



**Minnesota Pollution  
Control Agency**

# **Guidance for Incorporating TMDL Requirements into a MS4 SWPPP**

**March, 2008**

# **Outline**

## **Acronyms**

### **I. Introduction**

**A. To Whom Does this Guidance Apply?**

**B. Purpose**

**C. Permit Language and SWPPPs**

### **II. Process for addressing TMDL requirements**

**A. Determine a general strategy, tracking system and schedule for meeting a TMDL WLA**

**1. Selecting a General Strategy**

**2. Selecting a Pollutant Tracking System**

**3. Determining a schedule for achieving the TMDL WLA**

**B. Building, implementing, and maintaining a stormwater program**

**1. Organizational Structure**

**2. Resources which may be needed for implementation**

**3. Regulatory tools**

**4. Funding mechanisms**

**C. Mapping and Load calculations**

**1. Mapping**

**i. Identify and map discharge points, stormwater drainage areas (stormsheds) contributing to discharge points, and within each stormshed, map the conveyance system**

**ii. Identify and map percent impervious surface, land use, and soil type**

**2. Calculate loads based on TMDL assumptions**

**3. Calculate loads based on current conditions**

**D. Implement and Track BMPs**

## **Acronyms**

EPA – United States Environmental Protection Agency  
MPCA – Minnesota Pollution Control Agency  
MS4 – Municipal Separate Storm Sewer System  
SWPPP – Stormwater Pollution Prevention Program  
TMDL – Total maximum Daily Load  
WLA – Wasteload Allocation

## I. Introduction

### A. To Whom Does this Guidance Apply?

This guidance is designed for permitted owners and operators of Municipal Separate Storm Sewer Systems (MS4s) that are or will be impacted by a United States Environmental Protection Agency (EPA)-approved Total Maximum Daily Load (TMDL).

### B. Purpose

This guidance describes recommended elements to be included in a Stormwater Pollution Prevention Program (SWPPP) that addresses a TMDL requirement. Each element will be discussed in greater detail in accompanying fact sheets or guidance<sup>1</sup>.

The guidance supplements the MPCA document GUIDANCE MANUAL FOR SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s) FOR GENERAL PERMIT NUMBER MNR040000. MS4s seeking information about permit requirements, SWPPPs, and other aspects of the MS4 general permit should review that guidance and other materials on MPCA's MS4 webpage (<http://www.pca.state.mn.us/water/stormwater/stormwater-ms4.html>).

### C. Permit Language and SWPPPs

The MS4 general permit states *"If a USEPA-approved TMDL(s) has been developed, You must review the adequacy of your Storm Water Pollution Prevention Program to meet the TMDL's Waste Load Allocation set for Storm Water sources. If the Storm Water Pollution Prevention Program is not meeting the applicable requirements, schedules and objectives of the TMDL, You must modify your Storm Water Pollution Prevention Program, as appropriate, within 18 months after the TMDL Waste Load Allocation is approved"*. Activities outlined in a SWPPP intended to meet the TMDL requirement are thus tied to the TMDL wasteload allocation (WLA).

A TMDL wasteload allocation comprises a numeric value for pollutant loading. TMDLs and TMDL Implementation Plans may include a set of recommended actions to achieve the numeric value. These actions can guide the process of meeting the WLA. The Minnesota Pollution Control Agency (MPCA) recommends early and significant involvement on the part of the MS4s in the TMDL process so these actions closely align with activities that are most likely to be implemented. MPCA has developed guidance for the Impaired Water-TMDL Stakeholder process and for development of TMDL Implementation Plans (see <http://www.pca.state.mn.us/water/stormwater/impairedwaters.html>).

MPCA recommends including activities that address the WLA in an EPA-approved TMDL in a separate section of the SWPPP. This section would include

- summary statements and narrative;
- checklists;
- timelines; and
- BMP information sheets that describe specific TMDL-related activities. BMP information sheets should contain a short summary of how the activity relates to the TMDL.

