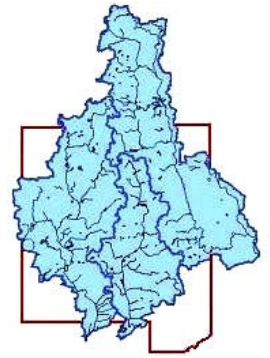


The Minnehaha Creek Watershed District (Minnesota) Nine Lakes TMDL



Introduction and Purpose

The Minnehaha Creek watershed is in the Twin Cities area in Minnesota. Nine lakes within the watershed's boundaries have been identified as impaired due to excess nutrients. In 2004 the Minnehaha Creek Watershed District (MCWD) worked with the Minnesota Pollution Control Agency (MPCA) to initiate the development of a Total Maximum Daily Load (TMDL) study for the impaired lakes. During the preparation of the draft Nine Lakes TMDL study, MCWD identified challenging technical and policy issues related to the TMDL provisions, including how to best develop equitable wasteload allocations (WLAs) for permitted stormwater sources, and links between the TMDL and the National Pollutant Discharge Elimination System (NPDES) stormwater permitting program.

This case study presents key issues surrounding the development of the Nine Lakes TMDL and the implementation of the WLAs through municipal separate storm sewer system (MS4) stormwater permits. The objective of the case study is to address three overarching questions posed by MCWD and the MPCA:

- How should the TMDL be crafted to best address environmental needs and facilitate implementation?
- How can/should the TMDLs link to stormwater permits?
- What processes can be used to effectively involve local community stakeholders in both the TMDL development and stormwater permitting activities?

The case study reflects information from MCWD's March 2005 draft of the Nine Lakes TMDL, as

well as MPCA's draft document entitled *Lakes TMDL Protocols and Submittal Requirements (Protocols)*. The *Protocols* document provides guidance for MPCA staff, as well as technical staff of local organizations and consultants responsible for developing TMDLs. It presents the federal requirements for the major components of a TMDL and describes Minnesota's state-specific requirements. Under each protocol discussion, the MPCA provides guidance on how to address MS4s in the respective component of the TMDL. In addition, the document includes an appendix on how to integrate TMDL requirements into MS4 stormwater pollution prevention programs (SWPPPs).

MCWD initiated the development of the Nine Lakes TMDL before the release of the *Protocols*. Therefore, the draft Nine Lakes TMDL study did not fully address all the MS4-specific issues covered in the *Protocols*. This case study summarizes and offers observations on the draft TMDL; it also considers the draft TMDL in light of the more recent guidance provided in the *Protocols*. The case study is organized as follows:

- I. Overview of the Minnehaha Creek Watershed and the Draft Nine Lakes TMDL Study
- II. TMDL Development Key Issues
- III. NPDES Stormwater Permitting Key Issues
- IV. Recommendations and Next Steps

I. The Minnehaha Creek Watershed and the Draft Nine Lakes TMDL Study

The Minnehaha Creek watershed, shown in Figure 1, is in the central portion of Hennepin County and a portion of northern Carver County.

The watershed drains approximately 181 square miles (roughly 116,000 acres) and consists of two major water features—Lake Minnetonka and Minnehaha Creek. The upper portion of the watershed drains to Lake Minnetonka, which then flows into the creek at Grays Bay Dam. The creek flows about 22 miles east and then flows over Minnehaha Falls and into the Mississippi River in Minneapolis (MCWD 2005). Nine lakes within the Minnehaha Creek watershed’s boundaries have been identified as impaired due to excess nutrients—Brownie, Isles, Diamond, Nokomis, Hiawatha, Powderhorn, Parley, Wasserman, and Virginia.

