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

NOV 20 2014

REPLY TO THE ATTENTION OF:

WW-16J

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

Dear Ms. Flood:

The U.S. Environmental Protection Agency has conducted a complete review of the final Total Maximum Daily Loads (TMDLs) for segments impaired due to bacteria in the Upper Mississippi River Watershed (UMRW), including support documentation and follow up information. The UMRW is located in central Minnesota in parts of Anoka, Benton, Dakota, Hennepin, Morrison, Ramsey, Sherburne, Stearns, Washington and Wright Counties. The UMRW bacteria TMDLs address impaired aquatic recreation use due to excessive bacteria.

EPA has determined that the UMRW bacteria 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 22 bacteria 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,

for Tinka G. Hyde
Director, Water Division

Enclosure

cc: Celine Lyman, MPCA
Barbara Peichel, MPCA

wq-iw8-08g

TMDL: Upper Mississippi River bacteria TMDLs
Anoka, Benton, Dakota, Hennepin, Morrison, Ramsey, Sherburne, Stearns, Washington and Wright Counties, Minnesota
Date: November 20, 2014

DECISION DOCUMENT
FOR THE UPPER MISSISSIPPI RIVER BACTERIA TMDL, MINNESOTA

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 C.F.R. Part 130 describe the statutory and regulatory requirements for approvable 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 area addressed by the Upper Mississippi River (UMR) bacteria TMDLs includes portions of three 8-digit hydrologic unit code (HUC-8) watersheds in central Minnesota. Those HUC-8 watersheds are:

- Mississippi River – Sartell Watershed (HUC-8, 07010201);
- Mississippi River – St. Cloud Watershed (HUC-8, 07010203); and
- Mississippi River – Twin Cities Watershed (HUC-8, 07010206).

The areal extent of the Upper Mississippi River watershed (UMRW) includes parts of Anoka, Benton, Dakota, Hennepin, Morrison, Ramsey, Sherburne, Stearns, Washington and Wright counties. The area covered by the Upper Mississippi River bacteria TMDLs is approximately 3,130 square miles (approximately 2,000,000 acres) and is located northwest of the Minneapolis/St. Paul metropolitan area.

The UMR bacteria TMDLs address twenty-two *E. coli* and fecal coliform impaired segments (Table 1 of this Decision Document). These segments are either direct tributaries to the main stem of the Mississippi River or they are streams which contribute flow to those direct tributaries which drain to the main stem of the Mississippi River.

Table 1: Upper Mississippi River bacteria impaired waters addressed by this TMDL

Water body name	Assessment Unit ID	Affected Use	Pollutant or stressor	TMDL
Little Two River	07010201-516	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Two River	07010201-523	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Spunk Creek	07010201-525	Aquatic Recreation	Bacteria (fecal coliform)	Bacteria
Watab River	07010201-528	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Watab River, North Fork	07010201-529	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
County Ditch 12	07010201-537	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
South Two River	07010201-543	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Watab River, South Fork	07010201-554	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
County Ditch 13	07010201-564	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Unnamed Creek	07010203-528	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Silver Creek	07010203-557	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Unnamed Creek (Luxemburg Creek)	07010203-561	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Plum Creek	07010203-572	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Johnson Creek (Meyer Creek)	07010203-635	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Johnson Creek (Meyer Creek)	07010203-639	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Unnamed Creek (Robinson Hill Creek)	07010203-724	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Shingle Creek (County Ditch 13)	07010206-506	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Unnamed Creek (Plymouth Creek)	07010206-526	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Bassett Creek	07010206-538	Aquatic Recreation	Bacteria (fecal coliform)	Bacteria
Unnamed Creek (Interstate Valley Creek)	07010206-542	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria

Unnamed Creek (North Branch, Bassett Creek)	07010206-552	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Rice Creek	07010206-584	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria

Land Use:
Land use in the UMRW is comprised of various levels of developed lands (i.e., high intensity developed lands in the Minneapolis/St. Paul metropolitan area, medium intensity developed lands, and minimally developed lands), cultivated croplands, grasslands and pastures, forested lands/woodlands, open water and wetlands.

- Mississippi River – Sartell Watershed (07010201): Land cover is mainly agricultural (Figures 4-5 and 4-6 of the final TMDL document).
- Mississippi River – St. Cloud Watershed (07010203): Land cover is partly agricultural, partly forested and partly developed areas (Figures 4-7 to 4-10 of the final TMDL document).
- Mississippi River – Twin Cities Watershed (07010206): Land cover is mainly medium to high intensity developed areas (Figures 4-11 to 4-13 of the final TMDL document).

Problem Identification:
The twenty-two bacteria impaired segments are listed on the draft 2014 Minnesota 303(d) list for impaired aquatic recreation due to bacteria (*E. coli* and fecal coliform) exceedances. The Minnesota Pollution Control Agency (MPCA) describes the historic water quality conditions of the UMRW in Section 5.1 of the final TMDL document (pages 96-98, and Appendices C, D and E). Bacteria exceedances can negatively impact recreational uses (swimming, wading, boating, fishing etc.) 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.

In addition to the recreation use of the waters addressed by the 22 bacteria TMDLs, MPCA explained that the main stem of the Mississippi River is used as a drinking water source for approximately 940,000 residents of central Minnesota. As part of its water quality assessment process, MPCA and the Minnesota Department of Health (MDH) monitor the main stem and its tributaries for bacteria and other contaminants of concern. MPCA and MDH have classified bacterial related species (ex. fecal coliform), *Cryptosporidium*, and *Giardia* as contaminants of concern for drinking water protection purposes. MPCA believes that by addressing the bacteria recreational use concerns it will improve the overall water quality in the main stem of the Mississippi River which will result in cleaner drinking water.

Priority Ranking:
The water bodies addressed by the UMR bacteria TMDLs were given a priority ranking for TMDL development due to: the impairment impacts on recreational use and drinking water resources, 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 and the restorability of the water body, and the technical capability and the willingness of local partners to assist with the TMDL.

Pollutant of Concern:
The pollutant of concern is <u>bacteria</u> (*E. coli*).

Source Identification (point and nonpoint sources):
Point Source Identification: The potential point sources to the UMRW are:

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 treated wastewater according to their NPDES permit. MPCA determined that there are eight wastewater treatment facilities (WWTFs) in the UMRW which contribute bacteria from treated wastewater releases (Table 2 of this Decision Document). MPCA assigned each of these facilities a portion of the bacteria wasteload allocation (WLA).

