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

DEC 11 2013

REPLY TO THE ATTENTION OF WW-16J

Rebecca J. Flood, Assistant Commissioner
Regional Environmental Management Division
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 Load (TMDL) for one segment of the Poplar River (ID#04010101-613) in northeastern Minnesota, including supporting documentation and follow up information. The Poplar River flows southward into Lake Superior. The TMDL was calculated for Total Suspended Solids (TSS) to address the turbidity impairment. The designated use impairment for the river is aquatic recreational use, classified as Class 2A water and is defined as and protected for aquatic life (cold water sport or commercial fish and associated aquatic life, and their habitats) and recreation (all water recreational activities including bathing); this class includes protection as a source of drinking water.

This TMDL meets the requirements of Section 303(d) of the Clean Water Act and EPA's implementing regulations at 40 C.F.R. Part 130. Therefore, EPA hereby approves Minnesota's TMDL for TSS. The statutory and regulatory requirements, and EPA's review of Minnesota's compliance with each requirement, are described in the enclosed decision document. We wish to acknowledge Minnesota's effort in submitting this TMDL, 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,

Tinka G. Hyde
Director, Water Division

Enclosure

cc: Jeff Risberg, MPCA
Celine Lyman, MPCA
Karen Evens, MPCA

TMDL: Poplar River, Minnesota
Date: December 2013

DECISION DOCUMENT FOR THE APPROVAL OF POPLAR RIVER, MINNESOTA, TMDL

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 Waterbody, Pollutant of Concern, Pollutant Sources, and Priority Ranking

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

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

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

(1) the spatial extent of the watershed in which the impaired waterbody is located;
(2) the assumed distribution of land use in the watershed (e.g., urban, forested, agriculture);
(3) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources;

(4) present and future growth trends, if taken into consideration in preparing the TMDL (e.g., the TMDL could include the design capacity of a wastewater treatment facility); and (5) an explanation and analytical basis for expressing the TMDL through *surrogate measures*, if applicable. *Surrogate measures* are parameters such as percent fines and turbidity for sediment impairments; chlorophyll *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

Comment:

Location Description/Spatial Extent: The Poplar River TMDL is submitted by the Minnesota Pollution Control Agency (MPCA). Information from the Poplar River Turbidity Assessment[1] (Assessment document) completed in 2008 is critical to understanding the project and contributed analysis and source assessment to this TMDL; the Assessment document is included in the Administrative Record of this Decision Document.

Section 1.3.1 of the final TMDL states that the Poplar River watershed is located in Cook County, Minnesota, in northeastern Minnesota and flows into Lake Superior; the watershed covers approximately 114 square miles and the Poplar River is 25.5 miles long with the lower 2.73 miles listed as impaired for turbidity. This submittal is for one TMDL for Total Suspended Solids (TSS) addressing the turbidity impairment in Assessment Unit (AU) ID# 04010101-613.

The headwaters begin on a plateau in the Boundary Waters Canoe Area where there is a relatively low gradient with wide river channels, wide meanders, and little erosion. Vegetation is dense and includes willows, reeds, and other grasses. Further downstream is a transition to the Lower Poplar River where the gradient increases after the river flows over an escarpment. Downstream of the escarpment is defined at a bridge crossing of the Superior Hiking Trail; the channel changes and is defined by bedrock, lacustrine beach, glacial deposits, and steep slopes. There are many waterfalls flowing from the upper watershed to the lower watershed. Section 1.3.3 of the final TMDL states that the watershed soils are primarily glacial deposits and the river is located between two lobes of glacial deposits. The glacial till moraine deposits are gravelly-loamy in the upper watershed and clayey in the lower watershed. Soils are developed at various depths above these moraines and bedrock. Section 1.3.6 of the final TMDL describes the lower valley as changing from a stream on a Midwest plain to a stream with mountain drainage characteristics. The downstream portion of the stream is located in a former glaciated valley approximately 120 - 250 feet deep and 500 - 1000 feet wide, with side slopes of 18% - 50%, without a well-defined floodplain.