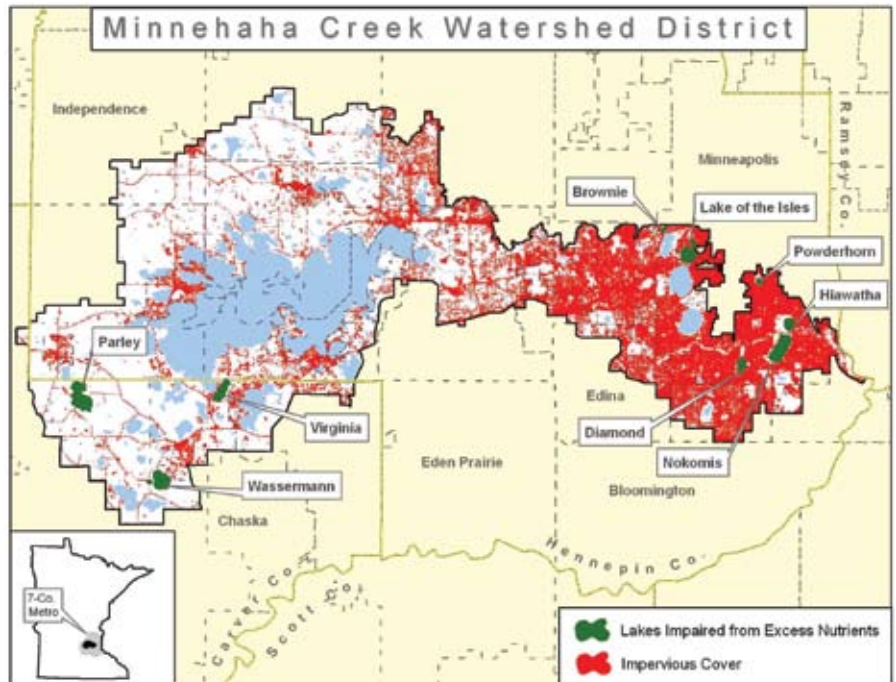


Figure 1. Minnehaha Creek Watershed District and the Nine Impaired Lakes

Working with the MPCA, MCWD initiated the development of the Nine Lakes TMDL in 2004. Total phosphorus (TP) is the primary pollutant of concern addressed in the draft Nine Lakes TMDL study. The March 2005 draft study consists of the following six sections:

Section I: Applicant information, including the contact information for MCWD, which is leading the development of the TMDL study.

Section II: Project information, including the project title, a list of the impaired lakes, the impaired use, the stressor, and a project summary.

Section III: Background information, including a history of the watershed and descriptions of the lakes and the respective watersheds.

Section IV: Modeling and TMDL determination, including a description of the monitoring data, goal setting, pollutant sources, the in-lake modeling approach, and the TMDL determination for each lake.

Section V: Implementation plan, including recommended actions to achieve the TP load reductions necessary to attain the water quality goal established for each lake.

Section VI: An appendix that provides detailed

watershed TP load estimates calculated using the method described in Section IV.

Section III, Background Information, provides detailed descriptions of each lake and the respective watershed. Six of the nine impaired lakes (Brownie, Isles, Diamond, Nokomis, Hiawatha, and Powderhorn) are in the City of Minneapolis in the lower portion of the Minnehaha Creek watershed. Land use is predominately single-family residential land use, with some areas containing high concentrations of commercial and industrial land uses. Two of the impaired lakes (Parley and Wasserman) are in the southwest portion of the Minnehaha Creek watershed in the Six Mile Creek watershed. Land use in the area is predominately agricultural; however, the watersheds of these lakes are experiencing rapid growth, converting agricultural lands to residential uses. The last of the nine impaired lakes, Lake Virginia, is along the southern boundary of the MCWD and is dominated by single-family residential land use. All the lakes are listed as impaired with respect to aquatic recreation due to excess nutrients. Some of the lakes are used for swimming and have public swimming beaches. Other lakes are not used for swimming, and being supportive of swimming uses is not a goal for some

lakes. The aquatic recreation goals for many of these lakes include boating, fishing, and aesthetic enjoyment (MCWD 2005).

The draft Nine Lakes TMDL study identifies a combination of point and nonpoint sources that contribute to the TP load in the nine lakes. Municipal, industrial, and construction permitted stormwater sources are considered the predominant point sources contributing TP loads to the lakes. There are no wastewater treatment plants in the watershed, and the March 2005 draft TMDL study also states that several of the lakes are suspected to have a higher-than-average internal TP loading. Table 1 (next page) summarizes the current TP loads estimated from point sources (i.e., watershed runoff from various land uses, including those covered by stormwater permits) and required percentages for reductions in TP loads from point sources.

