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

NOV 04 2011

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 Shingle and Bass Creeks, including supporting documentation and follow up information. Shingle and Bass Creeks are located in eastern central Minnesota in Hennepin County. The TMDLs were calculated for Total Oxygen Demand to address biota impairment and low dissolved oxygen. The TMDLs address the impairment of aquatic life and recreational use in Shingle Creek (HUC 07010206-506) and Bass Creek (HUC 07010206-784).

These TMDLs meet the requirements of Section 303(d) of the Clean Water Act and EPA's implementing regulations at 40 C.F.R. Part 130. Therefore, EPA hereby approves Minnesota's two TMDLs in Shingle and Bass Creeks. The statutory and regulatory requirements, and EPA's review of Minnesota's compliance with each requirement, are described in the enclosed decision document.

We wish to acknowledge Minnesota's effort in submitting these TMDLs, addressing impaired biota and low dissolved oxygen, 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: Barb Peichel, MPCA
Dave L. Johnson

TMDL: Shingle and Bass Creek, Minnesota
Date: NOV 04 2011

DECISION DOCUMENT FOR THE APPROVAL OF SHINGLE AND BASS CREEK 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: Section 1.2 of the TMDL states that Shingle Creek is located in east central Minnesota in the Upper Mississippi River Basin in Hennepin County. This TMDL study includes two reaches, the Upper Shingle Creek which includes Bass Creek in HUC 07010206-784 (formerly 07010206-527), and Lower Shingle Creek in HUC 07010206-506. The drainage area is 44.7 square miles. Bass Creek, located in Upper Shingle Creek, begins at the outlet of Bass Lake and flows northeasterly until it becomes Lower Shingle Creek at its confluence with Eagle Creek. Lower Shingle Creek flows northward and eastward, then southerly into the Mississippi River in Minneapolis. This TMDL is for Total Oxygen Demand (TOD), which includes Biochemical Oxygen Demand (BOD) in the water column and Sediment Oxygen Demand (SOD) in the sediments. Low DO resulted in impaired fish and macroinvertebrate communities as measured by the Index of Biological Integrity (IBI). The submittal is for 2 Total Oxygen Demand TMDLs.

Land use: Section 2.2 of the TMDL states that the primary land use is single family residential development at 43.8%. Parks, industry, undeveloped, commercial, institutional, water, major highways, extractive, multi-family residential, and airport land uses are 10 – 1% each, and there are very small amounts of remaining land uses. Approximately 30-35% of the land area of the watershed as a whole is covered by impervious surface. The lower portion of the watershed has a greater percentage of impervious cover, as it is more developed overall. There are many channels and storm sewers in the watershed; there are least 60 mapped storm sewer outfalls into Shingle and Bass Creeks, not to mention unmapped discharges. There are approximately 20 open channels, some natural and some man-made ditches, that also discharge to the creek. Much of the upper watershed has enacted stormwater detention and treatment regulations, but most of the lower watershed has less treatment and flow rate control.

Problem Identification: Section 1.4 of the TMDL states that the waters are impaired for aquatic life use. Bioassessment indicates low IBI scores, with both fish and macroinvertebrates having scores lower than the impairment threshold, out of a total maximum score of 100 (Table 1.3 below). Shingle Creek macroinvertebrates indicate very low IBI with only 20 points of the 54 point impairment threshold, and Bass Creek in the upper reaches shows a very low fish score with 12 points of the 46 point impairment threshold.

Table 1.3. Index of Biotic Integrity listing criteria and relevant Shingle and Bass Creek data.

Stream and IBI	Impairment Threshold	Shingle/Bass Creek IBI
Shingle Creek – fish	46	49
Shingle Creek – macroinvertebrates	54	20
Bass Creek –fish	46	12
Bass Creek - macroinvertebrates	54	67

Note: IBI data are from 2000 MPCA and DNR collections.

