minnesota, demonstrate the commitment of stakeholders to improving water quality and reducing pollutant load to surface waters in the BRW and other adjacent watersheds of western Minnesota. While measureable progress may be slow to develop, actions from these groups and other stakeholders in the BRW should ultimately result in improvements to water quality for all of the pollutants addressed in the BRW TMDLs.

MPCA has authored a Buffalo River WRAPS document (finalized August 2016) which provides information on the development of scientifically-supported restoration and protection strategies for implementation planning and action. MPCA sees the WRAPS document as a starting point for which MPCA and local partners can develop tools that will help local governments, land owners, and special interest groups determine (1) the best strategies for making improvements and protecting resources that are already in good condition, and (2) focus those strategies in the best places to do work.[2]

Continued water quality monitoring within the basin is supported by MPCA. Additional water quality monitoring results could provide insight into the success or failure of BMP systems designed to reduce *E. coli*, nutrient and TSS loading into the surface waters of the watershed. Local watershed managers would be able to reflect on the progress of the various pollutant removal strategies and would have the opportunity to change course if observed progress is unsatisfactory.

The MPCA regulates the collection, transportation, storage, processing and disposal of animal manure and other livestock operation wastes at State registered animal feeding operation (AFO) facilities. The MPCA Feedlot Program implements rules governing these activities, and provides assistance to counties and the livestock industry. The feedlot rules apply to most aspects of livestock waste management including the location, design, construction, operation and management of feedlots and manure handling facilities.

Reasonable assurance that the WLA set forth will be implemented is provided by regulatory actions. According to 40 CFR 122.44(d)(1)(vii)(B), NPDES permit effluent limits must be consistent with assumptions and requirements of all WLAs in an approved TMDL. MPCA's stormwater program and the NPDES permit program are the implementing programs for ensuring WLA are consistent with the TMDL. The NPDES program requires construction and industrial sites to create SWPPPs which summarize how stormwater will be minimized from construction and industrial sites. Under the MPCA's Stormwater General Permit, managers of sites under construction or industrial stormwater permits must review the adequacy of local SWPPPs to ensure that each plan meets WLA set in the BRW TMDLs. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified. This applies to sites under the MPCA's General Stormwater Permit for Construction Activity (MNR100001) and its NPDES/SDS Industrial Stormwater Multi-Sector General Permit (MNR050000) or NPDES/SDS General Permit for Construction Sand & Gravel, Rock Quarrying and Hot Mix Asphalt Production facilities (MNG490000).

Various funding mechanisms will be utilized to execute the recommendations made in the implementation section of this TMDL. The Clean Water Legacy Act (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.

[2] Buffalo River WRAPS document (August 2016).

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 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).

The EPA finds that this criterion has been adequately addressed.

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:

The final TMDL document outlines the water monitoring efforts in the Buffalo River watershed. Progress of TMDL implementation will be measured through regular monitoring efforts of water quality and total BMPs completed. MPCA anticipates that monitoring will be completed by local groups (e.g., the Buffalo-Red River Watershed District) as long as there is sufficient funding to support the efforts of these local entities. Additionally, volunteers may be relied on to complete monitoring in the lakes discussed within this TMDL. At a minimum, the BRW will be monitored once every 10 years as part of the MPCA's Intensive Watershed Monitoring cycle.

Water quality monitoring is a critical component of the adaptive management strategy employed as part of the implementation efforts utilized in the BRW. Water quality information will aid watershed managers in understanding how BMP pollutant removal efforts are impacting water quality. Water quality monitoring combined with an annual review of BMP efficiency will provide information on the success or failure of BMP systems designed to reduce pollutant loading into water bodies of the BRW.

Watershed managers will have the opportunity to reflect on the progress or lack of progress, and will have the opportunity to change course if progress is unsatisfactory. Review of BMP efficiency is expected to be completed by the local and county partners.

Stream Monitoring:
River and stream monitoring in the BRW, has been completed by a variety of organizations (i.e., SWCDs) and funded by Clean Water Partnership Grants, and other available local funds. MPCA anticipates that stream monitoring in the BRW should continue in order to build on the current water quality dataset and track changes based on implementation progress. Continuing to monitor water quality and biota scores in the listed segments will determine whether or not stream habitat restoration measures are required to bring the watershed into attainment with water quality standards. At a minimum, fish and macroinvertebrate sampling should be conducted by the MPCA, Minnesota Department of Natural Resources (MN-DNR), or other agencies every five to ten years during the summer season.

Lake Monitoring:
The lakes of the BRW have all been periodically monitored by volunteers and staff over the years. Monitoring for some of these locations is planned for the future in order to keep a record of the changing water quality as funding allows. Lakes are generally monitored for TP, chl-a, and Secchi disk transparency. MPCA expects that in-lake monitoring will continue as implementation activities are installed across the watersheds. These monitoring activities should continue until water quality goals are met. Some tributary monitoring has been completed on the inlets to the lakes and may be important to continue as implementation activities take place throughout the subwatersheds.

The EPA finds that this criterion has been adequately addressed.