II. TMDL Development—Key Issues

TMDL studies involve comprehensive data collection and analysis to identify pollutant sources and quantify pollutant reductions needed to achieve water quality standards. TMDLs and associated implementation plans should provide stormwater permittees with a clear understanding of the pollutant load contributions from stormwater discharges and the pollutant load reductions necessary to achieve water quality standards. In addition, TMDL studies have the potential to provide guidance to permittees on how to quantify pollutant load reductions associated with stormwater management activities. Most stormwater permittees are not required to measure or estimate pollutant load contributions or reductions under traditional permit requirements; therefore, permittees will benefit from easy-to-understand TMDLs (e.g., wasteload allocations for MS4s) that provide guidance on

Table 1. Summary of Point Source Analysis from Draft Nine Lakes TMDL Study (MCWD 2005 and 2006)

Lake and Proposed Nutrient Standard ^a (µg/L)	Current Estimated Point Source TP Load (kg/yr)	Point Source TP Load to Achieve Goal (kg/yr)	Required Point Source TP Load Reduction (kg/yr and %)	Land Use in Lake Watershed/ Trend to 2020
Powderhorn (90 ^b)	57	22	35 (-61%)	Built out (residential, light commercial-industrial)
Diamond (90 ^b)	118	65	53 (-45%)	Built out (residential, light commercial-industrial)
Hiawatha (60)	4952	4232	720 (-15%)	Built out (residential, light commercial-industrial)
Nokomis (50)	161	75	86 (-53%)	Built out (residential, light commercial-industrial)
Lake of the Isles (40 ^b)	Not included in draft TMDL study because of request for delisting			Built out (residential, light commercial-industrial)
Brownie (40 ^b)	Not included in draft TMDL study because of on request for delisting			Built out (residential, light commercial-industrial)
Parley (60 ^b)	530	353	177 (-33%)	Ag., natural areas/rapid growth (ag to residential)
Wasserman (40)	251	78	173 (-69%)	Ag., natural areas/rapid growth (ag to residential)
Virginia (40)	115	94	21 (-18%)	Single-family residential/moderate growth

^aAll nine listings based on 40 µg/L TP. Expect rulemaking for numeric standards based on ecoregion/lake type (shallow, deep).

^bSite-specific Approach candidates (e.g., site-specific standard, Use Attainability Analysis, variance.)

modifying existing SWPPPs to achieve requirements under approved TMDLs and meet water quality standards.

Federal regulations require that NPDES permits contain effluent limitations and conditions consistent with the requirements and assumptions of a WLA in an approved TMDL. As noted earlier, most permittees are familiar with best management practice (BMP)-based permit requirements and likely have quantified stormwater pollutant load reductions associated with BMP implementation. Thus it is helpful if the WLA for stormwater sources presents information on the loading reductions needed, and if the WLA and/or the implementation plan go on to lay out stormwater management measures to achieve the stipulated load reductions (or guidance sufficient for permittees to clearly determine the management measures needed). Key considerations for WLA development and expression of the WLA in a TMDL are provided below:

- Regulated stormwater sources—industrial activities, construction activities, and MS4s—are point sources and must be assigned a WLA.
- Non-NPDES-regulated stormwater runoff from an urban area is considered urban nonpoint source runoff.
- Non-NPDES-regulated stormwater runoff should be assigned a separate load allocation as urban nonpoint source runoff.

Wasteload Allocations

A variety of methods, ranging from simple to complex, are available for estimating the pollutant load contributions from permitted stormwater sources. The draft Nine Lakes TMDL study uses EPA's Simple Method to calculate pollutant loads. The Simple Method uses volume of runoff (based on the percentage of impervious cover for a land use area type, area of land use type, and precipitation data) and event mean concentrations for land use types (based on literature values and calibrated with monitoring data). Using an approach like the Simple Method involves clearly defining which land cover and land uses are included in the analysis

and the associated rationale. For example, pollutant loads associated with runoff from cropland and agricultural land are not regulated under the NPDES stormwater program, and therefore the analysis should account for pollutant loads from these land uses under nonpoint source load contributions. In the case of the draft Nine Lakes TMDL study, however, it is assumed that the agricultural lands in a lake's watershed will eventually transition to urban land uses that will fall into the MS4 boundary. As a result, these agricultural land uses are included in the MS4 pollutant loading analysis using the Simple Method.

The approach for estimating the pollutant load contributions from permitted stormwater sources should take into account land uses and existing BMPs, and the description of the approach should clearly state how the approach addresses existing BMPs. In the case of the draft Nine Lakes TMDL study, the approach does not take pollutant load reductions from existing BMPs into account.

NPDES regulations require that NPDES permit requirements be consistent with the assumptions and requirements of the WLA. The WLA in the TMDL should quantify the load reductions needed to restore uses, and the WLA and/or the implementation plan should provide definitive language or guidance on what NPDES permittees will need to do to achieve the stipulated loading reductions and restore uses. Stormwater permittees, most of which are covered under general permits, can then look to the TMDL to be clear on what they need to do.

