

# Addressing Phosphorus Impairments in a Stormwater Pollution Prevention Program

This fact sheet provides information to assist Municipal Separate Storm Sewer Systems (MS4s) addressing a Total Phosphorus Total Maximum Daily Load (TMDL) requirement. TMDLs are required under Section 303(d) of the federal Clean Water Act when a water body is impaired and not meeting its designated use.

## What is phosphorus and what are sources in stormwater?

Phosphorus is a chemical that serves as an important nutrient in surface water. There are many sources of phosphorus in urban stormwater, including fertilizer, vegetation, road salt, soil and dust, and animal waste. In urban areas, phosphorus concentrations are related to intensity of land use, with loads being highest from urban lawns and streets.

## How do I know if water is contaminated with too much phosphorus?

High levels of phosphorus lead to excess algal growth, which can decrease light penetration and cause oxygen depletion when the algae die off. These conditions interfere with recreational and aquatic life uses and reduce the aesthetic quality of receiving waters. Severe phosphorus concentrations can result in concentrations of blue-green algae that are toxic to wildlife and pets.

To determine concentrations of phosphorus, samples are collected and sent to a laboratory for analysis. If phosphorus concentrations exceed water quality standards, MPCA considers the water to be impaired recreational use.

Currently we only have standards for lakes. These standards vary depending on region of the state and whether or not a lake is shallow or deep. Lakes in northern Minnesota, for example, have a lower standard than those in southern Minnesota, while deep lakes have a lower standard than shallow lakes. The phosphorus criteria used for calculating load and wasteload allocations will be clearly stated in a TMDL.

## How do TMDLs address phosphorus from urban stormwater?

During the TMDL process, models and data are used to estimate average phosphorus loads that can be discharged to a lake without exceeding the water quality criteria. This load is the TMDL.

A TMDL may be estimated from several sources, such as agriculture, stormwater, and wastewater treatment plants. The portion of the TMDL assigned to regulated MS4s, those MS4s covered under a National Pollutant Discharge Elimination System (NPDES) permit, is part of the TMDL wasteload allocation (WLA). NPDES permits must be consistent with the WLA. MS4s regulated under an NPDES permit must therefore comply with any TMDL requirements in the permit.

## Which best management practices (BMPs) are most effective for reducing phosphorus?

Development of a phosphorus management strategy allows selection of BMPs as needed over time (adaptive management) to achieve water quality standards.

There are a large number of potential BMPs. See the Minnesota Stormwater Manual (<http://www.pca.state.mn.us/water/stormwater/stormwater-manual.html>), particularly Chapter 12, which includes summary BMP factsheets.

A stormwater phosphorus management strategy should identify sources of phosphorous, reduce runoff and treat runoff.

## Identify sources

Potential phosphorus reduction strategies include:

- phosphorus fertilizer limitations
- lawn and yard waste management
- animal waste controls
- improved material storage
- street sweeping
- reducing illicit discharge connections.
- reduce runoff through a combination of:
  - site design principles, like increased green space and protection of sensitive wetlands
  - structural BMPs, like green roofs and pervious pavement
  - regulatory requirements, including ordinances that require increased infiltration

## Treat runoff

Stormwater treatment BMPs reduce phosphorus concentrations by sedimentation or by infiltration. Typically, several BMPs used in a series sequentially reduce phosphorus loads. These BMPs require careful design, construction, operation, and maintenance.

## How do I comply with the permit requirement?

The Phase 2 MS4 General Permit will be re-issued in 2011. There will be significant changes from the 2006 permit. Specific guidance has not been developed yet as the permit language for the 2011 permit is not finalized. Following is a list of items MS4s can consider addressing until the permit is re-issued.

- Develop a list of TMDL WLAs that apply to the MS4, including baselines. MPCA can provide this information.
- Develop a list of BMPs that apply toward the WLA(s).
- Develop a list of BMPs to be implemented and applied toward the WLA(s) and schedules for those BMPs.

## Where can I learn more?

There are several excellent sources of information in the literature. The MPCA recommends consulting the Minnesota Stormwater Manual (<http://www.pca.state.mn.us/water/stormwater/stormwater-manual.html>) or MPCA staff for additional information.