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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:
The findings from the BRW TMDLs will be used to inform the selection of implementation activities as part of the Buffalo River WRAPS process. The purpose of the WRAPS report is to support local working groups and jointly develop scientifically-supported restoration and protection strategies to be used for subsequent implementation planning. The TMDL outlined implementation strategies in Section 7 of the final TMDL document. MPCA outlined the importance of prioritizing areas within the BRW, education and outreach efforts with local partners, and partnering with local stakeholders to improve water quality within the watershed. Reduction goals for the bacteria, phosphorus and TSS TMDLs may be met via components of the following strategies:

BRW bacteria TMDLs:

Pasture management/livestock exclusion plans: Reducing livestock access to stream environments will lower the opportunity for direct transport of bacteria to surface waters. The installation of exclusion fencing near stream and river environments to prevent direct access for livestock, installing alternative water supplies, and installing stream crossings between pastures, would work to reduce the influxes of bacteria and improve water quality within the watershed. Additionally, introducing rotational grazing to increase grass coverage in pastures, and maintaining appropriate numbers of livestock per acre for grazing, can also aid in the reduction of bacteria inputs.

Manure Collection and Storage Practices: Manure has been identified as a source of bacteria. Bacteria can be transported to surface water bodies via stormwater runoff. Bacteria laden water can also leach into groundwater resources. Improved strategies for the collection, storage and management of manure can minimize impacts of bacteria entering the surface and groundwater system. Repairing manure storage facilities or building roofs over manure storage areas may decrease the amount of bacteria in stormwater runoff.

Manure management plans: Developing manure management plans can ensure that the storage and application rates of manure are appropriate for land conditions. Determining application rates that take into account the crop to be grown on that particular field and soil type will ensure that the correct amount of manure is spread on a field given the conditions. Spreading the correct amount of manure will reduce the availability of bacteria to migrate to surface waters.

Feedlot runoff controls: Treatment of feedlot runoff via diversion structures, holding/storage areas, and stream buffering areas can all reduce the transmission of bacteria to surface water environments. Additionally, cleaner stormwater runoff can be diverted away from feedlots so as to not liberate bacteria.

Subsurface septic treatment systems: Improvements to septic management programs and educational opportunities can reduce the occurrence of septic pollution. Educating the public on proper septic maintenance, finding and eliminating illicit discharges and repairing failing systems could lessen the impacts of septic derived bacteria inputs into the BRW.

Stormwater wetland treatment systems: Constructed wetlands with the purpose of treating wastewater or stormwater inputs could be explored in selected areas of the BRW. Constructed wetland systems may be vegetated, open water, or a combination of vegetated and open water. MPCA explained that recent studies have found that the more effective constructed wetland designs employ large treatment volumes in proportion to the contributing drainage area, have open water areas between vegetated areas, have long flow paths and a resulting longer detention time, and are designed to allow few overflow events.

Riparian Area Management Practices: Protection of streambanks within the watershed through planting of vegetated/buffer areas with grasses, legumes, shrubs or trees will mitigate bacteria inputs into surface waters. These areas will filter stormwater runoff before the runoff enters the main stem or tributaries of the BRW.

Bioinfiltration of stormwater: Biofiltration practices rely on the transport of stormwater and watershed runoff through a medium such as sand, compost or soil. This process allows the medium to filter out sediment and therefore sediment-associated bacteria. Biofiltration/bioretention systems, are vegetated and are expected to be most effective when sized to limit overflows and designed to provide the longest flow path from inlet to outlet.

Education and Outreach Efforts: Increased education and outreach efforts to the general public bring greater awareness to the issues surrounding bacteria contamination and strategies to reducing loading and transport of bacteria. Education efforts targeted to the general public are commonly used to provide information on the status of impacted waterways as well as to address pet waste and wildlife issues. Education efforts may emphasize aspects such as cleaning up pet waste or managing the landscape to discourage nuisance congregations of wildlife and waterfowl. Education can also be targeted to municipalities, wastewater system operators, land managers and other groups who play a key role in the management of bacteria sources.

BRW phosphorus TMDLs:

Septic Field Maintenance: Septic systems are believed to be a source of nutrients to waters in the BRW. Failing systems are expected to be identified and addressed via upgrades to those SSTS not meeting septic ordinances. MPCA explained that SSTS improvement priority should be given to those failing SSTS on lakeshore properties or those SSTS adjacent to streams within the direct watersheds for each water body. MPCA aims to greatly reduce the number of failing SSTS in the future via local septic management programs and educational opportunities. Educating the public on proper septic maintenance, finding and eliminating illicit discharges, and repairing failing systems could lessen the impacts of septic derived nutrients inputs into the BRW.

Manure management (feedlot and manure stockpile runoff controls): Manure has been identified as a potential source of nutrients in the BRW. Nutrients derived from manure can be transported to surface water bodies via stormwater runoff. Nutrient laden water can also leach into groundwater resources. Improved strategies in the collection, storage and management of manure can minimize impacts of nutrients entering the surface and groundwater system. Repairing manure storage facilities or building roofs over manure storage areas may decrease the amount of nutrients in stormwater runoff.