General permit coverage is available to regulated Phase II MS4s, industrial activities, and construction activities in the watershed:

- **Phase II MS4 general permit.** In the TMDL study area, the 32 regulated Phase II MS4s are eligible to apply for permit coverage under the MPCA's MS4 general permit. This general permit requires permittees that discharge to a waterbody with an approved TMDL to review the adequacy of the MS4 SWPPP to meet the WLA set for stormwater sources. If the permittee determines that the SWPPP does not meet the applicable requirements, sched-

ules, and objectives of the TMDL, the permittee must modify the SWPPP, as appropriate, within 18 months after TMDL approval.

The WLAs in the draft TMDL study requires a percent TP load reduction for each lake. Per the requirements in the MS4 general permit, regulated MS4s must review their respective MS4 SWPPPs to determine whether the BMPs selected to fulfill the six minimum control measures will achieve the applicable percent TP load reduction(s). However, no further guidance or requirements on conducting such a review is available. The MS4 general permit became effective June 1, 2006, and does not expire until May 31, 2011. Therefore, the most feasible way to incorporate specific requirements, schedules, and assumptions from the TMDL into the general permit is through the WLA.

- **Construction general permit.** Although the number of construction sites to be covered by the construction general permit in the TMDL study area is not known, the potential for these activities is high in the portions of the watershed experiencing significant population growth. The construction general permit contains conditions similar to those in the MS4 general permit, requiring permittees that discharge sediment or parameters associated with sediment transport to incorporate into their SWPPP any BMPs that are appropriate for the site and sufficient to comply with all applicable requirements of the TMDL WLA and implementation plan. The SWPPP must also comply with any conditions applicable to the discharges that are necessary to ensure consistency with the assumptions, allocations, and requirements of the TMDL within any timeframes established in the TMDL.

One way the TMDL could quantify the allocation for construction sites is to build into the TMDL the “ultimate loading scenario” identified in the MCWD Comprehensive Water Resources Management Plan. This scenario contrasts existing loading projections with

future loading to quantify the impacts of development on resources. The approach could be used to quantify the construction activity component of the WLA.

Permittees with coverage under the construction general permit require guidance on how to determine whether BMPs are adequate to comply with TMDL requirements. The construction general permit became effective August 1, 2003, and expires August 1, 2008. Therefore, the most feasible way to incorporate specific requirements, schedules, and assumptions from the TMDL into the general permit is through the WLA. MPCA might consider providing specific guidance in the construction general permit during the reissuance process.

- **Industrial general permit.** Although the number of industrial activities covered by the industrial general permit in the TMDL study area is not known, the potential for these activities is high in the lake watersheds characterized by light industrial and commercial land uses. The current industrial general permit, which has expired but is applicable until the MPCA reissues the permit, does not contain provisions related to discharges to impaired waterbodies. Therefore, the permit currently does not ensure any degree of consistency with WLA requirements and assumptions under approved TMDLs. It is expected, however, that the reissued permit for stormwater discharges associated with industrial activity will include language requiring permittees to comply with WLAs in approved TMDLs.

The City of Minneapolis’ Phase I individual MS4 permit, which expired January 1, 2004, does not contain provisions related to discharges to impaired waterbodies. The permit does stipulate the circumstances under which MPCA may require the City to modify its stormwater management program. Presumably, once a TMDL is approved, the MPCA may require a modification to the stormwater management program and may include other additional permit requirements (e.g., BMP performance

monitoring), as appropriate, to conform to the WLA in the TMDL.

Applicable Guidance

The MPCA's *Protocols* document cites the guidance issued by EPA in a 2002 memorandum entitled "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Stormwater Sources and NPDES Requirements Based on Those WLAs." The 2002 Memorandum highlights existing regulatory requirements and Agency recommendations for establishing WLAs for stormwater discharges. The MPCA's *Protocols* also presents two options for setting WLAs, depending on the amount of available data—sector-wide allocations and individual allocations. The current technical approach used in the draft Nine Lakes TMDL study produces an aggregated WLA for all permitted stormwater sources (combines MS4s, industrial activities, and construction activities). It is important to explain assumptions or limitations in the data that might prevent estimating pollutant loads and assigning WLAs for more narrowly defined categories of stormwater discharges (e.g., municipal stormwater as distinguished from stormwater discharges from construction sites) or individual WLAs for each discharger (e.g., municipal stormwater discharges from City A as distinguished from those from City B).

