Minnesota Pollution Control Agency

CLEAN WATER LAND & LEGACY AMENDMENT

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Addressing TMDL Requirements in MS4 General Permit Applications and Stormwater Pollution Prevention Program Documents

Guidance document

Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) approved by the U.S. Environmental Protection Agency (EPA) prior to the effective date of the MS4 General Permit (permit) must be addressed by Permittees in their Stormwater Pollution Prevention Program (SWPPP) Document. The Clean Water Act requires the Minnesota Pollution Control Agency (MPCA) to include, in all National Pollutant Discharge Elimination System (NPDES) permits, discharge requirements that are consistent with requirements established in TMDLs. The permit requires applicants to submit information, at the time of application, on applicable WLAs and indicate how they will make progress toward achieving those WLAs over the current five-year permit term. Applicants must include long term strategies for meeting WLAs that will not be fully achieved in the current permit term and target dates for fully achieving all WLAs.

Total Maximum Daily Loads

Total Maximum Daily Loads are the maximum about of a pollutant a water body can receive without violating water quality standards. Studies are conducted to determine the likely pollutant sources and loads are partitioned to all sources with the potential to contribute to the water quality impairment. This includes both regulated and non-regulated sources as well as background or natural loads, future growth and a margin of safety. All sources are represented in the following equation:

TMDL = WLA + LA + RC + MOS

Where:

WLA = Wasteload Allocation
LA = Load Allocation
RC = Reserve Capacity (future growth)
MOS = Margin of Safety

For the purposes of this guidance, we will focus on the Wasteload Allocation, the portion of the equation that includes all NPDES-regulated pollutant sources, as well as future regulated sources.

Additional information on impaired waters, the impaired waters listing process and TMDL projects can be found on Minnesota's impaired waters and TMDLs webpage (http://www.pca.state.mn.us/xggx950).

Understanding Wasteload Allocations

Wasteload Allocations are allowable loads from regulated or future regulated sources in TMDLs. They are expressed as a load (i.e. pounds per day, kilograms per year, etc.) in TMDLs. They may also be expressed as a percent reduction from existing conditions. MPCA's Stormwater Program believes the percent reduction, when provided in the TMDL report, is a useful expression of the information for implementation and planning because information on the effectiveness of Best Management Practices (BMPs) is often expressed as a percent of pollutant removed.

WLAs for MS4 sources are either individual or categorical. Individual WLAs provide a single load for each Permittee, whereas categorical WLAs group multiple Permittees into one load that collectively must be achieved by all contributing sources. Regardless of the type of WLA, the information required to be submitted at the time of application is the same.

It is important to note watershed boundaries define TMDL study areas, while MS4 permits apply to a political boundary or jurisdiction. Further, WLAs apply only to the area that drains to the receiving water defined in the TMDL report. Therefore, it is possible that only a portion of a regulated entity's area will be within the TMDL study area. Credit for pollutant removal from BMPs can only be applied to the treatment applied to stormwater runoff generated within the TMDL study area for a particular WLA; however, BMPs often treat water generated both inside and outside the study area.

A single TMDL project may contain multiple Wasteload Allocations for a single MS4. This can occur in the following situations:

- A project that addresses nutrient impairments in multiple lakes within a watershed. For example, the *Crystal, Keller, and Lee Lakes Nutrient Impairment TMDL* includes WLAs for nutrient impairments in all three lakes, and MS4s have WLAs for each lake based on their drainage area and imperviousness in each watershed.
- A stream or river TMDL in which multiple WLAs for the same Assessment Unit Identification/Water Body Identification (AUID/WID) are developed over multiple flow regimes. For example, in the *Brown's Creek Lack of Coldwater Assemblage and Impaired Biota TMDL*, only one creek segment, or AUID, is the subject of the study; however, each of the regulated MS4s in the study received ten WLAs – one for each of five flow regimes (high, moist, mid-range, dry, and low) for each pollutant addressed in the TMDL.
- A single AUID/WID that has impairments for multiple pollutants.
- A combination of these.

Including Wasteload Allocation in the SWPPP Document

The term "applicable WLA" is used in the MS4 General Permit and means any wasteload allocation assigned to a regulated MS4 in an EPA-approved TMDL. The permit conditions apply only to those TMDLs approved prior to the effective date of the General Permit and are the only WLAs that must be addressed in the SWPPP Document.