If BMPs included among the six minimum control measures are applied toward meeting the WLA, these can be cross-referenced in the TMDL section of the SWPPP. To be credited toward the WLA, load reductions associated with BMPs must be quantified.

## II. Process for addressing TMDL requirements

A TMDL allocates a pollutant load (e.g. pounds of phosphorus) to a MS4. TMDLs may provide estimates of pollutant load reductions needed to meet water quality standards (e.g.

---

<sup>1</sup> This supporting information is largely in development.

pounds of phosphorus to be reduced or % decrease in phosphorus loading). Compliance with the WLA, not the load reduction, is required.

To comply with the WLA, a MS4 will need to calculate its current loading. TMDLs typically provide information on current loading. MS4s may choose to use this information or may calculate their current loading using another appropriate method. If current loads exceed the WLA, then load reductions are needed.

#### **A. Determine a general strategy, tracking system and schedule for meeting a TMDL WLA**

The first objective for a MS4 is determining what general strategy they will use to meet the WLA. The MS4 should understand the steps needed to implement activities that will meet a TMDL WLA.

### **1. Selecting a General Strategy**

A MS4 should demonstrate, in the SWPPP, that it understands the TMDL requirement and that it has a strategy for meeting the WLA. There are several ways for a MS4 to meet a TMDL wasteload allocation, including

1. retrofitting with structural stormwater BMPs (e.g. infiltration BMPs in built out areas);
2. utilizing BMPs in newly developing areas (e.g. infiltration BMPs in areas converting from one land use to another);
3. implementing non-structural BMPs designed for source control (e.g. a leaf recycling program; fertilizer ban);
4. implementing non-structural BMPs designed to treat existing loads (e.g. street sweeping, alum treatment); and
5. trading.

A MS4 may use one or more of these approaches to meet a TMDL requirement. The activities and resources necessary to support these approaches differ. See the MPCA factsheet *Selecting a Stormwater Management Strategy for Your MS4* for more information (<http://www.pca.state.mn.us/water/stormwater/impairedwaters.html>).

**To incorporate this section into a SWPPP**, include a short narrative identifying the approach to be used in meeting the TMDL.

**Example (for a MS4 with a lake TMDL that gives a phosphorus WLA):** “MS4 X” is largely built out and therefore has limited potential for reducing pollutant loads through changes in land use. Initially, “MS4 X” will attempt to reduce pollutant loads through non-structural source controls and treatment BMPs. In-lake BMPs will not be considered during this initial phase. After implementing these BMPs, “MS4 X” will determine if structural BMPs in retrofit areas are required to achieve additional pollutant load reductions. In-lake BMPs will be utilized, if necessary, once these other BMP options have been explored.

### **2. Selecting a Pollutant Tracking System**

Once the strategy is determined, a MS4 should determine how they will track progress toward meeting the wasteload allocation. Four approaches are described below. Each requires different stormwater management resources. See the MPCA factsheet *Selecting a Stormwater Management Strategy for Your MS4* for more information (<http://www.pca.state.mn.us/water/stormwater/impairedwaters.html>).<sup>2</sup>

1. Monitor the receiving water body. Under this scenario, a MS4 may implement BMPs and monitor the quality of a receiving water body. Pollutant loads are not tracked. At some point, the water body may meet water quality standards and will be removed from

---

<sup>2</sup> Note that this section calls for a MS4 to simply identify a tracking system that will be used. Before the tracking system is applied to pollutant load calculations, it will require development and should be reviewed by MPCA.