Land Use: Categories of land use in the watershed are forest (77%), wetland (19%), grassland (1%), open water (1%), bare land (1%) and agriculture (1%). Within these categories, approximately 3.5% is urbanized.

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[1] RTI, 2008b. Poplar River Turbidity: Physical Channel Assessment. Prepared for USEPA Region 5, 77 West Jackson, Chicago, IL 60604. Prepared under contract 68-C02-110. February 4, 2008. http://www.pca.state.mn.us/index.php/water/water-types-and-programs/minnesotas-impaired-waters-and-tmdls/tmdl-projects/lake-superior-basin-tmdl/project-poplar-river-turbidity.html

Problem Identification

Section 1.3.7 of the final TMDL states that the Poplar River's aquatic life and recreation designated use is impaired. The impairment is supported by turbidity and biological sampling, which was collected relatively recently with "post-development" watershed characteristics. A 2008 report by the Minnesota Department of Natural Resources (DNR) fisheries states that trends indicate the highest population of wild brook trout is in the upper reaches of the river, populations decrease further downstream, and are lower when compared to other streams in the area. Based on summer sampling, juvenile steel head and brook trout are sparse downstream of the falls, and there is a lack of spawning habitat within the lower 2.6 miles of the river. Section 1.2 of the final TMDL states that the alteration of the substrate to a composition of greater fine sediments clogs the channel bed interstices, reduces general habitat availability for both small fish and invertebrates, decreases intergravel dissolved oxygen concentration, decreases light penetration to reduce plant photosynthesis, damages leaf surfaces, alters behavior, feeding and growth of fish and the invertebrate population that provides food for the fish, damages fish gills, increases fish disease, and increases water temperature.

As the fisheries are impacted by too much sedimentation, large materials such as boulders and cobbles can also have a negative effect on habitat for macroinvertebrates as well as fisheries. Section 1.3.7 of the final TMDL states that in 2008, University of Minnesota studies on macroinvertebrates and their habitat indicated that stream bottom sediments were relatively large, comprised of boulder and cobble size primarily due to high stream velocity, which transports smaller sediments and woody debris. Although there were 107 macroinvertebrate taxa, researchers noted there should have been greater taxa richness for a river this size. Populations were relatively diverse but not as abundant as expected; there were also high proportions of stress-tolerant invertebrates. The researchers concluded that the lower Poplar River condition was at the lower end of the spectrum when evaluated with comparable North Shore streams, because this portion of the river has a relatively harsh environment consisting of high velocity and large average substrate size that is conducive to hardier species. Though Qualitative Habitat Evaluation Index (QHEI) scores were relatively high, the high stream flow provided few bank, pool, or depositional habitats, and there was not much organic matter or woody debris, even though the area is wooded along the stream banks. Researchers believe that QHEI evaluation could have been higher if more fish cover habitat was available.

This TMDL addresses the turbidity in the stream as the primary contaminant that impairs the aquatic life use. In earlier years based on a 1961 assessment, there was a considerable amount of rubble, boulder, gravel, and sand (totaling 97%), and only 3% silt. In1989, a DNR fisheries stream survey reported the substrate of the stream be to be comprised of boulders, rubble, and gravel with no silt or muck. In 1994 and 1995, the DNR reported clay and silt sediment knee-deep in pools just above the mouth of the river that had previously been clean.

Pollutant of Concern: Turbidity due to excess TSS is the pollutant of concern.

Source Identification: The point source that contributes TSS to the river is the Caribou Highlands Lodge (MN0053252), which has a treatment lagoon that periodically discharges, but at very small amounts (<1%) of the total load calculated for the lower watershed, and always well

below the permit limit. All other sources are nonpoint; streamflow plays a large role in contributing to the turbidity impairment.

For nonpoint sources, Section 5 of the Assessment document states that three locations were used to collect data for this project, and at the furthest downstream monitoring point the exceedences of the standards were more frequent, predominantly under moist and high flow conditions. Section 5.1 of the TMDL describes the processes that are predominant in the upland and near channel portions of the watershed.