Table 2: Individual NPDES facilities receiving a portion of the WLA in the Upper Mississippi River bacteria TMDLs

Water body name	Subwatershed Assessment Unit ID	NPDES facility name (permit number)
Little Two River	07010201-516	Upsala WWTF (MNG580053)
Spunk Creek	07010201-525	Avon WWTF (MN0047325)
Watab River, North Fork	07010201-529	Order of St Benedict WWTF (MN0022411)
South Two River	07010201-543	Albany WWTF (MN0020575)
		Bowlus WWTF (MN0020923)
		Holdingford WWTF (MN0023710)
Unnamed Creek	07010203-528	Albertville WWTF (MN0050954)
		Otsego WWTF West (MN0066257)

Municipal Separate Storm Sewer System (MS4) communities: Stormwater from MS4s can transport bacteria to surface water bodies during or shortly after storm events. There are sixty-three (63) regulated MS4 permittees (**Attachment 1: Table A-1** of this Decision Document) which were assigned a portion of categorical wasteload allocations. The categorical WLAs allow permittees to work together to reduce stormwater loads to surface waters and to share the burden of reducing bacteria to achieve TMDL loading capacities.

Combined Sewer Overflows (CSOs): Combined sewer overflow events occur when there is a discharge of untreated sewage and stormwater runoff to surface waters. During periods of heavy rainfall or snowmelt, the wastewater volume in a combined sewer system may exceed the capacity of the sewer system or treatment plant. Under these circumstances, combined sewer systems via CSOs may introduce bacteria to surface waters in the UMRW. MPCA acknowledged the presence of combined sewer overflow events at specific locations in the UMRW (pages 46-47 and Table 4-3 of the final TMDL document).

Sanitary Sewer Overflows (SSOs): Sanitary sewer overflow events occur when there is an emergency discharge of partially treated or untreated sewage to surface waters. SSOs typically occur during periods of heavy precipitation, when WWTFs are overloaded with stormwater. These conditions may lead to the discharge of partially treated or untreated sewage to surface waters. MPCA acknowledged the presence of sanitary sewer overflow events at specific locations in the UMRW (pages 46-47 and Table 4-3 of the final TMDL document).

Concentrated Animal Feedlot Operations (CAFOs): MPCA recognized the presence of CAFOs in the UMRW and mapped CAFO locations in Figures 4-2, 4-3 and 4-4 of the final TMDL document.

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

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 UMRW. 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 UMRW. 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.

Illicit discharges from Subsurface Sewage Treatment Systems (SSTS) or unsewered communities: Failing septic systems are a potential source of bacteria within the UMRW. 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.

Future Growth:
MPCA explained in Section 5.8 of the final TMDL that it does not expect the bacteria load allocations of the UMRW TMDLs to change in the future (page 106 of the final TMDL document). MPCA communicated its procedures for potential expansion of WWTFs in response to population density changes and potential growth scenarios for MS4 communities in Section 5.8 of the final TMDL. Land use within the watershed is expected to remain unchanged for the foreseeable future. The WLA and load allocations (LA) for the UMRW TMDLs were calculated for all current sources. Any expansion of point

or nonpoint sources will need to comply with the respective WLA and LA values calculated in the UMRW 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.

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:

Numeric criteria:

The bacteria water quality standards which apply to UMRW TMDLs are:

Table 3: Bacteria Water Quality Standards Applicable to the UMRW 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
Fecal coliform [1]	# of organisms / 100 mL	The geometric mean of a minimum of 5 samples taken within any calendar month may not exceed 200 organisms
		No more than 10% of all samples collected during any calendar month may individually exceed 2,000 organisms

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

TMDL Target:
The bacteria TMDL targets employed for the UMRW bacteria TMDLs are the *E. coli* standards as stated in Table 3 of this Decision Document. However, the focus of this TMDL is on the 126 organisms (orgs) per 100 mL (126 orgs/100 mL) portion of the standard. 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 UMRW 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.

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.

Comment:

For all *E. coli* TMDLs addressed by the UMRW TMDLs the geometric mean portion (**126 orgs/100 mL**) of the *E. coli* water quality standard was used to set the loading capacity of 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 UMRW 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 UMRW. The UMRW FDCs were developed based on daily stream flow records from 1999-2008. MPCA compiled and assessed flow records from the main stem of the Mississippi River and tributaries from the three HUC-8 watersheds which make up the UMRW (i.e., 07010201, 07010203 and 07010206). Flow data focused on dates within the recreation season (April 1 to October 31). Dates outside of the recreation season were excluded from the flow record. 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 UMRW 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 UMRW 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 in 1998-2008 and 2010-2011 in the UMRW. Water quality monitoring station information and bacteria data summaries were presented in Appendix C and D 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. The individual sampling loads were plotted on the same figure with the created LDC.

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 UMRW were calculated and those results are found in **Attachment 3: Table A-3** 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. MPCA accounted for bacteria inputs from upstream contributing areas by using the following equation (page 102 of the final TMDL document):

TMDL = LCTR – LCUR

where

LCTR: The Loading Capacity of the TMDL Reach = (flow * *E. coli* WQS (126 orgs/100 mL))

LCUR: The Loading Capacity [or Existing Load] of Upstream Reaches not in the TMDL subwatershed = (flow * (*E. coli* WQS (126 orgs/100 mL)) OR monitored *E. coli* geometric mean)

Note: In the equation above 'flow' is an estimate of flow at the most downstream endpoint of a TMDL segment based on area weighted calculations from measured flows at the nearest flow monitoring station.

Table A-3 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 A-3 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.

TMDL reduction calculations:
The reductions from current conditions needed to meet the bacteria WQS were estimated for each segment where data were sufficient (see Table A-3 of this Decision Document). The reductions were calculated based on existing loading estimates of each TMDL segment subtracted from estimated TMDL segment load, which factored in existing loads of upstream segments and WWTF WLAs (Equation 3 on page 108 of the Decision Document). MPCA stated that these estimated reductions are intended to be approximate. The estimated reductions do not account for variability in flow, and bacteria itself can be a highly variable parameter.

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 UMRW bacteria TMDLs. The methods used for determining the TMDL are consistent with U.S. EPA technical memos.[1]

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 UMRW bacteria TMDLs can be attributed to different nonpoint sources. The calculated LA values for the bacteria TMDLs are applicable across all flow conditions in the UMRW (Table A-3 of this Decision Document). MPCA

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[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.

identified several nonpoint sources which contribute bacteria loads to the surface waters in the UMRW (Section 1: *Nonpoint Source Identification* of this Decision Document), including; 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.

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:

MPCA identified NPDES permitted facilities within the UMRW and assigned these facilities a portion of the WLA (Table A-3 of this Decision Document). The WLAs for each of these individual facilities were calculated based on the facility's 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) (page 20 and Table 4-1 of the final TMDL document). MPCA explained 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 UMRW 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.

Continuously discharging municipal WWTF WLAs were calculated based on the average wet weather design flow, equivalent to the wettest 30-days of influent flow expected over the course of a year. Municipal controlled discharge WWTF (pond) WLAs were calculated based on the maximum daily volume that may be discharged in a 24-hour period. MPCA expects the permitted facilities to meet the assigned WLA across all flow conditions.