Pasture management and agricultural reduction strategies: These strategies involve reducing nutrient transport from fields and minimizing soil loss. Specific practices would include; erosion control through conservation tillage, reduction of winter spreading of fertilizers, elimination of fertilizer spreading near open inlets and sensitive areas, installation of stream and lake shore buffer strips, streambank stabilization practices (gully stabilization and installation of fencing near streams), and nutrient management planning.

Urban/Residential Nutrient Reduction Strategies: These strategies involve reducing stormwater runoff from lakeshore homes and other residences within the BRW. These practices would include; rain gardens, lawn fertilizer reduction, lake shore buffer strips, vegetation management and replacement of failing septic systems. Water quality educational programs could also be utilized to inform the general public on nutrient reduction efforts and their impact on water quality.

Municipal activities: Municipal programs, such as street sweeping, can also aid in the reduction of nutrients to surface water bodies within the BRW. Municipal partners can team with local watershed groups or water district partners to assess how best to utilize their monetary resources for installing new stormwater BMPs (ex. vegetated swales) or retro-fitting existing stormwater BMPs.

Internal Loading Reduction Strategies: Internal nutrient loads may be addressed to meet the TMDL allocations outlined in the BRW phosphorus TMDLs. MPCA recommends that before any strategy is put into action, an intensive technical review, to evaluate the costs and feasibility of internal load reduction options be completed. Several options should be considered to manage internal load inputs to each of the water bodies addressed in this TMDL.

- *Management of fish populations:* Monitor and manage fish populations to maintain healthy game fish populations and reduce rough fish (i.e. carp, bullheads, fathead minnows) populations.
- *Vegetation management:* Improved management of in-lake vegetation in order to limit phosphorus loading and to increase water clarity. Controlling the vitality of curly-leaf pondweeds via chemical treatments (herbicide applications) will reduce one of the significant sources of internal loading, the senescence of curly-leaf plants in the summer months.
- *Chemical treatment:* The addition of chemical reactants (ex. aluminum sulfate) to lakes of the BRW in order for those reactants to permanently bind phosphorus into the lake bottom sediments. This effort could decrease phosphorus releases from sediment into the lake water column during anoxic conditions.

Public Education Efforts: Public programs will be developed to provide guidance to the general public on nutrient reduction efforts and their impact on water quality. These educational efforts could also be used to inform the general public on what they can do to protect the overall health of lakes in the BRW.

BRW TSS TMDLs:

Improved Agricultural Drainage Practices: A review of local agricultural drainage networks should be completed to examine how improving drainage ditches and drainage channels could be reorganized to reduce the influx of sediments to the surface waters in the BRW. The reorganization of the drainage network could include the installation of drainage ditches or sediment traps to encourage particle settling during high flow events. Additionally, cover cropping and residue management is recommended to reduce erosion and thus siltation and runoff into streams.

Reducing Livestock Access to Stream Environments: Livestock managers should be encouraged to implement measures to protect riparian areas. Managers should install exclusion fencing near stream environments to prevent direct access to these areas by livestock. Additionally, installing alternative watering locations and stream crossings between pastures may aid in reducing sediments to surface waters.

Identification of Stream, River, and Lakeshore Erosional Areas: An assessment of stream channel, river channel, and lakeshore erosional areas should be completed to evaluate areas where erosion control strategies could be implemented in the BRW. Implementation actions (ex. planting deep-rooted vegetation near water bodies to stabilize streambanks) could be prioritized to target areas which are actively eroding. This strategy could prevent additional sediment inputs into surface waters of the BRW and minimize or eliminate degradation of habitat.

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

11. Public Participation

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

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

Comment:
The public participation section of the TMDL submittal is found in Section 9 of the final TMDL document. Throughout the development of the BRW TMDLs the public was given various opportunities to participate. As part of the strategy to communicate the goals of the TMDL project and to engage with members of the public, MPCA formed a stakeholder engagement group composed of staff from BRRWD, Becker, Clay, Otter Tail and Wilkin county SWCDs, county and township staff, staff from Minnesota Department of Natural Resources and Board of Soil and Water Resources (BWSR). The stakeholder engagement group met and discussed the results of water quality sampling conducted in the BRW, draft results of BRW TMDLs and the Watershed Restoration and Protection Study (WRAPS) process. A full description of civic engagement activities associated with the TMDL process is available within in the BRW WRAPS report.

MPCA posted the draft TMDL online at (http://www.pca.state.mn.us/water/tmdl) for a public comment period. The 30-day public comment period was started on March 30, 2015 and ended on April 29, 2015. MPCA received two public comments during the public comment period from the Minnesota Department of Agriculture (MDA) and from Mr. Wayne Brininger of the Tamarac National Wildlife Refuge in Rochert, Minnesota.

The MDA requested that MPCA include; additional Land Use information to some of the BRW TMDL Figures, to include more detailed feedlot and livestock information in Section 2 (Tables 2-2 to 2-6), to add clarifying language to MPCA's discussion of septic influence for the bacteria TMDLs and to add clarifying language to MPCA's discussion of agricultural nonpoint source nutrient inputs. MPCA considered each of MDA's comments and updated its final TMDL where appropriate.