Upland sources: Section 5.1 of the final TMDL states: "Upland sediment erosion is the result of many factors including: intensity and magnitude of precipitation, antecedent conditions, cover, soil texture, slope, and land uses." For this study upland erosion includes sheet, rill (a very small stream of water), and interrill erosion from slump areas, but not stream bank erosion. Analysis, modeling, and physical channel assessment supports the conclusion that higher flows contribute TSS from upland sheet and rill erosion during rainfall/runoff events, whereas TSS loading is contributed from near channel erosion during high stage events.

- Surface erosion from slumps – there is a large slump/landslide in the area believed to add large amounts of sediment, and the soils of this land slide are very erodible. There are other smaller slumps where greater amounts of finer embedded sediment occur. The sediment is generated from the valley erosion, not the streambank. Locations of the landslides may be near development (such as a ski slope).
- Incision along valley slopes – a significant portion of the sediment budget, many gullies and ravines appear where erosion occurs on steep slopes. If naturally occurring, it is a slow process but erosion from concentrated storm water discharge is greater and adds large amounts of sediment. Overall, the median sediment load from gully and ravine incision is 11%, according to the Poplar River Turbidity Assessment. Efforts have been made to slow the erosion process via swales, drains, or other slope stabilization.
- Localized erosion within the river valley related to land-use alteration -
    - Ski Runs (including bare trails and roads) contribute a large amount of the total sediment load
    - Golf Course areas - contribute a small amount of the total sediment load
    - Developed areas - contribute a small amount of the total sediment load
    - Combined flow pathways – flow paths are mainly generated by roads cutting across steep slopes. These flow paths can concentrate flow and deliver sediment in greater concentrations to the river than past land use. As described in Section 5.3.1 of the final TMDL, flow pathways link sediment sources of roads, ravines/gullies, upland channels, and ski slopes, and ultimately alter the hydrology and sediment delivery. Preliminary observation and modeling were completed and raised additional questions, and a more detailed modeling effort to determine pathway effects on sediment loading will occur in the future. Three areas were identified for future BMPs based on preliminary flow pathway results.
- Natural forested area with ephemeral or first order channels – sedimentation may also occur where there is little development.

Near channel sources: Section 5.3.1 of the final TMDL states: "sediment from these sources is likely the result of high flow and/or precipitation events that provide a large sediment load infrequently."

- Channel bed incision – incision may not be a large source of sediment, but can contribute to the formation and expansion of landslides, which then contribute a large amount of sediment from valley walls
- Sudden channel migration (e.g., meander cut-off, channel avulsion (tearing away), etc.) – migrations may add a significant amount of sediment but are one-time events during high flows and then loads are rapidly flushed out of the system
- Streambank erosion, such as the river impinging on a slump – usually streambank erosion is a large contributor to the sediment budget, but there are many large boulders added to the Lower Poplar River to provide "armor" so there is not much active bank erosion.

Priority Ranking: TMDL priority ranking criteria include: impairment impacts on public health and aquatic life; public value of the impaired water; likelihood of completing the TMDL and restoring the water; local interest and assistance with the TMDL; and, sequencing of TMDLs within a watershed. The waterbody was listed as impaired in 2004. Many studies were completed in 2008, so the watershed has been a focus of MPCA for a number of years.

Future Growth: Section 4.2.1 of the final TMDL states that the Caribou Highlands Lodge point source is operating well below its permit limit so no changes are made in the WLA for future growth. Construction stormwater is set at 1% of the loading capacity for future build out. Recent construction permits indicate <1% TSS loading currently occurring in the watershed from construction activity.

Surrogate measures: In Section 2.2 of the TMDL submittal, MPCA states that it developed a turbidity/TSS relationship using linear regression on 101 paired, log-transformed TSS and turbidity measurements, and TSS is the most direct contributor to turbidity impairment. The correlation was very strong with an R^2 value of 0.8973. Sample values compared from other timeframes had even higher correlation. The standard in Nephelometric Turbidity Units (NTU) was calculated to have an equivalent TSS value. The following equation was used:

Log TSS (mg/L) = (0.9953 * Log Turbidity (NTRU)) + 0.0705 R^2 = 0.8973

EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this first element.