NPDES regulations require consistency between the requirements and assumptions of WLAs in approved TMDLs and the effluent limitations and conditions contained in NPDES permits (USEPA 2002). This requirement to connect NPDES permit requirements to the requirements and assumptions of the WLA is extremely important to ensure that implementation of stormwater permit requirements results in achieving the WLA. Specifically, the WLA provides an effective mechanism for requiring BMP implementation to achieve load reductions and monitoring (BMP performance, stormwater discharge, and ambient water quality) to demonstrate progress toward achieving the WLA and water quality goals. Where point source dischargers are covered under general permits, requirements and assumptions specified as part of the WLA become even more important because the WLA provides

a mechanism for incorporating additional requirements into an otherwise standardized set of permit conditions.

Specific requirements in the WLA for each lake that stormwater permits may explicitly include or incorporate by reference could improve the connection to NPDES stormwater permits. Requirements addressed under the WLA should include the following: BMP identification and implementation to address TP loads; BMP monitoring to gauge BMP effectiveness; methods for demonstrating progress toward achieving the WLA within one permit term or over multiple permit terms, including stormwater discharge monitoring; methods for reporting on progress toward achieving the WLA; methods and frequency for proposing modifications to the SWPPP based on monitoring data.

The MPCA's *Protocols* describes three options for specifying compliance requirements in the WLA that would translate to stormwater permit requirements. Two of these three options appear feasible for MCWD to consider incorporating into the draft TMDL study at this time:

- **Option 1:** Establish the WLA, and require benchmarks and performance measures to indicate progress toward achieving the WLA over multiple permit cycles. The MPCA's *Protocols* document states that "it should be assumed that multiple permit [terms] will be needed to meet TMDL reduction targets and that regulated MS4s need to make progress in each permit cycle to meet a WLA." To ensure that permitted stormwater sources make progress toward the WLA in each permit cycle, the MPCA recommends setting reduction milestone timelines and goals, if adequate data exists, that a permittee could reference in the SWPPP during each permit term to justify compliance with the TMDL. It would be important to note, in both the WLA and the stormwater permit, how the MPCA would determine compliance using reduction milestone timelines and goals. For example, Oregon Department of Environmental Quality uses this approach with the City of Portland's

Phase I MS4 permit and determines compliance not on the basis of achievement of the reduction milestone goal but rather on the basis of demonstrated attempts to achieve the reduction milestone goal through implementation of BMPs with estimated pollutant load reductions expected to achieve the goal (i.e., to the Maximum Extent Practicable).

MCWD and the MPCA could consider having the WLA require the permitted point sources to develop proposed reduction milestone timelines and goals, as opposed to having the timelines and goals included in the TMDL. The timelines and goals proposed by permitted stormwater sources would be subject to the MPCA's review and approval. In addition to reduction milestone timelines and goals for the overall SWPPP, the WLA could also include (or require permitted stormwater sources to develop) performance measures that would provide estimated pollutant reductions from BMPs selected to achieve the required pollutant load reductions (i.e., either the entire WLA or the reduction milestone goals).

- **Option 2:** Establish the WLA using the best available data and require permitted stormwater sources to collect the necessary data to refine loading estimates and expected load reductions from BMPs for purposes of revising the WLA in the near future. For this type of approach, EPA recommends that the TMDL document a monitoring plan and a scheduled timeframe for revision of the TMDL (USEPA 2006). The WLA should specify monitoring requirements for permitted stormwater sources to collect the data necessary to refine aspects of the TMDL analysis (e.g., loading capacity, allocations) that stormwater permits can incorporate by reference. The TMDL study should also specify the strategy and schedule for revisions.

Option 1, with the regulated entities setting up the milestones, might be the optimal approach for the Nine Lakes TMDL. Both options would require permitted stormwater sources to perform storm-

water discharge and BMP effectiveness monitoring. Existing general permits for MS4s, industrial activities, and construction activities do not contain these types of monitoring requirements. Therefore, it is very important that the WLA state the need for these types of monitoring and provide sufficient detail on the required methods, frequencies, and reporting to support these compliance options. The TMDL implementation plan might reiterate or elaborate on the various requirements contained in the WLA; however, if mandatory provisions are to be included in TMDL implementation plans (and not solely the WLA), the language in the general permits or the WLA should make specific reference to TMDL implementation plans.