- the Impaired Waters List. Note that EPA has determined a MS4 must still meet the TMDL WLA even if a water meets water quality standards unless the MS4 is in compliance with nondegradation standards. To avoid requiring excessive implementation of BMPs, the TMDL Implementation Plan can be used as a guide to link BMPs to achieving the WLA. In this scenario, achieving the BMPs described in the Implementation Plan and having the lake or stream meet water quality standards will likely be considered to meet the WLA. This approach is suitable for lakes that have a watershed occurring within a single MS4, such as Powderhorn Lake in Minneapolis.
2. Monitor stormwater effluent to ensure compliance with water quality standards. Under this scenario, a MS4 establishes a program to monitor stormwater effluent at specific stormwater outfalls. When effluent meets water quality standards, usually in response to implementation of BMPs, then no additional BMPs are required. This approach may be suitable for MS4s that have a small number of outfalls discharging to a water body that is impacted by many sources, such as the Minnesota or Mississippi rivers. Like the previous method of monitoring the receiving water, the Implementation Plan may be a useful tool to guide BMP implementation.
  3. Model the storm sewer system using a suitable model. There are many acceptable models. P8 and SWAT are currently widely used for TMDLs that have an urban stormwater component<sup>3</sup>. Models can be used to select BMPs for implementation and to track pollutant loads. Once modeled loads meet the WLA, some verification monitoring will be required. This approach is suitable for a MS4 that has the ability to conduct modeling and has adequately mapped its land use, stormsheds, and BMPs.
  4. Use a simple BMP tracking tool for tracking pollutant load reductions. Once loads meet the TMDL requirement, some verification monitoring will be required. This approach is suitable for MS4s that cannot conduct modeling or monitoring or that want to apply a simple tracking system.

**To incorporate into a SWPPP**, include a statement in the SWPPP describing the tracking system to be used.

**Example:** “MS4 X” will employ P8 for selecting BMPs and tracking pollutant load reductions.

### 3. Determining a schedule for achieving the WLA

The TMDL may set a general timeframe for permitted stormwater to meet the wasteload allocation. In some cases, the TMDL Implementation Plan will describe a more specific schedule. MS4s should include a TMDL implementation schedule in the SWPPP. The schedule should be consistent with the schedule outlined in the TMDL or Implementation Plan. This schedule should be general in nature, discussing groups of activities to be implemented within permit cycles or based on funding cycles. Specific activities should not be included in this section of the SWPPP.

**To incorporate into a SWPPP**, include a short statement describing a general schedule, or include a timeline that illustrates general activities to be conducted within each permit cycle.

**Example:** “MS4 X” will achieve necessary pollutant reductions within four permit cycles.

1. During the first permit cycle, “MS4 X” will evaluate its existing stormwater program, determine if the program requires modification, outline a process for modifying the program, and implement BMPs if opportunities arise.
2. In the second permit cycle, “MS4 X” will modify its stormwater program as necessary, implement non-structural BMPs, develop a system to evaluate the effectiveness of these BMPs and implement structural BMPs if opportunities arise.
3. In the third permit cycle, “MS4 X” will evaluate the effectiveness of non-structural BMPs, determine if structural BMPs (through retrofits) are needed, identify where and

---

<sup>3</sup> MPCA does not endorse or promote the use of specific models.

which structural BMPs will achieve the needed pollutant load reductions, and implement structural BMPs if opportunities arise.

4. In the fourth permit cycle, “MS4 X” will implement structural BMPs as needed.

### **B. Building, implementing, and maintaining a stormwater program**

Once a MS4 determines the general approach to be used to meet a TMDL requirement, it can evaluate the need to develop or modify a stormwater management program to meet the WLA. The MPCA has developed a checklist for the items in this section (see Appendix A). In evaluating whether your stormwater program needs to be modified, follow the different steps described in the checklist. Fact sheets accompany each item in the checklist.

#### **1. Organizational Structure**

This item addresses a MS4’s existing stormwater structure. It includes identifying

- a. where in a MS4’s organizational structure the various stormwater management elements are to exist,
- b. activities to be conducted through the stormwater program,
- c. human resources that exist,
- d. required funding,
- e. statutory requirements, and
- f. other organizations with stormwater management responsibilities.