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

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy. (40 C.F.R. §130.7(c)(1)). EPA needs this

information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

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

Comment:
Designated Uses: Section 1.1 of the final TMDL states that the impaired reach in the Poplar River watershed addressed by this TSS TMDL has a Class 1B, 2A, and 3B use classification (Minn. Rules Ch. 7050.0470).

For Class 2 waters, the use is: "Aquatic life includes all waters of the state which do or may support fish, other aquatic life, bathing, boating, or other recreational purposes, and where quality control is or may be necessary to protect aquatic or terrestrial life or their habitats, or the public health, safety, or welfare."

The Poplar River classification with an associated turbidity standard is Class 2A found in 7050.0222 subpart 2: "The quality of Class 2A surface waters shall be such as to permit the propagation and maintenance of a healthy community of cold water sport or commercial fish and associated aquatic life, and their habitats. These waters shall be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable. This class of surface waters is also protected as a source of drinking water."

Standards: The target for developing this TMDL is the turbidity water quality standard of 10 Nephelometric Turbidity Units (NTU), which is equivalent to **12 mg/L TSS** developed for this waterbody. The linkage between turbidity and TSS is explained above in the Source Identification Section. The correlation was strengthened by using samples with measurements from 0 to 40 NTU (not high turbidity values) so that a laboratory dilution factor would not increase the error.

EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this second element.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

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

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

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

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

Comment:

TMDL = Loading Capacity (LC) = WLA + LA + MOS

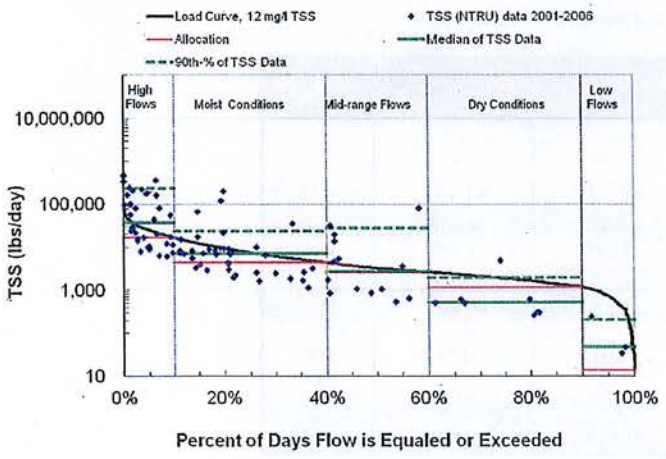
The nonpoint sources show the greatest sediment loading under high flow conditions, diminishing greatly at low flows. Though the point source (Caribou Highlands) has its allocation based on the permit limit, there is no reduction calculated for the source because the facility discharges well below the permit limit, and is <1% of the total load calculated for the lower watershed.

Table 4.1 Loading Capacity for Each Flow Zone Based on the Load Duration Curve Approach

	High Flows	Moist Conditions	Mid-Range Flows	Dry Conditions	Low Flows
Flow Interval (CFS)	> 260	260 – 68	68 – 41	41 – 18	< 18
Flow Interval (%)	0 – 10%	10 – 40%	40 – 60%	60 – 90%	90 – 100%
TMDL Capacity (lbs/day)	25,297	7,532	3,281	1,904	736
MOS (lbs/day)	2,530	753	328	190	74
Waste Load					
Caribou Highlands WW	106	106	106	106	106
Construction stormwater	227	67	28	16	6
Load Allocation (lbs/day)	22,434	6,606	2,819	1,592	550

Method for cause and effect: Several methodologies were used in developing the TMDL. Section 3.0 of the final TMDL and Section 1 of the Assessment document describes the processes:

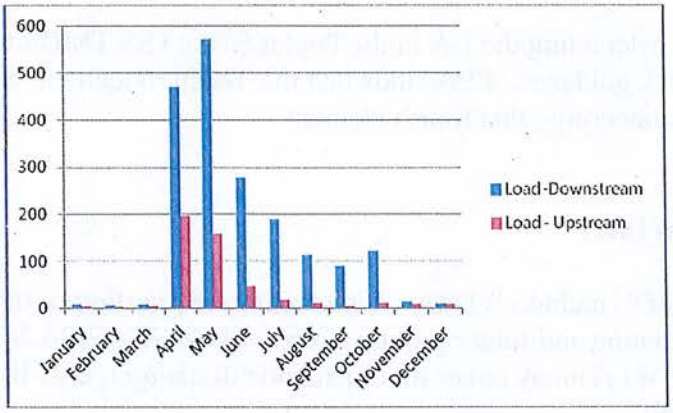
- Flow duration curve - (Section 3.2 of the final TMDL) - Where more measured flow and water quality data were available, flow duration curves were developed using the full range of hydrological conditions. This method includes ranking daily flow values from highest to lowest, computing the percentage of days in the period of record with flows that exceed each daily value, and then plotting daily flow versus the exceedance percentage (or flow duration interval). The resultant curve shows flow values and the frequency that the flow is exceeded. The range from flood conditions to low flow is represented, using the flow dataset from 1976-2006. Load Duration Curve (LDC) - load duration curves were developed using the flows multiplied by the TSS standard of 12 mg/l in each flow regime; data are from 2001-2006. Each plot was divided into five flow duration intervals (low, dry, mid-range, moist, and high flow conditions). The following page shows that points plotted above the curve are pollutant exceedences in the five flow regimes. Section 4.4 of the final TMDL states:
    - High flow regime exceedences more often occur from a storm-driven source (near stream/instream) on the far left portion of the plot. Contributions may be from bank or river bluff, and there is sufficient energy to potentially produce mass wasting. Over half of the measurements that exceed standards are in this flow regime.
    - Moist regime exceedences are both storm-driven and near stream/instream sources, and more often occur under transition conditions in the left portion of the plot; the transition occurs as upland conditions become saturated. The upland region is a large contributor of sediment with more efficient transportation of eroded materials, as well as movement of eroded materials from the riparian corridor.
    - Midrange exceedences are both storm-driven and near stream/instream sources, and more often occur under transition conditions in the middle portion of the plot; the transition is from dry to wetter conditions. The riparian corridor is a large contributor because the upland locations have not yet become saturated enough to erode and contribute sediment in large quantities.
    - Dry condition exceedences are steady input sources and near stream/instream sources.
    - Low flow exceedence conditions do not contribute much sediment.



- Modeling with FLUX – Models used sediment detachment and transport mechanisms in the upper and lower watershed to determine the TSS loading. Where measured flow and water quality data were not as available, seasonal, average monthly and annual loads at the upstream and downstream locations were estimated using the U.S. Corps of Engineers FLUX model. FLUX model estimates are also used to evaluate sediment loading originating from the lower watershed area, as well as critical conditions.

  Results show that downstream loads are greater than upstream, and the greatest influx of sediment both upstream and downstream occurs in April and May (Figure 3.3 below from the final TMDL). Simulated data also correlates well with observations that spring precipitation events and high flows transport more sediment into the river.

Figure 3.3 Estimated average monthly loads for upstream and downstream stations 1973-2006



- The Water Erosion Prediction Project (WEPP 2010) model was used to confirm the FLUX model and to simulate several scenarios with and without BMPs from upland sources of sediment, described below in the Reasonable Assurance Section of this document. Sediment contributions from various land uses and critical conditions are included in the WEPP 2010 modeling effort. Comparison was made of simulated and observed values on a monthly and annual basis, for total and average sediment loading. Data were separated into pre-2001 and 2001 onward, as the high flow frequency and storm events increased starting in 2001. Measured flow and sampling data were used from between April and October and a relationship was developed for those months. Between November through March an average winter concentration was used.

Critical Conditions: Section 4.4 of the final TMDL states that the critical conditions for exceedances of the standard occur in April, May, and June, and modeling supports that the greatest sediment contribution is in April and May. Significant runoff events occur in March, April, and May. These spring months are all accounted for in the analysis.