MPCA created a spreadsheet containing WLA information for all TMDLs approved prior to the effective date of the General Permit. The spreadsheet is located on the MS4 Permit Program website http://www.pca.state.mn.us/MS4. Data from the spreadsheet can be copied, as is, into the SWPPP Document form. Each line on the spreadsheet represents a different WLA, and all that are assigned to an MS4 must be included in the SWPPP Document. The information that must be included, at a minimum, in the SWPPP Document is as follows:

- TMDL project name
- numeric WLA
- WLA units

- type of WLA (i.e. categorical or individual)
- pollutant of concern, and
- flow data (if applicable)

Note the spreadsheet contains additional information that is not required to be included in the SWPPP Document. However, for ease in translating the information from the spreadsheet to the SWPPP Document, all information provided for each WLA may be submitted on the application as it is displayed on the spreadsheet.

Determining whether a Wasteload Allocation is being met

If an applicant reasonably believes they are meeting any WLA(s) at the time of application, they shall indicate this by checking the appropriate box on the application and list the TMDL Project Name(s) and WLA(s) in their SWPPP Document. However, justification that the necessary load is being met may be evaluated by MPCA in an audit or annual report review. Note that the MPCA will make the final determination on whether WLAs have been met.

Applicants may have WLAs they believe they are meeting and WLAs that are yet to be achieved at the time of application. The MPCA anticipates many of the WLAs in TMDLs that call for a reduction in loading from MS4 sources will take multiple permit cycles to fully achieve. Timelines established in TMDL reports and Implementation Plans also often project several years will be necessary to meet water quality standards.

Suggested methods for determining whether a Wasteload Allocation is being met

Several options exist for determining whether a WLA is being met. For the purpose of filling out the application, detailed modeling may not be necessary. Methods may range from a desktop review, including evaluation of the TMDL study area and BMPs in your jurisdiction that apply to those areas, to full scale water quality models or stormwater discharge monitoring. Additional information and resources related to modeling and monitoring is included below.

Modeling

Pollutant loading can be determined using models. These models range from very simple spreadsheet applications to more complex models such as XP-SWMM and WINSLAMM. The Minnesota Stormwater Manual (http://stormwater.pca.state.mn.us/index.php/Main_Page) provides:

- an overview of stormwater modeling (http://stormwater.pca.state.mn.us/index.php/Introduction_to_stormwater_modeling);
- a list of models that can be used to estimate pollutant loading (http://stormwater.pca.state.mn.us/index.php/Available_stormwater_models_and_selecting_a_model); and
- a brief discussion of stormwater credits, which are equivalent to decreases in pollutant loading (http://stormwater.pca.state.mn.us/index.php/Overview_of_stormwater_credits).

A variety of models can be used to estimate pollutant loads. Two widely used public domain models include the Simple Method and P8 (Program for Predicting Polluting Particle Passage Through Pits, Puddles, and Ponds). These are described below.

- The Simple Method provides an easy and reasonably accurate method for calculating pollutant loads (see http://www.dec.ny.gov/docs/water_pdf/simple.pdf; http://www.stormwatercenter.net/monitoring%20and%20assessment/simple%20meth/simple.htm; http://www.stormh2o.com/SW/Articles/The_Simple_Method_20_Enhancing_the_Results_14221.aspx; http://stormwater.pca.state.mn.us/index.php/The_Simple_Method_for_estimating_phosphorus_export). Model inputs include annual runoff, pollutant concentration, and the area being considered. The area typically is the entire area included in the TMDL calculation, although the

calculation of pollutant load may be done for several discrete areas within the TMDL study area. Pollutant concentrations in stormwater runoff are found in several places in the literature (see http://www.dec.ny.gov/docs/water_pdf/simple.pdf; http://water.epa.gov/scitech/wastetech/guide/stormwater/upload/2006_10_31_guide_stormwater_usw_b.pdf; http://rpitt.eng.ua.edu/Research/ms4/Paper/recentpaper.htm). Annual runoff can be calculated knowing annual precipitation and the runoff coefficient for the area being considered. Tabled values of runoff coefficients for different land uses can be found in several places in the literature (http://www.dec.ny.gov/docs/water_pdf/simple.pdf; http://www.newarkohio.net/userfiles/files/StormWater/Stormwater%20Construction%20Manual/Newark%20SDM%20Ch2%20Runoff.pdf; http://stormwater.pca.state.mn.us/index.php/Runoff_coefficients_for_5_to_10_year_storms).