Mr. Brininger from the Tamarac National Wildlife Refuge requested that MPCA further clarify descriptions within the public notice draft TMDL document. Specifically, Mr. Brininger requested additional explanation on the impairment status of Tamarac Lake (03-0241-02), on whether water quality sampling results collected for Tamarac Lake would be more appropriately assessed as part of the NCHF ecoregion instead of the Northern Lakes and Forests (NLF) ecoregion, reported magnitudes of sources impacting water quality in Tamarac Lake and regarding sharing water quality data collected by staff at the Tamarac National Wildlife Refuge. MPCA answered Mr. Brininger's questions, clarified its approach in response to Mr. Brininger's inquiries and updated the final BRW TMDL where appropriate.

EPA believes that MPCA adequately addressed the comments from MDA and Mr. Brininger and updated the final TMDL appropriately. MPCA submitted MDA's public comment and its response in the final TMDL submittal packet received by the EPA on December 19, 2016.

The Buffalo River Watershed includes White Earth Nation tribal lands in upstream areas of the watershed. MPCA explained that portions of the BRW include White Earth Nation tribal areas (Section 2.1 of the final TMDL document). EPA invited representatives of the White Earth Nation to consult with EPA regarding EPA's review and decision on the BRW TMDLs.[3] Representatives from the White Earth Nation did not respond to EPA's invitation to consult on EPA's review and decision of the BRW TMDLs. EPA understood this as White Earth Nation deferring on EPA's invitation to consult on EPA's review of the final Buffalo River TMDL. Therefore, EPA closed out the tribal consultation invitation via a follow-up letter to the Chairperson of the White Earth Nation.[4]

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

12. Submittal Letter

A submittal letter should be included with the TMDL submittal, and should specify whether the TMDL is being submitted for a *technical review* or *final review and approval*. Each final TMDL submitted to 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 water body, and the pollutant(s) of concern.

Comment:
The EPA received the final BRW TMDL document, submittal letter and accompanying documentation from MPCA on December 19, 2016. The transmittal letter explicitly stated that the final TMDLs referenced in Table 1 of this Decision Document were being submitted to EPA pursuant to Section 303(d) of the Clean Water Act for EPA review and approval.

The letter clearly stated that this was a final TMDL submittal under Section 303(d) of CWA. The letter also contained the name of the watershed as it appears on Minnesota's 303(d) list, and the causes/pollutants of concern. This TMDL was submitted per the requirements under Section 303(d) of the Clean Water Act and 40 CFR 130.

[3] EPA Letter from Tinka Hyde, Water Division Director, Region 5, U.S. EPA to Terrance Tibbetts, Chairman of the White Earth Nation, *Invitation for Consultation on EPA's Final Review for the Buffalo River Watershed Total Maximum Daily Load Study*, August 23, 2016.

[4] EPA Letter from Tinka Hyde, Water Division Director, Region 5, U.S. EPA to Terrance Tibbetts, Chairman of the White Earth Nation, *Closeout of EPA's consultation invitation and final review of the Buffalo River Watershed Total Maximum Daily Load Study*, September 13, 2016.

The EPA finds that the TMDL transmittal letter submitted for the Buffalo River Watershed TMDLs by MPCA satisfies the requirements of this twelfth element.

13. Conclusion

After a full and complete review, the EPA finds that the 21 bacteria TMDLs, 14 nutrient (TP) TMDLs, and 12 TSS TMDLs satisfy all elements for approvable TMDLs. This TMDL approval is for **forty-seven TMDLs**, addressing thirty-six different water bodies for aquatic recreational and aquatic life use impairments (Table 1 of this Decision Document).

The EPA's approval of these TMDLs extends to the water bodies which are identified above with the exception of any portions of the water bodies that are within Indian Country, as defined in 18 U.S.C. Section 1151. The EPA is taking no action to approve or disapprove TMDLs for those waters at this time. The EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under the CWA Section 303(d) for those waters.

ATTACHMENTS

Attachment #1: Table 8: Bacteria (*E. coli*) TMDLs for the Buffalo River Watershed

Attachment #2: Table 10: Total Phosphorus TMDLs for the Buffalo River Watershed

Attachment #3: Table 12: Total Suspended Solid (TSS) TMDLs for the Buffalo River Watershed

