

TMDL: Belle and North Branch Belle River, Michigan
Effective Date: February 25, 2005

Decision Document for Approval of Belle and North Branch Belle Rivers Dissolved Oxygen/Sediment TMDL Report

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:

The Belle and North Branch Belle Rivers (Michigan ID #061501G) are located in Lapeer and St. Clair Counties, Michigan. The Belle and North Branch Belle Rivers were placed on Michigan's 303(d) list for exceedances for total dissolved solids (TDS) and low dissolved oxygen (DO). This TMDL focuses only on the low DO; the other pollutant will be addressed in a separate TMDL. The listed segment that this TMDL addresses is from Riley Center Road up stream to Blacks Corners Road, in the vicinity of Imlay City. The Belle River reach runs from Riley Center Road to Webster Road and covers 17.1 miles. The North Branch of the Belle River reach runs from the Belle River confluence to Blacks Corners Road, a distance of 4.2 miles. This TMDL addresses a total of 21.3 river miles.

Numerous assessments of the water quality have been done between 1973 and 1982. The North Branch Belle River was monitored also in August 1997. In 2002 the State recorded continuous and instantaneous measurements of DO in the Belle and North Branch Belle Rivers along with other parameters and have shown that water quality standard for DO has been exceeded.

The primary source of the DO demanding pollutants (such as carbonaceous biochemical oxygen demand [CBOD], ammonia nitrogen, sediments, and nutrients) include both point and non-point sources. There are four permitted point sources, five non-storm water general permitted discharges and 11 industrial storm water permitted facilities in the drainage area. Non point source loads also contribute DO pollutants, in the nutrients and sediments that washed off the land surface.

EPA finds that the TMDL document submitted by Michigan Department of Environmental Quality (MDEQ) 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:

The Belle and North Branch Belle Rivers both have the designated use as warmwater fisheries. Michigan water quality standards under Rule 323.1100 of the Part 4 Water Quality Standards (WQS) state that all waters of the state are to be protected for warmwater fish, other indigenous aquatic life and wildlife, agriculture, navigation, industrial water supply, public water supply at the point of intake, partial body contact recreation, and total body contact recreation from May 1 to October 31. Regarding DO, the impaired designated use for the Belle and North Branch Belle Rivers addressed by this TMDL is the warmwater fish and other indigenous aquatic life and wildlife. The numeric water quality criteria that will be applied is found in Rule 64, which requires a DO minimum of 5.0 mg/l as a daily average for warmwater fishery. Where the water is not achieving the 5 mg/l standard, Rule 64 gives MDEQ authority to develop a comprehensive plan to upgrade the water. Under the rule, persons directly or indirectly discharging substances that contribute to the water not meeting the standard must take the necessary actions consistent with the comprehensive plan. MDEQ considers this TMDL to be the comprehensive plan for the Belle and North Branch Belle Rivers.

To address the pollutants, MDEQ has identified total suspended solids (TSS) as the surrogate for DO. MDEQ has determined that the DO impairment is the result of biological oxygen demanding (BOD) substances entering the waterbody. These substances are generally either organic material or nutrients. They impact the DO by consuming oxygen during decomposition (for the organic material) or by increasing algal and plant growth (nutrients), thereby consuming oxygen. MDEQ has determined that targeting TSS as a surrogate will reduce the amount of BOD substances in the waterbody. MDEQ has determined that the source of the BOD substances is closely tied with sediment, as sediments in the watershed contain either the organic material or nutrients. MDEQ believes that reducing the sediments will result in reductions of BOD material, and increasing the DO levels in the waterbody to meet the WQS and designated use.

EPA finds that the TMDL document submitted by MDEQ 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:

MDEQ used the O'Connor-DiToro multi-reach, steady-state DO model which is based on the modified Streeter-Phelps equation. This model has the capability of simulating diurnal DO variations resulting from plant photosynthesis and respiration. The model also includes DO depletion due to sediment oxygen demand (SOD).

Based upon the modeling and, river surveys MDEQ determined that the primary cause of DO depletion is plant respiration. Dense growth of rooted and detached macrophytes was noted in the North Branch Belle River during the summer of 2002 appearing to have the effect of slowing the movement of the water at the surface, but not below the surface. The Belle River in some areas had the same issues in water conditions. During routine checks on monitoring equipment the field crew DO sensors fouled with relatively heavy algal growths. This heavy plant growth results in high rates of photosynthesis and respiration. High diurnal DO variations were measured in 2002, and DO non-attainment was common throughout the TMDL reaches.