Implementation Plans

EPA does not require implementation plans for TMDL review and approval. However, the MPCA does require the development of broad implementation strategies for every TMDL study. After EPA approves the TMDL, the MPCA requires the development and submittal of a separate, more detailed implementation plan within one year.

The implementation plan described in Section V of the draft TMDL study presents existing and recommended actions to achieve the TP pollutant load reductions calculated for each lake. The MPCA's *Protocols* lists the information required in the implementation plan section of the TMDL submittal, as well as information pertaining to regulated MS4s. The implementation plan for the draft TMDL study addresses several of these items. Permitted stormwater sources could benefit from a discussion that clearly delineates which activities are required under NPDES stormwater permits (e.g., six minimum control measures of the Phase II MS4 stormwater management program) and which activities are voluntary BMPs.

Protocols states the following:

For MS4s, this section of the TMDL should provide a broad overview of activities that will be refined in the implementation plan. Providing this information will help enhance reasonable assurance and explain the adaptive management process planned during implementation, including:

- The current categories of BMPs that are planned (to be refined during implementation planning and SWPPP development);
- The current schedule (i.e., how many permit cycles) for putting BMPs in place; and
- Expected range of potential reductions, based on literature, which can be achieved for each category of BMP (e.g., citizen education program, stormwater ponds, alum treatment, etc.).

Monitoring

The MPCA *Protocols* states that monitoring provisions in TMDLs need to include at least these three components: (1) tracking the adoption of implementation activities; (2) monitoring the effectiveness of individual or sets of implementation measures; and (3) resource monitoring for evaluating impairment. The implementation plan of the draft TMDL study addresses monitoring activities related to in-lake water quality monitoring for each of the lakes. This type of monitoring directly addresses component 3 and indirectly addresses component 2. MCWD should consider expanding the monitoring plan subsections of Section V for each lake to address the need for BMP monitoring and stormwater discharge monitoring to comprehensively and directly address component (2).

The existing general permits for stormwater permittees in the watershed do not explicitly require stormwater discharge, BMP effectiveness, or ambient water quality monitoring. Federal regulations require that stormwater permits specify the monitoring necessary to determine compliance with effluent limitations (i.e., water quality-based effluent limitations expressed as BMPs to achieve the WLA) and BMP effectiveness, and provide a mechanism for adjusting BMPs to ensure their performance (USEPA 2002). As discussed earlier, however, general permits often contain very standardized TMDL compliance provisions that refer back to the requirements expressed in an approved TMDL WLA or a TMDL implementation plan. Therefore, the most effective way to require monitoring to support the TMDL through general permits is to ensure that (1) the WLAs for permitted stormwater sources require specific monitoring activities in conjunction with actions to achieve loading reductions or (2) the implementation plan contains specific monitoring activities necessary to determine compliance with the WLA and gauge BMP effectiveness and permittees are required to comply with the conditions of the implementation plan under the WLA that is referenced in the general permit requirements. A complete, linked, consistent set of requirements in the permit, the WLA, and the implementation plan is necessary to ensure that general permits have the adequate regulatory authority to require monitoring that is not otherwise required under these permits.

III. NPDES Stormwater Permitting—Key Issues

The MPCA is authorized to administer the federal NPDES stormwater program in Minnesota and regulates stormwater discharges from regulated MS4s, industrial activities, and construction activities. Stormwater permits have 5-year permit terms and contain varying requirements, depending on the type of permit (general or individual) and stormwater discharge (municipal, industrial, construction). This section focuses on key issues related to stormwater permitting with respect to TMDL implementation.

SWPPP Requirements

Where an approved TMDL contains a WLA assigned to a permitted stormwater source or, in the absence of a TMDL, other requirements are deemed necessary to attain or maintain water quality standards, the applicable stormwater permit must also contain water quality-based controls to achieve the WLA. EPA's 2002 Memorandum states that NPDES stormwater permits must contain water quality-based effluent limitations and conditions that are consistent with the WLA in approved TMDLs. In the Memorandum, EPA also

specifically recommends that stormwater permits for municipal and small construction discharges that express water quality-based effluent limitations to achieve a WLA typically express the limitations in the form of BMPs.