Table 8: Bacteria TMDLs for the Buffalo River Watershed

Allocation	Load Duration Curve Zone				
	High Flows	*Moist Conditions*	*Mid-range Flows*	*Dry Conditions*	*Low Flows*
	(billion - organisms per day)				
Buffalo River (09020106-501)					
WLA - Audubon WWTF (MNG5810148)	6.80	6.80	6.80	6.80	6.80
WLA - Barnesville WWTF (MN0022501)	18.70	18.70	18.70	18.70	18.70
WLA - Callaway WWTF (MNT022985)	2.70	2.70	2.70	2.70	2.70
WLA - Hawley WWTF (MN0020338)	10.30	10.30	10.30	10.30	10.30
WLA - Hitterdahl WWTF (MNG580178)	2.30	2.30	2.30	2.30	2.30
WLA - Lake Park WWTF (MNG580157)	6.30	6.30	6.30	6.30	6.30
WLA - Spring Prairie Hutterite Colony WWTF (MN0070467)	1.00	1.00	1.00	1.00	1.00
WLA TOTAL	48.10	48.10	48.10	48.10	48.10
LA	4302.50	708.30	309.70	135.90	40.00
MOS *(explicit 10%)*	483.40	84.00	39.80	20.50	9.80
TMDL	**4834.00**	**840.40**	**397.60**	**204.50**	**97.90**
Stoney Creek (09020106-502)					
WLA	0.00	0.00	0.00	0.00	0.00
LA	233.40	97.80	44.10	22.70	7.40
MOS *(explicit 10%)*	25.90	10.90	4.90	2.50	0.80
TMDL	**259.30**	**108.70**	**49.00**	**25.20**	**8.20**
Buffalo River (09020106-503)					
WLA - Barnesville WWTF (MN0022501)	18.70	18.70	18.70	18.70	18.70
WLA TOTAL	18.70	18.70	18.70	18.70	18.70
LA	63851.60	13246.70	6039.70	2604.30	865.50
MOS *(explicit 10%)*	7096.70	1473.90	673.10	291.40	98.20
TMDL	**70967.00**	**14739.30**	**6731.50**	**2914.40**	**982.40**
Buffalo River (09020106-504)					
WLA - Barnesville WWTF (MN0022501)	18.70	18.70	18.70	18.70	*
WLA TOTAL	18.70	18.70	18.70	18.70	0.00
LA	1176.10	244.00	67.50	13.80	8.70
MOS *(explicit 10%)*	132.80	29.20	9.60	3.60	1.00

TMDL	**1327.60**	**291.90**	**95.80**	**36.10**	**9.70**
Buffalo River (09020106-505)					
WLA	0.00	0.00	0.00	0.00	0.00
LA	443.70	92.60	27.10	7.90	1.40
MOS *(explicit 10%)*	49.30	10.30	3.00	0.90	0.20
TMDL	**493.00**	**102.90**	**30.10**	**8.80**	**1.60**
Deerhorn Creek (09020106-507)					
WLA	0.00	0.00	0.00	0.00	0.00
LA	135.50	25.40	7.80	2.70	0.80
MOS *(explicit 10%)*	15.10	2.80	0.90	0.30	0.10
TMDL	**150.60**	**28.20**	**8.70**	**3.00**	**0.90**
Buffalo River (09020106-508)					
WLA	0.00	0.00	0.00	0.00	0.00
LA	110.90	18.90	3.50	0.70	0.10
MOS *(explicit 10%)*	12.30	2.10	0.40	0.10	0.00
TMDL	**123.20**	**21.00**	**3.90**	**0.80**	**0.10**
Whiskey Creek (09020106-509)					
WLA - Barnesville WWTF (MN0022501)	18.70	18.70	18.70	*	*
WLA TOTAL	18.70	18.70	18.70	0.00	0.00
LA	168.60	38.60	8.50	13.60	5.20
MOS *(explicit 10%)*	20.80	6.40	3.00	1.50	0.60
TMDL	**208.10**	**63.70**	**30.20**	**15.10**	**5.80**
Hay Creek (09020106-511)					
WLA - Lake Park WWTF (MNG580157)	6.30	6.30	6.30	6.30	6.30
WLA TOTAL	6.30	6.30	6.30	6.30	6.30
LA	183.40	25.60	10.10	4.90	0.20
MOS *(explicit 10%)*	21.10	3.50	1.80	1.20	0.70
TMDL	**210.80**	**35.40**	**18.20**	**12.40**	**7.20**
Becker County Ditch 15 (09020106-515)					
WLA - Audubon WWTF (MNG5810148)	6.80	6.80	6.80	6.80	6.80
WLA - Callaway WWTF (MNT022985)	2.70	2.70	2.70	2.70	2.70
WLA TOTAL	9.50	9.50	9.50	9.50	9.50
LA	381.40	82.70	53.90	31.20	12.00
MOS *(explicit 10%)*	43.40	10.20	7.00	4.50	2.40
TMDL	**434.30**	**102.40**	**70.40**	**45.20**	**23.90**
Hay Creek (09020106-519)					
WLA	0.00	0.00	0.00	0.00	0.00
LA	114.70	37.20	19.90	9.60	2.756
MOS *(explicit 10%)*	12.70	4.10	2.20	1.10	0.31
TMDL	**127.40**	**41.30**	**22.10**	**10.70**	**3.062**
Hay Creek (09020106-520)					
WLA	0.00	0.00	0.00	0.00	0.00
LA	113.60	49.88	31.02	17.32	6.680
MOS *(explicit 10%)*	12.60	5.50	3.40	1.90	0.70
TMDL	**126.20**	**55.38**	**34.42**	**19.22**	**7.380**