Table 4: Bacteria loads assigned to NPDES permitted facilities in the Upper Mississippi River Watershed TMDLs

Facility Name	Permit Number [1]	AUID	Values Used to Calculate WLA		WLA
			Flow Information	Concentration	
			Maximum Design Flow	Minnesota bacteria (*E. coli*) WQS	
			(MGD)	*(# orgs / 100 mL)*	*(billions of bacteria/day)*
Upsala WWTF [2]	MNG580053	07010201-516	0.635	126 orgs / 100 mL	3.03
Avon WWTF	MN0047325	07010201-525	0.422	126 orgs / 100 mL	2.01
Order of St. Benedict WWTF	MN0022411	07010201-529	0.242	126 orgs / 100 mL	1.15
Albany WWTF [3]	MN0020575	07010201-543	5.000	126 orgs / 100 mL	23.8
Bowlus WWTF [4]	MN0020923	07010201-543	0.500	126 orgs / 100 mL	2.38
Holdingford WWTF	MN0023710	07010201-543	0.224	126 orgs / 100 mL	1.07
Albertville WWTF	MN0050954	07010203-528	0.930	126 orgs / 100 mL	4.43
Otsego WWTF	MN0066257	07010203-528	0.720	126 orgs / 100 mL	3.43

1 = WWTF permits are regulated for fecal coliform (200 orgs / 100 mL)
2 = Upsala WWTF is a controlled discharge system (i.e., not continuous) - WLA calculations are based on 0.935 MGD maximum permitted flow rate from a 3.9 acre secondary cell
3 = Albany WWTF is a controlled discharge system (i.e., not continuous) - WLA calculations are based on 5.0 MGD maximum permitted flow rate from a 9.66 acre secondary cell
4 = Bowlus WWTF is a controlled discharge system (i.e., not continuous) - WLA calculations are based on 0.5 MGD maximum permitted flow rate from a 1.7 acre secondary cell

MPCA calculated categorical WLAs for MS4 community stormwater contributions for each individual subwatershed (Table A-3 of the Decision Document). **Attachment 2: Table A-2** of this Decision Document summarizes the different MS4 communities which are covered in each categorical WLA calculation on a per subwatershed basis. The categorical WLA was calculated based on areal coverages of: MS4 community boundaries and land use coverages from the 2006 USGS National Land Cover Dataset (NLCD), Minnesota Department of Transportation (MnDOT) roadway areas, and watershed district and other property (ex. colleges and university) boundaries.

The use of a categorical bacteria WLA is consistent with aspects of MPCA guidance [2] for incorporating MS4 stormwater programs into TMDLs. MPCA explained that a categorical WLA is appropriate when each permittee can perform the same stormwater management activities to accomplish the requirements of the TMDL. This situation also occurs when the TMDL prescribes a set of BMPs for more than one stormwater entity and those BMPs alone will achieve the WLA. Also, MPCA explained that a

[2] Minnesota Pollution Control Agency, October 2011. *Supporting Material for Guidance and Policy for Incorporating Stormwater Language into Total Maximum Daily Loads.* Document Number: wq-strm7-03. St. Paul, MN.

categorical WLA may be appropriate when a single MS4 or other entity, such as the Capital Region Watershed District (CRWD), will track BMPs implementation and associated load reductions. MPCA anticipates that MS4 permittees will work together to track progress towards achieving water quality targets and ultimately the load allocations estimated in the UMRW bacteria TMDLs.

MPCA acknowledged the presence of combined sewer overflow and sanitary sewer overflow events at specific locations in the UMRW (pages 46-47 and Table 4-3 of the final TMDL document). MPCA communicated that the Cities of Minneapolis and St. Paul, along with the Metropolitan Council Environmental Services (MCES), have been working together to separate sanitary and storm sewers and to repair older sanitary sewer lines in the Minneapolis/St. Paul region. Due to these efforts, CSO discharges in the Minneapolis/St. Paul region have decreased significantly in the past 30 years. MPCA recognizes that there are still CSO locations in the Minneapolis/St. Paul region and the elimination of these remaining CSO structures may not be feasible due to their necessity for emergency bypasses triggered by extreme storm or flooding events in the region.

MPCA is working with the Cities of Minneapolis and St. Paul and the MCES to upgrade or eliminate the remaining CSOs in the project area and to replace aging infrastructure, which may exacerbate bacteria introduction to storm sewer lines. MPCA is meeting with the permittees outside of the TMDL process and is working toward upgrading the remaining CSO structures. CSOs were not assigned a portion of the WLA in the UMRW bacteria TMDLs (WLA = 0). Similarly, SSOs were not assigned a portion of the WLA in the UMRW bacteria TMDLs (WLA = 0).

MPCA acknowledged CAFO locations in the UMRW on Figures 4-2, 4-3 and 4-4. 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 UMRW bacteria TMDLs.

EPA finds the MPCA's approach for calculating the WLA for the UMRW bacteria TMDLs to be reasonable.

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 use of an explicit Margin of Safety (10% of the loading capacity) for the bacteria TMDLs. The explicit MOS was applied by reserving approximately 10% of the total loading capacity, and then allocating the remaining loads to point and nonpoint sources (Table A-3 of this Decision Document). The use of an explicit MOS accounted for environmental variability in pollutant loading, variability in water quality data (i.e., collected water quality monitoring data), calibration and validation processes of modeling efforts, uncertainty in modeling outputs, and conservative assumptions made during the modeling efforts.

The use of the LDC approach minimized variability associated with the development of the UMRW bacteria TMDLs because the calculation of the loading capacity was a function of flow multiplied by the *E. coli* WQS (126 orgs /100 mL). The MOS was set at 10% to account for uncertainty due to field sampling error and assumptions made during the TMDL development process.

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 UMRW 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.

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:

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 flow measurements from a local USGS flow gages, MCES and Department of Natural Resources (DNR) and MPCA operated stream gages. These flow measurements were collected over a variety of flow conditions observed during the recreation season. LDCs developed from these flow records represented a range of flow conditions within the UMRW 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).

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 UMRW TMDLs provide reasonable assurance that actions identified in the implementation strategy, as discussed in the TMDL in Section 9, will be applied to attain the loading capacities and allocations calculated for the impaired reaches within the UMRW. 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 partners to carry out the suggested actions.

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 some of the implementing programs for ensuring WLA are consistent with the TMDL.

Stormwater discharges associated with MS4s are regulated through National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) permits. The Stormwater Program for MS4s is designed to reduce the amount of pollution that enters surface and groundwater from storm sewer systems to the maximum extent practicable. MS4 Permits require the implementation of Best Management Practices to address WLAs. In addition, the owner or operator is required to develop a stormwater pollution prevention program (SWPPP) that incorporates BMPs applicable to their MS4. The SWPPP must cover six minimum control measures:

- Public education and outreach;
- Public participation/involvement;
- Illicit discharge, detection and elimination;
- Construction site runoff control;
- Post-construction site runoff control; and
- Pollution prevention/good housekeeping.

Many of the MS4 communities included in the UMRW bacteria TMDL have experience in managing nonpoint source pollution. Many MS4 communities have worked with Watershed Districts (MN Statute 103D) or Watershed Management Organizations (MN Statute 103B) to address nonpoint source pollution. Additionally, these MS4 communities have needed to coordinate with local officials from Anoka, Carver, Dakota, Hennepin, Ramsey, Scott and Washington Counties. MPCA explained that MS4 communities also have a history of working together to manage stormwater runoff through Capital Improvement Projects which cross MS4 jurisdictional boundaries.