- P8 simulates the generation and transport of stormwater runoff pollutants in urban watersheds. Continuous water-balance and mass-balance calculations are performed on a user-defined drainage system. The user must provide information about the watershed (e.g. total area, impervious fraction), devices (e.g. BMPs), particles (e.g. settling velocities, decay rates), and water quality components (e.g. phosphorus, TSS). For more information, see http://wwwalker.net/p8/webhelp/p8HelpWebMain.html.

Other commonly used models include HydroCAD, WINSLAMM, XPSWMM, and HSPF. These are described in the Minnesota Stormwater Manual (http://stormwater.pca.state.mn.us/index.php/Available_stormwater_models_and_selecting_a_model).

Two models not included in the Minnesota Stormwater Manual are EPA's STEPL (Spreadsheet Tool for Estimating Pollutant Load; http://it.tetratech-ffx.com/steplweb/models$docs.htm) and the Center for Watershed Protection's Watershed Treatment Model (http://www.stormwatercenter.net/monitoring%20and%20assessment/watershed_treatment_model.htm). These are spreadsheet models and are easy to use. They include a wide range of stormwater BMPs and can be used to estimate current pollutant loading and loading after BMP implementation.

For information on other models, see the Minnesota Stormwater Manual (http://stormwater.pca.state.mn.us/index.php/Available_stormwater_models_and_selecting_a_model).

Monitoring

Monitoring data may be used to demonstrate the MS4 discharge meets a WLA. The monitoring data should be representative of the contributing area of the MS4 within the TMDL study area and demonstrate either that a load is met or the loading rate from the MS4 is at or below the concentration of the applicable water quality standard.

Wasteload Allocations being met at the time of application

For each WLA the applicant believes is being met at the time of application, the applicant must provide an explanation of how the load is being met and the BMPs in place to ensure continued compliance. There are two scenarios in which an applicant may already be meeting a WLA.

1. The Permittee has a WLA in which no reduction is necessary from the MS4.
2. BMPs have been implemented and are accomplishing the needed reduction in loading.

WLAs that do not call for a reduction in loading from an MS4 (expressed on the spreadsheet as a 0% reduction) must still be included on the SWPPP Document, but additional BMPs to address the specific impairment are not necessary. And, therefore, a compliance schedule does not need to be developed for these WLAs. The Permittee must describe how they will continue to meet the WLA. A statement indicating this intent shall be included in the SWPPP Document.

For situations in which the TMDL calls for a reduction in loading from an MS4, but the Permittee believes they are meeting the loading requirement established in the TMDL, the Permittee shall provide

in the SWPPP Document a list of BMPs implemented since the baseline of the TMDL to achieve the necessary loading. TMDL baselines are established in the reports and can be expressed in terms of a year, BMP condition or both. Additional detail on the BMPs, including estimates of the reductions in pollutant loading achieved by each BMP, will be submitted with the Permittee's first Annual Report. Further guidance on estimating load reductions and BMP efficiency will be included in an update to the Minnesota Stormwater Manual and available prior to submittal to the first Annual Reports for the MS4 General Permit.

Water quality modeling of the MS4 system may be used to demonstrate appropriate BMPs are in place and a WLA is being met. The MPCA must approve the water quality model. Methods for determining pollutant load reductions for BMPs and then tracking overall pollutant load reductions depend on the model being used. If possible, use the same model that was used to calculate pollutant load(s) prior to implementation of BMPs. However, simple spreadsheets can also be used to track load reductions.

Models such as P8, HydroCAD and WINSLAMM compute loading as BMPs are entered into the model. The model therefore provides output needed to determine progress toward achieving a TMDL WLA.

Pollutant reductions can also be estimated using a simple spreadsheet. Models such as EPA's STEPL and the Watershed Treatment Model (Center for Watershed Protection) are examples of spreadsheet-based models. However, Permittees can develop their own spreadsheets to track load reductions. These can be tracked either as a cumulative percent reduction or a reduction in mass.