See the MPCA factsheet *Assessing Your Stormwater Program's Organizational Structure* for more information (<http://www.pca.state.mn.us/water/stormwater/impairedwaters.html>).

**To incorporate this into a SWPPP**, fill in part B.1 of the checklist. If you have a stormwater division, department, or something similar, you likely will answer yes in the checklist.

#### **2. Resources which may be needed for implementation**

MS4s will likely need a variety of resources to help meet a TMDL requirement.

Examples include

- Geographic Information Systems (GIS), which can be used for selecting BMPs and calculating loads for discrete areas, stormsheds, and land uses;
- database management, which allows tracking of BMPs, load reductions, maintenance schedules, and monitoring; and
- modeling resources, which are useful in selecting BMPs and calculating loads.

There are likely to be other resource needs, including staff time and equipment. See the MPCA factsheets *Assessing Your Stormwater Program's Resource Needs*; *GIS Applications for MS4 Stormwater Management*; *Database Applications for MS4 Stormwater Management*; and *Modeling Applications for MS4 Stormwater Management* for more information (<http://www.pca.state.mn.us/water/stormwater/impairedwaters.html>).

**To incorporate this into a SWPPP**, fill in part B.2 of the checklist.

#### **3. Regulatory tools**

Regulatory tools must align with the chosen strategy for meeting the TMDL. Although MS4s may have a variety of regulatory tools in place, they may need additional regulatory tools. For example, a MS4 that chooses to meet the wasteload allocation by implementing BMPs in newly developing areas may need to create new regulatory tools. An example is an ordinance for Low Impact Development (LID). See the MPCA factsheets *Regulatory Tools for MS4s: Building Codes, Easements and Ownerships*; and *Regulatory Tools for MS4s: development Issues* for more information (<http://www.pca.state.mn.us/water/stormwater/impairedwaters.html>).

**To incorporate this into a SWPPP**, fill in part B.3 of the checklist.

#### 4. Funding mechanisms

Many MS4s have a stormwater utility or other mechanism for funding stormwater management. Other resources may be needed for implementing BMPs. Each MS4 will have to evaluate its current level of funding in light of identified needs. See the MPCA factsheets *Assessing Your Stormwater Program's Funding Needs* and *Funding Your Stormwater Program: Utilities and Fees* for more information

(<http://www.pca.state.mn.us/water/stormwater/impairedwaters.html>).

**To incorporate this into a SWPPP**, fill in part B.4 of the checklist.

#### C. Mapping and Load Calculations

If a model or other pollutant tracking system is used, MS4s will have to calculate current pollutant loads and pollutant loads as BMPs are implemented. Mapping is an important tool for calculating pollutant loads. This section assists a MS4 in mapping and calculating pollutant loads. Even for a MS4 that is tracking progress through monitoring, the methods described in this section will be useful because they help identify BMPs that are most effective in reducing pollutant loads. See the MPCA factsheet *Calculating and Tracking MS4 Pollutant Loads - Illustrative Example* (<http://www.pca.state.mn.us/water/stormwater/impairedwaters.html>) for an example calculation of stormwater pollutant loads for a MS4 and a description of how this information can be included in a SWPPP.

##### 1. Mapping

Table 1 summarizes mapping requirements for each of the TMDL implementation strategies (see Section A.1). Mapping is necessary to track loads associated with implementation of BMPs or to model pollutant loads. Mapping is not necessary if monitoring will be used to determine compliance with a TMDL, but it is suggested because it helps identify the best locations for implementation of BMPs. See the MPCA factsheet *Mapping Your Storm Sewer System to Track Pollutant Loads* for more information (<http://www.pca.state.mn.us/water/stormwater/impairedwaters.html>).