Watershed Districts and Watershed Management Organizations have taken an active leadership role in developing regional stormwater management solutions that involve multiple MS4s entities. The MPCA developed Minimal Impact Design Standards (MIDS) which represent the next generation of stormwater management. MIDS defines water performance goals for new development and redevelopment that will provide enhanced protection for Minnesota's water resources. MIDS is being incorporated into the State Stormwater Manual and more information can be found at http://www.pca.state.mn.us/veiza8e.

SSTS are regulated by Minnesota Statutes 115.55 and 115.56 which establish minimum technical standards for individual and mid-sized SSTS, a framework for local administration of SSTS programs and statewide licensing and certification of SSTS professionals, SSTS product review and registration, and establishment of the SSTS Advisory Committee. MPCA explained that counties are responsible for regulating SSTS in areas not covered by city or township ordinances. Local government units (LGUs) which regulate SSTS must adopt ordinances which comply with revisions to the SSTS rules. LGUs may enforce ordinances and are responsible for permitting and inspection of new SSTS and for ensuring compliance of existing SSTS when problems are found (page 52 of the final TMDL document).

The MPCA regulates the collection, transportation, storage, processing and disposal of animal manure and other livestock operation wastes at State registered 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.

MPCA has identified local partners which were involved in the development of the UMRW bacteria TMDLs. It is anticipated that some of these partners will be some of the leading member organizations which will work to improve water quality within the UMRW. 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 UMRW: the Cities of Minneapolis and St. Paul, county representatives, municipal representatives, county level Soil and Water Conservation Districts (SWCD), watershed districts, watershed management organizations (WMOs), MCES, and other river organizations. A list of stakeholder organizations which participated in UMRW TMDL process is provided in Appendix A (Table A-1 of the final TMDL document).

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 bacteria effluent 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.

Various funding mechanisms will be utilized to execute the recommendations made in the implementation section of this TMDL. MPCA is in the process of developing Watershed Restoration and Protection Strategies (WRAPS) for all basins in the state. MPCA will incorporate the loadings and implementation recommendations described in this TMDL to ongoing or yet to be developed WRAPS. Funding for implementation efforts will be a mixture of local, state and federal funding vehicles. Local funding may be through SWCD cost-share funds, Natural Resources Conservation Service (NRCS) cost-share funds, and local government cost-share funds. Federal funding, via the Section 319 grants program, may provide money to implement voluntary nonpoint source programs within the UMRW. State efforts may be via Clean Water Legacy Act (CWLA) grant money and the Minnesota Clean Water Partnership program.

Clean Water Legacy Act: The CWLA is a statute passed in Minnesota in 2006 for the purposes of protecting, restoring, and preserving Minnesota water and providing the funding to do so. The Act discusses how MPCA and the involved public agencies and private entities will coordinate efforts regarding land use, land management, water management, etc. Cooperation is also expected between agencies and other entities regarding planning efforts, and various local authorities and responsibilities. This would also include informal and formal agreements to jointly use technical, educational, and financial resources. The CWLA provides the process to be used in Minnesota to develop TMDL implementation plans, which detail the restoration activities needed to achieve the allocations in the TMDL. The TMDL implementation plans are required by the State to obtain funding from the Clean Water Fund. MPCA expects the implementation plans to be developed within a year of TMDL approval.

The CWLA also provides details on public and stakeholder participation, and how the funding will be used. The implementation plans are required to contain ranges of cost estimates for point and nonpoint source load reductions, as well as monitoring efforts to determine effectiveness. MPCA has developed guidance on what is required in the implementation plans which includes cost estimates, general timelines for implementation, and interim milestones and measures. The Minnesota Board of Soil and Water Resources administers the Clean Water Fund as well, and has developed a detailed grants policy explaining what is required to be eligible to receive Clean Water Fund money (FY '11 Clean Water Fund Competitive Grants Policy; Minnesota Board of Soil and Water Resources, 2011).

The EPA finds that 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:
River and stream monitoring in the UMRW 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 UMRW should continue in order to build on the current water quality dataset and track changes based on implementation progress. Section 11 of the final TMDL document outlines the water monitoring efforts in the UMRW. 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., Benton County SWCD) as long as there is sufficient funding to support the efforts of these local entities. At a minimum, the subwatersheds of the UMRW 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 UMRW. Water quality information will aid watershed managers in understanding how BMP pollutant removal efforts are impacting water quality within the UMRW. 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 UMRW. 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.

The EPA finds that this criterion has been adequately addressed.

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:
Implementation strategies are outlined in Section 9 of the final TMDL document. MPCA outlined the importance of prioritizing areas within the UMRW, education and outreach efforts with local partners, and partnering with local stakeholders to improve water quality within the watershed. Reduction goals for the bacteria TMDLs may be met via components of the following strategies:

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 UMRW.

Stormwater wetland treatment systems: Constructed wetlands with the purpose of treating wastewater or stormwater inputs could be explored in selected areas of the UMRW. 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 UMRW.

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.

Wastewater system maintenance and improvements: Replacement of aging infrastructure of large community or regional wastewater treatment facilities should be explored in the UMRW to reduce inflow and infiltration through damaged sewer lines. These efforts may focus on repairing or upgrading aged sewer lines within the communities which those facilities serve, as well as infrastructure on the grounds of the wastewater facility. Additionally, improvements to infrastructure may reduce the incidence of CSO and SSO events and could improve the efficiency of wastewater treatment facilities.

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.

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 8 (Stakeholder Participation) of the final TMDL document. Throughout the development of the UMRW TMDLs the public was given opportunity to participate in the development of the UMRW bacteria TMDLs. MPCA held annual stakeholder meetings in either Minneapolis or Elk River, Minnesota from 2008 to 2013.[3] Members of the general public and local partners were invited to these annual meetings where MPCA updated those in attendance on the progress of the UMRW TMDL. MPCA worked with numerous local partners throughout the development of the bacteria TMDLs.[4]

The draft TMDL was posted online by MPCA at (http://www.pca.state.mn.us/water/tmdl). The 30-day public comment period was started on April 7, 2014 and ended on May 6, 2014. MPCA received nine public comments during the public comment period.

A comment was submitted by the Bassett Creek Watershed Management Commission (BCWMC) which requested that MPCA provide additional explanation related to reclassifying Plymouth Creek (07010206-526) and Bassett Creek (North Branch) (07010206-552) as 4C designated waters, the appropriateness of the Water Quality Risk GIS layer in the development of the UMRW TMDLs, livestock and septic inputs in the Bassett Creek subwatershed, Plymouth Creek monitoring data updates and additional discussion of the microbial source tracking study. MPCA provided answers to each of the BCWMC's comments and updated the final UMRW document accordingly.