Some states take a presumptive approach to NPDES stormwater permitting and TMDLs, assuming that compliance with the technology-based requirements reflected in current stormwater permit requirements will achieve water quality standards. As a result, some NPDES permits contain permit conditions for discharges to impaired waters with approved TMDLs that simply require developing and implementing SWPPPs, as already required by the permit to meet the existing technology-based standards. However, without analyzing the estimated pollutant load reductions expected from the BMPs selected and implemented to fulfill SWPPP requirements, whether the “standard” BMPs will actually achieve the loading reductions needed to comply with the WLA and meet water quality standards is unclear.

The state municipal and construction general permits both require permittees to examine their existing SWPPPs to determine the adequacy of the SWPPP to meet the WLA set for stormwater sources. If a permittee determines that the SWPPP is not meeting the applicable requirements, schedules, and objectives of the TMDL, the permittee must modify the SWPPP as appropriate. This type of approach supports the concept of analyzing existing SWPPPs that meet the standards of maximum extent practicable (MEP) or best conventional pollutant control technology (BCT) and best available technology economically achievable (BAT) to determine whether they are adequate to achieve the WLA.

The MPCA should consider including similar SWPPP analysis and modification requirements in the new industrial stormwater general permit. In addition, the MPCA could consider improving the specificity of the SWPPP analysis and modification requirements contained in the existing MS4 and construction general permits to provide permittees with a better understanding of what the SWPPP analysis should consider (e.g., estimated pollutant

load reductions from existing and planned BMPs to determine whether the sum of the estimated pollutant load reductions will achieve the WLA) and what the modified SWPPP should include to demonstrate why the permittee believes the proposed modifications are adequate to achieve the WLA.

Monitoring

EPA’s 2002 Memorandum provides a degree of specificity on monitoring requirements for stormwater permits with effluent limitations expressed as BMPs:

Where effluent limits are specified as BMPs, the permit should also specify the monitoring necessary to assess if the expected load reductions attributed to BMP implementation are achieved (e.g., BMP performance data). The permit should also provide a mechanism to make adjustments to the required BMPs as necessary to ensure their adequate performance.

According to the regulatory requirements cited in EPA’s 2002 Memorandum, NPDES stormwater permits that contain BMPs as water quality-based effluent limitations intended to achieve the WLA should specify BMP performance monitoring to determine whether BMPs implemented as part of the SWPPP are achieving the expected pollutant load reductions. It is important to note that the results from BMP performance monitoring would not be used to determine permit compliance because stormwater permits with water quality-based effluent limitations expressed as BMPs do not include numeric effluent limitations. The results from BMP performance monitoring would be used to demonstrate progress toward the pollutant load reductions necessary to achieve the WLA and to facilitate an adaptive management approach to refining SWPPPs that would effectively reduce pollutant loads.

In addition to BMP performance monitoring, NPDES stormwater permits might require stormwater discharge monitoring to assess the overall pollutant load reduction from the permitted stormwater source. For example, the Phase I MS4 permit for

the City of Portland, Oregon, requires the permittee and its co-permittees to develop benchmarks (total pollutant load reduction estimates) for each TMDL parameter and conduct stormwater discharge monitoring to assess progress toward the benchmarks.

The MPCA should consider specifying BMP performance monitoring requirements in NPDES stormwater general permits that require permittees to implement the SWPPP with BMPs expected to reduce pollutant load reductions that will demonstrate progress toward WLAs. The permit could require BMP performance monitoring in one of several ways, depending on the type of stormwater permit. For individual Phase I MS4 permits, the MPCA could either specify the type and frequency of BMP performance monitoring based on its knowledge of the Phase I MS4s stormwater management plan (SWMP) or require the Phase I MS4 to develop and submit a BMP performance monitoring plan for review and approval as part of the SWMP. For stormwater general permits, the MPCA could leave the current general permit language pertaining to discharges subject to WLAs under approved TMDLs as-is and work with TMDL staff to ensure that specific language on BMP performance monitoring is incorporated into the WLA of a TMDL study. Alternatively, the MPCA could add a new requirement to stormwater general permits stating that permittees subject to WLAs in approved TMDLs must develop and submit a proposed BMP performance monitoring plan to document the actual pollutant load reductions achieved through SWPPP implementation.