Section 2.4 of the TMDL discusses many issues that were considered as possible stressors or contributors to the problem of impaired biota. Five stressors found to be contributing to the impaired communities reviewed in detail in Section 2.6 of the TMDL submittal are: low dissolved oxygen (DO); altered habitat; loss of connectedness; altered hydrology; and ionic strength (chloride). After the stressors were identified, MPCA examined the parameters that contribute the most to the stressors, as described in Section 4.1 of the TMDL submittal. Overall, investigations by MPCA, in Section 3.3 of the TMDL, show that the low DO, altered habitat, and altered hydrology are the more important stressors that affect the biota, and that these stressors are interrelated.

Pollutant of Concern and Surrogate: The pollutants of concern addressed in this TMDL are substances in the water column or sediment (BOD and SOD, respectively), that demand oxygen. The BOD and SOD, which together equal the TOD, will be used as a surrogate for low DO. To achieve the DO standard, TOD needs to be reduced. Section 4.1 of the TMDL submittal discusses the influence of BOD and SOD and its impact on the biotic integrity in Shingle and Bass Creeks. Though algal growth has been documented, there is not a great amount of eutrophication in the system (Section 2.4.3 of the TMDL), as measured by chlorophyll-a in the water column. Therefore, most of the TOD reduction will focus on SOD reduction, and will likely achieve the DO water quality standards and aquatic life designated use.

Source Identification: There are three industrial dischargers in the watershed that do not discharge effluent that would contribute to the TOD. The point sources that contribute to the impairment of the biotic community are primarily stormwater runoff in urban areas from Municipal Separate Storm Sewer Systems (MS4s). They are collectively considered diffuse sources in the TMDL calculations, because there is not enough information available to assign the loads to individual permit holders. They are given an aggregate load as categorical stormwater permits. The unique MS4 identification numbers are assigned to the cities, Hennepin County, the colleges and MnDOT Metro District. Minneapolis has its own permit.

- Minneapolis has an individual NPDES permit # MN 0061018.
- The following locations have a categorical MS4 stormwater permit under Phase II General NPDES Stormwater Permit – MNR040000
    - Brooklyn Center – MS400006
    - Brooklyn Park – MS400007
    - Crystal – MS400012
    - Maple Grove – MS400102
    - New Hope – MS400039
    - Osseo – MS400043
    - Plymouth – MS400112
    - Robbinsdale – MS400046
    - Hennepin County – MS400138
    - MnDOT Metro District – MS400170
    - North Hennepin Community College – MS400205
    - Hennepin Technical College-Brooklyn Park – MS400198

The nonpoint sources are from wetland sources and sediment flux. Other nonpoint contributors to the impairment have been described as stressors in Section 2.6 of the TMDL, but some of these are considered "non-TMDL" stressors since there are no contaminant reductions that can be made.

- Low DO – the habitat is impaired by the oxygen demand of constituents in the water and sediment that decrease oxygen for the fish and macroinvertebrates.
- Altered Habitat – lack of species diversity, shallow river beds, lack of pool and riffle development for refuge, poor riparian vegetation.
- Loss of Connectedness – drought, altered flow, physical alteration, altered hydrology, physical barriers of intense urban and suburban development limits movement and colonization, land cover change; although there may be some benefit with reduced connectedness reducing the spread of invasive species, the overall benefits of connectedness outweigh the risks.
- Altered Hydrology – increased low flow condition can change habitat and species, and water conveyances bring great highs and lows of flows compared to natural conditions.
- Ionic Strength (chloride) – from road salt, very concentrated in the winter starting in November, the stream is criss-crossed by many roads and bridges. Though MPCA considers this to be a plausible stressor, in Section 4.8 it states that achieving reduction in other contaminants will indirectly address chlorides. In addition, a chloride TMDL was approved in 2007.