If the Permittee chooses to track load reductions using a spreadsheet or other tool they develop, they will need information on pollutant removal efficiencies for different BMPs. There is extensive information in the literature on pollutant removal efficiencies of structural BMPs. Removal efficiencies vary within a specific BMP, so a range of values is often given. Using a value on the low end of a range provides a conservative estimate of pollutant reductions for the BMP. Some sources of information on pollutant removal efficiencies include the following:

- Center for Watershed Protection. National Pollutant Removal performance Database. http://www.stormwaterok.net/CWP%20Documents/CWP-07%20Natl%20Pollutant%20Removal%20Perform%20Database.pdf.
- Minnesota Stormwater Manual (see http://stormwater.pca.state.mn.us/index.php/Process_for_selecting_Best_Management_Practices);
- New Hampshire Department of Environmental Services. See Volume 2 of the New Hampshire Stormwater Manual (http://des.nh.gov/organization/divisions/water/stormwater/documents/wd-08-20b_apxb.pdf.)
- North Carolina Department of Environment and Natural Resources. Stormwater Best Management Practices Manual. See chapter 4 (http://www.ncsu.edu/ehs/environ/DWQ_StormwaterBMPmanual_001[1].pdf).

Another useful document will be Accounting for Stormwater Wasteload Allocations and Impervious Acres Treated – Guidance for National Pollutant Discharge Elimination System Stormwater Permits (Maryland Department of the Environment, 2011, http://www.mde.state.md.us/programs/Water/StormwaterManagementProgram/Documents/NPDES%20Draft%20Guidance%206_14.pdf). This document provides guidance on BMP selection and accounting measures for meeting stormwater WLAs. The document includes a wide range of BMPs, information on pollutant removal efficiencies for several BMPs, and examples of pollutant accounting.

Compliance schedules

For each WLA not being met at the time of application, a compliance schedule must be included in the SWPPP Document. WLAs constitute discharge requirements and must be incorporated as such. The compliance schedule must demonstrate that progress in reducing pollutant loads will be achieved within the permit cycle. Multiple WLAs can be combined and referenced by TMDL project name to consolidate the compliance schedule. Compliance schedules must contain annual interim milestones, dates for

implementation of each milestone, a strategy for ongoing implementation, and a target date for achieving each WLA. Interim milestones may be expressed in the form of BMPs, implementation of BMPs, or progress in the implementation of BMPs. Per federal rule, dates and reporting on implementation of the interim milestones must be at least annual. MPCA recommends applicants align reporting on compliance schedules with the MS4 General Permit Annual Report.

Reductions in pollutant loading are achieved by implementing Best Management Practices (BMPs). Some common structural BMPs include stormwater ponds, wetlands, infiltration devices, bioinfiltration devices, and filtration devices. Some common non-structural BMPs include street sweeping, pet waste ordinances, illicit discharge detection and removal, and composting programs. The Minnesota Stormwater Manual provides detailed information for a wide range of BMPs (http://stormwater.pca.state.mn.us/index.php/Stormwater_Manual_Table_of_Contents).

The list of individual stormwater BMPs is extensive and it can be difficult to determine the best BMP or sequence of BMPs. Two important factors to consider are characteristics of the BMP and where the BMP occurs in the treatment train.

Some BMP characteristics to consider include pollutant removal efficiency, physical characteristics of a site, cost of construction, cost and ease of maintenance, community acceptance, and habitat quality. The Minnesota Stormwater Manual provides a discussion of factors to consider in selecting a Best Management Practice (http://stormwater.pca.state.mn.us/index.php/Process_for_selecting_Best_Management_Practices; http://stormwater.pca.state.mn.us/index.php/BMP_selection_based_on_community_and_environmental_factors; http://stormwater.pca.state.mn.us/index.php/BMP_selection_based_on_physical_feasibility; http://stormwater.pca.state.mn.us/index.php/Climate,_soil,_terrain_factors_affecting_BMP_selection).

The second factor in selecting BMPs is the location of the BMP in the landscape. A treatment train is a series of BMPs designed to treat stormwater to some target level. For example, a treatment train may consist of a swale, wet pond, and infiltration device in sequence. The Minnesota Stormwater Manual provides information on using the treatment train approach to BMP selection (http://stormwater.pca.state.mn.us/index.php/Using_the_treatment_train_approach_to_BMP_selection).