Map	Strategy selected for addressing TMDL (see Section 1.1)			
	Monitoring receiving water	Monitoring outfalls	Modeling	BMP tracking
Stormsheds	Recommended	Yes	Yes	Yes
Conveyance system	Recommended	Yes	Yes	Yes
Land use	Recommended	Recommended	Yes	Yes
Impervious	Recommended	Recommended	Yes	Yes
Soil	Recommended	Recommended	Recommended	Recommended
BMPs	Recommended	Recommended	Yes	Yes

Table 1: Maps for calculating pollutant loads. The four strategies for addressing a TMDL were discussed in Section A.1.

##### i. Identify and map discharge points, stormwater drainage areas (stormsheds) contributing to discharge points, and within each stormshed map the conveyance system

Calculation of pollutant loads requires understanding the stormwater drainage system. Each stormwater outfall will have a drainage area (stormshed) that contributes stormwater runoff. The greater the detail achieved in mapping these stormwater drainage areas, the more accurate the pollutant load calculations.



## **ii. Identify and map percent impervious surface, land use, and soil type**

Pollutant loads can be estimated using literature values or monitoring data for different land uses. For example, concentrations of phosphorus in “typical” stormwater runoff from a residential area are likely to differ from concentrations in commercial or industrial areas. Similarly, soil type and impervious surface are two factors that may affect pollutant concentrations in stormwater runoff. There are standard GIS coverages for impervious surface, land use, and soil type, although the level of detail may vary, particularly for soils and land use.

## **2. Calculate loads based on TMDL assumptions**

To track progress in reducing pollutant loads, a MS4 must first calculate the pollutant load at the time the TMDL was completed. The TMDL will provide a set of assumptions that must be used to calculate pollutant loads. For example, most TMDLs provide a wasteload allocation for permitted stormwater based on the assumption that no Best Management Practices (BMPs) are in place. Consequently, pollutant load calculations must be made using this assumption.<sup>4</sup>

## **3. Calculate loads based on current conditions**

If a MS4 has implemented BMPs and these were not accounted for in the TMDL, the current pollutant load must be calculated considering these BMPs.<sup>5</sup> There are several sources of information for BMP pollutant removal efficiency, including the Minnesota Stormwater Manual. MS4s should provide references for removal efficiencies used in calculations.

For BMPs in sequence, removal efficiencies are not additive. MPCA should be consulted when sequenced BMPs are being considered.

## **D. Implement and Track BMPs**

This section provides a brief overview of how to incorporate specific BMPs into the SWPPP. Information on specific BMPs, such as removal efficiency and cost, is not discussed in this section and can be found in the literature, including the Minnesota Stormwater Manual.

BMP Summary Sheets for the Six Minimum Control Measures provide an opportunity for MS4s to broadly discuss BMPs. These summary sheets are typically general in nature and do not provide estimates of pollutant load reductions achieved with each BMP. Greater detail is needed for BMPs to be credited toward achieving the TMDL WLA.

Assuming a separate TMDL section is included in the SWPPP, BMPs can be cross-referenced if they are included in the Minimum Control Measures. However, the descriptions must be more specific if load reduction credits are to be taken. For example, BMP 1a-1

---

<sup>4</sup> Pollutant load equals stormwater runoff volume times the pollutant concentration in the runoff. This can be written as an equation,

$$\text{Pollutant Load} = \sum_{i \text{ to } j} \text{Area}_j * \text{runoff}_j * \text{Pollutant Concentration}_j$$

where the subscript j refers to each stormshed. Thus, a pollutant load is calculated for each stormshed. The overall pollutant load is the sum of the loads from each stormshed.

<sup>5</sup> Pollutant loading, considering BMPs, is given by the following formula

$$\text{Pollutant Load} = \sum_{i \text{ to } j} \text{Area}_j * \text{runoff}_j \text{ (inches)} * \text{Pollutant Concentration}_j * (1-E_f)$$

where  $E_f$  is the pollutant removal efficiency. When  $E_f$  is zero, as would be the case for no BMPs, the pollutant load is the same as calculated in Step 3.2. The area contributing stormwater to each BMP must be known to calculate loads.