Based on the modeling and river surveys, MDEQ determined that sediment oxygen demand

(SOD) plays a less significant role in DO depletion for the North Branch and Belle River. Solids present in the water column can settle to the stream bed. Organic solids can undergo aerobic decomposition. This process causes diffusion of DO from the water column into the sediment, depleting the DO in the water column. High levels of TSS in a waterbody can potentially cause high SOD rates. Heading downstream the North Branch and the Belle Rivers' substrate became more silty until Riley Center Road. Some of the silt deposits may result from point source discharges as well as urban runoff, which is generally high in TSS.

The estimated annual TSS load is 4,290,000 pounds. The loading capacity to meet the TSS target has been calculated to be 2,506,000 pounds for the Belle and North Branch Belle Rivers.

The critical condition for the TMDL has been identified as the summer, low-flow, high-temperature conditions. The primary sediment inputs are from storm/run-off events. The model was developed for the critical summer period. MDEQ believes that controlling the wet-weather loads to meet the critical summer conditions will ensure that the designated uses are met at all times.

EPA finds that the TMDL document submitted by MDEQ satisfies all requirements concerning this third element.

4. Load Allocations (LAs)

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

Comment:

The LA is contained in Table 6 of the TMDL (Table 1 on page 11 of this document) and is 1,731,000 lbs/yr. The LAs represent a 50% load reduction of the existing estimated TSS loads contributed by those land uses classified as non-commercial land not covered under storm water permits or NPDES individual or general permits.

EPA finds that the TMDL document submitted by MDEQ 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 WQs 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:

For the TMDL, the WLA is 775,000 lbs/yr of sediment. MDEQ has determined that the current loads from individual non-storm water NPDES permits do not need reductions. The load from these sources is 721,000 lbs/year and the current load for each facility is found in appendix B Tables B.1 - B.4 of the TMDL. The WLA for the storm water permits is in Table 6 of the TMDL, and shows the current load from permitted storm water facilities is 108,000 lbs/yr with the target allocation set at 54,000 lbs/yr. Appendix A, Tables A.2 of the TMDL lists the name and permit number of all storm water permits addressed in this TMDL. The state has also included construction site permits (also regulated under NPDES general permits) in Tables A.3, and A.4 under the WLA for storm water, as they are unable to separate this load from the other regulated storm water. The WLA represent approximately 93% of the loads of the existing estimated TSS loads contributed by discharges under storm water permits or NPDES individual or general permits which is approximately 7% reduction.

EPA finds that the TMDL document submitted by MDEQ 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 used in the Belle River and North Branch Belle River TMDL is implicit as it is based on conservative assumptions in the modeling. MDEQ used a 95% exceedence summer low flow. This is a flow that is expected only during a severe drought, and is the minimum flow at which WQSs apply. MDEQ also used a high temperature value, the highest monthly 90% occurrence temperature. Again, this value is the maximum at which WQSs apply. The TMDL addresses low flow and higher temperature conditions giving minimal allowance. These assumptions are conservative because the pollutant loads enter the waterbodies during wet-weather events, when flows would increase and temperatures would decrease.

EPA finds that the TMDL document submitted by MDEQ satisfies all requirements concerning this sixth element.

7. Seasonal Variation

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

Comment:

Seasonality is addressed through the modeling effort. Modeling was performed to address the critical summer season when DO variations are the greatest, and modeling for other seasons using the critical flow and temperature values showed no predicted instances of DO violations. Additional monitoring in the Belle and North Branch Belle River will be done to ensure early fall DO violations are not occurring.