A comment was shared by the Friends of the Mississippi River (FMR) which appealed for MPCA to provide discussion in the TMDL document to address the following areas: an outline of MPCA's plans to complete additional sampling in the Mississippi River watershed (i.e., filling in some of the data gaps of the current water quality data set), follow up activities related to CSO and ITPHS septic elimination, application of biosolids and state authority over that practice, animal unit classifications, state roles in wildlife bacteria reduction efforts and other assumptions made by MPCA in the UMRW bacteria TMDL Study. MPCA answered each of FMR's concerns and provided additional discussion, where appropriate, in the final UMRW TMDL document.

A comment was submitted by the Minnesota Department of Agriculture (MDA) which requested that MPCA provide additional explanation regarding MPCA's calculation of livestock animal estimates and a referenced study on the movement of bacteria in agricultural soils and subsurface drainage systems. MDA had additional inquiries related to assumptions made by MPCA during the development of the UMRW TMDL. MPCA answered the requests of MDA, provided explanation to MDA's inquiries and, where appropriate, updated the TMDL document.

The City of Findlay, Minnesota submitted comments to MPCA which requested that MPCA improve the quality of figures in the draft TMDL report, revisit priority area tables for St. Paul and Vadnais, and update cost estimate tables and paragraphs of the draft TMDL document. MPCA answered the requests of the City of Findlay and agreed to update language and figures in the final UMRW TMDL.

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[3] MPCA Upper Mississippi River Basin bacteria TMDL webpage: http://www.pca.state.mn.us/index.php/water/water-types-and-programs/minnesotas-impaired-waters-and-tmdls/tmdl-projects/upper-mississippi-river-basin-tmdl/project-upper-mississippi-river-bacteria.html

[4] Appendix A of the final Upper Mississippi River Bacteria TMDL Study

Commenter Matt Johnson and the Minnesota Department of Health (MDH) communicated their support of the linkage of surface water quality to drinking water quality in the UMRW. MDH also expressed its appreciation of working with MPCA on the UMRW bacteria TMDLs. MPCA recommended that both commenters continue to support this project effort via implementation efforts coordinated by the WRAPS.

The Minnesota Department of Transportation identified certain deficiencies within the draft TMDL regarding MPCA explanation of sources, reasonable assurance, reserve capacity and future growth, NPDES construction stormwater contributions, water quality data and segments included on the draft 2014 303(d) list. MPCA answered each of the concerns presented by MnDOT and updated the final TMDL document where appropriate. MPCA explained that reasonable assurance of MS4 TMDL WLA would be based on the permittee's ability to demonstrate that it is completing interim improvements (i.e., milestones) as part of the SWPPP.

The Metropolitan Council asked for verification that MCES wastewater treatment facilities would not be affected by the UMRW bacteria TMDL, that MS4 communities will be required to reduce bacteria loadings, and recommended that MPCA tailor its implementation efforts in certain areas of the UMRW to better enforce existing rules and ordinances related to failing septic systems, manure spreading and excessive pet wastes. MPCA answered that WLAs were assigned to certain facilities in the UMRW and that MCES should revisit the detail provided in the TMDL, that MS4 communities in each segment must work together to not exceed the sum of loading from all MS4s in that particular subwatershed, that MPCA would continue to work with the Cities of Minneapolis and St. Paul to improve infrastructure (ex. separation of sanitary and storm sewers and repair older sanitary sewer lines), and that MPCA would take Metropolitan Council's recommendations under consideration when developing MPCA WRAPS and other implementation strategies.

The United States Department of the Interior (DOI) submitted questions and comments on the UMRW bacteria TMDLs. DOI requested explanation on a series of questions related to MPCA protocols and procedures for segments with insufficient water quality data, newly identified impaired segments and how those would be addressed in the context of this TMDL, land application of septage and other concerns. MPCA answer each of the questions and requests for additional explanation presented by the DOI.

EPA believes that MPCA adequately addressed each of these comments and updated the final TMDL with appropriate language to address these comments. The MPCA submitted all of the public comments and responses in the final TMDL submittal packet received by the EPA on August 25, 2014.

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 Upper Mississippi River watershed bacteria TMDL document, submittal letter and accompanying documentation from MPCA on August 25, 2014. The transmittal letter explicitly stated that the following final TMDLs were being submitted to EPA pursuant to Section 303(d) of the Clean Water Act for EPA review and approval. The segments of the UMRW bacteria TMDLs are:

- Little Two River (07010201-516);
- Two River (07010201-523);
- Spunk Creek (07010201-525);
- Watab Creek (07010201-528);
- Watab River (North Fork) (07010201-529);
- County Ditch 12 (07010201-537);
- South Two River (07010201-543);
- Watab River (South Fork) (07010201-554);
- County Ditch 13 (07010201-564);
- Unnamed Creek (07010203-528);
- Silver Creek (07010203-557);
- Unnamed Creek (Luxemburg Creek) (07010203-561);
- Plum Creek (07010203-572);
- Johnson Creek (Meyer Creek) (07010203-635);
- Johnson Creek (Meyer Creek) (07010203-639);
- Unnamed Creek (Robinson Hill Creek) (07010203-724);
- Shingle Creek (County Ditch 13) (07010206-506);
- Unnamed Creek (Plymouth Creek) (07010206-526);
- Bassett Creek (07010206-538);
- Unnamed Creek (Interstate Valley Creek (07010206-542);
- Unnamed Creek (North Branch Bassett Creek (07010206-552); and
- Rice Creek (07010206-584).

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 three watersheds as they appear 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.

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

13. Conclusion

After a full and complete review, the EPA finds that the Upper Mississippi River Watershed bacteria TMDLs satisfy all of the elements of approvable TMDLs. This TMDL approval is for **22 bacteria** TMDLs for aquatic recreational use impairments.

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 A-1: Regulated MS4 Permittees recognized in the Upper Mississippi River Watershed which are a part of categorical WLAs

Attachment 2: Table A-2: Regulated MS4 Permittees recognized in the Upper Mississippi River Watershed which are a part of categorical WLAs and AUID\

Attachment 3: Table A-3: Bacteria TMDLs for the Upper Mississippi River watershed segments in HUC-8 watersheds 07010201, 07010203 and 07010206

Table A-1: Regulated MS4 Permittees recognized in the Upper Mississippi River Watershed which are a part of categorical WLAs