Whiskey Creek (09020106-521)					
WLA - Barnesville WWTF (MN0022501)	18.70	18.70	18.70	*	*
WLA TOTAL	18.70	18.70	18.70	0.00	0.00
LA	140.30	31.80	6.00	13.60	5.20
MOS *(explicit 10%)*	17.70	5.60	2.70	1.50	0.60
TMDL	**176.70**	**56.10**	**27.40**	**15.10**	**5.80**
Stony Creek (09020106-523)					
WLA	0.00	0.00	0.00	0.00	0.00
LA	91.10	30.20	8.90	2.30	0.30
MOS *(explicit 10%)*	10.10	3.40	1.00	0.30	0.00
TMDL	**101.20**	**33.60**	**9.90**	**2.60**	**0.30**
State Ditch 14 (09020106-531)					
WLA	0.00	0.00	0.00	0.00	0.00
LA	47.30	7.70	2.20	0.85	0.426
MOS *(explicit 10%)*	5.30	0.85	0.20	0.10	0.047
TMDL	**52.60**	**8.55**	**2.40**	**0.95**	**0.473**
Spring Creek (09020106-534)					
WLA	0.00	0.00	0.00	0.00	0.00
LA	42.60	4.40	1.20	0.23	0.004
MOS *(explicit 10%)*	4.70	0.50	0.10	0.003	0.001
TMDL	**47.30**	**4.90**	**1.30**	**0.23**	**0.005**
County Ditch 2 (09020106-556)					
WLA - Spring Prairie Hutterite Colony WWTF (MN0070467)	1.00	1.00	1.00	1.00	*
WLA TOTAL	1.00	1.00	1.00	1.00	*
LA	318.90	43.60	11.50	3.40	0.20
MOS *(explicit 10%)*	35.50	4.90	1.40	0.50	0.00
TMDL	**355.40**	**49.50**	**13.90**	**4.90**	**0.20**
County Ditch 39 (09020106-559)					
WLA	0.00	0.00	0.00	0.00	0.00
LA	132.18	19.96	5.54	1.69	0.16
MOS *(explicit 10%)*	14.70	2.20	0.60	0.20	0.00
TMDL	**146.88**	**22.16**	**6.14**	**1.89**	**0.16**
County Ditch 10 (09020106-562)					
WLA	0.00	0.00	0.00	0.00	0.00
LA	70.74	9.18	1.26	0.11	0.00
MOS *(explicit 10%)*	7.90	1.00	0.10	0.00	0.00
TMDL	**78.64**	**10.18**	**1.36**	**0.11**	**0.00**
Buffalo River (09020106-594)					
WLA - Audubon WWTF (MNG5810148)	6.80	6.80	6.80	6.80	6.80
WLA - Callaway WWTF (MNT022985)	2.70	2.70	2.70	2.70	2.70
WLA - Lake Park WWTF (MNG580157)	6.30	6.30	6.30	6.30	6.30
CAFO - Baers Poultry Co. (Old Barn Site)	0.00	0.00	0.00	0.00	0.00
CAFO - Jona Baer Inc.	0.00	0.00	0.00	0.00	0.00

WLA TOTAL	15.80	15.80	15.80	15.80	15.80
LA	912.20	288.90	165.70	90.40	35.00
MOS *(explicit 10%)*	103.10	33.80	20.20	11.80	5.60
TMDL	**1031.10**	**338.50**	**201.70**	**118.00**	**56.40**
Buffalo River (09020106-595)					
WLA - Audubon WWTF (MNG5810148)	6.80	6.80	6.80	6.80	6.80
WLA - Callaway WWTF (MNT022985)	2.70	2.70	2.70	2.70	2.70
WLA - Glyndon WWTF (MN0020630)	7.90	7.90	7.90	7.90	7.90
WLA - Hawley WWTF (MN0020338)	10.30	10.30	10.30	10.30	10.30
WLA - Lake Park WWTF (MNG580157)	6.30	6.30	6.30	6.30	6.30
WLA TOTAL	34.00	34.00	34.00	34.00	34.00
LA	1513.10	494.00	310.10	185.10	68.60
MOS *(explicit 10%)*	171.90	58.70	38.20	24.30	11.40
TMDL	**1719.00**	**586.70**	**382.30**	**243.40**	**114.00**

* = The outflows from WWTFs will be greater than the median flows under these flow conditions. If the facility does discharge under these flow conditions, the WLA will be the permitted outflow concentration multiplied by the flow rate (See Section 3.3 of the final TMDL document)

Table 10: Nutrient TMDLs in the Buffalo River Watershed

Allocation	Daily Load *(lbs/day)*	Annual Load *(lbs/year)*
Nutrient TMDL for Boyer Lake (03-0579-00)		
WLA - Construction/Industrial Stormwater	0.0001	0.05
LA	0.13	46.30
MOS	0.03	11.90
TMDL	**0.16**	**58.25**
Nutrient TMDL for Forget-Me-Not Lake (03-0624-00)		
WLA - Construction/Industrial Stormwater	0.00	1.00
LA	2.76	1008.70
MOS	0.27	97.00
TMDL	**3.03**	**1106.70**
Nutrient TMDL for Gottenberg Lake (03-0528-00)		
WLA - Construction/Industrial Stormwater	0.00	0.40
LA	1.10	403.00
MOS	0.10	35.30
TMDL	**1.20**	**438.70**
Nutrient TMDL for Gourd Lake (03-0635-00)		
WLA - Construction/Industrial Stormwater	0.00	0.06
LA	0.14	52.90
MOS	0.03	8.80
TMDL	**0.17**	**61.76**
Nutrient TMDL for Jacobs Lake (56-1039-00)		