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

4. Load Allocations (LAs)

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

Comment:
Load allocation: Nonpoint source allocations are shown above in Table 4-1 in Section 3 above. Loading scenarios from nonpoint sources were analyzed using WEPP by land use, erosion potential (soil type and soil loss rate), flow pathways for sediment transport and deposition, and other factors as described later in the Reasonable Assurance section.

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

5. Wasteload Allocations (WLAs)

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

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

Comment:
Wasteload Allocations (WLAs) are shown above in Section 3 in Table 4-1. The existing point source is the Caribou Highlands Lodge but it contributes only a small portion of the load, and the other point sources are future construction activities that would be subject to Minnesota's

construction stormwater general permit, which would address any small contribution of TSS by future construction activities.

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

6. Margin of Safety (MOS)

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

Comment:
The Margin of Safety (MOS) is described in Section 4.2.3 of the final TMDL and indicates that a 10% explicit MOS was used. This value is applied to allow for the changes in loading in proportion to the allocation for each flow regime. EPA concurs with the validity of this MOS. Statistical correlation using regression analyses shows very good linkage of turbidity and TSS, and modeling analyses confirm a very good correlation of simulated and observed values, so there is a strong level of confidence in the data that supports the 10% MOS. Further, LDC methodology intrinsically captures the water quality conditions with only a small margin of error.

EPA finds that the TMDL document submitted by MPCA contains an appropriate MOS satisfying all requirements concerning this sixth element.

7. Seasonal Variation

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

Comment:
Seasonal variation was considered in this TMDL as described in Section 4.3 of the final TMDL. There are five distinct flow regimes that were used for the development of the allocations, from near drought to near flood conditions. Therefore, reductions and loadings vary, based on flow regimes that occur at all times of the year. Turbidity increased seasonally during spring and summer months (as well as spatially, increasing from upstream to downstream). For example, the

month of April contributed 51% of the TSS exceedences using monthly analysis. These seasonal changes were all accounted for in the TMDL development.

EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this seventh element.

8. Reasonable Assurances

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

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

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

Comment:
Section 6.0 of the final TMDL states several methods for reasonable assurance that TSS will be reduced in the watershed. Approaches may be regulatory or non-regulatory. MPCA, MN DNR and Cook County will improve water quality using regulatory approaches through permits with limits on stormwater and wastewater, limits for future wastewater expansion, and erosion and sediment controls on new development. The county, which is one of the several permitting authorities, also manages the area based on limits set in the "Lower Poplar River Alternative Urban Areawide Review" document and Mitigation Plan. Watershed Management Plans (WMPs) for both the county and Soil and Water Conservation District (SWCD) assist and manage non-regulatory issues including public education, BMP installation, and continuing engagement of stakeholders.

Funding will potentially occur to assist in providing reasonable assurance that the projects will be implemented. Local government cost share funds, state and local revolving loan funds, conservation reserve program funds, federal 319 program funds, state clean water partnership,

federal coastal program funds and federal Great Lakes erosion control funds are all potentially available.

BMPs have been installed which are already proving to be beneficial, and the activities are being endorsed to others in the watershed. Local landowners formed the Poplar River Management Board; landowners are making improvements through BMPs and have sustained a partnership with the county SWCD to complete a series of BMPs to reduce sediment input, and have participated in the draft implementation plan to continue BMPs for the long-term.

The WEPP 2010 modeling greatly enhanced the understanding of the upland sediment source contributions and processes from erosion, so that the best locations for BMPs would be used for greatest effectiveness, and greatly increases the reasonable assurance that work would be completed by optimizing the methodology and location of BMPs. Four scenarios were modeled and their impacts summarized:

- Existing conditions – these conditions include the development of the area with land use alteration, including golf courses, ski runs and evaluation of contribution of sediment from upland channels
- Pre-development conditions – results showed even with no development or land use alteration sediment would be delivered into the river
- Build-out conditions - were described in the Areawide Urban Assessment Review and showed that new build-out/development would result in increased sedimentation if no nonpoint source controls are included in future projects
- Stormwater control - existing conditions with addition of erosion control measures showed that erosion would be reduced well below the current existing conditions.