IV. Recommendations and Next Steps

Development of an effective TMDL to restore the nine impaired lakes in the Minnehaha Creek watershed is a challenging undertaking because of a number of factors, including the number and characteristics of the impaired waterbodies and the number of permitted stormwater sources. At the time MCWD developed the draft TMDL study, the MPCA's *Protocols* did not yet exist. Recommendations provided in this section address best practices and information presented in the *Protocols*. Many of the recommendations are applicable

Permit Compliance Timelines

The MPCA *Protocols* acknowledges that permitted stormwater sources might need multiple permit cycles to achieve the pollutant load reduction required to meet a WLA. This type of iterative approach is supported by EPA under *The Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits* (August 26, 1996). Specifically, the policy anticipates that a suite of BMPs will be used in the initial rounds of permits and that the BMPs will be tailored in subsequent rounds.

NPDES stormwater permits could help address the issue of evaluation to support adaptive management by requiring permitted stormwater sources to develop proposed reduction milestone timelines and goals. These timelines and goals could include BMP performance measures as well as pollutant load reduction benchmarks for TMDL parameters. The reduction milestone timelines and goals proposed by permitted stormwater sources would be subject to the MPCA's review and approval, as well as public review and comment. The major stakeholders could work cooperatively to determine the appropriate timelines and goals to demonstrate progress toward the WLA. It would be imperative that the public understand the intent of numeric performance measures and benchmarks in terms of adaptive management versus compliance determinations.

to other TMDL development in other watersheds where there are permitted stormwater sources.

- *Provide permitted stormwater sources with the necessary geographic context to understand how they relate to the impaired waterbodies addressed by the TMDL.* This recommendation includes providing a list and a map of stormwater sources that are subject to the TMDL WLA and associated stormwater permit requirements.

- *Provide a broad, but detailed, overview of the technical approach that includes a discussion of the methodology for estimating point and nonpoint source contributions, the data used in the analysis, assumptions, limitations, and plans for revision.* A common challenge in developing TMDLs that involve regulated MS4s is the use of the entire jurisdictional boundary, as opposed to the area within the regulated MS4 boundary, to calculate a WLA. Providing a detailed description of the approach will help permitted stormwater sources understand how the TMDL developers estimated pollutant loading contributions from a particular permitted area.
- *Delineate categories of stormwater discharges (municipal, industrial, construction) as much as possible when developing and assigning WLAs, and provide rationale for sector-based or aggregate WLAs.* Available data on permitted stormwater sources will determine the most appropriate approach for calculating and presenting WLAs for these types of point sources. As a result, it is important to collect information on permitted stormwater sources, such as MS4 boundary maps, stormwater outfall monitoring data, and existing BMPs, early in the TMDL development process. This type of information will assist in developing individual WLAs for specific stormwater permittees. It is also important to consider how easily a permitted stormwater source will be able to interpret a WLA and translate the WLA into appropriate BMPs under a SWPPP.
- *Include specific compliance options and requirements to demonstrate progress toward achieving the WLA as part of the actual WLA in the TMDL study to ensure that stormwater permits can subsequently reference the WLA requirements.* Closing the loop between TMDL WLA and NPDES stormwater permit requirements is essential to improving the connection and promoting effective implementation. NPDES permit requirements must be consistent with TMDL WLAs; therefore,

the WLA is a key mechanism for specifying how permittees should review and modify their SWPPPs to ensure that BMPs achieve the WLA, as well as requiring performance measures and benchmarks to demonstrate progress over time.

- *Specify monitoring activities necessary to track TMDL progress, assess BMP effectiveness, and facilitate adaptive management activities.* Many stormwater permits do not include monitoring requirements; however, monitoring BMP effectiveness and pollutant load reductions is an important activity for assessing progress toward WLAs over time. Monitoring activities will not produce data used for compliance purposes because stormwater permit compliance is based on BMP implementation. Without this type of data, stormwater permittees do not have the necessary information to take due credit for making strides toward water quality improvements or to make program adjustments where necessary.

Developing effective TMDLs to address the complex issues related to permitted stormwater sources is a topic that is gaining increasing attention across the country. The MPCA is addressing these issues by developing technical resources and guidance documents, such as the Protocols, and is working on specific TMDLs to plan loading reductions and implementation actions for specific watersheds. The MPCA is also considering issues related to discharges to impaired waters and links to TMDLs as it work on reissuance of stormwater general permits.

MCWD is now working with the MPCA to update the 2005 draft Nine Lakes TMDL study. Planned updates include refinements to the pollutant loading estimates for permitted stormwater sources and the WLAs for point sources. Refinement of the WLAs, which includes incorporating specific requirements that will link to NPDES stormwater permit requirements, will promote more effective implementation by permitted stormwater sources and should lead to attainment of water quality standards.

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