MS4s In TMDL Subwatershed (MS4 Permit ID)
Anoka County (MS400066)
Arden Hills City (MS400002)
Birchwood Village City (MS400004)
Blaine City (MS400075)
Brockway Township (MS400068)
Brooklyn Center City (MS400006)
Brooklyn Park City (MS400007)
Centerville City (MS400078)
Century College (MS400171)
Circle Pines City (MS400009)
Columbia Heights City (MS400010)
Crystal City (MS400012)
Dakota County (MS400132)
Dellwood City (MS400084)
Falcon Heights City (MS400018)
Forest Lake City (MS400262)
Fridley City (MS400019)
Golden Valley City (MS400021)
Grant City (MS400091)
Hennepin County (MS400138)
Hennepin Technical College Brooklyn Park (MS400198)
Hugo City (MS400094)
Inver Grove Heights City (MS400096)
Lauderdale City (MS400026)
Le Sauk Township (MS400143)
Lexington City (MS400027)
Lilydale City (MS400028)
Lino Lakes City (MS400100)
Mahtomedi City (MS400031)
Maple Grove City (MS400102)
Medicine Lake City (MS400104)
Mendota Heights City (MS400034)
Minneapolis Municipal Storm Water (MN0061018)
Minnesota Correctional-Lino Lakes (MS400177)
Minnetonka City (MS400035)
MnDOT Metro District (MS400170)
Mounds View City (MS400037)
New Brighton City (MS400038)
New Hope City (MS400039)
North Hennepin Community College (MS400205)
North Oaks City (MS400109)
Osseo City (MS400043)
Plymouth City (MS400112)
Ramsey County Public Works (MS400191)
Robbinsdale City (MS400046)
Roseville City (MS400047)

Sartell City (MS400048)
Shoreview City (MS400121)
Spring Lake Park City (MS400050)
St Anthony Village City (MS400051)
St Cloud City (MS400052)
St Joseph Township (MS400157)
St Louis Park City (MS400053)
St Michael City (MS400246)
Stearns County (MS400159)
Sunfish Lake City (MS400055)
University of Minnesota – Twin Cities Campus (MS400212)
Waite Park City (MS400127)
Washington County (MS400160)
West St Paul City (MS400059)
White Bear Lake City (MS400060)
White Bear Township (MS400163)
Willernie City (MS400061)

Table A-2: Regulated MS4 Permittees recognized in the Upper Mississippi River Watershed which are a part of categorical WLAs and AUID information

AUID	Reach Name	MS4 Permittees (MS4 Permit ID)
07010201-523	Two River	Brockway Township (MS400068)
07010201-525	Spunk Creek	Brockway Township (MS400068)
07010201-528	Watab River	Le Sauk Township (MS400143)
		Sartell City (MS400048)
		St Cloud City (MS400052)
		St Joseph City (MS400125)
		St Joseph Township (MS400157)
		Stearns County (MS400159)
07010201-529	Watab River (North Fork)	St Joseph Township (MS400157)
07010201-537	County Ditch 12	Brockway Township (MS400068)
07010201-554	Watab River (South Fork)	St Joseph City (MS400125)
		St Joseph Township (MS400157)
		Stearns County (MS400159)
07010201-564	County Ditch 13	Brockway Township (MS400068)
		Le Sauk Township (MS400143)
		Sartell City (MS400048)
07010203-528	Unnamed Creek	Otsego City (MS400243)
		St Michael City (MS400246)
07010203-572	Plum Creek	St Cloud City (MS400052)
07010203-639	Johnson Creek (Meyer Creek)	St Cloud City (MS400052)
07010203-724	Unnamed Creek (Robinson Hill Creek)	St Cloud City (MS400052)
		Stearns County (MS400159)
		Waite Park City (MS400127)
07010206-506	Shingle Creek (County Ditch 13)	Brooklyn Center City (MS400006)
		Brooklyn Park City (MS400007)
		Crystal City (MS400012)
		Hennepin County (MS400138)
		Hennepin Technical College Brooklyn Park (MS400198)
		Maple Grove City (MS400102)
		Minneapolis Municipal Storm Water (MN0061018)
		MnDOT Metro District (MS400170)
		New Hope City (MS400039)
		North Hennepin Community College (MS400205)
		Osseo City (MS400043)
		Plymouth City (MS400112)
		Robbinsdale City (MS400046)
07010206-526	Unnamed Creek (Plymouth Creek)	Hennepin County (MS400138)
		MnDOT Metro District (MS400170)
		Minnetonka City (MS400035)
		Plymouth City (MS400112)

07010206-538	Bassett Creek	Crystal City (MS400012)
		Golden Valley City (MS400021)
		Hennepin County (MS400138)
		Medicine Lake City (MS400104)
		Minneapolis Municipal Storm Water (MN0061018)
		Minnetonka City (MS400035)
		MnDOT Metro District (MS400170)
		New Hope City (MS400039)
		Plymouth City (MS400112)
		Robbinsdale City (MS400046)
		St Louis Park City (MS400053)
07010206-542	Unnamed Creek (Interstate Valley Creek)	Dakota County (MS400132)
		Inver Grove Heights City (MS400096)
		Lilydale City (MS400028)
		Mendota Heights City (MS400034)
		MnDOT Metro District (MS400170)
		Sunfish Lake City (MS400055)
		West St Paul City (MS400059)
07010206-552	Unnamed Creek (North Branch Bassett Creek)	Crystal City (MS400012)
		Golden Valley City (MS400021)
		Hennepin County (MS400138)
		MnDOT Metro District (MS400170)
		New Hope City (MS400039)
		Plymouth City (MS400112)
07010206-584	Rice Creek	Anoka County (MS400066)
		Arden Hills City (MS400002)
		Birchwood Village City (MS400004)
		Blaine City (MS400075)
		Centerville City (MS400078)
		Century College (MS400171)
		Circle Pines City (MS400009)
		Columbia Heights City (MS400010)
		Dellwood City (MS400084)
		Falcon Heights City (MS400018)
		Forest Lake City (MS400262)
		Fridley City (MS400019)
		Grant City (MS400091)
		Hennepin County (MS400138)
		Hugo City (MS400094)
		Lauderdale City (MS400026)
		Lexington City (MS400027)
		Lino Lakes City (MS400100)
		Mahtomedi City (MS400031)
		Minneapolis Municipal Storm Water (MN0061018)
		Minnesota Correctional-Lino Lakes (MS400177)

		MnDOT Metro District (MS400170)
		Mounds View City (MS400037)
		New Brighton City (MS400038)
		North Oaks City (MS400109)
		Ramsey County Public Works (MS400191)
		Roseville City (MS400047)
		Shoreview City (MS400121)
		Spring Lake Park City (MS400050)
		St Anthony Village City (MS400051)
		University of Minnesota – Twin Cities Campus (MS400212)
		White Bear Lake City (MS400060)
		White Bear Township (MS400163)
		Willernie City (MS400061)
		Washington County (MS400160)

Table A-3: Bacteria TMDLs for the Upper Mississippi River watershed segments in HUC-8 watersheds 07010201, 07010203 and0 7010206