Options in evaluating runoff using the WEPP 2010 model included the use of field measured hydraulic conductivity, the use of a restricting layer to impede drainage which was more representative of the local geology and not a default value, and assessment of winter freeze/thaw conditions using the artificial snow pack generated for the ski slope. Ski slopes were modeled with adjustments to vegetative cover or high value leaf litter. Ski slope length was altered using small terraces (water bars) to redirect rain or snowmelt runoff. Further, there were 195 discrete hillslope units and upland channels identified within the Lower Poplar River watershed to better determine overland runoff. Individual slumps and ravines used field measurements (rather than default values) in the WEPP model outputs, and flow pathways that linked sediment sources from roads, ravines and gullies, upland channels and ski slopes were identified as critical source areas for future BMP work. Near channel sources were studied using geomorphological assessment, and though near channel locations do provide a large load of sediment it is infrequent, as listed in the sources (Section 1) earlier in this document.

The CWLA is a statute passed in Minnesota in 2006 for the purposes of protecting, restoring, and preserving Minnesota water. 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. 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 and to jointly utilize technical educational, and financial resources. 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 both 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 (Implementation Plan Review Combined Checklist and Comment, MPCA), 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)

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:
Section 7.0 of the final TMDL states that monitoring will include inspection of implementation practices, and measurement of water quality and flow. DNR Station 01101001 collects flow data which is also used by the MPCA. Under the protocol of the MPCA Major Watershed Load Monitoring project, approximately 25-30 flow samples are collected each year with a range of flow and precipitation events. Biological monitoring (originally scheduled for 2013) is part of the Intensive Monitoring program for fish and macroinvertebrates; embeddedness of the stream channel will be evaluated for improvements as well. Landowners also would also like a thorough habitat evaluation as a future project started after more BMPs are completed.

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:
The implementation discussion is in Section 8 of the final TMDL. There are detailed BMPs included in a separate implementation plan. The following information is provided in the final TMDL submittal to show several ongoing and future steps to ensure that implementation occurs.

- Ski runs need increased vegetative cover and erosion control must be continued
- Evaluation of resort trails and road should continue
- Ravines, gullies and intercepting flow pathways need further investigation and need to have a reduction of flow velocity and restore areas to reduce erosion
- The megaslump should be stabilized and the wastewater discharge pipe should possibly be eliminated
- Runoff should be limited from impervious areas, dirt roads, parking lots and bare areas
- Low Impact Designs should be recommended , construction stormwater activities should be permitted, and construction stormwater BMPs should be installed and maintained
- Continue to review and finalize the draft implementation plan which includes specific locations for improving erosion control and sediment management
- $1.6 million has been spent on BMP design and implementation and it is anticipated that $1 million more will be spent.

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

11. Public Participation

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

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

Comment:
Public outreach activities are detailed in Section 9.0 of the TMDL submittal and began long before the draft TMDL. There is locally managed public involvement, which includes webpage development, email list serve development and maintenance, public comment tracking, event and meeting advertisement, local landowner organizations, media outreach, local government outreach, and educational outreach. Capacity has been built to sustain longer-term public participation. The TMDL was public noticed from July 8, 2013 to August 7, 2013. Copies of the draft TMDL were made available upon request and on the Internet web site: http://www.pca.state.mn.us/water/tmdl/index.html#drafttmdl. Two comment letters were sent during the public comment period, one of which was a compilation of comments of several non-profit organizations. MPCA adequately addressed the comments.

EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning 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 waterbody, and the pollutant(s) of concern.

Comment:
The EPA received the final Poplar River TSS TMDL on November 14, 2013, accompanied by a submittal letter dated November 5, 2013. In the submittal letter, MPCA states that the submission includes the final TMDL for turbidity, including supporting documentation under Section 303(d) of the Clean Water Act.

EPA finds that the TMDL document submitted by MPCA satisfies all requirements concerning this twelfth element.

13. Administrative Record

Conclusion

After a full and complete review, EPA finds that the TSS TMDL for the Poplar River watershed satisfy all of the elements of an approvable TMDL. This approval addresses one segment for TSS for a total of one TMDL in AUID# 04010101-613.

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