There are dozens of excellent resources that can be used for selecting BMPs, including individual state stormwater manuals. Some references specific to BMP selection include the following:

- Midwest Research Institute. Stormwater Best Management Practice (BMP) Selection and Implementation. http://www.floridayards.org/professional/Stormwater-bmpmanual.pdf.
- North Carolina Department of Environment and Natural Resources. DWQ Stormwater BMP Manual and BMP Forms. http://portal.ncdenr.org/web/wq/ws/su/bmp-manual.
- University of Tennessee. Stormwater BMP Selection guide manual for Tennessee. http://eerc.ra.utk.edu/divisions/wrrc/BMP/bmp.htm.
- Upper White River Watershed Alliance. Best Management Practice selection Tool. http://www.uwrwa.org/bmpTool/.

When selecting BMPs to include as interim milestones, the applicant should consider the following:

- What is the magnitude and nature of pollutant reduction needed to achieve the WLA?
- What BMPs will be effective in reducing pollutant loads and can these BMPs be reasonably implemented within the permit cycle?
- If the WLA is categorical, what portion of the WLA is the Permittee's responsibility?
  - If a categorical WLA is expressed as a percent reduction, the reduction applies equally to all areas and MS4s included in the WLA.
  - If a categorical WLA is not expressed in terms of a percent reduction, the Permittee may determine their portion of the load based on their MS4's land area in the TMDL study area. For example, if an MS4 constitutes 25 percent of the land area in a TMDL study area, the Permittee may be responsible for 25 percent of the categorical WLA.

- § NOTE: Although it is not necessary for the applicant to identify an individual numeric load from a categorical WLA, it may be useful to consider during implementation planning and BMP selection.

- Are there opportunities to incorporate pollution prevention practices?
- Are there upcoming projects planned and what pollutant reduction will these projects achieve?
- Are there existing practices, both structural and non-structural, that may be modified or adapted to recognize additional pollutant removal?
- Are there policy or ordinance updates that may provide a mechanism for the Permittee to require pollutant reductions from others (e. g. volume control ordinance)?
- Are there opportunities to partner with other entities to achieve pollutant reductions to address WLAs?

The applicant will include BMPs they plan to implement over the current five-year permit term in the Compliance Schedule section of the SWPPP Document. BMPs are often applicable to multiple WLAs and can reduce the contribution of multiple pollutants. For example, volume control practices are likely applicable to both nutrient and turbidity WLAs. MPCA recommends WLAs included in the same TMDL Project be grouped together and BMPs selected that address multiple WLAs when possible. MPCA also recommends BMP identification numbers be included at the time of application as they are a required component of pond inventories and annual reporting. BMP IDs should be unique and can be developed using any numeric naming convention useful to the Permitte (e.g. POND-0362).

A long term strategy and target date must also be included in the compliance schedule that describes the approach the Permittee will take to continue to recognize reductions in loading from their MS4 until all WLAs are being met. Incorporating pollution prevention strategies that reduce or eliminate pollution at its source can be an effective approach when developing long term strategies. This may include a general timeframe developed as part of the TMDL report or TMDL Implementation Plan, or a schedule the Permittee finds more appropriate. To incorporate this into the SWPPP Document, include a short narrative statement describing a general approach the Permittee will take to continue implementation of BMPs, making progress toward the ultimate achievement of all WLAs.

It should be noted target dates that extend beyond the current five-year permit term are expected for WLAs requiring a significant reduction in pollutant loading from an MS4. In subsequent permitting cycles, the target date can be refined to more accurately reflect full implementation of BMPs to achieve the WLAs.

Acronyms

AUID – Assessment Unit Identification

BMP – Best Management Practice

LA – Load Allocation

MOS – Margin of Safety

MPCA – Minnesota Pollution Control Agency

MS4 – Municipal Separate Storm Sewer Systems

RC – Reserve Capacity

SWPPP – Stormwater Pollution Prevention Program

TMDL – Total Maximum Daily Load

EPA – U.S. Environmental Protection Agency

WID – Water Body Identification

WLA – Wasteload Allocation