The TMDL addresses the low DO stressor by allocating and reducing the mass of oxygen-demanding substances that have a BOD and SOD. Section 2.4 of the TMDL states that the low DO condition can be caused by the decomposition of natural organic matter, from plant and leaf debris; organic matter may also be from anthropogenic sources, such as wastewater effluent and animal feces. The CBOD contribution to the low DO occurs as the metabolic action of microorganisms reduce organic carbon in the organic matter to carbon dioxide. This CBOD value is then subtracted from the BOD to get NBOD. The NBOD is the biologic reduction of ammonia to nitrate. High NBOD is indicative of rapidly decomposing organic matter or significant inputs of human/animal waste. The NBOD was not particularly high in Shingle Creek, and the resultant BOD was not high, further indicating that the SOD was more of a factor in the watershed.

Section 2.4.4 further explains that the altered habitat/poor riparian vegetation leads to higher water temperatures that reduce the solubility of oxygen in water. Section 2.4.5 describes that when rivers are changed and have shallow river beds due to dredging and straightening, the previously rocky substrate that aided in reaeration is reduced and there can be long periods of low DO in stagnant pools or shallow streambeds.

Priority Ranking: Section 1.3.1 of TMDL submittal states that the priority ranking is implicit in the TMDL schedule included in Minnesota's 303(d) list. The schedule shows a start for the project in 2007 and a completion in 2011. The criteria for ranking in MPCA's program include all or some of the following: impairment impacts on public health and aquatic life; public value of the water; ability to complete the TMDL in an expedient manner, strong data, restorability, technical capability, local assistance, and sequencing within the watershed.

Future growth: Section 4.7 of the TMDL states that no future growth is anticipated. Any new growth would be required to comply with rules and standards for runoff and volume management.

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 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 – Shingle and Bass Creeks have an aquatic life and recreation designated use, Class 2B, as found in Minnesota's Rule 7050.0430.

Standards for Biota – There are narrative standards for biotic integrity as set forth in Minn. R. 7050.0150 (3) and (6).

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

Subp. 6. "In evaluating whether the narrative standards in subpart 3, which prohibit serious impairment of the normal fisheries and lower aquatic biota upon which they are dependent and the use thereof, material alteration of the species composition, material degradation of

stream beds, and the prevention or hindrance of the propagation and migration of fish and other biota normally present, are being met, the commissioner will consider all readily available and reliable data and information for the following factors of use impairment..." The standard goes on to state that it applies to the resident fish, invertebrate, and aquatic plant community by measurements of species diversity and composition; feeding and reproduction characteristics; and fish abundance and condition.

Target for Biota: The Index of Biological Integrity (IBI) measures the attributes needed to achieve the narrative standard of the aquatic community. Section 1.4 of the TMDL states that the IBI (maximum score 100) thresholds are:

- **Fish: ≥ 46**
- **Macroinvertebrates: ≥ 54**

Standard for DO – Section 1.3.1 of the TMDL submittal states that a **5.0 mg/L daily minimum** is the DO standard, according to Minnesota Rules 7050.2222(4).

Table 1.2 below shows the details of the revised standard for DO, with details relating to the frequency of measurements, and prior to 9:00 a.m. observations. The time of day is important because DO has large diurnal swings (low readings in early morning) due to low rates of photosynthesis during the night that cannot replace the oxygen used in biochemical reactions.

Table 1.2. 2010 revised DO impairment listing criteria and relevant Shingle Creek data 2001-2009.

Criterion	Requirement	Shingle Creek Data
Number of independent observations	20 observations (over at least 2 years)	317 total observations, 65 (21%) less than 5.0 mg/L
May-September observations	Must be taken prior to 9:00 a.m. over at least two years	29 confirmed May-September pre-9:00 a.m. observations
DO standard must be met prior to 9:00 a.m. during May-September AND	90% of the time (no more than 10% below standard)	29 observations, 13 (45%) less than 5.0 mg/L
DO standard must be met during October-April	90% of the time (no more than 10% below standard)	105 observations, 6 (6%) less than 5.0 mg/L
Number of violations	Must be at least 3	At least 21 violations

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 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:
TMDL = Loading Capacity (LC) = $\sum$LA + $\sum$WLA + MOS

Tables 4.1 and 4.2 below are the Upper and Lower Shingle Creek TOD TMDLs.