(Distribute Education Materials) could identify specific education materials that relate to the TMDL, such as distribution of a shoreline buffer fact sheet to all residents with lake property. This will apply to most of the Good Housekeeping, Pollution Prevention, and Education BMPs.

Structural BMPs should be included as separate BMP Summary Sheets in the TMDL section rather than cross-referencing to a Minimum Control Measure Summary Sheet. This is because these BMPs are likely to be very specific. The BMP Sheet should include calculations for pollutant reduction achieved by implementing the TMDL. This would include any mapping information used to make the calculations, BMP efficiencies, and maintenance information for the BMP (e.g. to ensure the efficiency used in the calculation is valid into the future or determine if it needs to be adjusted). Include references to support the calculations.

Some tools (BMPs) used to make load calculations may be included among the Minimum Control Measures. An example is storm sewer mapping. The SWPPP section on TMDLs can cross-reference these tools.

BMP Sheets can be prepared for ordinances, resources, or other tools needed for implementation of BMPs. Load reductions are not associated with these, but these tools may be needed to implement BMPs that reduce loading.

MPCA is developing a document illustrating examples of TMDL language in SWPPPs.

## Appendix A

<p><b>This checklist is designed to help determine if your current stormwater program can achieve the broad strategy, pollutant tracking, and general schedule that you outlined in your SWPPP.</b></p>	
<b>Element</b>	<b>Yes/No</b>
<b>B.1 STORMWATER ORGANIZATION/PROGRAM</b>	
Answer the following questions related to the organization of the stormwater program within your MS4. Then, determine if you already have a fully implemented stormwater organization or if there are gaps in the current structure that need to be addressed.	
a. Do you know in what department the stormwater program will be housed?	
b. What stormwater activities are currently conducted through the program?	
c. Have staff been defined who will be responsible for administering the functions of the program?	
d. Has level of funding needed to staff each program been determined?	
e. Are there other requirements the city has related to stormwater?	
f. Are there other organizations with overlapping or related responsibilities?	
<b>Do you have a fully implemented stormwater organization based on the above questions? If no, indicate in your SWPPP where the deficiencies lie and your plan to address them.</b>	
<b>B.2 RESOURCES FOR IMPLEMENTATION</b>	
Answer the following questions that relate the resources your MS4 currently has available for the implementation of the TMDL requirements.	
a. Will you require and do you have a Geographic Information Systems (GIS)	
b. Will you require and do you have a database management system	
c. Will you require and do you have modeling resources	
d. Other (including necessary staff)	
<b>Do you have the needed resources for implementation of the TMDL requirements? If no, indicated in your SWPPP where the deficiencies lie and your plan to address them.</b>	

<b>B.3 REGULATORY TOOLS AND NEEDS</b>	
Considering your strategy for meeting the TMDL requirements, answer the following questions related to the regulatory tools you may need to meet the TMDL requirements.	
a. Will you need additional authorities for building codes, easements, and ownerships	
b. Will you require additional authorities on development issues (e.g. input on plat review process)	
c. Will you require additional ordinances (e.g. to implement Low Impact Development)	
<b>Do you have the needed regulatory tools for implementation of the TMDL requirements? If no, indicated in your SWPPP where the deficiencies lie and your plan to address them.</b>	
<b>B.4 FUNDING MECHANISM</b>	
Considering your strategy for meeting the TMDL requirements, answer the following questions related to the regulatory tools you may need to meet the TMDL requirements.	
a. Do you have a stable funding source dedicated to stormwater management?	
b. Can stormwater funds be used to implement actions outlined in your strategy (e.g. for Capital Improvement Projects)	
<b>Do you have the needed funding resources for implementation of the TMDL requirements? If no, indicated in your SWPPP where the deficiencies lie and your plan to address them.</b>	