WLA - Construction/Industrial Stormwater	0.00	0.04
LA	0.11	39.60
MOS	0.02	8.90
TMDL	**0.13**	**48.54**
Nutrient TMDL for Lime Lake (03-0646-00)		
WLA - Construction/Industrial Stormwater	0.01	3.40
LA	9.24	3374.10
MOS	1.04	377.00
TMDL	**10.29**	**3754.50**
Nutrient TMDL for Lake Maria (14-0099-00)		
WLA - Construction/Industrial Stormwater	0.00	1.50
LA	4.09	1493.20
MOS	0.32	114.70
TMDL	**4.41**	**1609.40**
Nutrient TMDL for Marshall Lake (03-0526-00)		
WLA - Construction/Industrial Stormwater	0.00	0.30
LA	0.75	275.30
MOS	0.01	2.20
TMDL	**0.76**	**277.80**
Nutrient TMDL for Sand (Stump) Lake (03-0659-00)		
WLA - Construction/Industrial Stormwater	0.002	0.60
LA	1.54	563.80
MOS	0.27	94.80
TMDL	**1.81**	**659.20**
Nutrient TMDL for Sorenson Lake (03-0625-00)		
WLA - Construction/Industrial Stormwater	0.0005	0.20
LA	0.49	180.6
MOS	0.02	6.60
TMDL	**0.51**	**187.40**
Nutrient TMDL for Stakke Lake (03-0631-00)		
WLA - Construction/Industrial Stormwater	0.0060	2.10
LA	5.86	2138.5
MOS	0.31	114.70
TMDL	**6.18**	**2255.30**
Nutrient TMDL for Stinking Lake (03-0647-00)		
WLA - Lake Park WWTF (MNG580157)*	1.27	462.40
WLA - Construction/Industrial Stormwater	0.01	4.10
LA	11.25	4106.0
MOS	0.83	304.20
TMDL	**13.36**	**4876.70**
Nutrient TMDL for Talac (Lee) Lake (03-0619-00)		
WLA - Construction/Industrial Stormwater	0.0030	0.90
LA	2.45	894.2
MOS	0.17	59.50
TMDL	**2.62**	**954.60**
Nutrient TMDL for West LaBelle Lake (03-0645-00)		
WLA - Construction/Industrial Stormwater	0.0020	0.10
LA	0.19	70.5

MOS	0.02	4.40
TMDL	**0.21**	**75.00**

* = The daily WLA for Lake Park WWTF (MNG580157) is 1.27 lbs/day, which was derived from a 365 day discharge. However, the permitted discharge is limited to 37 days (10.95 lbs/day)

Table 12: Total Suspended Solids TMDLs for the Buffalo River Watershed

Allocation	Load Duration Curve Zone				
	High Flows	*Moist Conditions*	*Mid-range Flows*	*Dry Conditions*	*Low Flows*
	(tons per day)				
Buffalo River (09020106-501)					
WLA - Audubon WWTF (MNG5810148)	0.27	0.27	0.27	0.27	0.27
WLA - Barnesville WWTF (MN0022501)	0.73	0.73	0.73	0.73	0.73
WLA - Callaway WWTF (MNT022985)	0.11	0.11	0.11	0.11	0.11
WLA - Hawley WWTF (MN0020338)	0.40	0.40	0.40	0.40	0.40
WLA - Hitterdahl WWTF (MNG580178)	0.09	0.09	0.09	0.09	0.09
WLA - Lake Park WWTF (MNG580157)	0.25	0.25	0.25	0.25	0.25
WLA - Spring Prairie Hutterite Colony WWTF (MN0070467)	0.04	0.04	0.04	0.04	0.04
WLA - Aggregate Industries - Pit 21 (MN0069515)	0.21	0.21	0.21	0.21	0.21
WLA - Construction/Industrial Stormwater	0.41	0.07	0.03	0.01	0.01
WLA TOTAL	2.51	2.17	2.13	2.11	2.11
LA	413.93	68.34	31.66	14.75	6.52
MOS *(explicit 10%)*	46.27	7.84	3.76	1.87	0.96
TMDL	**462.71**	**78.35**	**37.55**	**18.73**	**9.59**
Stoney Creek (09020106-502)					
WLA - Construction/Industrial Stormwater	0.02	0.009	0.004	0.002	0.0007
LA	22.65	9.15	4.21	2.15	0.71
MOS *(explicit 10%)*	2.52	1.02	0.47	0.24	0.08
TMDL	**25.19**	**10.18**	**4.68**	**2.39**	**0.79**
Buffalo River (09020106-503)					
WLA - Barnesville WWTF (MN0022501)	0.73	0.73	0.73	0.73	0.73
WLA - Construction/Industrial Stormwater	0.114	0.021	0.010	0.004	0.001
WLA TOTAL	0.84	0.75	0.74	0.73	0.73
LA	113.78	21.36	9.72	3.71	0.87
MOS *(explicit 10%)*	12.74	2.46	1.16	0.49	0.18
TMDL	**127.36**	**24.57**	**11.62**	**4.93**	**1.78**