Table 4.1. Current loads and Total Maximum Daily Loads for the Upper Shingle Creek Watershed.

	Oxygen Demand (kg/day) from:						Total Oxygen Demand (kg/day)	
	CBOD		NBOD		SOD			
Source	Current	TMDL	Current	TMDL	Current	TMDL	Current	TMDL
Load: I-94 Wetland	7.8	7.8	18.3	18.3	--	--	26.1	26.1
Load: Sources of Sediment Flux	--	--	--	--	491.9	12.0	491.9	12.0
Wasteload: Diffuse Sources	--[1]	--[1]	35.8	35.8	--	--	35.8	35.8
Margin of Safety	--	--	--	--	--	1.3	--	1.3
Total	7.8	7.8	54.1	54.1	491.9	13.3	553.8	75.2

Table 4.2. Current loads and Total Maximum Daily Loads for the Lower Shingle Creek Watershed.

	Oxygen Demand (kg/day) from:						Total Oxygen Demand (kg/day)	
	CBOD		NBOD		SOD			
Source	Current	TMDL	Current	TMDL	Current	TMDL	Current	TMDL
Load: Palmer Lake	67.3	67.3	50.2	50.2	--	--	117.5	117.5
Load: Sources of Sediment Flux	--	--	117.2	38.4	703.0	186.5	820.2	224.9
Wasteload: Diffuse Sources	--[1]	--[1]	11.8	11.8	--	--	11.8	11.8
Margin of Safety	--	--	--	--	--	20.7	--	20.7
Total	67.3	67.3	179.2	100.4	703.0	207.2	949.5	374.9

[1] It is noted that there may be diffuse sources of CBOD, but for practical purposes the absence of loading is supported by model calibration to in-stream water quality samples.

Method for cause and effect: Section 3.1 of the TMDL states that the QUAL 2K model was developed for four scenarios, in order to best represent the varied seasonal conditions in June and September, and to best represent hydrological characteristics of Upper (Bass) and Lower Shingle Creek. The model was subdivided above and below Palmer Lake, because the creek experiences different hydrological and geochemical conditions as it flow through a wetland basin upstream and north of Palmer Lake. Below Palmer Lake at its outlet at the south end, the stream characteristics are much more typical and channeled without as much wetland influence.

Section 4.2.1 of the TMDL defines the varied oxygen demand as: "Dissolved oxygen is consumed both in the water column and at the sediment interface. This consumption is expressed in terms of the mass of oxygen-demanding substances available per day." The basic analysis used to determine the oxygen demand is shown below; it was then determined that SOD was the greatest contributing factor on which to focus the reductions.

1. The equation used for calculating the oxygen demand is:
   TOD = BOD + SOD.

2. The BOD is further divided to calculate the Carbonaceous Biochemical Oxygen Demand (CBOD) and Nitrogenous Biochemical Oxygen Demand (NBOD)
   BOD = CBOD + NBOD

Section 4.1 of the TMDL submittal states that the SOD in sediments and particulates is a greater contributing factor to the impairment than the BOD in the water column. This conclusion was based on modeling sensitivity runs to determine the most appropriate TMDL parameter that would improve the biotic integrity. The need to focus on SOD is also evident when reviewing the values in the tables above, where both "current" and "TMDL" SOD values are larger than the BOD values. Further, in the upper creek, the current CBOD and NBOD loadings compared with the TMDL CBOD and NBOD loadings show that there is no change, i.e., no reduction needed. NBOD reduction is needed in the lower creek, but overall the quantity of NBOD substances (in kg/day) compared to SOD remains much smaller. SOD was not collected for the I-94 wetland or Palmer Lake, as SOD is difficult and expensive to measure and is often calculated with models (Section 2.4.2 of the TMDL).