EPA finds that the TMDL document submitted by MDEQ 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:

To provide reasonable assurance that the WLA will be met, the existing NPDES permit requirements will be maintained for all individual non-storm water permits. The main focus of the TMDL will be to ensure that the proper controls are placed on the storm water control efforts and non-point source flows. The Southeast Michigan Council of Governments (SEMCOG) is involved in the Belle River water quality. SEMCOG working with the Macomb-St. Clair Intercounty Watershed Advisory group has set out initiatives to include the development of watershed management plans and sediment reduction through storm water control. These activities include both engineering/behavioral components. Engineering measures might include permanent buffer strips on agricultural lands to reduce stormwater runoff and associated TSS loads. Increase street cleaning in residential and urban areas can also reduce TSS loads to waterbodies. Educational and behavioral measures might include the dissemination of information regarding the negative water quality impacts from over-fertilization of lawns, or the disposal of trash and pet wastes in catch basins. The watershed management plan is still under development.

Both Lapeer and St. Clair Counties administer the National Resources and Environmental Protection Act's Part 91, Soil Erosion and Sedimentation Control Program (SESC). This program aims to reduce sedimentation in rivers, lakes, and streams by controlling sediments in runoff from construction sites greater than 1 acre in area, or those located within 500 feet of a water of the state.

EPA finds that the TMDL document submitted by MDEQ satisfies all requirements concerning this eighth element.

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:

MDEQ will conduct monitoring following the implementation of applicable Best Management Practice (BMPs). As resources allow additional monitoring will be done for the waterbody, and these waterbodies are scheduled for re-analysis in 2007.

EPA finds that the TMDL document submitted by MDEQ satisfies all requirements concerning this ninth element.

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:

Actions to restore the Belle River and North Branch Belle Rivers have been developed using Clean Michigan Initiative Program grants, and elimination of sanitary sewers and other illicit connections. The Southeast Michigan Council of Governments is involved in Belle River water quality through the Macomb-St. Clair inter-county Watershed Advisory Group. The activities of this group focus on improving water quality in Lake St. Clair by improving water quality in streams tributary to the lake. The group's initiatives include the development of watershed management plans, sedimentation at reduction, and minimization of land use impacts through storm water control.

EPA finds that the TMDL document submitted by MDEQ satisfies all requirements concerning this tenth element.

11. Public Participation

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

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

Comment:

The TMDL was public noticed from September 6, 2004 to October 6, 2004. A stakeholder meeting was held on September 30, 2004. The availability of the TMDL was announced in the Michigan Department of Environmental Quality Calendar. Copies of the draft TMDL were available upon request, and the TMDL was also placed on the Michigan Department of Environmental Quality internet web site. Copies were also distributed at a stakeholder meeting. No public comments were received on the draft TMDL.

EPA finds that the TMDL document submitted by MDEQ 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 USEPA received the formal submittal of the final sediment TMDL for the Belle River and North Branch Belle River on January 18, 2004, along with a submittal letter from Richard A. Powers, Chief of the Surface Water Quality Division dated January 3, 2004. In the submittal letter, MDEQ stated that the "The final dissolved oxygen (DO) Total Maximum Daily Loads (TMDLs) for the Belle and North Branch Belle Rivers, is enclosed for your review and approval".

The submittal letter included the name and location of the waterbody and the pollutants of concern. The letter states that the Belle and North Branch Belle was identified as an impaired waterbody due to nonattainment of Michigan's DO Water Quality Standards and was listed on Michigan's 2004 Section 303(d) list. Michigan does not include a separate priority ranking, however, it prioritizes waters based on its five-year rotating watershed assessment approach.

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

13. Conclusion

After a full and complete review, EPA finds that the TMDL for TSS to resolve the DO impairment on the Belle and North Branch Belle Rivers (WB ID#061501G), satisfies all of the elements of an approvable TMDL.

Table 1

Waterbody (Bell River and North Branch Belle River)	Current Annual TSS load (lbs)	Annual TSS load Numeric Target (lbs)	WLA - Annual TSS Load (lbs)	LA - Annual TSS Load (lbs)
Industrial storm water Permitted Outfalls*	108,000	54,000	54,000	--
Other Land Use Related Sources**	3,461,000	1,731,000	--	1,731,000
Existing Ind/Gen NPDES permitted facilities	721,000	721,000	721,000	--
Total Annual Loads	4,290,000	2,506,000	775,000	1,731,000

*Primarily attributed to urban or built-up land uses in the city of Imlay City

**Attributed to non-commercial land uses in the townships of Almont, Attica, Berlin, Brockway, Dryden, Emmet, Goodland, Imlay, Mussey, and Riely.