Flow Regime TMDL analysis bacteria Load (billions of bacteria / day)	High Flow Conditions	Moist Flow Conditions	Mid Range Flow Conditions	Dry Flow Conditions	Low Flow Conditions
Duration Interval	0-10%	10-40%	40-60%	60-90%	90-100%
TMDL - Little Two River (07010201-516)					
Existing Load (estimated)	72.300	136.000	55.000	93.500	ID
Reduction	0%	73%	60%	86%	--
TMDL - Little Two River (07010201-516)	**95.030**	**44.370**	**27.810**	**18.030**	**9.933**
Wasteload Allocation (WLA) -Upsala WWTF (MNG580053)	3.030	3.030	3.030	3.030	3.030
Load Allocation (LA)	82.500	36.900	22.000	13.200	5.910
Margin Of Safety (MOS) (10%)	9.500	4.440	2.780	1.800	0.993
TMDL - Two River (07010201-523)					
Existing Load (estimated)	169.000	239.000	IDUL	IDUL	ID
Reduction	82%	94%	0%	0%	--
TMDL - Two River (07010201-523)	**32.974**	**16.033**	**10.003**	**6.605**	**3.499**
Wasteload Allocation (WLA) - MS4s	0.274	0.133	0.083	0.055	0.029
Load Allocation (LA)	29.400	14.300	8.920	5.890	3.120
Margin Of Safety (MOS) (10%)	3.300	1.600	1.000	0.660	0.350
TMDL - Spunk Creek (07010201-525)					
Existing Load (estimated)	116.000	756.000	176.000	189.000	ID
Reduction	0%	84%	58%	75%	--
TMDL - Spunk Creek (07010201-525)	**286.76**	**134.36**	**84.00**	**54.43**	**30.01**
Wasteload Allocation (WLA) - Avon WWTF (MN0047325)	2.010	2.010	2.010	2.010	2.010
Wasteload Allocation (WLA) - MS4s	2.050	0.948	0.588	0.375	0.200
Load Allocation (LA)	254.000	118.000	73.000	46.600	24.800
Margin Of Safety (MOS) (10%)	28.700	13.400	8.400	5.440	3.000
TMDL - Watab River (07010201-528)					
Existing Load (estimated)	137.000	65.400	IDUL	IDUL	ID
Reduction	57%	56%	0%	0%	--
TMDL - Watab River (07010201-528)	**65.73**	**31.88**	**14.69**	**9.69**	**4.04**
Wasteload Allocation (WLA) - MS4s	9.460	4.590	2.120	1.400	0.582
Load Allocation (LA)	49.700	24.100	11.100	7.320	3.050
Margin Of Safety (MOS) (10%)	6.570	3.190	1.470	0.969	0.404
TMDL - Watab River (North Fork) (07010201-529)					
Existing Load (estimated)	ID	45.700	60.200	18.500	ID
Reduction	--	34%	74%	59%	--
TMDL - Watab River (North Fork) (07010201-529)	**83.12**	**34.80**	**18.65**	**9.64**	**5.09**
Wasteload Allocation (WLA) -Order of St. Benedict WWTF (MN0022411)	1.150	1.150	1.150	1.150	1.150
Wasteload Allocation (WLA) - MS4s	0.655	0.269	0.139	0.067	0.031

Load Allocation (LA)	73.000	29.900	15.500	7.460	3.400
Margin Of Safety (MOS) (10%)	8.310	3.480	1.860	0.964	0.509
TMDL - County Ditch 12 (07010201-537)					
Existing Load (estimated)	ID	29.900	23.100	7.470	ID
Reduction	--	0%	0%	0%	--
TMDL - County Ditch 12 (07010201-537)	**81.63**	**34.23**	**18.29**	**9.47**	**5.00**
Wasteload Allocation (WLA) - MS4s	0.268	0.112	0.060	0.031	0.016
Load Allocation (LA)	73.200	30.700	16.400	8.490	4.480
Margin Of Safety (MOS) (10%)	8.160	3.420	1.830	0.947	0.500
TMDL - South Two River (07010201-543)					
Existing Load (estimated)	ID	230.000	245.000	291.000	206.00
Reduction	--	18%	56%	79%	0.900
TMDL - South Two River (07010201-543)	**513.65**	**240.25**	**150.25**	**97.39**	**53.62**
Wasteload Allocation (WLA) - Albany WWTF (MN0020575)	23.800	23.800	23.800	23.800	23.800
Wasteload Allocation (WLA) - Bowlus WWTF (MN0020923)	2.380	2.380	2.380	2.380	2.380
Wasteload Allocation (WLA) - Holdingford WWTF (MN0023710)	1.070	1.070	1.070	1.070	1.070
Load Allocation (LA)	435.000	189.000	108.000	60.400	21.000
Margin Of Safety (MOS) (10%)	51.400	24.000	15.000	9.740	5.370
TMDL - Watab River (South Fork) (07010201-554)					
Existing Load (estimated)	ID	82.900	84.700	29.100	ID
Reduction	--	44%	71%	56%	--
TMDL - Watab River (South Fork) (07010201-554)	**122.85**	**51.33**	**27.47**	**14.25**	**7.51**
Wasteload Allocation (WLA) - MS4s	4.550	1.900	1.020	0.525	0.278
Load Allocation (LA)	106.000	44.300	23.700	12.300	6.480
Margin Of Safety (MOS) (10%)	12.300	5.130	2.750	1.420	0.751
TMDL - County Ditch 13 (07010201-564)					
Existing Load (estimated)	ID	23.000	29.700	9.520	ID
Reduction	--	45%	77%	63%	--
TMDL - Watab River (07010201-528)	**33.57**	**14.13**	**7.53**	**3.90**	**2.07**
Wasteload Allocation (WLA) - MS4s	2.910	1.220	0.653	0.338	0.179
Load Allocation (LA)	27.300	11.500	6.120	3.170	1.680
Margin Of Safety (MOS) (10%)	3.360	1.410	0.753	0.390	0.206
TMDL - Unnamed Creek (07010203-528)					
Existing Load (estimated)	169.000	43.300	15.600	ID	ID
Reduction	66%	54%	64%	--	--
TMDL - Unnamed Creek (07010203-528)	**72.54**	**31.04**	**15.00**	**9.65**	**0.62**
Wasteload Allocation (WLA) -Albertville WWTF (MN0050954)	4.430	4.430	4.430	4.430	EQN
Wasteload Allocation (WLA) -Otsego WWTF (MN0066257)	3.430	3.430	3.430	3.430	EQN
Wasteload Allocation (WLA) - MS4s	6.830	2.380	0.671	0.098	EQN