Where stream beds are widened, there is reduced velocity and depth of waters, allowing for much greater interaction with sediment and larger influence of SOD. Section 4.2.2 of the TMDL states that the SOD loading is so significant that the model had difficulty with calibrating modeled SOD to observed SOD values, leading to the assumption that there are additional sources of SOD, either unknown or from stagnant pools. For the model to accommodate these significant amounts, the SOD within the model was both "model predicted" and had an added SOD amount, or "modeler prescribed" SOD. The "modeler prescribed" SOD was added to the modeling process to account for the "extra" SOD present in the river system due to the unusually wide and shallow channels, and resulted in a better calibration result for DO.

After the calibration, four scenarios were run. Reductions were based on conditions in the modeling that yielded the DO value remaining at the standard of 5.0mg/l or higher in all four scenarios of the model: Upper and Lower Shingle Creek, in June and September timeframes.

Critical Conditions: Sections 2.4 and 4.6 discuss critical conditions that cause a reduction in available oxygen. The critical time occurs under late summer low flow conditions, with concurrent increases in biomass, water temperatures, and excessive algal growth. Section 3.2 states that the grab samples were taken in early morning hours to capture the low DO swing of the diurnal fluctuations, which is another component contributing to the critical condition.

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 Allocations are shown in Tables 4.1 and 4.2 in the previous section. In section 2.6.4 MPCA states: ".... low flow conditions can reduce overall habitat availability by decreasing.... wetted channel area." Section 4.2.2 modeling suggests the building of a low-flow channel is expected to decrease wetted surface area contributing to sediment flux and to decrease SOD; there will be concurrent increases in flow velocities and reaeration.

Section 4.2.3 of the TMDL states that the Load Allocation is oxygen demand from:

1. Wetland outlet sources - I-94 wetland (Upper) and Palmer Lake wetland complex (Lower), with no load allocation reductions needed at these locations (because they are dominated by CBOD and NBOD);
2. Sediment flux - includes both SOD and ammonia release (NBOD), with load allocation reductions needed in both upper and lower creeks;
3. Integrating model-predicted and prescribed release rates across the wetted area of each reach;
4. Calculations assume a smaller wetted surface area resulting from stream modifications creating a low-flow channel and eliminating the prescribed SOD.

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 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:
Wasteload Allocations are shown in Tables 4.1 and 4.2 in Section 3 of this document, and are described as "diffuse sources" for the following wasteloads:

- Minneapolis - individual NPDES stormwater permit;
- Categorical wastewater stormwater permits; and,
- Other - Phase II General NPDES Stormwater permit.

The individual permitees are listed in Section 1 of this document. There are three active industrial dischargers in the watershed, but no WLA was determined for these dischargers, as MPCA believes that they do not contribute to the pollutants of concern (Section 4.2.4 of the TMDL).

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

6. Margin of Safety (MOS)

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

Comment:
Section 4.2.5 of the TMDL states that there is an explicit 10% MOS. MPCA determined that this MOS addressed several uncertainty issues in the TMDL process. The uncertainty includes the modeling, the use of two sampling surveys, channel dimensions, SOD coverage in the system, and stream responses to the changes in loading. EPA concurs that this MOS is adequate, especially considering the large percentage of reduction calculated for SOD.

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 4.5 of the TMDL. The seasonal variation was one of the priorities in the development of the modeling as described in Section 3.2, incorporating spatial (lower and upper stream reaches) and temporal (June and September) differences. There was separate low flow September modeling in the upper and lower creeks, in-stream grab sample collection, and sampling in early morning to capture diurnal DO swings.