Buffalo River (09020106-504)					
WLA - Barnesville WWTF (MN0022501)	0.73	0.73	0.73	0.73	*
WLA - Construction/Industrial Stormwater	0.073	0.015	0.005	0.001	0.001
WLA TOTAL	0.80	0.75	0.74	0.73	0.00
LA	73.21	14.71	4.68	1.34	0.49
MOS *(explicit 10%)*	8.22	1.72	0.60	0.23	0.06
TMDL	**82.23**	**17.18**	**6.02**	**2.30**	**0.55**
Buffalo River (09020106-505)					
WLA - Construction/Industrial Stormwater	0.044	0.009	0.0030	0.001	0.0001
LA	44.40	8.62	2.73	0.78	0.12
MOS *(explicit 10%)*	4.94	0.96	0.30	0.09	0.01
TMDL	**49.38**	**9.59**	**3.03**	**0.87**	**0.13**
Deerhorn Creek (09020106-507)					
WLA - Construction/Industrial Stormwater	0.013	0.002	0.0008	0.000	0.0001
LA	12.64	2.42	0.75	0.25	0.08
MOS *(explicit 10%)*	1.41	0.27	0.08	0.03	0.01
TMDL	**14.06**	**2.69**	**0.83**	**0.28**	**0.09**
Buffalo River (09020106-508)					
WLA - Construction/Industrial Stormwater	0.011	0.0018	0.0004	0.0001	0.00001
LA	10.810	1.81	0.35	0.06	0.01
MOS *(explicit 10%)*	1.20	0.20	0.04	0.01	0.00
TMDL	**12.02**	**2.01**	**0.39**	**0.07**	**0.01**
Whiskey Creek (09020106-509)					
WLA - Barnesville WWTF (MN0022501)	0.73	0.73	0.73	*	*
WLA - Construction/Industrial Stormwater	0.011	0.003	0.001	*	0.001
WLA TOTAL	0.74	0.73	0.73	0.00	0.00
LA	10.99	2.65	0.87	*	0.30
MOS *(explicit 10%)*	1.30	0.38	0.18	*	0.03
TMDL	**13.03**	**3.76**	**1.78**	**0.88**	**0.33**
Whiskey Creek (09020106-521)					
WLA - Barnesville WWTF (MN0022501)	0.73	0.73	0.73	*	*
WLA - Construction/Industrial Stormwater	0.009	0.002	0.001	*	0.001
WLA TOTAL	0.74	0.73	0.73	0.00	0.00
LA	8.88	2.25	0.71	*	0.30
MOS *(explicit 10%)*	1.07	0.33	0.16	*	0.03
TMDL	**10.69**	**3.31**	**1.60**	**0.88**	**0.33**
Stony Creek (09020106-523)					
WLA - Construction/Industrial Stormwater	0.009	0.003	0.0008	0.0002	0.00
LA	8.550	2.790	0.830	0.210	0.03
MOS *(explicit 10%)*	0.95	0.31	0.09	0.02	0.00

TMDL	**9.51**	**3.10**	**0.92**	**0.23**	**0.03**
Buffalo River (09020106-594)					
WLA - Audubon WWTF (MNG5810148)	0.27	0.27	0.27	0.27	0.27
WLA - Callaway WWTF (MNT022985)	0.11	0.11	0.11	0.11	0.11
WLA - Lake Park WWTF (MNG580157)	0.25	0.25	0.25	0.25	0.25
WLA - Construction/Industrial Stormwater	0.05	0.02	0.01	0.005	0.002
WLA TOTAL	0.68	0.65	0.64	0.64	0.63
LA	51.48	17.21	9.69	5.08	2.13
MOS *(explicit 10%)*	5.79	1.98	1.15	0.63	0.31
TMDL	**57.95**	**19.84**	**11.48**	**6.35**	**3.07**
Buffalo River (09020106-595)					
WLA - Audubon WWTF (MNG5810148)	0.27	0.27	0.27	0.27	0.27
WLA - Callaway WWTF (MNT022985)	0.11	0.11	0.11	0.11	0.11
WLA - Glyndon WWTF (MN0020630)	0.31	0.31	0.31	0.31	0.31
WLA - Hawley WWTF (MN0020338)	0.40	0.40	0.40	0.40	0.40
WLA - Lake Park WWTF (MNG580157)	0.25	0.25	0.25	0.25	0.25
WLA - Aggregate Industries - Pit 21 (MN0069515)	0.21	0.21	0.21	0.21	0.21
WLA - Construction/Industrial Stormwater	0.09	0.03	0.02	0.01	0.00
WLA TOTAL	1.64	1.58	1.57	1.56	1.55
LA	85.20	29.47	18.60	11.15	4.09
MOS *(explicit 10%)*	9.65	3.45	2.24	1.41	0.63
TMDL	**96.49**	**34.50**	**22.41**	**14.12**	**6.27**

* = Low flow conditions - The outflows from WWTF will be greater than the median flows under these flow conditions. If discharges from WWTFs occur during these flow conditions, the WLA will be the permitted outflow concentration multiplied by the flow rate (see Section 3.3 of the final TMDL)