Load Allocation (LA)	50.600	17.700	4.970	0.727	EQN
Margin Of Safety (MOS) (10%)	7.250	3.100	1.500	0.965	0.622
TMDL - Silver Creek (07010203-557)					
Existing Load (estimated)	38.100	61.100	36.600	14.200	10.80
Reduction	0%	0%	1.6%	18%	46%
TMDL - Silver Creek (07010203-557)	**295.50**	**110.00**	**40.00**	**12.89**	**6.46**
Wasteload Allocation (WLA)	0.000	0.000	0.000	0.000	0.000
Load Allocation (LA)	266.000	99.000	36.000	11.600	5.810
Margin Of Safety (MOS) (10%)	29.500	11.000	4.000	1.290	0.646
TMDL - Unnamed Creek (Luxemburg Creek) (07010203-561)					
Existing Load (estimated)	ID	53.700	52.800	21.000	ID
Reduction	--	56%	76%	69%	--
TMDL - Unnamed Creek (Luxemburg Creek) (07010203-561)	**63.22**	**26.55**	**14.22**	**7.33**	**3.87**
Wasteload Allocation (WLA)	0.000	0.000	0.000	0.000	0.000
Load Allocation (LA)	56.900	23.900	12.800	6.600	3.480
Margin Of Safety (MOS) (10%)	6.320	2.650	1.420	0.733	0.387
TMDL - Plum Creek (07010203-572)					
Existing Load (estimated)	ID	41.500	43.100	11.800	ID
Reduction	--	0%	43%	0%	--
TMDL - Plum Creek (07010203-572)	**121.12**	**50.57**	**27.12**	**14.00**	**7.41**
Wasteload Allocation (WLA) - MS4s	0.024	0.010	0.005	0.003	0.001
Load Allocation (LA)	109.000	45.500	24.400	12.600	6.670
Margin Of Safety (MOS) (10%)	12.100	5.060	2.710	1.400	0.741
TMDL - Johnson Creek (Meyer Creek) (07010203-635)					
Existing Load (estimated)	ID	118.000	41.900	12.400	ID
Reduction	--	89%	83%	70%	--
TMDL - Johnson Creek (Meyer Creek) (07010203-635)	**36.00**	**15.11**	**8.00**	**4.17**	**2.21**
Wasteload Allocation (WLA)	0.000	0.000	0.000	0.000	0.000
Load Allocation (LA)	32.400	13.600	7.200	3.750	1.990
Margin Of Safety (MOS) (10%)	3.600	1.510	0.800	0.417	0.221
TMDL - Johnson Creek (Meyer Creek) (07010203-639)					
Existing Load (estimated)	720.000	1520.000	678.000	399.000	ID
Reduction	87%	97%	97%	97%	--
TMDL - Johnson Creek (Meyer Creek) (07010203-639)	**102.02**	**43.13**	**22.89**	**11.85**	**6.31**
Wasteload Allocation (WLA) - MS4s	3.120	1.320	0.701	0.364	0.193
Load Allocation (LA)	88.700	37.500	19.900	10.300	5.490
Margin Of Safety (MOS) (10%)	10.200	4.310	2.290	1.190	0.631
TMDL - Unnamed Creek (Robinson Hill Creek) (07010203-724)					
Existing Load (estimated)	ID	48.600	42.800	13.700	ID
Reduction	--	53%	71%	54%	--

TMDL - Unnamed Creek (Robinson Hill Creek) (07010203-724)	**60.51**	**25.32**	**13.57**	**7.02**	**3.71**
Wasteload Allocation (WLA) - MS4s	4.060	1.690	0.911	0.470	0.249
Load Allocation (LA)	50.400	21.100	11.300	5.850	3.090
Margin Of Safety (MOS) (10%)	6.050	2.530	1.360	0.702	0.371
TMDL - Shingle Creek (County Ditch 13) (07010206-506)					
Existing Load (estimated)	602.000	142.000	87.900	11.100	4.91
Reduction	61%	43%	69%	13%	68%
TMDL - Shingle Creek (County Ditch 13) (07010206-506)	**263.20**	**89.33**	**29.94**	**10.70**	**1.74**
Wasteload Allocation (WLA) - MS4s	202.000	68.400	22.900	8.190	1.330
Load Allocation (LA)	34.900	12.000	4.050	1.440	0.238
Margin Of Safety (MOS) (10%)	26.300	8.930	2.990	1.070	0.174
TMDL - Unnamed Creek (Plymouth Creek) (07010206-526)					
Existing Load (estimated)	149.000	48.600	40.700	2.450	ID
Reduction	51%	41%	74%	0%	--
TMDL - Unnamed Creek (Plymouth Creek) (07010206-526)	**80.33**	**31.89**	**11.60**	**5.11**	**2.09**
Wasteload Allocation (WLA) - MS4s	61.100	24.300	8.830	3.890	1.590
Load Allocation (LA)	11.200	4.400	1.610	0.707	0.295
Margin Of Safety (MOS) (10%)	8.030	3.190	1.160	0.511	0.209
TMDL - Bassett Creek (07010206-538)					
Existing Load (estimated)	861.000	23.1.	4.400	19.400	7.30
Reduction	79%	0%	0%	30%	37%
TMDL - Bassett Creek (07010206-538)	**197.50**	**77.44**	**28.41**	**15.14**	**5.10**
Wasteload Allocation (WLA) - MS4s	138.000	54.100	19.900	10.600	3.560
Load Allocation (LA)	39.800	15.600	5.670	3.030	1.030
Margin Of Safety (MOS) (10%)	19.700	7.740	2.840	1.510	0.509
TMDL - Unnamed Creek (Interstate Valley Creek) (07010206-542)					
Existing Load (estimated)	57.700	37.600	4.700	1.430	0.27
Reduction	31%	57%	0%	0%	33%
TMDL - Unnamed Creek (Interstate Valley Creek) (07010206-542)	**44.33**	**17.81**	**6.72**	**1.98**	**0.20**
Wasteload Allocation (WLA) - MS4s	26.900	10.800	4.080	1.200	0.120
Load Allocation (LA)	13.000	5.230	1.970	0.578	0.058
Margin Of Safety (MOS) (10%)	4.430	1.780	0.672	0.198	0.020
TMDL - Unnamed Creek (North Branch - Bassett Creek) (07010206-552)					
Existing Load (estimated)	ID	70.300	31.300	12.200	9.70
Reduction	--	84%	87%	85%	92%
TMDL - Unnamed Creek (North Branch - Bassett Creek) (07010206-552)	**32.12**	**12.71**	**4.63**	**2.04**	**0.83**
Wasteload Allocation (WLA) - MS4s	26.700	10.600	3.850	1.690	0.692
Load Allocation (LA)	2.210	0.839	0.317	0.145	0.058
Margin Of Safety (MOS) (10%)	3.210	1.270	0.463	0.204	0.083

TMDL - Rice Creek (07010206-584)					
Existing Load (estimated)	684.000	312.000	130.000	ID	ID
Reduction	0%	4.8%	44%	--	--
TMDL - Rice Creek (07010206-584)	**1350.00**	**329.80**	**80.78**	**16.81**	**5.99**
Wasteload Allocation (WLA) - MS4s	396.000	96.800	23.600	4.930	1.750
Load Allocation (LA)	819.000	200.000	49.100	10.200	3.640
Margin Of Safety (MOS) (10%)	135.000	33.000	8.080	1.680	0.599

ID = Insufficient Data: One or more reaches (either TMDL reach or upstream reaches) lack monitoring data for the calculation of the TMDL and/or the existing load attributable to the TMDL subwatershed

IDUL = Impairment due to upstream load: The existing load from the TMDL subwatershed appears to be insignificant

EQN = The WLAs and LA for this reach are represented by Equation 2 on page 104 in Section 5.5.2 *(WLAs and LA for TMDL reach 07010203-528 - Unnamed Creek)*