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 of the TMDL describes several actions to assure achievement of the TMDLs. There is a Shingle Creek Watershed Commission (the Commission) formed in 1984 that requires watershed management plans within the Twin Cities area. Minnesota Rules Chapter 8410 includes goals and policies for each of eight management areas. The Commission's Second Generation Watershed Management Plan also includes goals and policies, and covers the years 2003-2012,

including updated Capital Improvement Program and a Cost Sharing Policy to assist member cities. The Management Plan establishes common goals and standards for water resources management in the watersheds, agreed to by the nine cities in the watershed, and implemented by those cities at both the Commission and local levels.

The Commission is beginning work on its third generation plan, which will cover 2013-2022. The policies, programs, and activities will incorporate the numerous TMDLs already approved in the watershed, including this TMDL. NPDES permits will be consistent with TMDLs, as will implementation plans and Construction General Permits, requiring Storm Water Pollution Prevention Plans. State General Permits for industries will include stormwater requirements and associated BMPs.

Clean Water Legacy Act (CWLA): 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 to jointly use 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 6.4.2 of the TMDL states that the creek will be monitored for flow and quality by the Commission to ensure that the water quality has improved. The Commission partners with the USGS at a third location, which operates its National Water Quality Assessment (NAWQA) Program site on Shingle Creek. Macroinvertebrates are sampled twice a year at four locations and more rigorous invertebrate sampling has been conducted as part of special studies. Fish sampling has occurred on two locations on Bass Creek and two locations on Shingle Creek, all sponsored by the Commission; it also annually updates its Watershed Monitoring Plan.

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:
Section 5.0 of the TMDL has many suggestions and details for implementation, including costs, such as:

- habitat restoration – morphology restoration such as the addition of rock vanes to form deeper pools, root wads to provide shelter and lurking areas for aquatic animals;
- connectedness restoration
    - removal or bypass fish barriers – barriers replaced with steps to encourage fish migration; create more natural streams with fewer culverts;
    - restore access to floodplain and riparian wetlands – providing refuge from high flows and locations for breeding and brooding; regrading for easier access to the floodplain;
- volume management and peak runoff rate reduction
    - increase infiltration and filtration – increase the use of infiltration basins, rain gardens, native plantings, and reforestation both on private and public lands to increase groundwater and reduce surface flashiness;
    - education and outreach – use newsletters, fliers, and website to encourage good property management practices
- reduce chloride loading – goal of reducing ice control salt application by 71% using different application methods, chloride alternatives, and porous road surfaces to reduce ice.

Section 5.2 of the TMDL further describes actions that were determined to best address the need to reduce SOD and include cost estimates. The approach would include a combination of reaeration at wetland outlets and creation of low flow channel morphology that would reduce channel width and increase the depth for more effective flushing of SOD materials.

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:
Sections 7.2 and 7.3 of the TMDL states that there was a technical advisory committee formed for the TMDL process. Its meetings were held on August 14, 2008; February 25, 2010; April 22, 2010; and May 13, 2010. A TMDL overview and proposed methodology was presented to the Shingle Creek Watershed Management Commission at a public meeting on August 14, 2008. The results of the TMDL and Stressor Identification were presented to the Commission on January 14, 2010 and May 13, 2010.

The draft was public noticed from June 20, 2011 to August 15, 2011. Copies of the draft TMDL were made available upon request, in news releases, and on the Internet web site: http://www.pca.state.mn.us/index.php/view-document.html?gid=15930. No comments were received. MPCA adequately addressed EPA comments that were submitted before the public comment period.

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 Shingle Creek and Bass Creek Biota and Dissolved Oxygen TMDL on September 28, 2011, accompanied by a submittal letter dated September 15, 2011. In the submittal letter, MPCA stated the submission addresses the impaired biota and low dissolved oxygen in Bass and Shingle Creeks.

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

13. Conclusion

After a full and complete review, EPA finds that the TMDLs for Bass Creek (07010206-784) and Shingle Creek (07010206-506) satisfy all of the elements of an approvable TMDL. This approval addresses TOD for a total of 2 TMDLs.

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